University of Alberta

Early Motor Development of Term Breech- and Cephalic-Presenting Infants

by

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Abstract

The purpose of this study was to determine whether breech-presenting infants have a different pattern of early motor development than cephalic-presenting infants, thus explaining both the failure to assume cephalic version at the end of gestation and the higher rates of childhood morbidities associated with breech presentation. Ninety consecutively born term breech-presenting singletons with birth weights greater than 2500 grams and no major congenital anomalies were paired with similar cephalic-presenting infants, matched on gender and mode of delivery, for an overall total of 180 infants (100 delivered abdominally, 80 delivered vaginally). Infants were examined at birth, 6 weeks, and 3, 5, 7, 10, 15, and 18 months by reliable raters who were unaware of presentation and delivery histories. Data on growth, neurological status, primitive reflexes, joint angles, and motor performance were collected and analysed using 2-way or 3-way repeated measures ANOVAs. Breech-presenting infants were found to have minor transient differences: they had greater popliteal angles at birth and were shorter from birth through 5 months than cephalic-presenting infants and they had significantly lower total scores than the normative sample on the Alberta Infant Motor Scale at 6 weeks. At 18 months, two out of three of the infants identified to be developing "suspiciously" were from the cesarean-breech group (degenerative central nervous system disorder; global developmental delay). Another infant (cesarean-breech), who had dropped out of the study early for failure to thrive, was subsequently diagnosed with severe cerebral palsy. While breech presentation *per se* may explain the transient differences in joint angles, the rapid "catch-up" in growth and motor performance among breech-presenting infants once in a nurturing extrauterine environment suggests that breech presentation may be a

marker of intrauterine compromise. Although fetuses at either end of the spectrum of severity of compromise may be unaffected by mode of delivery, those in the intermediate "gray zone" may be vulnerable to the relative asphyxia of vaginal delivery. Future investigations of the condition of breech-presenting fetuses at the end of gestation may optimize mode of delivery decisions and minimize maternal morbidity associated with the high rate of elective cesarean deliveries.

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List of Abbreviations

abd	abduction
add	adduction
AGA	average for gestational age
AIMS	Alberta Infant Motor Scale
ANOVA	Analysis of Variance
AO	auditory orientation (Dubowitz' item)
Ap1	Apgar score at 1 minute
Ap5	Apgar score at 5 minutes
AR	arm recoil (Dubowitz' item)
ARP	arm release in prone position (Dubowitz' item)
AT	arm traction (Dubowitz' item)
ATN, ATNR	asymmetrical tonic neck reflex (PRP item)
B	Balance (PDMS subsection)
Bc	birth complications
BL	birth length
BOB	segmental roll, body on body (PRP item)
BW	birth weight
C	contrast
CA	chronological age
Cahrs	chronological age in hours
C-B	cesarean-breech
C-C	cesarean-cephalic
cl	classification of breech presentation
cms	centimetres
crit	critical
C-S	cesarean section

List of Abbreviations (continued)

curv	curvation (PRP descriptor)
D	delivery
DF, dflex	dorsiflexion of foot (INFANIB item)
derotn	derotation (PRP descriptor)
df	degrees of freedom
EE	elbow extension (joint laxity)
EH	Eye-hand coordination (PDMS subsection)
Eth	ethnicity
ext	extension
extr	extremity (PRP descriptor)
F	female
flex	flexion
G	gender
GA	gestational age
GAL	Galant reflex
GR	Grasping (PDMS subsection)
H	hospital
HC	head circumference
HCA	head control anterior (Dubowitz' item)
HCB	head circumference at birth
HCP	head control posterior (Dubowitz' item)
HE	heel to ear (INFANIB Item)
HL	head lag (Dubowitz' item)
HOB	segmental roll, head on body (PRP item)
HRP	head raising in prone position (Dubowitz' item)
HU	Hand Use (PDMS subsection)

List of Abbreviations (continued)

ID	identification number
incr	increase (PRP descriptor)
INFANIB	Infant Neurological International Battery
IUGR	intrauterine growth retardation
KE	knee extension (joint laxity)
kgs	kilograms
KJ	knee jerk reflex (Dubowitz' item)
L	length
Lab On	labour onset
Lab Pres	labour present
Lab Prog	labour progress
lat	laterally (PRP descriptor)
LC	Locomotor (PDMS subsection)
LE	lower extremity (PRP descriptor)
LEG, LEGR	lower extremity grasp reflex (PRP item)
LEP, LEPL	lower extremity placing (PRP item)
LR	leg recoil (Dubowitz' item)
LT	leg traction (Dubowitz' item)
M	male
MANOVA	multivariate analysis of variance
mat	maternal
MCP	metacarpophalangeal
Md	median
MD	Manual dexterity (PDMS subsection)
min	minimal (PRP descriptor)
ML	midline (PRP descriptor)

List of Abbreviations (continued)

MOR	Moro reflex
movt	movement (PRP descriptor)
MR	PRP Moro reflex (PRP item)
MS	mean square
n	number
N	no
NEURO	Neurological outcome (Pediatrician's summary)
NL	Non-locomotor (PDMS subsection)
obs	observed
occ	occiput (PRP descriptor)
p	probability value
P	prone (AIMS item with numerical suffix)
PA	popliteal angle (INFANIB item)
par	parity
pass	passive (PRP descriptor)
PDMS	Peabody Developmental Motor Scales
PG	palmar grasp (Dubowitz' item)
POP	popliteal angle (Dubowitz' item)
POS	posture (Dubowitz' item)
Pr	presentation
PRP	Primitive Reflex Profile
prtr	protraction (PRP descriptor)
R1	rater 1
R2	rater 2
R	Royal Alexandra Hospital
retr	retraction (PRP descriptor)

List of Abbreviations (continued)

rotn	rotation (PRP descriptor)
RP	Receipt and Propulsion of Objects (PDMS subsection)
RT	rooting reflex (Dubowitz' item)
S	supine (AIMS item with numerical suffix)
SCF, Scrf	scarf sign (INFANIB item)
sd	standard deviation
sem	standard error of the mean
SGA	small for gestational age
sh	shoulder (PRP descriptor)
Sit	Sitting (AIMS item with numerical suffix)
SK	sucking reflex (Dubowitz' item)
SPSS	Statistical Packages for the Social Sciences
SR: BoB	segmental roll: body on body (PRP item)
SR: HoB	segmental roll: head on body (PRP item)
St	Standing (AIMS item with numerical suffix)
STP, STEP	Stepping Reflex (PRP item)
STN, STNR	symmetrical tonic neck reflex (PRP item)
SUP	positive supporting reaction (PRP item)
TFM	Total Fine Motor Score (PDMS subscale)
TGM	Total Gross Motor Score (PDMS subscale)
TL	Total Laxity Score
TLP	tonic labyrinthine reflex in prone (PRP item)
TLS	tonic labyrinthine reflex in supine (PRP item)
TTW	thumb-to-wrist (laxity score)
Typ	type of delivery
U	University of Alberta Hospitals
UE	upper extremity (PRP descriptor)

List of Abbreviations (continued)

UEG, UEGR	upper extremity grasp reflex (PRP item)
V-B	vaginal-breech
V-C	vaginal-cephalic
VO	visual orientation (Dubowitz' item)
VS	ventral suspension (Dubowitz' item)
W	weight
WALK	age walked
WK	walking reflex (Dubowitz' item)
x	by
Y	yes

Chapter 1
The Problem

Introduction[1]

Breech presentation refers to a longitudinal lie of the fetus with the buttocks as the presenting part (Gimovsky and Petrie, 1989). The incidence of breech presentation has remained remarkably consistent over time, occurring in 3 to 4 percent of term births (Hickok et al. 1992; Tompkins, 1946). When compared with cephalic presentation, breech presentation is associated with higher rates of perinatal mortality (Jonas and Roder, 1993; Schutte et al. 1985) and morbidity (Dale and Stanley, 1980; Gimovsky and Paul. 1982), even when adjusting for the effects of preterm birth (Croughan-Minihane et al. 1990) and congenital anomalies (Dunn, 1976a).

Previously, the adverse outcomes associated with breech presentation have been attributed exclusively to the mechanical risks of vaginal-breech delivery (Alexopoulos, 1973; Tank et al. 1971), which include cord prolapse (Rovinsky et al. 1973; Todd and Steer, 1963) and entrapment of the after-coming head (Kauppila, 1975; Potter et al. 1960). Birth injuries secondary to handling during total breech extractions have contributed significantly to high rates of perinatal mortality and morbidity in the past (Hall and Kohl, 1956; Todd and Steer, 1963). As a result, cesarean section became the recommended delivery route for most cases of breech presentation (Wright, 1959). Although abdominal delivery is still favoured in many centres (Spellacy, 1995), its high use is not associated with significantly lower rates of birth trauma (Gimovsky and Paul, 1982), birth asphyxia (Green et al. 1982), or childhood morbidity (Croughan-Minihane et al. 1990) when compared to the outcomes associated with the current method of assisted vaginal-breech delivery. The results of small sample randomized controlled trials have shed doubt on the hypothesis that the mode of delivery accounts for *all* of the increased risks associated with selected term breech pregnancies (Collea et al. 1980; Gimovsky et al. 1983).

Recently, it has been suggested that some factor intrinsic to the fetus may be responsible for both the breech presentation and any subsequent neurological

abnormality, thereby implicating the fetus rather than the mode of delivery (Ingemarsson et al. 1990). In short, it is believed that an unknown pre-existing factor in the fetus may greatly increase the likelihood of a breech presentation; thus, delivery of such infants by cesarean section does not solve their intrinsic problems (Nelson, 1988).

Problem Statement

Despite its relatively frequent and consistent occurrence over time, the cause of breech presentation and the increased perinatal risks is not clear in the majority of term breech-presenting cases. The potential role of inherent fetal motor abilities in explaining both the determination of presentation at birth and subsequent developmental status has not been elucidated. The purpose of the present study is to determine whether term breech-presenting infants have different patterns of early growth and motor development than term cephalic-presenting infants.

Significance

Breech presentation is not an uncommon obstetrical event, but one that instills a heightened alertness among all attendants in the delivery room due to the potential adverse perinatal outcomes. This study was conducted to determine whether some of the increased vulnerability associated with this group of infants is due to inherent differences in the fetuses, pre-existing the onset of labour rather than the result of difficult or traumatic deliveries. The identification of persistent differences between breech- and cephalic-presenting infants, independent of mode of delivery, may explain both breech presentation and some of the motor disorders, such as cerebral palsy, that have been shown to be related to breech presentation. Such a finding may have practical management consequences such that more prospective mothers may opt for a trial of vaginal delivery of the breech-presenting fetus at term, potentially resulting in reduced maternal morbidity associated with cesarean deliveries. Similarly, such a finding would have obvious medico-legal implications; awareness of intrinsic differences in these infants may offset potential legal action wherein developmental problems are inappropriately attributed to intrapartum factors.

Footnote:

1. A version of this section has been published in the introduction of an annotation by Doreen Bartlett and Nanette Okun: Breech presentation: A random event or explainable phenomenon? *Developmental Medicine and Child Neurology*, 36, 833-838, 1994. This material is used with permission of the MacKeith Press (publishers of *Developmental Medicine and Child Neurology*) and the co-author of the annotation (Nanette Okun).

Chapter 2
Literature Review

Introduction

Identifying the source of the high rates of perinatal mortality and morbidity among term breech-presenting infants is the first step in reducing these adverse events. In order to solve this "breech dilemma", most contributors to the obstetrical literature continue to focus exclusively on the issue of mode of delivery (Eller and VanDorsten, 1995; Krebs et al. 1995; Schiff et al. 1996). Undeniably, vaginal-breech deliveries may be complicated by significant risks such as a prolapsed umbilical cord or entrapment of the after-coming head due to neck hyperextension, an incompletely dilated cervix, feto-maternal disproportion, or nuchal arms. Recognized associated consequences include cord compression and asphyxia, and cervical spinal cord, intracranial, intra-abdominal, or brachial plexus injuries (Menticoglou, 1993; Spellacy, 1995). As a result, either elective cesarean section (Spellacy, 1995) or external cephalic version followed by a trial of labour (Gifford et al, 1995a; Laros et al. 1995) are popular delivery options for this problematic group of fetuses. Yet, the evidence supporting these alternatives is not strong for all cases of breech presentation.

In a recently published critical overview of research reporting results according to the *intended* mode of delivery of term breech singletons, investigators concluded that vaginal deliveries may continue to be associated with higher perinatal risks than cesarean deliveries (Cheng and Hannah, 1993). However, problems associated with the authors' assumptions and selection biases and variations in management protocols among the various studies complicate attempts to quantify the extent of risk for any given setting. Specifically, the authors assumed that infants delivered via emergency cesarean section were planned vaginal deliveries, which may not be the case. Secondly, congenital anomalies were excluded in only half of the articles selected for inclusion in the meta-analysis. The choice to deliver fetuses with known anomalies vaginally may explain the excess mortality and morbidity among those delivered via this route. Also, the average year of publication of investigations reporting adverse results associated with vaginal

deliveries was earlier than those reporting no difference according to mode of delivery (1971, sd = 10.5 years; and 1983, sd =3.8 years). The previous practice of total breech extraction may be associated with poorer outcomes. Nonetheless, authors of a separate review of articles published since 1980 also reported an excess risk attributable to a trial of labour instead of elective cesarean delivery for term breech fetuses (.89 and 1.1 percent for injury and death respectively) (Gifford et al. 1995b); however, the problem of selection bias persists.

Thus, despite the abundance of observational studies, it is not yet clear whether elective cesarean delivery of the singleton term breech infant *completely* eliminates all of the adverse perinatal outcomes associated with breech presentation. For example, in a large population-based study - which was not included in Cheng and Hannah's meta-analysis because it reported on outcomes according to actual, rather than intended, mode of delivery - investigators reported no differences in a variety of childhood morbidities among vaginally-delivered infants compared with those delivered by cesarean section (Croughan-Minihane et al. 1990).

Inherent differences have been proposed as a possible alternative explanation for the poorer outcomes among breech-presenting infants. In this chapter, evidence supporting the position that breech-presenting fetuses may be inherently different, particularly with regard to motor abilities, is reviewed by discussing what is known about the mechanism of breech presentation. The rationale for extrapolating postnatal observations to prenatal status is discussed in the context of what is known about the continuity of motor functions from prenatal to postnatal life.

Mechanism of Breech Presentation[1]

An understanding of the mechanism of spontaneous cephalic version, and the factors that may prevent it from taking place, may shed light on the mechanism of breech presentation. At 20 weeks gestation, fetuses are equally likely to be in either breech or cephalic presentation. As gestation continues, a greater proportion of fetuses undergo a final cephalic version. By 37 weeks, more than 96 percent of fetuses are in cephalic presentation (Hughey, 1985). In 1931, Taussig suggested that the combination of a

normal maternal pelvis and uterus and a single term fetus with adequate kicking movements results in cephalic presentation by the end of gestation. The role of each of these three factors - the pelvis, the uterus, and, in particular, the fetus, may be investigated to determine their contribution to preventing spontaneous cephalic version from taking place.

The Pelvis

Cephalo-pelvic disproportion as a reason for breech presentation is easily discounted: presentation is determined before the fetus enters the pelvis (Vartan, 1945). Two groups of investigators have reported that 10 percent of maternal pelves in breech cases were contracted (Tompkins, 1946; Wilcox, 1949), a frequency that is no different from cephalic cases (Wilcox, 1949). More recently, the dimensions of the anteroposterior diameter of the pelvic inlet and the sum of the three pelvic outlet diameters were found to be no different between women with breech and women with cephalic presentations at birth (Luterkort et al. 1984).

The Uterus

Historically, the accommodation theory of cephalic version suggested that in the later part of pregnancy the fetus became irritated by the poor fit of breech presentation and moved until it was more comfortable with the fit of a cephalic presentation (Stevenson, 1950; Vartan, 1945). The shape and amount of available uterine space, and therefore presentation, may be influenced by uterine malformation, placental location, the volume of amniotic fluid, and parity.

The best evidence on the role of uterine malformations is obtained from three recent investigations on the relationship between confirmed uterine malformation and presentation at birth. Breech presentation occurred among 28 and 47 percent of all (Ben-Rafael et al. 1991; Michalas, 1991) and 29 percent of full-term (Acien, 1993) births of women with identified uterine anomalies. Although uterine malformations clearly increase the probability that a fetus may not assume spontaneous cephalic version before delivery, anomalies are not invariably linked with breech presentation.

Placental location has long been investigated as a factor influencing the propensity to breech presentation. Several earlier investigators found cornual-fundal placental

implantation to be associated with approximately 70 percent of all breech presentations (Fianu and Vaclavinkova, 1978; Kian, 1963; Stevenson, 1950); however, the methodological problems associated with the strategies used to confirm placental location limit confidence in these results. More recently, the site of placental implantation among fetuses in breech presentation at 32 to 33 weeks was determined by ultrasound. No difference in placental location was found between fetuses who later assumed spontaneous cephalic version and those who remained in breech presentation (Luterkort et al. 1984; Westgren et al. 1985).

Both too little and too much amniotic fluid increases the chance a fetus will present in the breech at the time of birth. Oligohydramnios significantly reduces the likelihood that a fetus will be able to undergo version (Hofmeyr et al. 1986), largely because the fetus has more difficulty moving in the relatively restricted available space (Sival et al. 1990). In contrast, polyhydramnios provides the fetus with an environment similar to that of the second trimester when movement is unrestricted, resulting in a random orientation of the fetus (Dunn, 1976b).

Parity has a similar influence. The incidence of breech presentation is higher among first, compared with subsequent, births (Rayl et al. 1996; Todd and Steer, 1963). A fetus of a primigravida has less available space in the third trimester than that of a multigravida due to reduced extensibility of the uterine wall and abdominal musculature. Nevertheless, when all breech births are analyzed, 60 percent are subsequent, rather than first, births (Jonas and Roder, 1993). Grand multiparity, defined as more than five deliveries of a fetus of viable age, is also associated with a higher rate of breech presentation (Berendes et al. 1965), presumably because the fetus is less constrained at the end of pregnancy.

Overall, mechanical maternal factors such as uterine malformations or oligohydramnios have been identified in less than 15 percent of breech births (Luterkort et al. 1984). It is clear that these mechanical restrictions are not the sole cause of breech presentation.

The Fetus

What of the third factor, the fetus? In 1947, Stabler proposed a mechanism of spontaneous cephalic version comprising the interaction of two components: the change in uterine shape in the later stages of pregnancy and kicking. Fetal kicking up until the 7th month is believed to result in sequential somersaulting due to contact of the feet with the relatively spheroid uterus. As pregnancy nears completion, the uterus becomes increasingly broad at the fundus and relatively narrow within the pelvis. When the buttocks are lowermost, the fetus has only to give a small kick before the pelvis is encountered, enhancing the effectiveness of the kick and facilitating cephalic version. Once in cephalic presentation, the fetus kicks ineffectually into the softer uterine and abdominal walls. Stabler proposed that by the end of the third trimester, fetal kicking will much more rapidly and easily convert a breech to a cephalic presentation, than the other way around.

Support for the notion that fetal kicking is an important determinant of presentation at birth can be found by investigating congenital anomalies that adversely affect the neuromuscular function of the fetus. Indicators of neuromuscular function are strength and the quality of muscle tone. If either of these are impaired, one might expect an increased incidence of breech presentation. In fact, the weaker the lower extremity musculature, the more likely the fetus is to present in the breech at the time of delivery. The majority of infants with a thoracic level myelomeningocele will present by the breech, while breech presentation occurs in only 35 percent of those with lumbosacral involvement (Dunn, 1976b). A similar dose-response relationship between neuromuscular dysfunction and breech presentation is found among fetuses with disorders of muscle tone (Smith, 1976). Fetuses with severe hypotonia (Prader-Willi or Zellweger Syndromes) are much more likely to present in the breech than fetuses with mild or moderate hypotonia (Down Syndrome). In turn, fetuses with Down Syndrome are more likely to present by the breech at birth than are genetically unaffected fetuses (Dunn, 1976b). Similarly, the association between breech presentation and hypopituitarism is speculated to operate through a mechanism of hypotonia secondary to a congenital midline brain malformation (deZegher et al. 1995). While breech

presentation at birth is relatively common among infants with congenital disorders, the vast majority of breech-presenting infants are morphologically normal. Does a difference in the neuromuscular function of a structurally normal fetus explain a propensity to breech presentation?

Fetal growth has long been identified to be impaired in fetuses presenting by the breech; breech-presenting fetuses are smaller than their cephalic counterparts (Berendes et al. 1965; von Numers, 1952) even when gestational age is controlled for (Luterkort et al. 1984). Impaired fetal growth has been found to predate breech presentation, rather than breech presentation *per se* having an inhibitory effect on growth (Zhang and Schwingl, 1993). Less than optimal growth may coexist with reduced fetal vigour and weaker kicking, increasing the likelihood that a smaller fetus will present by the breech at the time of delivery. The primary cause of both reduced fetal growth and vigour may be placental (Ingemarsson et al. 1990) or fetal (Luterkort and Gennser, 1987) circulatory insufficiency, resulting in prenatal hypoxia. Indeed, intrapartum asphyxia (Dunn, 1976a) and higher than expected cord hematocrit values (Dunn, 1976b) occur more frequently in breech than cephalic deliveries. Clarification of the circulatory hypotheses remains to be made (Luterkort and Gennser, 1987); more detailed postpartum placental examinations in the future may reveal microvascular abnormalities (Altschuler, 1993) that are associated with prenatal hypoxia, reduced growth, and breech presentation.

Fetal vigour may also be affected by maternal health. Increased rates of breech presentation have been documented in pregnancies complicated by maternal diabetes (Rayl et al. 1996), excessive prenatal caffeine exposure (Barr and Streissguth, 1991), maternal alcoholism (Halliday et al. 1982), and psychotropic drug abuse (Silver et al. 1987). Reduced fetal activity is associated with all of these adverse intrauterine environmental conditions.

Further support for the importance of fetal movement in determining presentation at birth is obtained from evidence associated with infants who have been identified to have increased motor competencies, rather than impaired movement, early in life. Infants of Black African descent have been identified to exhibit such early motor precocity (Cintas, 1988). These fetuses assume spontaneous cephalic version later in gestation, despite the

influence of an increasingly restrictive available uterine space in which to move (Hofmeyr et al. 1986). In addition, they are half as likely to present by the breech at the time of birth compared with Caucasian fetuses (Berendes et al. 1965; Hofmeyr et al. 1986; Rayl et al. 1996; Todd and Steer, 1963), even with parity controlled for. This supports the view that motor function is an important determinant of presentation at birth.

Data associated with umbilical cord length also support the notion of pre-existing motor differences among breech-presenting infants compared with cephalic-presenting infants. Because the tensile forces exerted on the cord secondary to fetal movements are important determinants of cord length, umbilical cord length is considered to be a reflection of fetal activity. Most of the umbilical cord length is established during the first two trimesters, when the fetus is free to move. A normal slowing of the growth rate of the umbilical cord occurs during the last trimester, when the fetus becomes increasingly inhibited by a reduction of available uterine space due to increased fetal growth and a relative reduction in the volume of amniotic fluid (Miller et al. 1981). Animal work has demonstrated that the length of the umbilical cord is inversely proportional to the duration of inhibition of fetal movement by temporary paralysis (Moessinger et al. 1982). Because breech-presenting infants have shorter umbilical cords (mean of 53 cm) than cephalic-presenting infants (mean of 57.5 cm), it has been concluded that breech fetuses have decreased levels of motor activity (Soernes and Bakke, 1986). Naeye (1985) reported that children who had very short umbilical cords (less than 40 cm) were more likely to exhibit two or more abnormalities on a neurological examination at 7 years of age. This study provides further support for the premise that motor abnormalities arise before, rather than during, labour and delivery.

Investigators who have extensively studied early fetal movement support the view that motor functions are important determinants of fetal orientation *in utero*. With the advent of real time ultrasound scanning, early fetal motor patterns are now observable and quantifiable, thereby permitting the study of neuromotor development. Fetal movements have recently been investigated in an attempt to clarify the causative factor of breech presentation. Suzuki and Yamamuro (1985) demonstrated that at about 30 weeks gestation cephalic version of the fetus occurs as the fetus attempts to accommodate itself

to the shape of the uterus by active whole body movements. They propose that if these body movements are weak or absent, cephalic version does not occur and breech presentation is established. Milani Comparetti (1981) suggests that antecedents to the placing and stepping reflexes noted after birth are critical in the determination of cephalic presentation prior to birth. Both groups conclude that the important causative factor of breech presentation is the fetus itself and its inability to actively move and assume a cephalic presentation. Recently, term breech fetuses have been observed to have different, and more variable, eye movements than term cephalic fetuses (Takashima et al. 1995). Although the authors speculate that these differences may signal problems with the developing brain, specific neurological impairments or consequential alterations in function have not been clarified.

In addition to taking an active role in establishing presentation, the fetus is believed to initiate and participate in the processes of labour and delivery, both physiologically (Olsen et al. 1995) and physically (Milani Comparetti, 1981). This awareness of fetal collaboration in labour suggests that a disorder of delivery may be due, in part, by a movement disorder of the fetus; hence, disorders of labour may be the consequence rather than the cause of intrinsic fetal problems that later may manifest as cerebral palsy (Freud. 1897, cited in a translation published in 1968; Milani Comparetti, 1981).

These findings have been expanded in light of several epidemiological studies of cerebral palsy. Breech presentation was reported as being an important risk factor for cerebral palsy in the U.S. National Collaborative Perinatal Project (Nelson and Ellenberg, 1985). Among infants with birth weights of greater than 2500 grams, breech-presenting infants were found to be 3.9 times more likely to be diagnosed with cerebral palsy than their cephalic counterparts. When breech presentation and breech delivery were evaluated simultaneously by means of multivariate analyses, breech presentation rather than breech delivery was the significant predictor of cerebral palsy (Nelson and Ellenberg, 1986). A separate group of investigators evaluated the outcome of 1240 breech-presenting infants and found no difference in the relative risks for vaginal compared with abdominal deliveries in the outcomes of cerebral palsy and developmental delay (Croughan-Minihane, 1990). These findings suggest an inherent difference among

breech-presenting fetuses, rather than an effect of mode of delivery. Breech presentation may be a marker of risk without necessarily being the cause of poor outcomes.

The present state of knowledge of the mechanism of breech presentation suggests that a failure to assume spontaneous cephalic version by the end of pregnancy is inadequately explained by pelvic or uterine factors. The association of fetal movement problems and the heightened risk of cerebral palsy with breech presentation, and the increasing evidence that mode of delivery does not explain all of the adverse outcomes associated with breech presentation, suggest that a pre-existing motor disorder in the fetus may greatly increase the likelihood of a breech presentation. Collectively, a wealth of supporting evidence suggests that motor differences predispose the fetus to breech presentation, rather than breech presentation causing a difference in motor development. Evidence on the relationship between breech presentation and fetal variables associated with movement such as fetal growth, maternal health, race, and umbilical cord length suggest that motor differences have antenatal rather than intrapartum origins.

In the past, Lilienfeld and colleagues (Lilienfeld and Parkhurst, 1951; Lilienfeld and Pasamanick, 1955) observed that various complications of pregnancy are associated with a spectrum of damage that ranges from abortion through stillbirth and neonatal death to include a sublethal component of brain damage, which is manifest as cerebral palsy, epilepsy, and minimal cerebral dysfunction. They referred to this phenomenon as "a continuum of reproductive casualty". Breech presentation, as a complication of pregnancy, is also associated with higher rates of perinatal mortality and neurological morbidity. Similarly, associations between breech presentation and both epilepsy (Churchill, 1959) and learning difficulties (Fianu, 1976; Fianu and Joelsson, 1979) have been identified. If this continuum of reproductive casualty exists, one would expect differences in the pattern of motor development among breech-presenting infants compared with cephalic-presenting infants, with the origin of the differences in development being antenatal rather than intrapartum.

Continuity of Motor Functions from Prenatal to Postnatal Life

Clearly, the best method to investigate this motor hypothesis would be to enroll a cohort of fetuses into a study at some point past midgestation, follow their *in utero* motor development until term using visual ultrasound, and then analyze the results according to presentation at birth. Two significant problems are associated with this approach. First, given the incidence of term breech presentation of 3 to 4 percent, and the possibilities for cephalic version right up until the time of delivery, a large number of fetuses would have to be enrolled in order to obtain a sufficient number who would remain as breech. Second, detailed fetal motion studies are difficult to conduct at the end of gestation. The current state of ultrasound does not readily permit real time, three dimensional evaluation of the entire fetus in the second half of gestation (Lyons, 1993; Rayburn, 1995). Although a psychometrically sound method of measuring fetal movement is under development, it has not been completed (Sparling and Wilhelm, 1993).

Investigations have indicated, however, that no neonatal pattern of movement can be considered to originate at birth (Milani Comparetti, 1981); rather, the fetus has been shown to have rich and varied movement patterns (Iannirubertо and Tajani, 1981), including the full repertoire of movements of the neonate (DeVries et al. 1982). Close follow up of preterm infants born at varying gestational ages suggests that neuromotor development is not affected by the change in environment at the time of birth. Instead, neuromotor development continues along a predetermined trajectory. Infants born at less than 32 weeks gestation have been found to have similar neuromotor development as infants born between 32 and 36 weeks gestation when compared at 35 and 40 weeks postconceptional age (Piper et al. 1989a). Similarly, the expression of primitive reflexes in extremely premature infants evolves as determined by biological age (Allen and Capute, 1986). Accordingly, the assessment of early infant development is believed to provide important information on the prior capabilities of the fetus.

Summary

The present state of knowledge of the mechanism of breech presentation suggests that a failure to assume spontaneous cephalic version by the end of pregnancy may be due to a pre-existing motor difference in the fetus. Evidence on the relationship between breech presentation and fetal variables associated with movement such as fetal growth, maternal health, race, and umbilical cord length suggest that motor differences have antenatal rather than intrapartum origins. Delivery of such breech-presenting infants by timely cesarean section will not solve their intrinsic problems.

Previous investigations have focused on the relationship between breech birth and perinatal mortality, major neurological handicap, or immediate postpartum status. While certain increased risks have been noted, until recently these risks have been attributed to mode of delivery rather than pre-existing motor disorders. Yet, no information is currently available about the detailed early motor development of infants who are born breech. If, indeed, breech presentation is a result of inherent motor differences of the fetus, and if the fetus exhibits *in utero* all the movements of the neonate, it can be hypothesized that breech-presenting infants will exhibit patterns of early motor development that differ from those exhibited by cephalic-presenting infants.

Footnote:

1. A version of this section has been presented as a poster at the 1993 annual meeting of the American Academy for Cerebral Palsy and Developmental Medicine and subsequently published in the body of an annotation by Doreen Bartlett and Nanette Okun: Breech presentation: A random event or explainable phenomenon? *Developmental Medicine and Child Neurology*, 36, 833-838, 1994. This material is used with permission of the MacKeith Press (publishers of *Developmental Medicine and Child Neurology*) and the co-author of the annotation (Nanette Okun).

Chapter 3

Method

Objectives

1. To examine a possible underlying mechanism of breech presentation by determining whether term breech-presenting infants differ from term cephalic-presenting infants in the pattern of early motor and physical development as measured by growth parameters, primitive reflexes, joint angles, motor performance, neurological status, and minor congenital anomalies.
2. To determine whether term breech- or cephalic-presenting infants who are delivered vaginally differ from similar infants who are delivered via cesarean section in the pattern of early motor and physical development.
3. To determine whether there is an interaction between presentation (breech versus cephalic) and mode of delivery (vaginal versus cesarean section) in the pattern of early motor and physical development.

Research Hypotheses

1. There will be significant differences between term breech-presenting infants and term cephalic-presenting infants in some of the measured dependent variables.
2. There will be no significant differences between infants who are delivered via cesarean section and infants who are delivered vaginally in the pattern of early motor and physical development.
3. There will be no significant interactions between presentation (breech versus cephalic) and mode of delivery (vaginal versus cesarean section) in the pattern of early physical and motor development.

Sample and Design

A cohort of term breech-presenting singletons who were born at either the Royal Alexandra Hospital or the University of Alberta Hospitals were identified between May 1993 and June 1995. Prior to hospital discharge, the mothers of breech-presenting infants who were delivered either vaginally or by cesarean section between 37 and 42 completed weeks of gestation with birth weights greater than 2500 grams were approached and recruited into the study upon consent. Gestational age at birth was determined by the last menstrual period and/or early ultrasound and confirmed by clinical assessment (Dubowitz et al. 1970), if questioned at the time of birth.

All types of breech presentations were included. Infants who were believed to present as breech due to factors such as uterine anomalies or oligohydramnios were considered for recruitment. Breech-presenting infants with major congenital anomalies or known or suspected chromosomal abnormalities or syndromes were excluded.

A comparison cohort of term cephalic-presenting singletons (37 to 42 completed weeks of gestation) with birth weights greater than 2500 grams were recruited from the same hospitals as the study subjects. These infants were matched to breech-presenting infants on gender and mode of delivery (vaginal versus cesarean section). In addition, an attempt was made to match infants within the cesarean section groups on indication for the procedure (elective versus following trial of labour). A cephalic-presenting infant was recruited following completion of each newly recruited breech-presenting infant's term assessment to control for the effects of differences in overall early management over time. Infants with major congenital anomalies were excluded.

The recruited infants were followed longitudinally for evaluation of motor and physical development through the first eighteen months of life. With the temporal sequence of this research design, the independent variables are type of presentation: breech versus cephalic, and mode of delivery: vaginal versus cesarean section. The dependent variables are components of motor and physical development: growth parameters, primitive reflexes, joint angles, motor performance, neurological status, and minor congenital anomalies. The outcome measures were administered by raters who were unaware of the infants' presentation and delivery histories.

Data Collection

Measurement of Independent Variables

Appendix 3A contains the term data collection sheet outlining the factual information transcribed from the hospital record shortly after birth to check the inclusion and exclusion criteria. These data were used to describe the groups and to ensure comparability of the groups on potential confounding variables such as parity and ethnic origin.

The type of presentation was identified at the onset of labour. The mode of delivery was determined at the discretion of the attending physician using the guidelines recommended by the Canadian Medical Association Consensus Conference on Aspects of Cesarean Birth (1986) and was not influenced by the study. These guidelines suggest that planned vaginal birth should be recommended in the case of term singleton frank or complete breech pregnancies with estimated birth weights between 2500 to 4000 grams. At the same time, the guidelines recognize the importance of medical education programs and physician experience in the acquisition and maintenance of the skills required for safe vaginal-breech birth. Footling presentations and complications involving oligohydramnios and hyperextension of the fetal neck favour cesarean section. In Edmonton, in accordance with experience elsewhere (Ferguson et al. 1987; VanDorsten et al. 1981), external cephalic version may be attempted with the breech-presenting fetus after 37 weeks gestation under ultrasound guidance in proximity to the labour and delivery area. Whether or not the version was successful, the infant was analyzed as breech presentation. Information on whether or not the delivery included labour, and if so, whether the onset was spontaneous or induced, and whether the progress of labour was normal or augmented also was recorded on this form. In addition, whether the mode of delivery was planned or unplanned was recorded.

Measurement of Dependent Variables

The assessment of motor and physical development encompasses evaluation of physical growth parameters, primitive reflexes, range of motion, motor performance, neurological status (Stengel, 1991), and congenital anomalies. In order to adequately capture the very early motor and physical development, infants were evaluated frequently

in the first half year, and less frequently thereafter. They were evaluated soon after birth, at 6 weeks, and then at 3, 5, 7, 10, 15, and 18 months.

Physical Growth: Physical growth was documented through the standard techniques of measuring length, weight, and head circumference at each assessment session.

Primitive Reflexes: The antecedents to the primitive reflexes are believed to be critical in enabling the fetus to assume cephalic presentation and to actively collaborate in the delivery (Milani Comparetti, 1981). This suggests that fetuses who do not assume cephalic presentation may have absent or weak primitive reflexes. Primitive reflexes were measured using the *Primitive Reflex Profile* (Capute et al. 1978). This profile was developed to measure the presence and intensity of the asymmetrical tonic neck, symmetrical tonic neck, positive support, tonic labyrinthine (prone and supine), segmental rolling (head on body and body on body), Galant, and Moro reflexes from birth to 24 months. Each of the reflexes is rated on a 5 point ordinal scale ranging from 0 (absent) to 4 (obligatory). Inter-rater reliability on individual items ranged from 72.1 to 95.0 percent (Capute et al. 1984). Appendix 3B contains a form developed to record the primitive reflexes. This form also contains four additional primitive reflexes: upper and lower extremity grasp reflexes, lower extremity placing, and stepping (Allen and Capute, 1986). These reflexes are also rated on an ordinal scale and were included because they measure two of the reflexes Milani Comparetti (1981) considered to be important for determination of presentation prior to delivery (placing and stepping). Primitive reflexes were evaluated after birth, at 6 weeks, and at 3 and 5 months.

Range of Motion: The clinical picture of a frank breech-presenting neonate (the most common type) is one of extreme hip flexion and adduction and full knee extension. It is important to determine whether this variation in early alignment is associated with a different pattern of

motor development (Sival et al. 1993). Joint angles were measured using five items of the *Infant Neurological International Battery* (*INFANIB*) (Ellison et al. 1985; Ellison, 1994). This 20 item instrument has five factors or subscales: Spasticity, Vestibular Function, Head and Trunk, French Angles, and Legs. The angles included in the French Angles subscale are the scarf sign, heel to ear, popliteal angle, and leg abduction. Although dorsiflexion of the foot was not included in the French Angles factor, data also were collected on this variable. Total score reliability was found to be .91 and reliability for the French Angles factor was .89 (Ellison et al. 1985). The quantified scoring system enables comparison of infants on item scores, subscores (factor scores), and total scores (Ellison, 1986). Appendix 3C contains the items from the French Angles factor and ankle dorsiflexion of the *INFANIB*. These items were assessed at all assessment sessions, excluding the one at 18 months.

To assist in determining whether joint hypermobility is the cause or effect of breech presentation, an assessment of generalized joint laxity was conducted at 18 months. Guidelines for the assessment of inherent laxity of elbow extension, knee extension, thumb to the volar aspect of the forearm (thumb-to-wrist), and 5th metacarpophalangeal joint extension were proposed by Beighten et al. (1989). Each of the four motions, which are inhibited by capsulo-ligamentatous rather than neuromuscular structures, are categorized "normal" (0) or "hypermobile" (1) as indicated by the criteria on the form in Appendix 3D. Three of these motions involve the upper extremities and are therefore not expected to be influenced by breech presentation, but rather permit evaluation of inherent joint laxity. A fifth motion suggested by Beighten et al. (1989) - palms to the floor - was excluded because it primarily measures extensibility of neuromuscular, rather than ligamentous, structures. Both left and right sides were scored separately for a maximum inherent joint laxity score of 8. Reliability of this measure was not reported by the authors. In this

study, scoring was done directly in clear cut cases; a goniometer was used for joint motions close to the cut-off point.

Motor Performance: Gross motor development was measured using the *Alberta Infant Motor Scale* (*AIMS*) (Piper and Darrah, 1994). The *AIMS* is a norm referenced, observational assessment designed to identify infants whose motor performance is delayed or aberrant relative to the normative group and to evaluate change in infant motor behavior over time. It identifies motor developmental sequences by assessing 58 items in prone, supine, sitting, and standing from birth to the attainment of independent walking. The *AIMS* captures the components of weight bearing, posture, and antigravity movements through drawings and specific criteria in these categories. Using the normative data, it is possible to convert the raw scores to percentile scores for each month age range from 1 to 15 months. Inter-rater and test-retest reliabilities are very high ($r = .99$ for both) (Piper and Darrah, 1994). A sample portion of the *AIMS* is contained in Appendix 3E. The *AIMS* was completed at each assessment from 6 weeks through 15 months, at which point most infants were expected to reach the highest score. The measure was administered at 18 months only on those infants who had not obtained ceiling scores at 15 months.

At 15 months, motor development was measured using the *Peabody Developmental Motor Scales* (*PDMS*) (Folio and Fewell, 1983). The *PDMS* is a standardized assessment tool which evaluates fine and gross motor development between birth and 83 months of age. Raw scores may be converted into an age equivalent, a developmental motor quotient, a percentile ranking, or a standardized score. Test-retest reliability coefficients of .95 and .80 and inter-rater reliability coefficients of .97 and .94 for the two subscales are reported by the authors. Appendix 3F contains sample pages of the fine and gross motor subscales of the *PDMS*.

Neurological Status: Increased morbidity in terms of neurological status was determined on two occasions in this study. Shortly after birth, *The*

Neurological Assessment of the Preterm and Full-term Newborn Infant (Dubowitz and Dubowitz, 1981) was administered. The assessment comprises two items on habituation (auditory and visual) followed by 16 items on posture, movement, and tone, then 5 primitive reflexes and finally 7 neurobehavioural items. Each item is rated on a 5 point ordinal scale ranging from a minimal to maximal response (although occasionally, a score of "5" indicates abnormality). This examination has been used extensively by local investigators (Piper et al. 1989a), who have achieved good inter-rater reliability with a correlation of greater than .80 between raters' scores. The predictive validity of this examination has been reported as exceeding that offered by ultrasound scans in terms of 12 month outcomes (Dubowitz et al. 1984). The movement and tone subsection of the Dubowitz' assessment is contained in Appendix 3G.

The overall neurological status was determined at 18 months using the *Neurological Examination of the Collaborative Perinatal Project* (Hardy et al. 1979) administered by one pediatrician. This examination involves a complete standard pediatric examination, including assessment of neurological function and developmental skills, in order to enable the physician to judge the overall status of the infant (normal, suspect, or abnormal). Only the data on this physician's final judgment were used in the analyses.

Minor Congenital Anomalies: Because both the central nervous system and minor external malformations arise from primitive embryonic ectoderm, a constellation of findings such as skin tags, hair whorls, or anomalies of placement or orientation of the eyes, mouth, nose, or ears is considered indicative of aberrant embryonic development of the central nervous system (Miller, 1989; Smith and Bostian, 1964). If breech-presenting infants have lower motor scores and a greater number of minor anomalies than cephalic-presenting infants, evidence for the etiology of breech presentation being inherent to the fetus and originating early in

prenatal life would be provided (Miller, 1989; Coorssen et al. 1991). The number and type of minor congenital anomalies were transcribed from the hospital discharge pediatric examination to the term data collection form (Appendix 3A). The discharge exam encompasses evaluation of the head and neck, abdomen, and skin, as well as the respiratory, cardiac, genitourinary, and neurologic systems. In addition, the *Neurological Examination of the Collaborative Perinatal Project* (Hardy et al. 1979) also incorporates evaluation of the structure of the eyes, ears, nose, neck, thorax, skin, and hands and feet. The number and type of minor congenital anomalies associated with an ectodermal origin were recorded. Assessment of minor congenital anomalies at the time of hospital discharge is known to be inconsistently recorded (Snell et al. 1992). An attempt was made to collect data on minor congenital anomalies from two sources: the hospital discharge pediatric examination (conducted by many pediatricians) and the 18 month examination of the Collaborative Perinatal Project (conducted by one pediatrician). This second evaluation is very detailed, thus enhancing the likelihood of detecting all minor anomalies.

The particular ages for follow-up assessment were selected because: 6 weeks and 3 and 5 months are ages at which changes in joint angles and primitive reflexes occur; 5 months is the age at which most infants have achieved symmetry and some axial control in flexion and extension; 7 months marks the onset of prone mobility; 10 months provides the opportunity to identify the early walkers; and evaluation at 15 months will identify the late walkers. The final follow up at 18 months was chosen because the ability to walk independently by this age is an important indicator in the identification of infants who are developing within normal limits versus those with persistent abnormalities (Amiel-Tison and Grenier, 1983).

Sample Size

Sample size calculations were based on the main dependent variable of intererest: motor performance as measured by the *AIMS*. Appendix 3H contains the calculations.

An anticipated attrition rate of 15 percent over the course of this longitudinal study was based on a recently completed longitudinal investigation of infants in Edmonton, Alberta, in which an 11 percent dropout rate was experienced (Piper et al. 1989b). A proposed cell sample size of 45, allowing for attrition, was shown to be sufficient to determine clinically significant main effects and interactions over time. Forty-five infants were planned for the two breech presentation cells, resulting in an overall total sample size of 180 infants when matched with cephalic-presenting infants on mode of delivery. Recruitment of these infants was expected in 18 months based on previous delivery rates and anticipated interest in the study.

Reliability of Raters

The term assessments were primarily conducted by DB (the doctoral candidate), who received initial training from an examiner with extensive expertise using the Dubowitz' assessment. Two additional raters conducted the term assessments. Inter-rater reliability of select items on *The Neurological Assessment of the Preterm and Full-Term Newborn Infant* (Dubowitz and Dubowitz, 1981) (the first 12 items in the Movement and Tone section, all six reflex items, and auditory and visual orientation), all thirteen items of the adapted *Primitive Reflex Profile* (Capute et al. 1978), and items 2 to 6 of the *INFANIB* (Ellison, 1994) was determined by comparing each rater's responses with those independently recorded by DB. The criteria of greater than or equal to 75 percent item agreement on all selected items, and greater than or equal to 90 percent item agreement within 1 point, were set. These criteria were met on three initial assessments (that is, before the additional raters could conduct assessments independently), and on one follow-up assessment.

The results for the initial and follow-up reliability assessments for both additional term raters are contained in Appendix 3I. The first rater achieved between 76 and 84 percent item agreement initially, and 82 percent agreement on follow up. The second rater achieved 76 percent item agreement initially, and 92 percent on follow up. Both raters achieved greater than 97 percent item agreement within one point of DB's ratings at both the initial and follow-up checks.

The follow-up assessments, which included the *AIMS*, the *Primitive Reflex Profile*, and selected items from the *INFANIB* at 6 weeks and 3 and 5 months, only the *AIMS* and *INFANIB* items at 7 and 10 months, and the *PDMS* at 15 months, were primarily conducted by DB, with major assistance from one additional rater, and minor assistance from one further rater. Reliability of the follow-up assessments was conducted in a manner similar to that of the term evaluations: agreement on selected items was determined by comparing each rater's responses with those independently recorded by DB. Because reliability indices of the total score on the *AIMS* are inflated with age if all items are included, analysis comprised those items in the "window" in each section, defined by 2 items below the lowest item and 2 items above the highest item observed by DB. A similar strategy was used when evaluating comparability of scoring on the *PDMS*. Appendix 3J contains the data on the reliability of the follow-up assessors.

For the first rater, agreement for items assessed over time at 6 weeks, and 3 to 10 months was greater than 97 percent when evaluated within 1 point. Actual percentage agreement ranged from 76 to 100 percent. For the second rater, agreement within one point ranged from 91 to 100 percent; actual percentage agreement ranged from 72 to 86 percent.

For the 15 month assessments, all of which were conducted by either DB or Rater 1, all items were within 1 point, with exact item agreement ranging from 93 to 94 percent. Agreement for the 18 month assessment of Generalized Joint Laxity was consistently 100 percent.

Procedures

Two research assistants identified breech- and cephalic-presenting infants from the delivery log books at either the Royal Alexandra Hospital or the University of Alberta Hospitals. These recruiters contacted each eligible mother while she was still in hospital to explain the nature of the study and to leave her with an information pamphlet (Appendix 3K). The families were given time to consider whether they wished to be involved in this longitudinal study. If they agreed to participate, the mother's name was given to the person conducting the term assessment, who clarified aspects of the study and obtained written consent (Appendix 3L) before completing the initial examinations.

The families were asked to refrain from discussing their infants' birth history with the examiners. Data from the health record were transcribed onto the term data collection sheet (Appendix 3A) by the recruiter once consent had been obtained.

The examiners aimed to assess each infant after the first 24 hours, to allow the major birth and position effects to be dissipated and to give families adequate time to consider seriously their enrollment in this longitudinal study, and before the infant was discharged home. If the family was discharged home from hospital before the first assessment could be completed, arrangements were made to conduct the examination in the family's home.

The study coordinator made arrangements for the mothers and/or fathers and their infants to return at intervals through the first 18 months to complete all of the examinations. Appointments were made close to the exact ages under investigation to ensure that possible differences between groups are not affected by variation in chronological age. Examiners were unaware of the infants' presentation and mode of delivery at birth.

Ethical Considerations

Consent from the Ethics Committees of both the University of Alberta Hospitals and the Royal Alexandra Hospital was obtained before the onset of the study. Informed consent was obtained from the parents before an infant was enrolled in the study.

Chapter 4
Results

The data were entered using SPSS Data Entry II (SPSS Inc., 1987) and checked using the "valid-entry specification" feature. Data entry was completed by two people: one reading the data from the hard copy and the other entering the data using the personal computer. Random second checks were conducted throughout the three-and-one-half year period of data collection to ensure comparability of the information between the hard copy and the computer version. The raw data are contained in Appendices 4A to 4O. Descriptive and inferential analyses were conducted using SPSS/PC+ Base and Advanced Statistics. Version 5.0 (SPSS Inc., 1992). Descriptive results are presented in tables, for all variables, and box-and-whisker plots, for growth, joint flexibility, and *Alberta Infant Motor Scale (AIMS)* data, using information collected from all subjects. Inferential results utilize only those cases with complete data for each variable at the appropriate chronological ages (Appendices 4P to 4Y).

Sample Characteristics

Description

The recruited sample consists solely of singleton full-term infants with birth weights greater than 2500 grams and no major congenital anomalies born either at the Royal Alexandra Hospital or the University of Alberta Hospitals between May 1993 and June 1995. The cesarean and vaginal delivery groups comprise 50 and 40 infants respectively, in both breech and cephalic presentation categories, for an overall total of 180 infants. Initially, a sample size of 45 in each of the 4 study cells was anticipated; however, the vaginal delivery rate for breech-presenting infants dropped over the course of the study. At the Royal Alexandra Hospital, the vaginal births for this group of infants dropped from 34 to 25 percent. Through 1993, the vaginal delivery rate for breech-presenting infants born at the University of Alberta Hospitals remained similar to the prestudy values (25 versus 26 percent). Unfortunately, data for 1994 and the first part of 1995 were not compiled at this facility due to a major cut-back in support staff and the

subsequent closure of the Department of Obstetrics. The reduction in the vaginal-breech delivery rate led to a final sample size of only 40 infants in each of the vaginal delivery groups, despite having added 6 months to the planned 18 month period of subject recruitment. In addition, at the end of the first year of data collection, an attrition rate slightly higher than initially anticipated (18 versus 15 percent) led to the decision to recruit 50, instead of 45, infants in each of the groups. The subsequent decline in the vaginal-breech delivery rate made this higher target unattainable in a reasonable time frame in the remaining two cells.

The infant, maternal, and delivery characteristics of the four groups are summarized in Table 4-1. Overall, more females than males were recruited (94 versus 86). Most of the infants (n=106) were recruited from the Royal Alexandra Hospital, which, as of the end of June 1995, has become the sole tertiary-care maternity hospital in Edmonton. In all groups, the majority of the infants were Caucasian and born to women in their mid-twenties to mid-thirties.

All but one of the cephalic infants assumed a vertex presentation; subject 97 assumed face presentation. Classification of the type of breech presentation for infants delivered abdominally and vaginally respectively (n = 50, 40) included frank (n = 19, 19), complete (n = 0, 1), incomplete (n = 1, 0), double footling (n = 7, 1), single footling (n = 2, 1), and unclassified (n = 21, 18). None of the breech-presenting infants had been noted to assume neck hyperextension *in utero*.

Three women, each of whom delivered her infant by cesarean section, were identified to have uterine anomalies. Of these infants, one had been in breech presentation (ID 25: partial septum) and two in cephalic presentation (ID 126, 138: both with a history of myomectomies). Unusual volumes of amniotic fluid were reported in 4 pregnancies: two with polyhydramnios (ID 111, 142), both cephalic-presenting and delivered by each mode, and two with oligohydramnios (ID 11, 147), the first a cephalic-presenting fetus delivered vaginally, and the second a breech-presenting fetus delivered abdominally.

Table 4-1. Infant, Maternal, and Delivery Characteristics

Characteristic		Group				
		Cesarean-Breech (n=50)	Cesarean-Cephalic (n=50)	Vaginal-Breech (n=40)	Vaginal-Cephalic (n=40)	Total Sample (N=180)
Gender[a]	Male	22	22	21	21	86
	Female	28	28	19	19	94
Hospital[a]	R	32	32	21	21	106
	U	18	18	19	19	74
GA (weeks)	Mean	38.7	39.7	39.0	39.6	39.2
	sd	1.0	1.2	1.2	1.3	1.2
Ethnicity[a]	Caucasian	42	37	33	35	147
	Native	1	1	2	2	6
	Oriental	4	4	3	0	11
	Black	2	3	0	1	6
	Other	1	5	2	2	10
Mat. Age	Mean	28.4	29.8	28.5	29.1	29.0
	sd	6.0	5.1	4.6	4.6	5.1
Parity[a,b]	1	28	32	15	19	94
	2	14	12	14	14	54
	3	6	5	11	6	28
	4	1	1	0	0	2
Labour Present[a]	yes	17	42	40	40	139
	no	33	8	--	--	41
Labour Onset[a]						
spontaneous		14	27	35	28	104
induced		3	15	5	12	35
not recorded		33	8	--	--	41
Labour Progress[a]						
normal		11	5	24	23	63
augmented		2	29	13	17	61
not recorded		37	16	3	--	56
Type of Delivery[a]						
planned		42	10	1	2	55
unplanned		8	40	--	--	48
not recorded		--	--	39	38	77
Apgar Score						
1 minute:Md (Range)		8 (3-9)	8 (3-10)	7 (1-10)	8.5 (3-9)	8 (1-10)
5 minutes: Md (Range)		9 (7-10)	9 (7-10)	9 (6-10) (n=39)	9 (6-10)	9 (6-10)
Birth Complications[a]						
yes		4	2	4	4	14
no		46	48	36	36	166

Notes. R = Royal Alexandra Hospital; U = University of Alberta Hospitals; GA = gestational age; sd = standard deviation; Mat. Age = maternal age in years; Md = median.

[a] Frequency; [b] one mother in each of the V-C and C-B cells had 5 and 6 children, respectively.

Among the women carrying breech-presenting fetuses, review of the delivery records indicated that 12 had had a trial of external cephalic version. Of the 5 successful versions, 4 infants were delivered vaginally (ID 18, 79, 96, and 172) and one abdominally (ID 147). All cases of successful version occurred with multiparous women. Of the 7 unsuccessful versions, 3 infants went on to be delivered vaginally (ID 21, 31, 170) and 4 via cesarean section (ID 34, 36, 49, 64). Four of these women were primigravidae (ID 31, 34, 49, 64).

Although an attempt was made to match infants within the cesarean section groups on indication for the procedure (elective versus following trial of labour), hospital delivery practices at the time of recruitment favoured elective cesarean delivery for women with breech-presenting fetuses, in contrast to a trial of labour for women with cephalic-presenting fetuses. A two week period following the recruitment of a breech-presenting infant delivered via elective cesarean section was set up to try to acquire a strict match. If unsuccessful after that period, a mode of delivery match was obtained, ruling out fetal distress as the reason for the operative delivery. As a result of these delivery practices, 84 percent of the cesarean deliveries were reported as elective in the breech-presenting group, compared with 20 percent in the cephalic-presenting group. One third of the women carrying breech fetuses who ultimately delivered via cesarean section were reported to have experienced labour, in contrast to 84 percent of the women in the cephalic-presenting group.

Among the breech-presenting infants, birth complications included placenta previa (ID 10), cord prolapse (ID 106, 125), and nuchal cord (ID 147) for those delivered via cesarean section, and respiratory problems (ID 31, 38), shoulder dystocia after a successful version (ID 79), and brachial plexus injury (ID 171) for those delivered vaginally. Complications among cephalic-presenting infants included nuchal cord (ID 42, 156, 180) and respiratory problems (ID 76, 90, 141) in both modes of delivery. None of the infants experienced hypoxic ischemic encephalopathy at the time of delivery.

Representativeness

From the 1993 University of Alberta Hospitals Annual Report, the rate of term breech presentation among singleton births was 3.4 percent, a figure that is consistent

with the known incidence of breech presentation among term singletons. The 1993 and 1994 Annual Reports from the Royal Alexandra Hospital document breech presentation rates of 5.0 and 5.1 percent of all deliveries (that is, including preterm and multiple births). The overall cesarean delivery rates for these facilities were 19.6 and 18.5 percent respectively. During the same period, the cesarean delivery rates for preterm and full-term breech presenting fetuses was 80 and 73 percent. By way of describing these facilities further, perinatal mortality rates among livebirths of greater than 2500 grams were 3.6 and 1.2 per 1,000 births at the Royal Alexandra Hospital and the University of Alberta Hospitals respectively. These figures include hospital transfers and high-risk term newborns.

Determining the proportion of eligible breech-presenting infants who subsequently participated in the study can only be estimated. Because data concerning breech presentation from the Royal Alexandra Hospital comprises infants born at all gestational ages and includes both single and multiple pregnancies, these data could not be used for estimation purposes. Therefore, data from the 1993 University of Alberta Hospitals Report were used: 66 term breech singletons were delivered via cesarean section in this period. Between May 1993 and June 1994, 18 term breech singletons delivered by cesarean section were recruited from the University of Alberta Hospitals, resulting in a participation rate of 27 percent, assuming that the annual frequency of breech-presenting infants delivered by cesarean section did not change over the first 6 months of 1994. Similarly, 16 term breech singletons were delivered vaginally in 1993. Given that recruitment for the vaginal-breech cell occurred over two years, the estimated pool of eligible subjects is 32. During this period, 19 term breech-presenting singletons who had been delivered vaginally were recruited from this facility, resulting in a 59 percent participation rate. Combining the mode of delivery cells, the overall participation rate at the University of Alberta Hospitals may be estimated to be 37.7 percent.

Infants in the breech presentation cells clearly comprise convenience samples; virtually all eligible subjects were contacted by the recruiters. In contrast, the cephalic presentation cells more closely approximate random samples: the timing of recruitment was dependent upon the successful recruitment of a breech-presenting infant. Still, for all

four subgroups, the characteristics of families consenting to participate in the study is likely to be different from those declining. Specifically, only those parents interested in early child development, who lived reasonably close to the follow-up facility, and who had time to participate over the 18 month period of the study consented.

Comparability of Initial Characteristics Among the Four Study Groups

Analyses yielded nonsignificant differences among the four groups in terms of the following variables: gender, hospital of birth, ethnicity, parity, and maternal age. Due to the large number of cells with frequencies less than 5, all of the non-Caucasian infants were pooled as "other" when evaluating comparability of ethnic classifications. Similarly, comparability of parity among the four groups was evaluated by pooling 3 or more children into one category.

Between the two groups of breech-presenting infants, a Chi-square analysis of the comparability of three classifications of breech presentation (frank, other, unclassified) showed nonsignificant differences.

Gestational age at birth *was* significantly different among groups. A 2-way ANOVA revealed a significant effect for presentation. Breech-presenting infants were delivered at an average of .85 of a week earlier than cephalic-presenting infants.

As suggested by the descriptive data, of the infants delivered by cesarean section, a highly statistically significant difference in the proportion of infants experiencing labour between the presentation groups was found. Similarly, the presentation groups differed in the proportion of infants who were actually delivered according to plan.

Of the infants delivered vaginally, no significant differences were noted between the presentation groups for labour onset (spontaneous versus induced) or the proportion of labours receiving augmentation.

A Kruskal-Wallis 1-way ANOVA revealed a statistically significant difference among all four groups on Apgar scores at 1 minute. The vaginal-cephalic group received the highest ranking (with half of the group receiving scores of 9) and the vaginal-breech group received the lowest ranking (with only 20 percent of the group receiving scores of greater than or equal to 9). Individual contrasts using the Mann-Whitney U test determined significant differences between two sets of groups: vaginal-cephalic /

vaginal-breech and vaginal-cephalic / cesarean-cephalic. The Bonferroni procedure was used to adjust the p value from .05 to .0083 for six comparisons (Duncan et al. 1977). The groups did not differ on Apgar scores at 5 minutes.

A summary of these inferential analyses is contained in Appendix 4P.

Attrition

One hundred and seventy-eight infants completed the initial assessment. Assessments were not obtained for two infants in the cesarean-breech group. One family (ID 81) lived quite a distance from Edmonton and had left the hospital before the examiner was able to meet with them. The second family (ID 103) left the hospital with a study brochure and made contact with the coordinator at three weeks after birth. The attrition for subsequent assessments is detailed in Table 4-2. Overall, the permanent attrition rates were 8.9, 14.4, 15.0, 17.2, 18.9, 20.6, and 21.2 percent for the 6 week and 3, 5, 7, 10, 15 and 18 month assessments respectively.

Analyses of the comparability between those completing all of the assessments and those missing one or more of the chronological age data collection points, revealed no differences for presentation, birth complications, gender, parity, 1 minute Apgar scores, and gestational age at birth.

Significant differences were obtained for mode of delivery, hospital of birth, ethnicity (pooling classifications as previously described), and maternal age. Study dropouts were more likely to have been born at the Royal Alexandra Hospital, by cesarean section, to younger mothers, and of non-Caucasian descent. Details of the inferential analyses are contained in Appendix 4Q.

Table 4-2. Subject Attrition

Assessment Age	Group			
	Cesarean-Breech	Cesarean-Cephalic	Vaginal-Breech	Vaginal-Cephalic
6 Weeks	**(n = 45)**	**(n = 38)**	**(n = 37)**	**(n = 39)**
Permanent Attrition		8 (16,39,75,86,		
Not interested in continuing	2(64,133)	95,105,131,145)	1(35)	
Lived too far out of town	2(56,81)			
Moved: could not track down			1(77)	1(111)
Withdrew due to child's health	1(59)			
Temporary Attrition				
Family on holiday		1(19)	1(127)	
Missed appointment		2(89,123)		
Too late to be assessed		1(17)		
3 Months	**(n = 38)**	**(n = 39)**	**(n = 36)**	**(n = 39)**
Permanent Attrition				
Not interested in continuing		1(17)	2(163,170)	
Lived too far out of town	2(4,72)			
Moved: could not track down	1(57)	1(76)		
Withdrew due to child's health	3(37,84,144)			
Temporary Attrition				
Missed Appointment	1(40)			
Too late to be assessed		1(114)		
5 Months	**(n = 39)**	**(n = 39)**	**(n = 36)**	**(n = 39)**
Permanent Attrition				
Not interested in continuing		1(123)		
7 Months	**(n = 36)**	**(n = 38)**	**(n = 36)**	**(n = 38)**
Permanent Attrition				
Lived too far out of town		1(139)		
Moved: could not track down	2(100,101)			1(155)
Temporary Attrition				
Family on holiday	1(34)			
10 Months	**(n = 37)**	**(n = 37)**	**(n = 35)**	**(n = 37)**
Permanent Attrition				
Moved: could not track down		1(58)		
Moved: away from Edmonton			1(79)	1(117)
15 Months	**(n = 36)**	**(n = 37)**	**(n = 34)**	**(n = 36)**
Permanent Attrition				
Moved: could not track down			1(177)	
Moved: away from Edmonton	1(48)			1(71)
18 Months	**(n = 36)**	**(n = 36)**	**(n = 34)**	**(n = 36)**
Permanent Attrition				
Not interested in continuing		1(112)		

Notes. The number in bold parentheses indicates the number of infants seen at each chronological age; the reason for and the number of infants leaving the study during the period immediately before the assessment is detailed.

Regarding the reasons for dropout: frequency in cells; identification numbers in parentheses.

Age at Assessment

The raw data for the chronological ages at which the infants were assessed over the duration of the study are contained in the Appendices. Very young infants assessed clearly outside of the age range targeted for the study were excluded from analyses; Table 4-3 contains a summary of the ages of the remaining subjects. At the initial assessment, a main effect for delivery was present. Infants delivered by cesarean section were assessed an average of 22 hours earlier than infants delivered vaginally. This difference occurred because women who delivered abdominally remained in hospital longer than women who delivered vaginally, thus giving the examiner a greater opportunity to assess the infants before the family was discharged. No significant differences in chronological age were noted at subsequent assessments. Appendix 4R contains a summary of the 2-way ANOVAs conducted at each age.

Evaluation of Physical and Motor Development

Appendices 4B - 4O contain the raw data for physical and motor development over the 18 month period. Data on growth parameters at birth are contained in Appendix 4A. Both descriptive and inferential analyses were conducted on each of the dependent variables. Box plots have been constructed only for measures with sufficient variation in scores taken repeatedly over time. The "boxes" comprise the 75th, 50th and 25th percentile values. The ends of the whiskers comprise the first data point within one and one-half box-lengths of either the 25th or 75th percentiles. Each outlier is marked with an asterisk. Two-way ANOVAs were used for variables measured on one occasion (Dubowitz' Assessment, Joint Laxity Scores, *PDMS*, and age of walking) and 3-way repeated measures ANOVAs were conducted on variables measured over time (growth parameters of height, weight and head circumference, primitive reflexes, joint angle scores, and *AIMS* scores) using the MANOVA procedure. All post-hoc tests were conducted using the Dunn Method of multiple comparisons. Assumptions supporting the use of parametric analyses were met for the growth parameters, the total scores for the two motor scales, and the "French Angles" factor of the *INFANIB*. The data on some of

Table 4-3. Chronological Age at Time of Assessment[a]

Assessment	Group			
	Cesarean-Breech	Cesarean-Cephalic	Vaginal-Breech	Vaginal-Cephalic
Initial	(n = 48)	(n = 50)	(n = 40)	n = (40)
Mean	70.4	75.4	97.0	93.1
sd	34.8	42.1	80.2	107.7
6 Weeks	(n = 45)	(n = 38)[b]	(n = 37)	(n = 39)
Mean	43.6	44.0	42.8	43.3
sd	2.5	2.9	2.4	1.9
3 Months	(n = 38)	(n = 39)[b]	(n=36)	(n=39)
Mean	93.0	93.1	92.0	92.3
sd	3.4	4.1	2.8	1.9
5 Months	(n = 39)	(n = 39)	(n = 36)	(n = 39)
Mean	153.7	153.9	153.5	152.7
sd	4.1	3.6	2.7	3.5
7 Months	(n = 36)	(n = 38)	(n = 36)	(n = 38)
Mean	214.6	215.0	214.8	213.9
sd	3.7	3.2	2.2	2.4
10 Months	(n = 37)	(n = 37)	(n = 35)	(n = 37)
Mean	304.4	305.7	304.3	304.0
sd	2.9	2.7	2.7	2.5
15 Months	(n = 36)	(n = 37)	(n = 34)	(n = 36)
Mean	456.0	456.5	456.9	456.4
sd	4.7	3.7	2.2	2.8
18 Months	(n = 36)	(n = 36)	(n = 34)	(n = 36)
Mean	553.0	553.5	554.1	553.4
sd	13.4	18.3	17.7	12.7

Notes. sd = standard deviation.

[a] Chronological age is in hours for the initial assessment and in days for subsequent assessments.

[b] excluding those infants who were clearly outside of the age targeted.

the individual items of the *PRP* and the *INFANIB*, however, did not meet these assumptions. Despite this finding, use of parametric techniques is supported because the items are monotonically related to development and because the ANOVA is robust. The departure from normality of the distribution of the individual items is not problematic because a reasonable sample size exists in each of the four groups. With numbers of greater than 25, the shape of the sampling distribution approaches normality, regardless of the parent distribution (Glass and Hopkins, 1984, pp 184-188). Similarly, failure to

meet the assumption of homogeneity of variance is not problematic because the number of infants in each of the groups is nearly equal (Glass and Hopkins, 1984, pp 350-353).

Inspection of the Dubowitz' Assessment items determined that many of them are not monotonically related to development. That is, scores do not progress as developmental competence increases. Several items are considered to reflect neurological abnormality, instead of optimal performance, if graded on the extreme right. These items include posture, arm recoil, leg recoil, head control posterior, and the rooting, sucking, walking, and Moro reflexes, if graded 5, and tendon reflexes, if graded 4. Examination of the data revealed that only two subjects (ID 44 and 115) received extreme scores for the sucking and tendon reflexes respectively. With these subjects removed for the analysis of these specific items, use of a 2-way ANOVA is justified, as discussed above.

Neurological status at 18 months is simply categorical data, with few infants in several cells, warranting only descriptive reporting.

Effect of Initial Noncomparability of Groups

Initial analyses revealed several differences among the four groups of infants. Breech-presenting infants were delivered at younger gestational ages than cephalic-presenting infants. Of those delivered by cesarean section, breech-presenting infants were less likely to experience labour. The vaginal-breech and cesarean-cephalic groups obtained significantly lower Apgar scores at one minute than infants in the vaginal-cephalic group. And finally, infants delivered by cesarean were assessed at an earlier chronological age than infants delivered vaginally. Gestational age at birth and chronological age in hours were used as covariates in the analyses.

For those infants delivered by cesarean section, t-tests on the individual items of the Dubowitz' Assessment and the *PRP* conducted at term revealed nonsignificant differences between those experiencing labour or not (using a liberal p value of .05). Only one item at birth obtained a statistically significant correlation with the Apgar score at one minute. Head raising in the prone position had a moderately weak correlation of -.21 with the first Apgar score; lower Apgar scores tended to be associated with "better" performance of extension abilities in prone. Overall, neither the experience of labour nor

the presence of lower Apgar scores adversely affected the initial assessment (Appendix 4S).

Effects of Attrition

Families of non-Caucasian decent, with a younger mother or having delivered at the Royal Alexandra Hospital or by cesarean section were more likely to have dropped out over the course of the study. Independent t-tests were used to evaluate differences at the first assessment between those who ultimately left and those who stayed for the duration of the study. Adjusted alpha levels were used for the three sections of the Dubowitz assessment (posture and movement - .004; reflexes - .008; and orientation - .025), the thirteen *PRP* Items (.004), and the five items on the *INFANIB* (.01). Only head raising in the prone position and head control posterior were noted to be weaker among those who dropped out. Infants who dropped out did not differ from those remaining in the study on the three growth parameters recorded at the delivery and on the individual items of the *PRP* and the *INFANIB* (Appendix 4T).

Neurological Status at Birth

A summary of the Dubowitz' scores for infants in the four groups is contained in Table 4-4. Two-way ANOVAs were conducted and gestational age at birth and chronological age in hours at the time of the assessment were entered as covariates. Using Bonferroni's procedure to correct for multiple testing, adjusted alpha levels of .004, .008, and .025 for the items tested in the "posture and movement", "reflexes", and "orientation" subsections of the Dubowitz' assessment were obtained. Appendix 4U contains the ANOVA summary for these analyses. Popliteal angle was the only item to achieve significance for a main effect of "presentation": infants having presented in the breech had larger popliteal angles than infants previously in cephalic presentation.

Table 4-4. Dubowitz' Assessment

Item	Group			
	Cesarean-Breech (n = 48)	**Cesarean-Cephalic** (n = 50)	**Vaginal-Breech** (n = 40)	**Vaginal-Cephalic** (n = 40)
Posture and Movement				
Posture				
Mean (sd)	3.8 (.4)	3.7 (.6)	3.7 (.6)	3.6 (.6)
Median (range)	4 (3-4)	4 (1-4)	4 (2-4)	4 (2-4)
Arm Recoil				
Mean (sd)	3.1 (.6)	3.0 (.6)	3.0 (.5)	3.1 (.5)
Median (range)	3 (2-4)	3 (2-4)	3 (2-4)	3 (2-4)
Arm Traction				
Mean (sd)	3.4 (.8)	3.2 (.8)	3.2 (.9)	3.4 (1.0)
Median (range)	3 (2-5)	3 (1-5)	3 (2-5)	3 (2-5)
Leg Recoil				
Mean (sd)	3.6 (.6)	3.1 (.8)	3.2 (.8)	3.2 (.8)
Median (range)	4 (2-4)	3 (2-4)	3 (2-4)	3 (1-4)
Leg Traction				
Mean (sd)	3.4 (.8)	3.6 (.6)	3.5 (.8)	3.8 (.6)
Median (range)	3 (2-5)	4 (2-5)	3 (2-5)	4 (3-5)
Popliteal Angle				
Mean (sd)	2.7 (1.0)	3.3 (1.0)	2.3 (1.1)	3.4 (1.2)
Median (range)	3 (1-5)	3 (2-5)	2 (1-4)	3.5 (1-5)
Head Control Posterior				
Mean (sd)	2.8 (.9)	2.9 (.9)	2.8 (.8)	2.8 (.9)
Median (range)	3 (1-4)	3 (1-4)	3 (2-4)	3 (1-4)
Head Control Anterior				
Mean (sd)	2.8 (.8)	3.0 (.6)	2.8 (.7)	2.8 (.6)
Median (range)	3 (1-4)	3 (2-4)	3 (1-4)	3 (1-4)
Head Lag				
Mean (sd)	3.0 (1.0)	3.0 (.8)	2.8 (.7)	2.9 (.9)
Median (range)	3 (1-5)	3 (2-5)	3 (1-5)	3 (1-5)
Ventral Suspension				
Mean (sd)	3.0 (.7)	2.8 (.8)	2.9 (.7)	3.0 (.8)
Median (range)	3 (2-4)	3 (1-4)	3 (2-4) (n=39)	3 (2-5)
Head Raising in Prone				
Mean (sd)	3.0 (.9)	3.3 (.7)	2.9 (.7)	3.2 (.8)
Median (range)	3 (1-5)	3 (2-4) (n=49)	3 (2-4)	3 (1-4)
Arm Release in Prone				
Mean (sd)	3.9 (.2)	3.8 (.4)	3.8 (.4)	3.8 (.5)
Median (range)	4 (3-4)	4 (3-4) (n=49)	4 (3-4)	4 (2-4)

Notes. sd = standard deviation.

Table 4-4. Dubowitz' Assessment (continued)

Item	Group			
	Cesarean-Breech (n = 48)	Cesarean-Cephalic (n = 50)	Vaginal-Breech (n = 40)	Vaginal-Cephalic (n = 40)
Reflexes				
Knee Jerk[a]				
Mean (sd)	2.0 (.3)	2.0 (.3)	1.9 (.2)	2.0 (.2)
Median (range)	2 (1-3)	2 (1-3)	2 (1-2)	2 (2-3)
	(n=46)	(n=47)	(n=38)	(n=39)
Palmar Grasp				
Mean (sd)	3.7 (.7)	3.6 (.6)	3.3 (.8)	3.5 (.8)
Median (range)	4 (2-4)	4 (2-4)	4 (2-4)	4 (2-5)
Rooting				
Mean (sd)	3.5 (.6)	3.5 (.8)	3.3 (.9)	3.5 (.7)
Median (range)	4 (2-4)	4 (1-4)	3 (1-4)	4 (1-4)
			(n=39)	
Sucking[b]				
Mean (sd)	3.9 (.5)	3.9 (.5)	3.7 (.4)	3.8 (.6)
Median (range)	4 (2-4)	4 (1-4)	4 (3-4)	4 (1-4)
			(n=39)	(n=39)
Walking				
Mean (sd)	3.3 (1.1)	3.1 (1.1)	3.4 (.8)	3.2 (1.1)
Median (range)	4 (1-4)	3 (1-4)	4 (1-4)	4 (1-4)
Moro				
Mean (sd)	3.6 (.6)	3.4 (.8)	3.3 (.8)	3.5 (.6)
Median (range)	4 (2-4)	4 (2-4)	3.5 (2-4)	3 (2-4)
Orientation				
Auditory Orientation				
Mean (sd)	2.5 (1.1)	2.4 (1.1)	2.1 (.7)	2.3 (.9)
Median (range)	3 (1-5)	2.5 (1-5)	2 (1-4)	2 (1-5)
	(n=42)	(n=48)	(n=38)	(n=37)
Visual Orientation				
Mean (sd)	2.1 (1.0)	2.3 (1.1)	2.1 (.9)	2.3 (.9)
Median (range)	2 (1-4)	2 (1-5)	2 (1-4)	2 (1-4)
	(n=37)	(n=45)	(n=37)	(n=36)

Notes. sd = standard deviation.

[a] Subject 115 is excluded from group Cesarean-Cephalic due to abnormal value.

[b] Subject 44 is excluded from group Vaginal-Cephalic due to abnormal value.

Growth

Table 4-5 contains a summary of the growth variables collected at each of the chronological ages. Figures 4-1, 4-2, and 4-3 contain box plots of weight, length and head circumference over time. Inspection of these descriptive data do not reveal striking differences among the groups of infants.

Three-way repeated measures analyses were conducted on each of the three variables, using gestational age at birth as a covariate. Appendix 4V contains a summary of these analyses. No significant between subjects effects were obtained for any of the growth parameters.

As expected, highly statistically significant main effects of "time" were obtained for all three within subjects analyses. No other within subjects effect was noted for weight. Significant interactions with time were obtained "by presentation" for length and "by delivery" for head circumference. Although the data collected repeatedly over time for length and head circumference violated the assumptions relating to the variance-covariance matrix, more rigorous statistical testing was not warranted because the obtained p values of less than or equal to .001 are far from the alpha level for statistical significance of .05.

To determine the points at which analyses would be conducted to clarify the timing of a significant "time by presentation" interaction, the average unadjusted lengths of breech- and cephalic-presenting infants over the 18 month period were compared using visual inspection (Figure 4-4). Breech-presenting infants averaged 1.4 centimetres shorter than cephalic-presenting infants at birth and six weeks, and .6 and .5 centimetres at 3 and 5 months. Thereafter, their average lengths were virtually identical. Post-hoc analyses were conducted between birth and 6 weeks, 6 weeks and 3 months, 3 and 5 months, and 5 and 7 months. Interactions were nonsignificant between each of these ages. The analysis was repeated between birth and 3 months (nonsignificant) and between birth and 5 months (significant). While breech infants were significantly shorter early in life, they had demonstrated "catch up" in growth at 5 months, and thereafter maintained a growth trajectory similar to their cephalic counterparts. Details of these multiple comparisons are contained in Appendix 4V.

Table 4-5. Growth

Assessment Age		Group			
		Cesarean-Breech	Cesarean-Cephalic	Vaginal-Breech	Vaginal-Cephalic
Birth		(n = 50)	(n = 50)	(n = 40)	(n = 40)
Weight	Mean	3364	3699	3273	3432
	sd	424	421	472	403
Length	Mean	50.8	52.7	50.9	51.6
	sd	3.2 (n=49)	2.4	2.4	2.3
HC	Mean	35.2	35.4	34.6	34.7
	sd	1.5 (n=45)	1.6	1.3 (n=38)	1.4
6 Weeks		(n = 45)	(n = 38)	(n = 37)	(n = 39)
Weight	Mean	4.65	4.92	4.65	4.83
	sd	.60 (n=43)	.56 (n=36)	.61 (n=36)	.56 (n=38)
Length	Mean	55.2	57.0	55.5	56.4
	sd	1.9	1.9	2.3 (n=36)	2.2
HC	Mean	38.6	38.8	38.3	38.6
	sd	1.1	1.1	1.4	1.0
3 Months		(n = 38)	(n = 39)	(n = 36)	(n = 39)
Weight	Mean	6.13	6.05	6.02	6.13
	sd	.98 (n=37)	.67 (n=37)	.74 (n=33)	.68 (n=36)
Length	Mean	60.4	61.1	60.4	60.9
	sd	2.4	2.1	2.5	2.3
HC	Mean	40.9	41.0	40.8	40.8
	sd	1.2	1.3	1.4	1.2
5 Months		(n = 39)	(n = 39)	(n = 36)	(n = 39)
Weight	Mean	7.28	7.20	7.12	7.34
	sd	1.04 (n=34)	.96 (n=37)	.91 (n=33)	.75 (n=38)
Length	Mean	64.9	65.8	65.2	65.2
	sd	2.6	2.9	2.5	2.1
HC	Mean	43.0	43.0	42.8	42.9
	sd	1.2	1.5	1.4	1.2

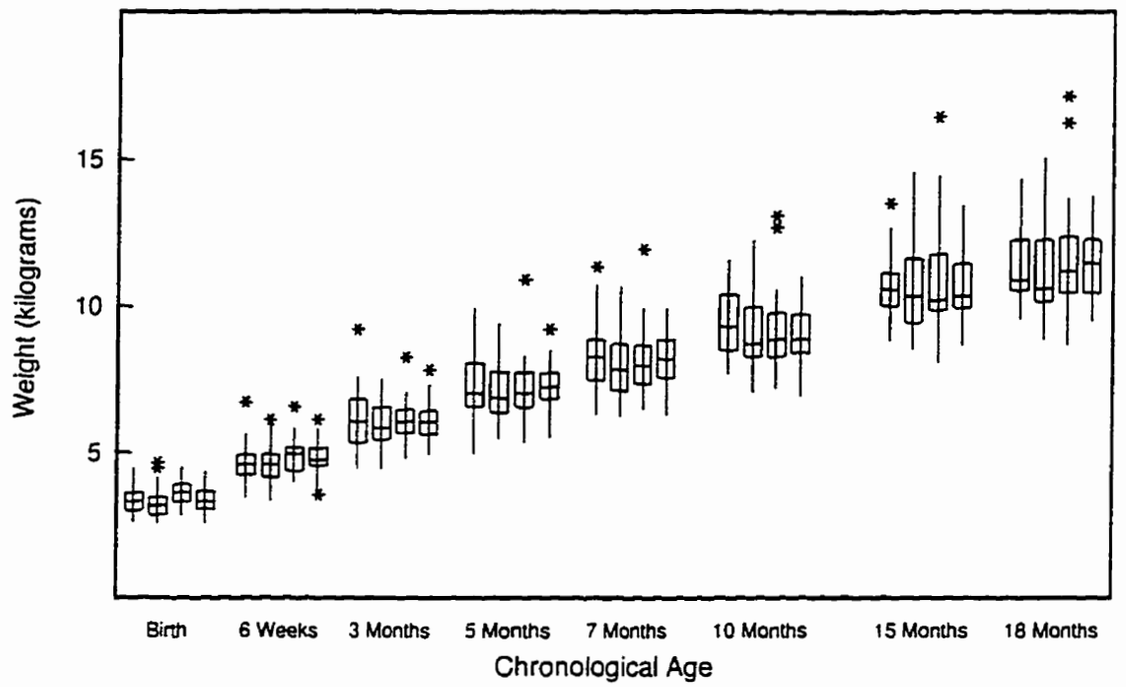
Notes. Weight in grams at birth, kilograms thereafter; Length in centimetres; HC = head circumference, measured in centimetres; sd = standard deviation.

Table 4-5. Growth (continued)

Assessment Age		Group			
		Cesarean-Breech	Cesarean-Cephalic	Vaginal-Breech	Vaginal-Cephalic
Seven Months		(n = 36)	(n = 38)	(n = 36)	(n = 38)
Weight	Mean	8.30	8.12	8.05	8.24
	sd	1.11	1.05	1.05	.84
		(n=33)	(n=35)	(n=35)	(n=37)
Length	Mean	68.8	68.9	68.3	68.2
	sd	2.3	2.8	2.9	2.1
			(n=37)	(n=35)	(n=37)
HC	Mean	44.4	44.5	44.2	44.3
	sd	1.3	1.6	1.5	1.3
			(n=37)	(n=35)	(n=37)
Ten Months		(n = 37)	(n = 37)	(n = 35)	(n = 37)
Weight	Mean	9.3	9.1	9.1	9.1
	sd	1.0	1.3	1.3	.9
		(n=34)	(n=35)	(n=31)	(n=35)
Length	Mean	73.0	73.0	72.1	72.2
	sd	2.6	3.0	3.1	2.4
HC	Mean	45.9	46.0	45.7	45.7
	sd	1.3	1.7	1.6	1.3
Fifteen Months		(n = 36)	(n = 37)	(n = 34)	(n = 36)
Weight	Mean	10.7	10.8	10.7	10.6
	sd	1.0	1.8	1.5	1.1
		(n=32)	(n=34)		(n=35)
Length	Mean	78.4	78.3	78.3	78.1
	sd	2.4	3.5	3.6	2.7
HC	Mean	47.3	47.4	47.2	47.2
	sd	1.4	1.6	1.6	1.2
Eighteen Months		(n = 36)	(n = 36)	(n = 34)	(n = 36)
Weight	Mean	11.3	11.5	11.2	11.4
	sd	1.2	1.8	1.6	1.1
Length	Mean	82.4	82.6	82.1	82.5
	sd	3.4	3.8	3.3	2.9
HC	Mean	48.2	48.0	47.9	47.8
	sd	1.5	1.6	1.7	1.3

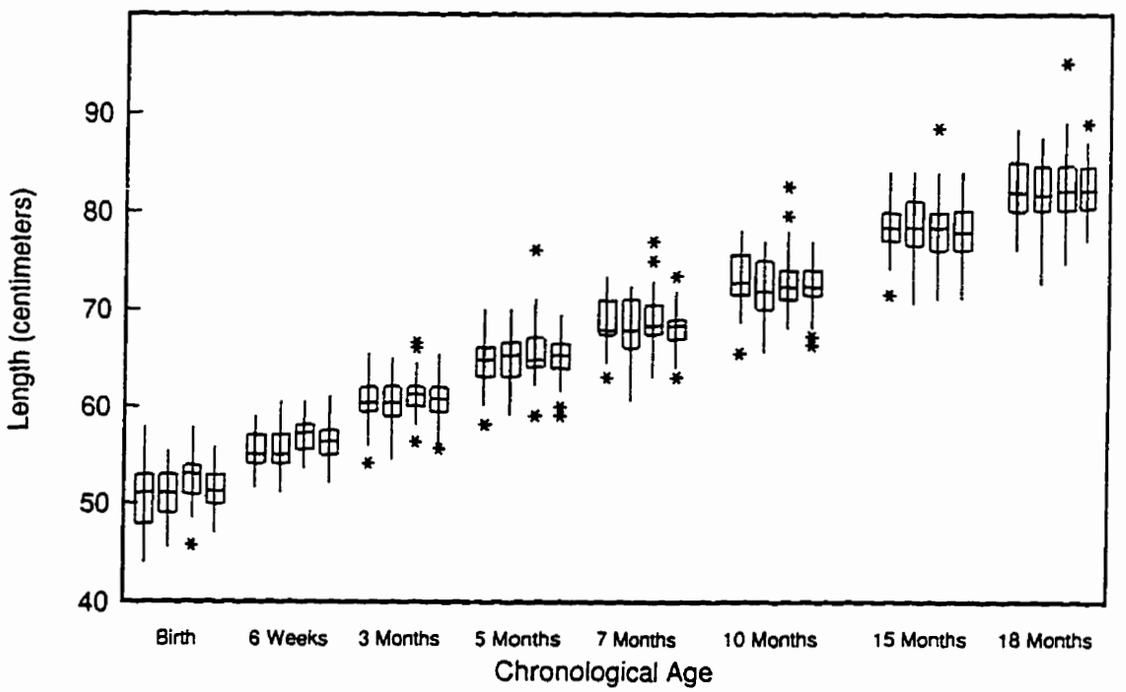
Notes. Weight in grams at birth, kilograms thereafter; Length in centimetres; HC = head circumference, measured in centimetres; sd = standard deviation.

Figure 4-1. Box-plots of Change in Weight



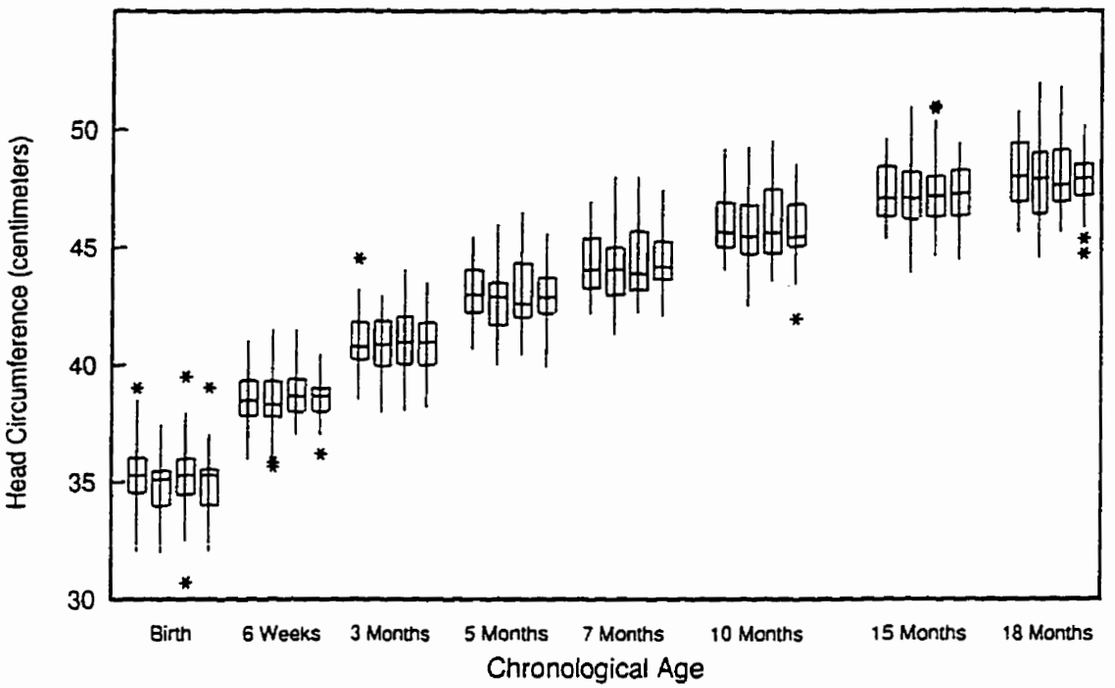
At each chronological age, groups from left to right are cesarean-breech, vaginal-breech, cesarean-cephalic, and vaginal-cephalic.

Figure 4-2. Box-plots of Change in Length



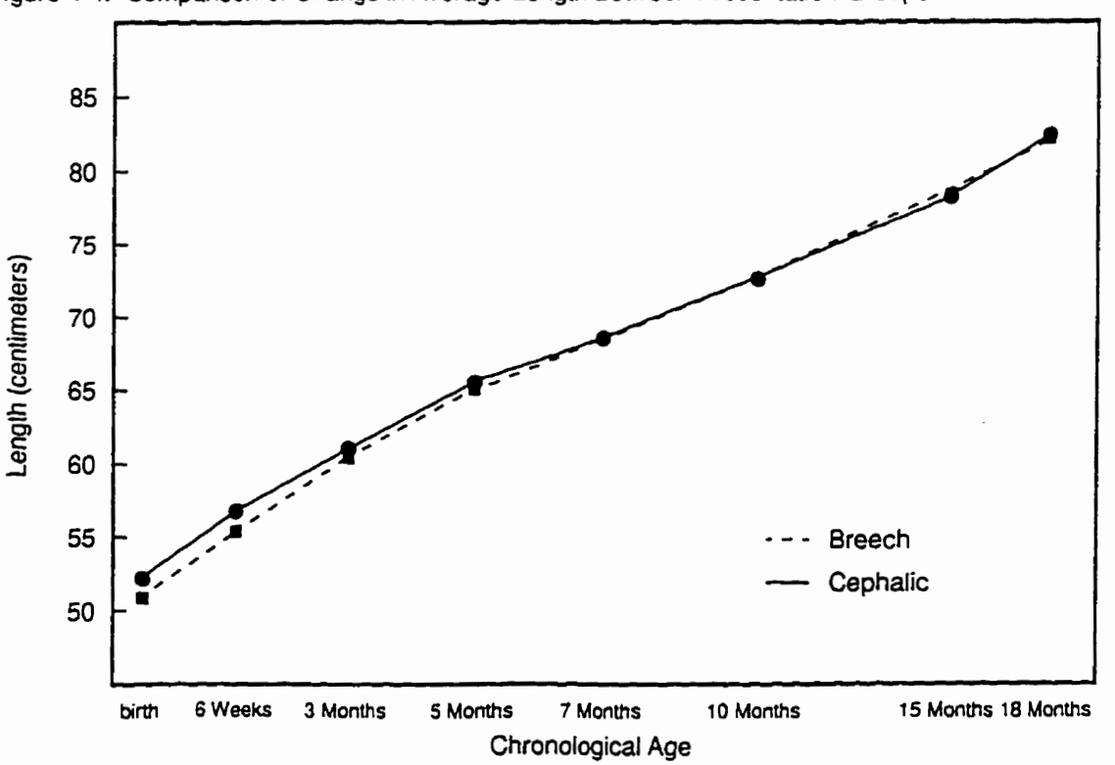
At each chronological age, groups from left to right are cesarean-breech, vaginal-breech, cesarean-cephalic, and vaginal-cephalic.

Figure 4-3. Box-plots of Change in Head Circumference



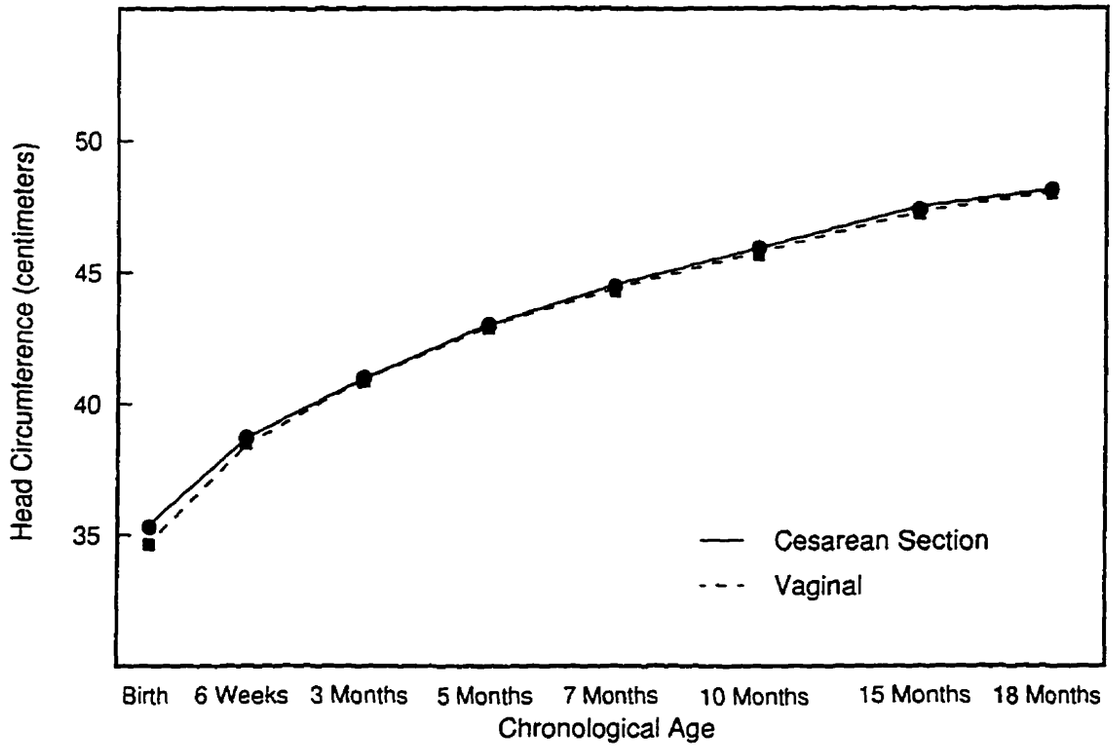
At each chronological age, groups from left to right are cesarean-breech, vaginal-breech, cesarean-cephalic, and vaginal-cephalic.

Figure 4-4. Comparison of Change in Average Length Between Presentation Groups



To determine where the differences in the slopes for the within subjects head circumference data occurred, the average unadjusted measurements of infants delivered vaginally and by cesarean section were compared (Figure 4-5). Throughout the entire data collection period, infants delivered vaginally had smaller head circumferences than those delivered abdominally, but a main between subjects effect of delivery was not obtained. The greatest difference in measurements was noted at birth (.6 centimeters), with minor differences noted at the remaining chronological ages (between .11 and .26 centimeters). Two post-hoc analyses were conducted: between birth and 6 weeks and 6 weeks and 3 months. A significant difference in the slope of the head circumference trajectories was obtained only for the first contrast. Appendix 4V also contains details of these analyses.

Figure 4-5. Comparison of Change in Average Head Circumference Between Delivery Groups



Primitive Reflexes

Table 4-6 contains summary data on the primitive reflexes for the four groups at term, 6 weeks, and 3 and 5 months. The mean and standard deviation for each item is recorded to facilitate interpretation of the inferential analyses. The values for median and range are also recorded because many of the items are skewed. Box plots were not constructed for these items because of the limited variation in scores due to the item scaling and the behaviour elicited in the infants studied.

Three-way repeated measures ANOVAs were conducted on each of the thirteen items, using gestational age at birth and chronological age at the time of the first assessment as covariates. Bonferroni's correction was used to control for the increased probability of making a Type 1 error due to multiple comparisons. An adjusted p value for statistical significance of .004 was obtained. Appendix 4W contains a summary of these analyses.

The assumption of homogeneity of covariance among all levels of between subjects effects was violated for several items (asymmetrical and symmetrical tonic neck, tonic labyrinthine prone, body on body, and upper extremity grasp reflexes), but not for the Moro reflex, which was the only significant between subjects main effect or interaction obtained. A main effect of "delivery" for this item was noted ($p = .002$), with vaginally-delivered infants, regardless of presentation, attaining an average of .11 of a point lower than their cesarean section counterparts over the course of the first four data collection points.

Again, as expected, highly statistically significant within subjects main effects of "time" were obtained for all reflexes, except the symmetrical tonic neck reflex which was not observed very frequently in this sample of infants. Otherwise, no statistically significant within subjects effects were obtained; no differences existed among the four groups of infants in the evolution of the primitive reflexes.

Table 4-6. Primitive Reflex Profile

Assessment Age	Group			
	Cesarean-Breech	Cesarean-Cephalic	Vaginal-Breech	Vaginal-Cephalic
Term	(n = 48)	(n = 50)	(n = 40)	(n = 40)
ATNR				
Mean (sd)	.04 (.29)	.02 (.14)	.08 (.35)	.05 (.31)
Median (range)	0 (0-2)	0 (0-1)	0 (0-2)	0 (0-2)
STNR				
Mean (sd)	.04 (.29)	.04 (.20)	.03 (.16)	.10 (.38)
Median (range)	0 (0-2)	0 (0-1)	0 (0-1)	0 (0-2)
Positive Support Reflex				
Mean (sd)	.90 (.47)	.88 (.44)	.95 (.32)	.95 (.39)
Median (range)	1 (0-2)	1 (0-2)	1 (0-2) (n=39)	1 (0-2)
TLS				
Mean (sd)	.13 (.44)	.32 (.62)	.18 (.50)	.30 (.56)
Median (range)	0 (0-2)	0 (0-2)	0 (0-2)	0 (0-2)
TLP				
Mean (sd)	.04 (.20)	.04 (.20)	0	.08 (.35)
Median (range)	0 (0-1)	0 (0-1)	0	0 (0-2)
HOB				
Mean (sd)	2.9 (.4)	2.8 (.7)	2.9 (.4)	2.7 (.8)
Median (range)	3 (1-3)	3 (0-3)	3 (1-3)	3 (0-3)
BOB				
Mean (sd)	2.9 (.4)	2.8 (.5)	2.9 (.4)	2.9 (.3)
Median (range)	3 (1-3)	3 (1-3)	3 (1-3)	3 (2-3)
Galant Reflex				
Mean (sd)	.91 (.88)	1.04 (.97)	.58 (.81)	.78 (.86)
Median (range)	1 (0-3) (n=47)	1 (0-3)	0 (0-3)	.5 (0-2)
Moro Reflex				
Mean (sd)	1.8 (.4)	1.8 (.5)	1.8 (.4)	1.9 (.3)
Median (range)	2 (1-2)	2 (0-2)	2 (1-2)	2 (1-2)
UEGR				
Mean (sd)	2.5 (.7)	2.5 (.7)	2.1 (.8)	2.3 (.8)
Median (range)	3 (1-3)	3 (1-3)	2 (1-3)	2 (1-4)
LEGR				
Mean (sd)	1.9 (.4)	1.9 (.3)	1.8 (.4)	2.0 (.2)
Median (range)	2 (1-2)	2 (1-2)	2 (1-2)	2 (1-2)
Placing Reflex				
Mean (sd)	1.8 (.4)	1.8 (.5)	1.9 (.3)	1.8 (.6)
Median (range)	2 (1-2)	2 (0-2)	2 (1-2)	2 (0-2)
Stepping Reflex				
Mean (sd)	1.4 (.8)	1.3 (.8)	1.6 (.6)	1.4 (.7)
Median (range)	2 (0-2)	1.5 (0-2)	2 (0-2)	2 (0-2)

Notes. sd = standard deviation; ATNR = asymmetical tonic neck reflex; STNR = symmetrical tonic neck reflex; TLS = tonic labyrinthine reflex in supine; TLP = tonic labyrinthine reflex in prone; HOB = segmental roll, head on body reaction; BOB = segmental roll, body on body reaction; UEGR = upper extremity grasp reflex; LEGR = lower extremity grasp reflex.

Table 4-6. Primitive Reflex Profile (continued)

Assessment Age	Group			
	Cesarean-Breech	Cesarean-Cephalic	Vaginal-Breech	Vaginal-Cephalic
6 Weeks	(n = 45)	(n = 38)	(n = 37)	(n = 39)
ATNR				
Mean (sd)	.96 (.98)	.74 (.89)	1.1 (.92)	.82 (.94)
Median (range)	1 (0-2)	0 (0-2)	1 (0-2)	0 (0-2)
STNR				
Mean (sd)	.11 (.44)	.08 (.36)	0	.13 (.47)
Median (range)	0 (0-2)	0 (0-2)	0	0 (0-2)
Positive Support Reflex				
Mean (sd)	1.4 (.8)	1.2 (.5)	1.1 (.4)	1.1 (.5)
Median (range)	1 (0-3)	1 (1-3)	1 (1-3)	1 (0-3)
TLS				
Mean (sd)	.31 (.70)	.55 (.79)	.65 (.89)	.56 (.82)
Median (range)	0 (0-2)	0 (0-2)	0 (0-2)	0 (0-2)
TLP				
Mean (sd)	.18 (.53)	.29 (.69)	.35 (.75)	.28 (.65)
Median (range)	0 (0-2)	0 (0-3)	0 (0-3)	0 (0-2)
HOB				
Mean (sd)	2.6 (.6)	2.4 (.7)	2.7 (.6)	2.5 (.7)
Median (range)	3 (1-3)	3 (1-3)	3 (1-4)	3 (0-3)
BOB				
Mean (sd)	2.3 (.6)	2.1 (.7)	2.1 (.8)	2.0 (.8)
Median (range)	2 (1-3)	2 (1-3)	2 (1-3)	2 (0-3)
Galant Reflex				
Mean (sd)	1.3 (.8)	1.6 (.8)	1.4 (.8)	1.3 (.8)
Median (range)	2 (0-3)	2 (0-3)	2 (0-2)	2 (0-2)
Moro Reflex				
Mean (sd)	1.3 (.5)	1.2 (.5)	1.4 (.6)	1.1 (.6)
Median (range)	1 (0-2) (n=44)	1 (0-2) (n=37)	1 (0-2)	1 (0-2) (n=38)
UEGR				
Mean (sd)	2.1 (.9)	1.9 (.9)	1.9 (.8)	2.0 (.8)
Median (range)	2 (0-4)	2 (1-3)	2 (1-3)	2 (0-3)
LEGR				
Mean (sd)	1.9 (.3)	1.9 (.3)	1.9 (.3)	1.7 (.5)
Median (range)	2 (1-2)	2 (1-2)	2 (1-2)	2 (1-2)
Placing Reflex				
Mean (sd)	1.3 (.8)	1.5 (.7)	1.4 (.7)	1.5 (.6)
Median (range)	1 (0-3)	2 (0-3)	2 (0-2)	2 (0-2)
Stepping Reflex				
Mean (sd)	.58 (.72)	.92 (.71)	1.0 (.74)	.92 (.66)
Median (range)	0 (0-2)	1 (0-2)	1 (0-2)	1 (0-2)

Notes. sd = standard deviation; ATNR = asymmetical tonic neck reflex; STNR = symmetrical tonic neck reflex; TLS = tonic labyrinthine reflex in supine; TLP = tonic labyrinthine reflex in prone; HOB = segmental roll, head on body reaction; BOB = segmental roll, body on body reaction; UEGR = upper extremity grasp reflex; LEGR = lower extremity grasp reflex.

Table 4-6. Primitive Reflex Profile (continued)

Assessment Age	Group			
	Cesarean-Breech	Cesarean-Cephalic	Vaginal-Breech	Vaginal-Cephalic
3 Months	(n = 38)	(n = 39)	(n = 36)	(n = 39)
ATNR				
Mean (sd)	.42 (.86)	.26 (.64)	.25 (.65)	.23 (.67)
Median (range)	0 (0-3)	0 (0-2)	0 (0-2)	0 (0-3)
STNR				
Mean (sd)	0	0	.03 (.17)	.05 (.32)
Median (range)	0	0	0 (0-1)	0 (0-2)
Positive Support Reflex				
Mean (sd)	1.6 (.8)	1.4 (.5)	1.3 (.6)	1.5 (.72)
Median (range)	1 (0-3)	1 (0-2)	1 (0-3)	1 (0-3)
TLS				
Mean (sd)	.08 (.36)	.23 (.58)	.14 (.42)	.13 (.47)
Median (range)	0 (0-2)	0 (0-2)	0 (0-2)	0 (0-2)
TLP				
Mean (sd)	.08 (.36)	.10 (.38)	.14 (.35)	.18 (.45)
Median (range)	0 (0-2)	0 (0-2)	0 (0-1)	0 (0-2)
HOB				
Mean (sd)	2.1 (.8)	2.2 (.8)	2.5 (.8)	2.3 (.8)
Median (range)	2 (0-3)	2 (1-3)	3 (1-4)	2 (1-3)
BOB				
Mean (sd)	1.8 (.5)	1.8 (.7)	1.7 (.6)	1.6 (.6)
Median (range)	2 (1-3)	2 (0-3)	2 (1-3)	2 (0-3)
Galant Reflex				
Mean (sd)	.68 (.81)	.84 (.82)	.69 (.82)	.77 (.84)
Median (range)	0 (0-2)	1 (0-2) (n=38)	.5 (0-3)	1 (0-3)
Moro Reflex				
Mean (sd)	.97 (.43)	.87 (.34)	.89 (.57)	.69 (.57)
Median (range)	1 (0-2)	1 (0-1)	1 (0-2)	1 (0-2)
UEGR				
Mean (sd)	1.2 (.7)	1.1 (.8)	1.4 (.6)	1.3 (.8)
Median (range)	1 (0-3)	1 (0-2)	1 (1-3)	1 (0-3)
LEGR				
Mean (sd)	1.8 (.4)	1.7 (.4)	1.8 (.4)	1.7 (.44)
Median (range)	2 (1-2)	2 (1-2)	2 (1-2)	2 (1-2)
Placing Reflex				
Mean (sd)	1.3 (.7)	1.7 (.5)	1.6 (.7)	1.6 (.7)
Median (range)	1 (0-2)	2 (1-2)	2 (0-2)	2 (0-2)
Stepping Reflex				
Mean (sd)	.60 (.89)	.77 (.84)	.47 (.70)	.64 (.71)
Median (range)	0 (0-3)	1 (0-2)	0 (0-2)	1 (0-2)

Notes. sd = standard deviation; ATNR = asymmetical tonic neck reflex; STNR = symmetrical tonic neck reflex; TLS = tonic labyrinthine reflex in supine; TLP = tonic labyrinthine reflex in prone; HOB = segmental roll, head on body reaction; BOB = segmental roll, body on body reaction; UEGR = upper extremity grasp reflex; LEGR = lower extremity grasp reflex.

Table 4-6. Primitive Reflex Profile (continued)

Assessment Age	Group			
	Cesarean-Breech	Cesarean-Cephalic	Vaginal-Breech	Vaginal-Cephalic
5 Months	(n = 39)	(n = 39)	(n = 36)	(n = 39)
ATNR				
Mean (sd)	.05 (.32)	.05 (.22)	.22 (.64)	.15 (.54)
Median (range)	0 (0-2)	0 (0-1)	0 (0-2)	0 (0-2)
STNR				
Mean (sd)	0	0	0	0
Median (range)	0	0	0	0
Positive Support Reflex				
Mean (sd)	1.59 (.55)	1.56 (.55)	1.50 (.51)	1.46 (.64)
Median (range)	2 (0-2)	2 (1-3)	1.5 (1-2)	1 (1-3)
TLS				
Mean (sd)	0	0	0	0
Median (range)	0	0	0	0
TLP				
Mean (sd)	.08 (.35)	.03 (.16)	.22 (.48)	.13 (.47)
Median (range)	0 (0-2)	0 (0-1)	0 (0-2)	0 (0-2)
HOB				
Mean (sd)	2.08 (.70)	2.23 (.90)	2.42 (.73)	2.13 (.92)
Median (range)	2 (0-3)	2 (0-3)	3 (1-3)	2 (0-4)
BOB				
Mean (sd)	1.67 (.58)	1.51 (.60)	1.53 (.61)	1.38 (.49)
Median (range)	2 (0-3)	2 (0-3)	2 (0-3)	1 (1-2)
Galant Reflex				
Mean (sd)	.28 (.56)	.44 (.64)	.25 (.55)	.28 (.56)
Median (range)	0 (0-2)	0 (0-2)	0 (0-2)	0 (0-2)
Moro Reflex				
Mean (sd)	.49 (.51)	.44 (.50)	.11 (.32)	.21 (.41)
Median (range)	0 (0-1)	0 (0-1)	0 (0-1)	0 (0-1)
UEGR				
Mean (sd)	.13 (.41)	.23 (.54)	.28 (.70)	.21 (.47)
Median (range)	0 (0-2)	0 (0-2)	0 (0-3)	0 (02)
LEGR				
Mean (sd)	1.49 (.51)	1.51 (.56)	1.58 (.50)	1.54 (.55)
Median (range)	1 (1-2)	2 (0-2)	2 (1-2)	2 (0-2)
Placing Reflex				
Mean (sd)	1.51 (.82)	1.64 (.58)	1.64 (.68)	1.51 (.76)
Median (range)	2 (0-3)	2 (0-2)	2 (0-2)	2 (0-2)
Stepping Reflex				
Mean (sd)	.28 (.60)	.26 (.55)	.25 (.50)	.23 (.43)
Median (range)	0 (0-2)	0 (0-2)	0 (0-2)	0 (0-1)

Notes. sd = standard deviation; ATNR = asymmetical tonic neck reflex; STNR = symmetrical tonic neck reflex; TLS = tonic labyrinthine reflex in supine; TLP = tonic labyrinthine reflex in prone; HOB = segmental roll, head on body reaction; BOB = segmental roll, body on body reaction; UEGR = upper extremity grasp reflex: LEGR = lower extremity grasp reflex.

Joint Angles

Summary data for joint angles as measured by the items from the *INFANIB* from birth to 15 months are listed in Table 4-7. As for the *PRP* items, box plots were not constructed for the individual *INFANIB* items due to lack of variation in scores. To clarify the distribution of the data, both the mean and standard deviation, and the median and range are reported. The means and standard deviations for the total French Angles factor (sum of the first four items) across the ages are documented in Table 4-8. Inspection of the box plots of the French Angles factor (Figure 4-6) reveals a feature of interest. While infants in all four groups became more flexible over time between 6 weeks and 15 months, this pattern was not observed from birth to 6 weeks. At this early stage, infants either remained unchanged (cephalic groups) or became less flexible (breech groups).

"Time by Presentation by Delivery" repeated measures analyses were conducted on each of the five variables and the French Angles factor, using chronological age at the first assessment and gestational age at birth as covariates. Bonferroni's correction for the five items resulted in an adjusted alpha level of .01. Results of the inferential analyses are contained in Appendix 4X. The assumption of homogeneity of covariance among all levels of between subjects effects was not violated for any item of the French Angles factor. Only popliteal angle obtained a significant main effect. Breech-presenting infants obtained significantly larger popliteal angles than cephalic-presenting infants over the course of the study.

As expected, highly statistically significant main within subjects effects of "time" were noted for each individual item and the French Angles factor. The assumptions regarding the variance-covariance matrix were not met for any of the individual items or the French Angles factor. This violation potentially affected only the results of the French Angles factor, which obtained a significant "time by presentation" interaction, and the popliteal angle, which also obtained a "time by presentation" interaction. For the French Angles factor, an adjusted critical value for the F ratio was calculated by multiplying the value of the Greenhouse-Geisser epsilon (.72) by the degrees of freedom of the numerator and denominator separately. With 4 degrees of freedom in the

Table 4-7. Joint Angles

Assessment Age	Group			
	Cesarean-Breech	Cesarean-Cephalic	Vaginal-Breech	Vaginal-Cephalic
Term	(n = 48)	(n = 50)	(n = 40)	(n = 40)
Scarf Sign				
Mean (sd)	3.8 (1.1)	3.6 (1.1)	3.8 (1.1)	3.7 (1.1)
Median (range)	4 (2-6) (n=47)	4 (2-6)	4 (2-5)	4 (2-5)
Heel to Ear				
Mean (sd)	3.8 (1.2)	3.1 (1.1)	3.9 (1.2)	3.0 (1.2)
Median (range)	4 (1-5)	3 (1-5)	4 (1-6)	3 (1-5)
Popliteal Angle				
Mean (sd)	5.3 (.8)	4.6 (1.1)	4.9 (1.1)	4.4 (1.0)
Median (range)	5 (3-6)	5 (1-6)	5 (3-6)	5 (3-6)
Hip Abduction				
Mean (sd)	3.0 (.9)	2.8 (.9)	2.9 (1.0)	2.9 (.7)
Median (range)	3 (2-5)	3 (1-4)	3 (2-5)	3 (2-5)
Ankle Dorsiflexion				
Mean (sd)	1.5 (.5)	1.4 (.5)	1.6 (.6)	1.6 (.6)
Median (range)	2 (1-3)	1 (1-2) (n=49)	1.5 (1-3)	2 (1-3)
6 Weeks	(n = 45)	(n = 38)	(n = 37)	(n = 39)
Scarf Sign				
Mean (sd)	3.3 (1.0)	3.4 (1.0)	3.5 (1.0)	3.7 (.9)
Median (range)	3 (2-5)	3 (2-5)	3 (2-5)	4 (2-6)
Heel to Ear				
Mean (sd)	2.4 (1.0)	2.0 (.7)	2.2 (1.0)	2.1 (.8)
Median (range)	2 (1-5)	2 (1-4)	2 (1-5)	2 (1-4)
Popliteal Angle				
Mean (sd)	5.3 (.5)	5.0 (1.0)	5.3 (.5)	5.1 (.6)
Median (range)	5 (5-6)	5 (2-6)	5 (4-6)	5 (4-6)
Hip Abduction				
Mean (sd)	2.4 (.7)	2.7 (.7)	2.9 (.9)	2.8 (.8)
Median (range)	2 (1-4)	3 (2-4)	3 (2-5)	3 (1-5)
Ankle Dorsiflexion				
Mean (sd)	2.3 (.6)	2.2 (.6)	2.0 (.5)	2.2 (.5)
Median (range)	2 (1-4)	2 (1-4)	2 (1-3)	2 (1-3)
3 Months	(n = 38)	(n = 39)	(n = 36)	(n = 39)
Scarf Sign				
Mean (sd)	3.4 (.9)	3.5 (.9)	3.4 (.9)	3.5 (.9)
Median (range)	3 (2-5)	3 (2-5)	3 (2-6)	3 (1-5)
Heel to Ear				
Mean (sd)	2.3 (.8)	2.2 (.7)	2.4 (.7)	2.3 (.8)
Median (range)	2 (1-4)	2 (1-4)	2 (1-4)	2 (1-4)
Popliteal Angle				
Mean (sd)	5.7 (.5)	5.5 (.8)	5.7 (.5)	5.5 (.6)
Median (range)	6 (5-6)	6 (2-6)	6 (5-6)	6 (4-6)
Hip Abduction				
Mean (sd)	3.2 (.8)	3.5 (.9)	3.4 (.8)	3.7 (.8)
Median (range)	3 (2-5)	4 (2-5)	3.5 (2-5)	4 (1-5)
Ankle Dorsiflexion				
Mean (sd)	2.4 (.5)	2.2 (.5)	2.2 (.5)	2.3 (.5)
Median (range)	2 (2-3)	2 (1-3)	2 (1-3)	2 (2-4)

Notes. sd = standard deviation.

Table 4-7. Joint Angles (continued)

Assessment Age	Group			
	Cesarean-Breech	Cesarean-Cephalic	Vaginal-Breech	Vaginal-Cephalic
5 Months	(n = 39)	(n = 39)	(n = 36)	(n = 39)
Scarf Sign				
Mean (sd)	4.1 (.8)	4.2 (.9)	3.9 (.9)	4.1 (.9)
Median (range)	4 (2-5)	4 (2-5)	4 (2-6)	4 (2-6)
Heel to Ear				
Mean (sd)	3.2 (.8)	3.4 (1.0)	3.4 (.9)	2.9 (.8)
Median (range)	3 (1-5)	3 (2-5)	3 (2-5)	3 (1-4)
Popliteal Angle				
Mean (sd)	5.9 (.2)	5.9 (.2)	6.0 (.2)	5.8 (.4)
Median (range)	6 (5-6)	6 (5-6)	6 (5-6)	6 (5-6)
Hip Abduction				
Mean (sd)	3.9 (.6)	4.2 (.9)	4.2 (.9)	4.3 (.8)
Median (range)	4 (3-5)	4 (3-6)	4 (2-6)	4 (3-6)
Ankle Dorsiflexion				
Mean (sd)	2.4 (.6)	2.3 (.8)	2.3 (.5)	2.3 (.6)
Median (range)	2 (1-3)	2 (1-5)	2 (1-3)	2 (1-3)
7 Months	(n = 36)	(n = 38)	(n = 36)	(n = 38)
Scarf Sign				
Mean (sd)	4.3 (.8)	4.4 (.9)	4.4 (.8)	4.3 (.7)
Median (range)	4 (2-5)	5 (3-6)	5 (3-6)	4 (3-6)
Heel to Ear				
Mean (sd)	3.9 (.8)	3.8 (.9)	4.0 (.9)	3.8 (.8)
Median (range)	4 (2-5)	4 (1-5)	4 (2-5)	4 (2-5)
Popliteal Angle				
Mean (sd)	6	5.9 (.2)	5.9 (.2)	6
Median (range)	6	6 (5-6)	6 (5-6)	6
Hip Abduction				
Mean (sd)	4.4 (.8)	4.7 (.9)	5.0 (.8)	5.1 (.8)
Median (range)	4 (3-6)	5 (3-6)	5 (3-6)	5 (4-6)
Ankle Dorsiflexion				
Mean (sd)	2.6 (.6)	2.5 (.8)	2.4 (.7)	2.4 (.6)
Median (range)	3 (2-5)	2 (1-5)	2 (1-5)	2 (1-4)
10 Months	(n = 37)	(n = 37)	(n = 35)	(n = 37)
Scarf Sign				
Mean (sd)	4.5 (.7)	4.8 (.9)	4.6 (.9)	4.5 (.8)
Median (range)	5 (3-5)	5 (3-6)	5 (3-6)	5 (3-6)
Heel to Ear				
Mean (sd)	4.1 (.9)	4.3 (.9)	4.2 (1.1)	4.2 (.9)
Median (range)	4 (2-5)	5 (2-5)	4 (2-6)	4 (2-6)
Popliteal Angle				
Mean (sd)	5.9 (.3)	6.0 (.2)	5.9 (.3)	6.0 (.2)
Median (range)	6 (5-6)	6 (5-6)	6 (5-6)	6 (5-6)
Hip Abduction				
Mean (sd)	4.7 (.7)	5.3 (.8)	5.3 (.8)	5.1 (.8)
Median (range)	5 (3-6)	5 (3-6)	6 (4-6)	5 (3-6)
Ankle Dorsiflexion				
Mean (sd)	2.6 (.6)	2.5 (.6)	2.3 (.5)	2.6 (.6)
Median (range)	3 (2-4)	2 (2-4)	2 (1-3)	3 (2-4)

Notes. sd = standard deviation.

Table 4-7. Joint Angles (continued)

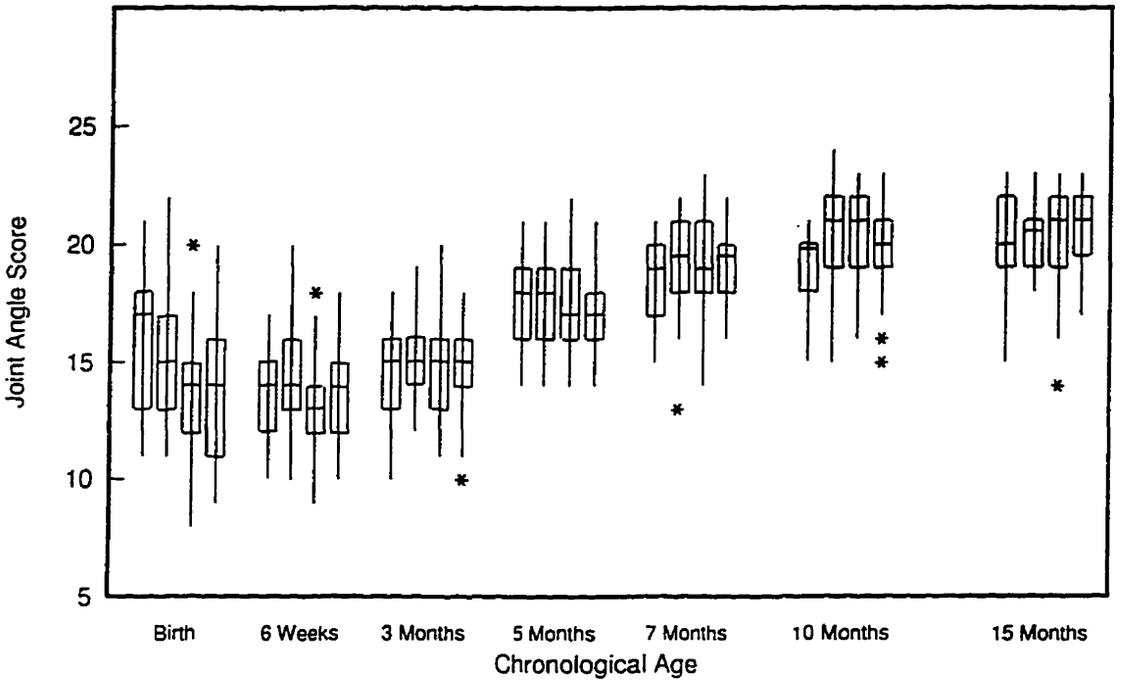
Assessment Age	Group			
	Cesarean-Breech	Cesarean-Cephalic	Vaginal-Breech	Vaginal-Cephalic
15 Months	(n = 36)	(n = 37)	(n = 34)	(n = 36)
Scarf Sign				
Mean (sd)	5.2 (.9)	5.0 (1.1)	4.9 (.7)	4.7 (1.0)
Median (range)	5 (3-6)	5 (3-6)	5 (3-6)	5 (3-6)
Heel to Ear				
Mean (sd)	4.0 (.9)	4.0 (1.0)	4.3 (.8)	4.1 (.9)
Median (range)	4 (2-5)	4 (1-5)	4 (3-5)	4 (2-5)
Popliteal Angle				
Mean (sd)	5.9 (.2)	5.9 (.2)	6	5.9 (.2)
Median (range)	6 (5-6)	6 (5-6)	6	6 (5-6)
Hip Abduction				
Mean (sd)	5.2 (.6)	5.5 (.6)	5.3 (.7)	5.6 (.6)
Median (range)	5 (4-6)	6 (4-6)	5 (4-6)	6 (4-6)
Ankle Dorsiflexion				
Mean (sd)	2.9 (.7)	2.9 (.4)	2.9 (.6)	2.9 (.6)
Median (range)	3 (2-5)	3 (2-4)	3 (2-5)	3 (2-5)

Notes. sd = standard deviation.

Table 4-8. INFANIB: French Angles Factor

Assessment Age	Group			
	Cesarean-Breech	Cesarean-Cephalic	Vaginal-Breech	Vaginal-Cephalic
Term	(n = 48)	(n = 50)	(n = 40)	(n = 40)
Mean	15.9	14.0	15.4	13.9
Standard Deviation	2.8	2.6	2.8	3.0
6 Weeks	(n = 45)	(n = 38)	(n = 37)	(n = 39)
Mean	13.5	13.1	13.9	13.8
Standard Deviation	2.0	2.3	2.1	1.9
3 Months	(n = 38)	(n = 39)	(n = 36)	(n = 39)
Mean	14.5	14.7	14.9	15.0
Standard Deviation	2.0	2.2	1.8	1.9
5 Months	(n = 39)	(n = 39)	(n = 36)	(n = 39)
Mean	17.2	17.7	17.5	17.2
Standard Deviation	1.8	2.1	1.8	1.5
7 Months	(n = 36)	(n = 38)	(n = 36)	(n = 39)
Mean	18.6	18.8	19.4	19.1
Standard Deviation	1.7	2.3	1.9	1.6
10 Months	(n = 37)	(n = 37)	(n = 35)	(n = 37)
Mean	19.2	20.4	20.1	19.7
Standard Deviation	1.6	2.0	2.3	1.8
15 Months	(n = 36)	(n = 37)	(n = 34)	(n = 36)
Mean	20.4	20.4	20.4	20.4
Standard Deviation	2.0	2.2	1.4	1.8

Figure 4-6. Box-plots of Change in French Angles Factor



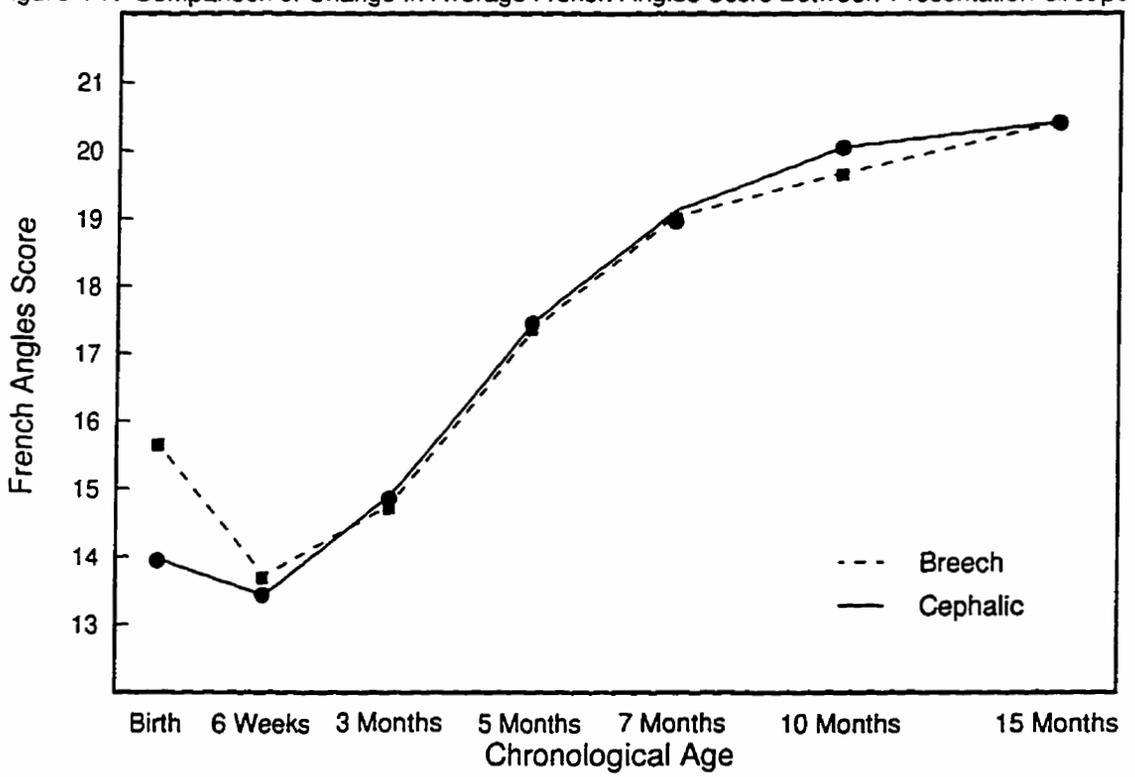
At each chronological age, groups from left to right are cesarean-breech, vaginal-breech, cesarean-cephalic, and vaginal-cephalic.

numerator, and 500 degrees of freedom in the denominator, and adjusted F (critical) of 2.39 was obtained. The previously obtained F (observed) of 2.72 remained greater than this adjusted value; therefore the "time by presentation" interaction remained statistically significant, despite violation of the assumption. The p value for significance of the interaction for popliteal angle was less than .001, therefore the result is not affected by the violation of the assumption.

To determine at which point post-hoc analyses would be conducted to elucidate the timing of significant differences in overall flexibility over the first 15 months, the unadjusted averages of the French Angles factor between breech- and cephalic-presenting infants were plotted and compared (Figure 4-7). Post-hoc comparisons were conducted between birth and 6 weeks and 10 and 15 months. A significant interaction was obtained for the first, but not the second contrast. Breech-presenting infants were significantly

more flexible than cephalic-presenting infants at birth, but from 6 weeks of age, their changes in scores were similar. Calculations are detailed in Appendix 4X.

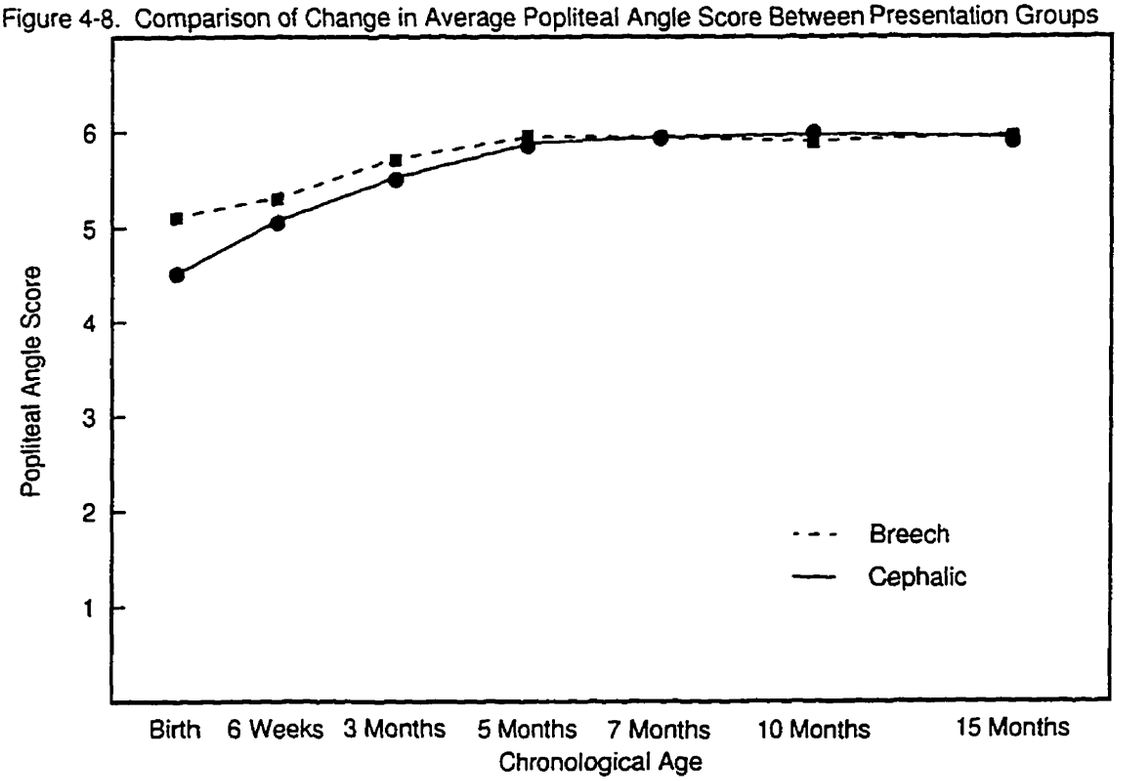
Figure 4-7. Comparison of Change in Average French Angles Score Between Presentation Groups



To determine the periods for which post-hoc analyses would be conducted to clarify the age at which the significant "time by presentation" interaction of the popliteal angle occurred, the average unadjusted values for breech- and cephalic-presenting infants were compared using visual inspection (Figure 4-8). Breech-presenting infants were more flexible than their counterparts at each assessment session from birth to 5 months, and thereafter, were either the same or less flexible. Given the disordinal interaction, this within subjects interaction of "time by presentation" is more important than the previously noted between subjects main effect of "presentation" for popliteal angle. The

difference in angle between the two presentation groups was .6, .25, .2, and .1 of a point at birth, 6 weeks, and 3 and 5 months. Post-hoc analyses of the significance of the "differences between differences" between these groups were conducted between birth and 6 weeks, 3 and 5 months, and 6 weeks and 3 months. A significant interaction was obtained for the first contrast, but not for the second one, and therefore, the third contrast was not conducted. Breech-presenting infants had significantly larger popliteal angles than cephalic presenting infants at birth, but by 6 weeks the groups were no different. Breech-presenting infants assumed a trajectory of increasing flexibility over time that was similar to cephalic-presenting infants after 6 weeks of age. Details of the multiple comparisons are contained in Appendix 4X.

Figure 4-8. Comparison of Change in Average Popliteal Angle Score Between Presentation Groups



At 18 months, joint laxity was measured and is summarized in Table 4-9. No differences are apparent in the table, and the results of the "time by presentation by delivery" analyses for the individual items and the total laxity score were statistically nonsignificant (Appendix 4X).

Table 4-9. Joint Laxity

Item		Group			
		Cesarean-Breech (n = 36)	Cesarean-Cephalic (n = 36)	Vaginal-Breech (n = 34)	Vaginal-Cephalic (n = 36)
Elbow Extension	Mean (sd)	.06 (.3)	.11 (.5)	0	0
	Median (range)	0 (0-2)	0 (0-2)	0	0
Knee Extension	Mean (sd)	.28 (.7)	.25 (.6)	0	.22 (.6)
	Median (range)	0 (0-2)	0 (0-2)	0	0 (0-2)
Thumb-to-Wrist	Mean (sd)	1.3 (1.0)	1.4 (.9)	1.5 (.9)	1.5 (.9)
	Median (range)	2 (0-2)	2 (0-2)	2 (0-2)	2 (0-2)
Fifth MCP Extension	Mean (sd)	.67 (1.0)	.75 (1.0)	1.0 (1.0)	.83 (1.0)
	Median (range)	0 (0-2)	0 (0-2)	.5 (0-2)	0 (0-2)
Total Laxity Score	Mean (sd)	2.3 (1.9)	2.6 (2.2)	2.5 (1.5)	2.6 (1.4)

Notes. MCP = metacarpophalengeal: sd = standard deviation.

Motor Performance

Summary data for the *AIMS* subsection and total scores across the ages assessed are contained in Tables 4-10 and 4-11 respectively. Figure 4-9 contains box plots for the total scores from 6 weeks to 15 months. All infants obtained top scores by 18 months, except IDs 109 and 126, who were identified as neurologically "suspicious". No striking group differences or trends over time are apparent upon inspection of these descriptive data.

Table 4-10 Alberta Infant Motor Scale Subsections

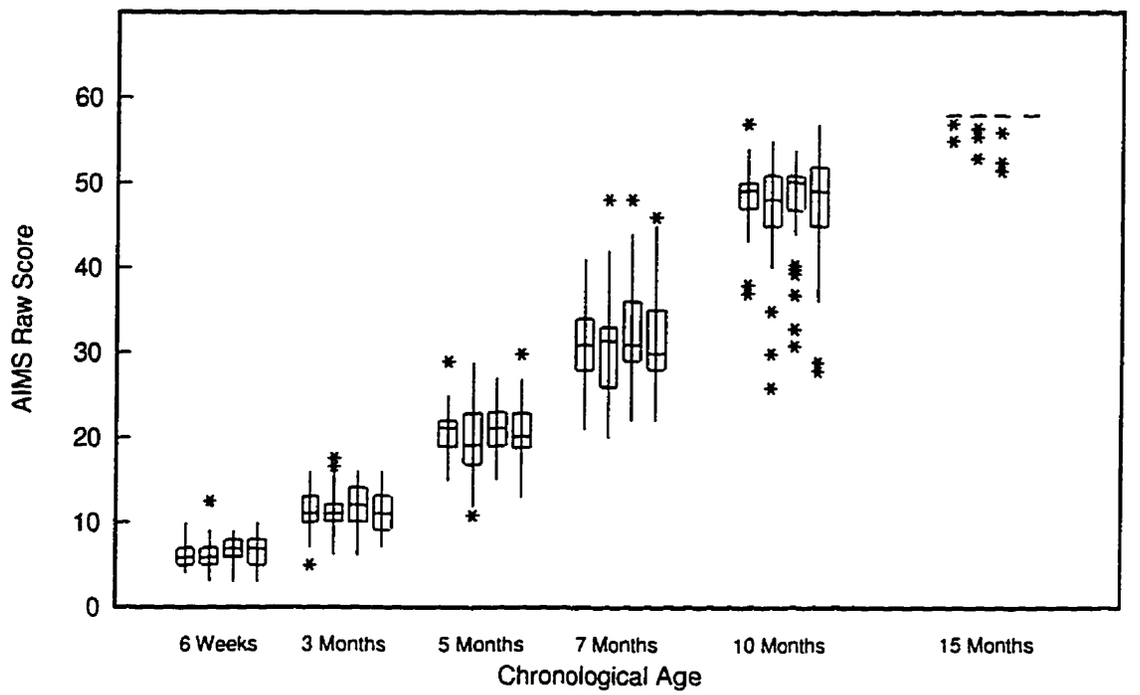
Assessment Age	Group			
	Cesarean-Breech	Cesarean-Cephalic	Vaginal-Breech	Vaginal-Cephalic
6 Weeks	(n = 45)	(n = 38)	(n = 37)	(n = 39)
Prone	1.6 (.6)	1.7 (.6)	1.7 (.8)	2.0 (.9)
Supine	2.6 (.6)	2.7 (.6)	2.4 (.6)	2.6 (.6)
Sitting	.7 (.6)	1.0 (.6)	.7 (.8)	.8 (.6)
Standing	1.3 (.4)	1.6 (.5)	1.4 (.5)	1.6 (.5)
3 Months	(n = 38)	(n = 39)	(n = 36)	(n = 39)
Prone	3.4 (1.3)	3.6 (1.3)	3.1 (1.2)	3.3 (1.3)
Supine	3.8 (.9)	4.1 (.9)	4.0 (1.0)	3.9 (.8)
Sitting	2.3 (1.0)	2.3 (1.1)	2.2 (1.0)	1.9 (.9)
Standing	2.1 (.5)	2.1 (.4)	2.0 (.4)	2.1 (.5)
5 Months	(n = 39)	(n = 39)	(n = 36)	(n = 39)
Prone	6.7 (1.6)	6.9 (1.7)	6.3 (1.8)	6.9 (1.7)
Supine	6.7 (1.0)	7.2 (1.1)	6.6 (1.3)	6.8 (1.4)
Sitting	4.8 (1.1)	4.7 (1.3)	4.3 (1.5)	4.5 (1.3)
Standing	2.5 (.6)	2.4 (.5)	2.4 (.5)	2.5 (.5)
7 Months	(n = 36)	(n = 38)	(n = 36)	(n = 38)
Prone	11.4 (3.0)	11.9 (3.5)	11.1 (3.5)	11.7 (3.8)
Supine	8.2 (.9)	8.4 (.8)	8.3 (.8)	8.0 (.9)
Sitting	8.4 (1.4)	8.6 (1.6)	8.6 (1.6)	8.6 (1.5)
Standing	2.9 (.6)	3.2 (1.3)	3.1 (1.1)	3.3 (1.5)
10 Months	(n = 37)	(n = 37)	(n = 35)	(n = 37)
Prone	19.1 (1.4)	19.2 (2.2)	18.3 (3.1)	18.6 (2.9)
Supine	9	8.9 (.2)	8.9 (.4)	8.8 (.7)
Sitting	11.0 (1.0)	11.0 (1.2)	10.9 (1.1)	11.1 (1.0)
Standing	9.2 (2.5)	8.7 (3.0)	8.5 (2.8)	9.1 (3.1)

Notes. Mean (standard deviation in brackets).

Table 4-11. Alberta Infant Motor Scale

Assessment Age	Group			
	Cesarean-Breech	Cesarean-Cephalic	Vaginal-Breech	Vaginal-Cephalic
6 Weeks	(n = 45)	(n = 38)	(n = 37)	(n = 39)
Mean	6.1	6.9	6.2	7.0
Standard Deviation	1.5	1.7	1.8	1.9
3 Months	(n = 38)	(n = 39)	(n = 36)	(n = 39)
Mean	11.6	12.1	11.2	11.2
Standard Deviation	2.4	2.5	2.6	2.3
5 Months	(n = 39)	(n = 39)	(n = 36)	(n = 39)
Mean	20.7	21.2	19.6	20.7
Standard Deviation	2.7	3.0	3.9	3.5
7 Months	(n = 36)	(n = 38)	(n = 36)	(n = 38)
Mean	30.8	32.1	31.1	31.6
Standard Deviation	4.1	5.7	6.0	6.3
10 Months	(n = 37)	(n = 37)	(n = 35)	(n = 37)
Mean	48.2	47.9	46.7	47.6
Standard Deviation	3.8	5.7	6.2	6.9
15 Months	(n = 36)	(n = 37)	(n = 34)	(n = 36)
Mean	57.9	57.6	57.7	58.0
Standard Deviation	.5	1.4	1.0	--

Figure 4-9. Box-plots of Change in AIMS Total Scores



At each chronological age, groups from left to right are cesarean-breech, vaginal-breech, cesarean-cephalic, and vaginal-cephalic.

Three-way repeated measures analyses were conducted on subsection scores from 6 weeks to 10 months, and from 6 weeks to 15 months for the total score. Analyses were limited for the subsections because many singular variance-covariance matrices occurred with inclusion of the 15 month data. Bonferroni's correction was used to adjust the p value from .05 to .0125 for the four subsections analysed. Results are contained in Appendix 4Y. Aside from the highly statistically significant main within subjects effect of "time" for all subsections and total score, no significant effects were obtained.

The total AIMS scores for each of the four groups were also compared with the norms on the *AIMS* at 6 weeks, and 3, 5, 7, and 10 months using a series of z-tests. Details of the analyses are contained in Appendix 4Y. Group scores were not significantly different from the normative data except for the following exceptions. First, the cesarean-cephalic group obtained significantly higher average scores than the normative sample at 3 months of age, and at 15 months, the cesarean-breech and vaginal-cephalic groups obtained higher average scores. Second, cesarean-breech and vaginal-breech groups obtained highly statistically significant lower average scores at 6 weeks ($p < .001$).

Inspection of the proportion of *AIMS* items observed and not observed at 6 weeks of age among the four groups led to the selection of one item for further analysis: supported standing (2). Chi-square analysis determined that the proportion of infants who were credited with this item was significantly different among the four groups (Chi-square = 14.44, df = 3, p = .002). To confirm the source of this difference, analyses were repeated for presentation and mode of delivery groups; only presentation groups were different (Chi-square = 13.75, df = 1, p = .0002) with fewer breech-presenting infants being credited with the item. Specifically, 65 percent of cephalic-presenting infants were credited with the item, in contrast to 35 percent of breech-presenting infants. The most striking changes from the first to the second supported standing items on the *AIMS* are the head being held in line with the body, instead of being flexed forward, when viewed from the side, and more consistent bearing of weight through the lower extremities.

To determine whether a loss of statistical significance in motor differences by 3 months might be explained by either a greater drop out among breech-presenting infants

with lower 6 week *AIMS* scores or cephalic-presenting infants with higher 6 weeks *AIMS* scores, t-tests were conducted. No difference in 6 week scores was obtained between those who had or had not dropped out by 3 months for either the breech ($t = -.85$, $df = 80$, $p = .40$) or cephalic ($t = .44$, $df = 75$, $p = .66$) groups.

A summary of the results of the Gross Motor and Fine Motor Subscales of the *PDMS* evaluated at 15 months is contained in Table 4-12. Two-way ANOVAs were conducted on the four skill areas within each subscale, and on the total subscale scores. Bonferroni's correction yielded an adjusted alpha level of .013 for the skill areas. No statistically significant main effects or interactions were obtained (Appendix 4Y).

Table 4-12. Peabody Developmental Motor Scales

Subscale and Skill Area	Group			
	Cesarean-Breech (n = 36)	Cesarean-Cephalic (n = 37)	Vaginal-Breech (n = 34)	Vaginal-Cephalic (n = 36)
Gross Motor Total				
Mean	154.0	155.4	155.5	156.6
Standard Deviation	7.8	7.6	6.3	4.2
Balance				
Mean	26.3	26.0	26.1	26.4
Standard Deviation	1.3	1.8	1.2	.9
Non-locomotor				
Mean	62.6	62.4	62.5	62.4
Standard Deviation	.9	.7	.9	.8
Locomotor				
Mean	34.8	36.2	35.9	36.5
Standard Deviation	4.3	4.5	3.9	3.0
Receipt / Propulsion				
Mean	6.3	6.9	7.0	7.3
Standard Deviation	2.4	2.2	2.2	1.8
Fine Motor Total				
Mean	123.3	121.7	122.7	123.3
Standard Deviation	4.6	5.1	4.1	5.4
Grasping				
Mean	41.3	41.4	41.3	41.3
Standard Deviation	1.0	.9	1.2	1.0
Hand Use				
Mean	40.7	40.7	40.7	40.7
Standard Deviation	1.7	1.5	1.3	1.5
Eye-Hand Coordination				
Mean	34.9	33.3	34.4	35.1
Standard Deviation	2.5	3.0	2.7	3.4
Manual Dexterity				
Mean	6.4	6.3	6.4	6.2
Standard Deviation	1.5	1.1	1.3	1.1

A summary of the ages at which the infants first walked (by parental report) is contained in Table 4-13. All of the averages are close to 12 months. A 2-way ANOVA resulted in no significant findings (Appendix Y).

Over the course of the study, ten children were observed to use forms of movement other than crawling at 10 months of age. Seven of these children presented in the breech: four had been delivered via cesarean delivery (ID 30, 34, 49, 103) and three vaginally (ID 45, 68, 171). The remaining three were in vertex presentation, one was delivered by cesarean section (ID 50), and two vaginally (ID 47, 174). With the exception of cases 103, 171 and 174, these infants did not crawl before becoming ambulatory.

Table 4-13. Age Walked

	Group			
Months (parental report)	Cesarean-Breech (n = 36)	Cesarean-Cephalic (n = 36)	Vaginal-Breech (n = 34)	Vaginal-Cephalic (n = 36)
Mean	11.8	11.8	12.2	11.8
Standard Deviation	1.3	1.5	1.6	1.4

Neurological Status at 18 months

Two children in the cesarean-breech group were identified by the pediatrician to be developing "suspiciously" at 18 months. Both of these deliveries were elective cesarean sections, with no labour. Subject 6 was identified to have strabismus, a tremor, and a global delay. Subject 109 was identified to have hypotonicity in the shoulder girdle, hypertonia in the lower extremities, strabismus, and poor balance. He was referred to the Glenrose Rehabilitation Hospital for an assessment, and was subsequently diagnosed with a degenerative central nervous system disorder (deceased July 1996, aged 2 1/2 years). One child in the cesarean-cephalic group (ID 126) was identified to be developing "suspiciously" on the basis that he had not yet acquired independent ambulation. His mother reported a history of late walking. A summary of the outcomes of the infants assessed at 18 months is contained in Table 4-14.

Table 4-14. Neurological Outcome

	Group			
	Cesarean-Breech (n = 36)	**Cesarean-Cephalic** (n = 36)	**Vaginal-Breech** (n = 34)	**Vaginal-Cephalic** (n = 36)
Normal	34	35	34	36
Suspicious	2	1	0	0
Abnormal	0	0	0	0

Minimal Congenital Anomalies

Only one infant in the total sample (ID 59, cesarean-breech) was identified to have a minimal congenital anomaly at birth. She was described as having an unusual head shape and tapered fingers. The family withdrew from the study after the first assessment due to the infant's failure to thrive. This child has subsequently been referred to the Glenrose Rehabilitation Hospital and has been diagnosed with myoclonic seizures, mental retardation, and severe cerebral palsy (spastic quadriplegia).

Anomalies of ectodermal origin were specifically targeted; however, none were detected at either the pediatric hospital discharge examination or the 18 month assessment. Other congenital anomalies were noted. Congenital dysplasia of the hip was present in four infants, all of whom had been in breech presentation: three were delivered abdominally (ID 37, 72, 84) and one vaginally (ID 166). Congenital muscular torticollis was observed in four infants: one in each of the four study cells (ID 47, 50, 103, 166). Two of these infants (47, 50) did not crawl before walking; both of them had been in cephalic presentation prior to delivery. Two infants (ID 114, 148), both in the cesarean-cephalic group, exhibited major plagiocephaly in the absence of congenital muscular torticollis. Both were evaluated for craniosynostosis with negative results.

Additional anomalies among breech-presenting infants included craniosynostosis (ID 54), a liver anomaly (ID 144), and a cardiac septal defect (ID 157). The first two were managed surgically, the latter conservatively. Among cephalic-presenting infants, two infants were diagnosed early with significant medical problems and promptly treated with

excellent results. One infant had infantile spasms (ID 70); the other had congenital hypothyroidism (ID 178). In all of these cases, the diagnoses were made after the infants had been recruited into the study.

Summary of Results

One hundred and eighty infants were recruited to investigate possible differences and interactions between presentation (breech versus cephalic) and mode of delivery (cesarean section versus vaginal) over the first eighteen months of life. Information was collected on neurological status at birth, growth (length, weight, and head circumference), primitive reflexes, joint angles, motor development, neurological status at 18 months, and minimal congenital anomalies.

The four groups of infants demonstrated some differences at the time of recruitment. Breech infants were born at earlier gestational ages, infants delivered by cesarean section were assessed earlier initially, vaginal-breech and cesarean-cephalic infants had lower Apgar scores at 1 minute than vaginal-cephalic infants, and of those delivered by cesarean section, infants in cephalic presentation were more likely to have experienced labour. Gestational age and chronological age in hours at the time of the first assessment were used as covariates in the analyses. Neither the one minute Apgar score nor the experience of labour affected the early results.

Over the course of the 18 month study, the attrition rate was 21.2 percent. Those dropping out were more likely to have been born at the Royal Alexandra Hospital, by cesarean section, to younger mothers, or of non-Caucasian descent than those remaining in the study. When the characteristics of infants remaining in the study were compared with data collected from the normative sample of the *AIMS*, with few exceptions, no differences were obtained.

Two-way ANOVAs or 3-way ANOVAs with repeated measures were conducted on each dependent variable to determine significant main effects of "presentation" and "delivery", interactions of "presentation by delivery", or interactions between either "presentation" or "delivery" and "time".

The neurological assessment at birth revealed only that breech-presenting infants had larger popliteal angles than cephalic-presenting infants. This finding was corroborated by the joint angle data. Breech-presenting infants were observed to have greater overall flexibility at birth, but were similar to cephalic-presenting infants thereafter. This effect of overall flexibility resulted from contributions of all 4 items of the French Angles factor, but upon item analyses, only popliteal angle was statistically significant. Again, breech-presenting infants had larger angles at birth, but developed similarly to their counterparts as they matured. No differences in joint laxity were detected between the groups at 18 months.

Breech infants were significantly shorter than cephalic infants early in life; they demonstrated "catch-up" growth by 5 months of age. Vaginally-delivered infants, regardless of mode of delivery, had smaller head circumference measurements than cesarean-delivered infants at birth only.

In terms of primitive reflexes, the only significant finding was a main effect of delivery on the Moro reflex. Infants delivered vaginally had more mature Moro reflex scores over the course of the first five months than infants delivered by cesarean section.

No statistically significant results were obtained from the 3-way repeated measures analysis of *AIMS* data on motor development; however, z-tests revealed that breech infants, regardless of mode of delivery, performed well below the normative sample at 6 weeks. Breech-presenting infants were less likely to exhibit the *AIMS* item supported standing (2) than cephalic presenting infants. No differences were obtained on the *PDMS* at 15 months or age of walking as determined by parental report. Of the 10 infants who were not crawling at 10 months, 7 had been breech.

At 18 months, three children were identified to be developing "suspiciously". Two had been in the cesarean-breech group: one was diagnosed with a global developmental delay, and the other was subsequently diagnosed with a degenerative central nervous system condition. The third infant was in the cesarean-cephalic group, and was identified as "suspicious" based on the observation that he was not yet walking, although was developing normally otherwise. One child who dropped out is known to have since been diagnosed with cerebral palsy (severe spastic quadriplegia), and was also from the

cesarean-breech group. No anomalies of ectodermal origin were detected in any of the infants.

Chapter 5
Discussion

Introduction

The relatively high rates of perinatal mortality and childhood morbidity among breech-presenting infants compared to their cephalic-presenting counterparts have resulted in the publication of many observational studies documenting the effects of mode of delivery. In a compelling commentary, Hytten (1982) stated that few investigators have addressed the fundamental question of why the fetus presents in the breech in the first place. During the 15 years since this editorial, the question has remained largely unanswered. To clarify why some fetuses fail to undergo cephalic version at the end of gestation, a comparison cohort study between breech- and cephalic-presenting infants, accounting for the possible effects of mode of delivery, was planned. Assuming continuity of motor functions from the origins of fetal movement through the perinatal period, three research hypotheses regarding the early postnatal physical and motor development of infants from these two presentation groups were proposed. Based on a critical review of the literature, breech-presenting infants were hypothesized to be inherently different from cephalic-presenting infants in the pattern of early development. however no differences between mode of delivery groups and no interactions between presentation and mode of delivery were anticipated.

The data do not support the first hypothesis: no persistent, inherent differences were obtained between the presentation groups. The second and third hypotheses were supported: no important effects of delivery or interactions between presentation and mode of delivery in the pattern of early physical and motor development were detected. Although support for the inherent difference hypothesis was not obtained, a few early differences between breech- and cephalic-presenting infants were present. Specifically, breech-presenting infants had greater popliteal angles at birth and were shorter than cephalic-presenting infants early in the first year. They also obtained significantly lower scores than the normative sample on the Alberta Infant Motor Scale *(AIMS)* at 6 weeks. After 3 months of age, however, all groups of infants were developing similarly. The

previous evidence that supports the premise that deficits in antenatal movement abilities may be causally implicated in breech presentation will be re-examined in light of the study findings.

Inherent Differences

The incidence of breech presentation is known to be greater among fetuses with major congenital abnormalities affecting neuromuscular function. The motor abilities of infants with diagnoses such as familial dysautonomia, myotonic dystrophy, meningomyelocele, hypopituitarism, or Wernig-Hoffmann, Smith-Lemli-Optiz, Prader Willi, Zellweger, or Down Syndromes are clearly different from morphologically normal infants (Axelrod et al., 1974; Braun et al. 1975; deZegher, 1995; Dunn, 1976b; Smith, 1976). In this study, infants with known or suspected major congenital anomalies were excluded from the sample. Based on the knowledge that minor anomalies of ectodermal origin are associated with anomalies of the central nervous system (Coorsen et al. 1991; Miller, 1989; Smith and Bostian, 1964), testing of the inherent difference hypothesis led to the evaluation of the presence and number of minor malformations around the time of birth and at 18 months. None of the infants in this study, in either presentation group, was identified to have any minor malformations of ectodermal origin. Despite collecting this information at two points, no support for the inherent difference hypothesis was obtained from this source.

Epidemiological evidence suggests that the excess rates of neurological morbidities among infants having presented by the breech have antenatal origins and are not a consequence of the effects of difficult vaginal deliveries (Croughan-Minihane, 1990; Nelson and Ellenberg, 1986). This study was not designed with a sufficient sample size to detect statistically significant differences in the proportions of neurologically abnormal infants between the presentation or mode of delivery groups. Nonetheless, the notion of intrinsic functional differences *was* supported in a few individual cases. Of the three children categorized "suspicious" at 18 months, the two with the more severe disorders (global delay and degenerative central nervous system disorder) had been breech presentations and were delivered by cesarean section. A third infant from the cesarean-

breech group, who had dropped out of the study, was subsequently diagnosed with severe spastic quadriplegia. The data, however, did not reveal differences in neonatal neurological status, thus concurring with results obtained by DeJong and Stolte (1982) and Luterkort et al. (1986a).

Close examination of the early longitudinal development of 13 primitive reflexes did not reveal any significant differences between the groups of infants that may explain a failure to undergo spontaneous cephalic version. Instead, these early elicited motor behaviours, for the most part, were observed to evolve similarly among all four groups of infants. These results do not support Milani Comparetti's suggestion that precursors to the lower extremity placing and stepping reflexes are critical determinants of the attainment of cephalic presentation prior to birth (1981). None of the breech-presenting infants had an absent lower extremity placing response when assessed soon after birth. In contrast, absent responses were recorded for several cephalic-presenting infants. The stepping reflex was noted to vary among all four groups of infants over time, being present (strongly or weakly) or absent with equal frequency among the four groups.

Similarly, no persistent differences were obtained on joint angles, growth, or motor performance. Given the evidence of a negative relationship between the quality of neuromotor performance and the incidence of breech presentation from infants with congenital anomalies (Dunn, 1976b) and those with precocious motor development (Cintas, 1988; Hofmeyer et al. 1986), subtle differences between the presentation groups were expected. Despite a careful analysis of many aspects of infant physical and motor development, support for the inherent difference hypothesis was not obtained.

Low power does not explain these results; the sample size was large enough to provide a power value of greater than .80 to detect "medium" main effects and interactions over time (Cohen, 1988). It might be argued that each of the items contained in the Dubowitz Assessment, *PRP*, French Angles Subsection of the *INFANIB*, and the *AIMS* offers an insufficient number of categories to enable possible differences between groups to be detected; however, all of these measures have been developed to detect clinically meaningful differences. Thus, breech-presenting infants were found to have no clinically meaningful, persistent, inherent differences in neurological status, growth,

primitive reflexes, joint angles, or motor performance when compared to cephalic-presenting infants.

Transient Differences

In contrast to the lack of support for inherent differences, minor transient differences were detected. First, the joint angle data revealed that breech-presenting infants had greater popliteal angles at birth; but by 6 weeks of age, their flexibility scores were no different from cephalic-presenting infants. This finding differs from the results of another group investigating the variations and effects of range of motion on early motor development of infants who had been in breech presentation (Sival et al. 1993). These investigators followed the postnatal development of motor functions of 13 infants who had been breech and compared their results with historical controls. Breech infants exhibited less hip extension in the neonatal period, maintained an attitude of hip flexion in the first 12 weeks, and had an abnormally flexed walking pattern at 12 to 18 months relative to the controls. They concluded that the intrauterine movement restriction of the legs may cause long term alterations in the development of motor functions of the lower extremities, possibly through a mechanism of altered proprioception. Problems in reconciling this interpretation with the current study include the possible effects of rater bias and the extreme intrauterine movement restriction imposed by oligohydramnios (Sival et al. 1990), which was experienced by more than half of the sample, rather than to breech presentation *per se*.

Although associations between breech presentation and congenital dysplasia of the hip (Robinson, 1968) and between inherently greater flexibility and congenital dysplasia of the hip (Carter and Wilkenson, 1964) have long been established, the hypothesis that breech-presenting fetuses are inherently more flexible than cephalic-presenting infants, and thus predisposed to an abnormal presentation, was not supported by the joint laxity data collected at 18 months.

The second transient difference detected was associated with growth. In this investigation, morphologically normal term breech-presenting infants with birth weights greater than 2500 grams, regardless of mode of delivery, were found to be shorter than

their cephalic-presenting counterparts from birth through 5 months of age. This finding of poorer growth among breech-presenting fetuses is not new. In studies of neonates born at all gestational ages and birth weights, breech-presenting infants have been observed to be lighter, but not shorter than their cephalic counterparts (Luterkort et al. 1984; von Numers, 1952). In the present study, because preterm infants and those weighing less than 2500 grams were excluded, a statistically significant difference in weight between presentation groups was not detected.

In the past, controversy regarding the causal order of events relating to breech presentation and poorer growth has arisen. Is poorer growth the cause or effect of breech presentation? With the knowledge that a final cephalic version is more likely to occur in the third trimester, Zhang and Schwingl (1993) postulated that there would be a positive relationship between the duration of the abnormal presentation and the differences in birth weight between breech and cephalic neonates if breech presentation caused fetal growth retardation. To investigate this hypothesis, they used cross sectional data from a birth cohort of breech- and cephalic-presenting infants and plotted the average birth weights of those born between 24 and 44 weeks gestation, calculated after controlling for gender, maternal race, parity, and maternal age. They found that the discrepancy in weight was greatest between 29 and 34 weeks gestation, decreasing after this point, suggesting that poor fetal growth predates breech presentation.

To interpret the possible clinical significance of this finding of smaller overall growth among breech-presenting neonates, the characteristics of infants with intrauterine growth retardation may be reviewed. Interestingly, growth compromised fetuses have been found to have a lower probability of assuming spontaneous cephalic version at the end of gestation than normally grown fetuses (Westgren et al. 1985). Although serial measurements of fetal anthropometric characteristics were not collected in this investigation of infants with birth weights appropriate for gestational age, some of these breech infants may have fallen off their growth curves and may represent infants with some degree of intrauterine growth retardation. In support of this view, breech-presenting infants had obtained similar growth patterns to cephalic-presenting infants by 5 months of age, timing that is similar to that reported recently in a sample of small-for-

gestational-age infants (Albertsson-Wikland et al. 1993). The possibility that breech-presenting infants with poor fetal growth and a high velocity of postnatal growth were born to mothers with low prepregnancy weight - the major determinant of size at birth (Brooks et al. 1995) - and parents of taller-than-average heights - the major determinant of postnatal growth (Herngreen et al. 1994) - cannot be excluded definitively. However, Luterkort et al. (1986b) found that birth weight among breech-presenting infants was not correlated with maternal prepregnancy weight.

Finally, variations in early motor performance revealed a third transient difference. Breech-presenting infants, regardless of mode of delivery, performed well below the normative sample at 6 weeks of age. Significantly fewer breech-presenting infants received credit for the second standing item on the *AIMS* at 6 weeks. That is, breech-presenting infants were less likely to demonstrate control of the neck and trunk extensors when supported in standing by the examiner. Rather than being able to hold the head in line with an extended trunk, they were more likely to be flexed throughout the body. Similarly, they were less likely to take weight through their lower extremities consistently. At 6 weeks of age, breech-presenting infants were apparently less vigorous than cephalic-presenting infants. No group differences in motor performance were observed after 3 months of age. In support of this finding, no differences in the age of acquisition of developmental milestones such as sitting, standing, and walking without support have been reported by others (Sival et al. 1993).

These transient differences may be best explained by liberation from a nonoptimal situation. Because inherent differences in joint laxity were not found, the resolution of joint angle differences are most plausibly explained through a causal path of breech presentation causing abnormal joint mobility which normalizes once the mechanical influences are removed at birth. Although persistent differences in growth and motor performance were not detected, the observed transient differences may signal antenatal characteristics that predispose the fetus to breech presentation. Following close inspection of the perinatal outcomes of a large number of breech-presenting infants, Kauppila (1975) speculated that a poorly grown fetus may not be capable of the vigorous movements required for cephalic version. The rapid catch up in length, coupled with the

rapid normalization of motor scores, suggest that both poorer growth and reduced vigour may have a common cause. Biologically, this common cause may be a less-than-optimal intrauterine environment. Once the fetus is freed from this environment, assuming a nurturing postnatal environment, growth and development can proceed unencumbered.

Recent studies of the association between fetal vigour and breech presentation support the "less-than-optimal intrauterine environment" hypothesis suggested by the transient differences detected in this study. For example, an inordinately high rate of breech presentation (14 percent) has been reported in pregnancies after embryo cryopreservation (Heijnsbroek et al. 1995). Although the authors did not provide an explanation for this extraordinary frequency, one wonders whether cryopreservation results in a more vulnerable fetus. In addition, the rate of breech presentation among preterm births is double that of fetuses at corresponding gestational ages. The underlying cause of some cases of preterm labour and breech presentation is speculated to be fetal compromise (Ingemarrson et al. 1990). Similarly, three recent studies of elderly primigravidae (> 35 years), have noted a doubling of the rate of breech presentation compared with primigravidae in their twenties (Edge and Laros, 1993; Ezra et al. 1995; Jonas et al. 1991). While this higher rate may be explained in part by the higher frequency of preterm deliveries among older women, these women are also more likely to experience other pregnancy complications such as hypertension. And, as previously noted in the literature review, women with nongestational diabetes are also predisposed to higher rates of breech presentation (Rayl et al. 1996). In addition to medical complications with pregnancy, maternal behavioural risk factors such as excessive caffeine intake (Barr and Streisguth, 1991) and alcohol (Halliday et al. 1982) and drug (Silver et al. 1987) abuse influence the intrauterine environment and are associated with less active fetuses and breech presentation. Less vigorous fetuses may have more difficulty assuming final cephalic version; thus, breech presentation may be a marker of a problem associated with reduced fetal vigour.

The literature findings of shorter umbilical cords occurring in pregnancies in which the fetus moved less do not help resolve the results relating to inherent versus transient differences. Presumably the shorter cords may occur as a result of either inherent

differences or transient effects on the fetus in the first two trimesters (Miller et al. 1981). On the basis that breech-presenting fetuses have been found to have shorter umbilical cords than cephalic-presenting fetuses, it has been concluded that breech fetuses move less (Soernes and Bakke, 1986). In contrast with this view, no quantitative differences in either subjective reporting of perceptible movements or ultrasound evaluation of the frequency of movements between fetuses who remained in breech presentation and fetuses who assumed cephalic presentation at the time of delivery were reported in a longitudinal study of fetuses identified to be in breech presentation at 33 weeks (Luterkort and Marsal, 1985). Thus, the *vigour* rather than the *quantity* of movement may be an important determinant of fetal orientation prior to birth.

Mechanism of Breech Presentation

The results of this study suggest that the fundamental reason that the fetus presents in the breech in the first place is not an inherent difference in motor competencies. Instead, an adverse influence during pregnancy may explain both the temporary reduction of growth and vigour, which may make cephalic version more difficult to assume at the end of gestation, and the catch up in growth once in a nurturing extrauterine environment.

In addition, the *type* of movement that may be responsible for establishing cephalic presentation may be different from that which has long been assumed to be implicated. The proposition of the importance of kicking (Stabler, 1947) and stepping (Milani Comparetti, 1981) in changing fetal orientation gained wide acceptance in the past. The results of this study do not support this popular assumption. Instead, active whole body movements, as observed by Suzuki and Yamamuro (1985) in midgestation, may be more influential. Although the dose-response relationship between either the extent of lower extremity paralysis (Dunn, 1976b) or the degree of hypotonia (Dunn, 1976b; Smith, 1976) and the incidence of breech presentation was discussed in the context of fetal kicking in the literature review (Chapter 2), fetuses with either a higher level of spinal impairment or greater severity of hypotonia will also have greater disabilities relating to trunk and whole body movements. In support of the importance of whole body movements, Soernes and Bakke (1986) observed that cephalic-presenting infants, who

had longer umbilical cords than breech-presenting infants, were also more likely to have coils around the body. Active whole body movements may explain this finding better than fetal stepping or kicking. Finally, the typical fetal attitude is known to be characterized by extreme flexion of all body parts, most notably in the neck and trunk. From this starting position, any movement is logically one toward greater extension (Tompkins, 1946). Absence or weakness of whole body movements, particularly in extension, might therefore increase the likelihood of a fetus remaining in breech presentation later in gestation. The results of this study, given the difference in early standing performance between breech- and cephalic-presenting infants detected by the *AIMS* and the absence of any finding relative to elicited neurological or primitive reflex items, support the view that spontaneous integrated whole body movements, rather than stepping responses, may be influential in determining presentation at birth.

In this study of breech- and cephalic-presenting infants, it is interesting to speculate whether a greater number or range of "significant findings" related to motor performance would have resulted with the use of measures of spontaneous movement other than the *AIMS*, such as the observation of "general movements". Broadly, "general movements" are described as gross movements involving the whole body lasting a few seconds to a minute, waxing and waning in intensity, force and speed, and notable for their fluency and elegance in normal, healthy individuals (Hopkins and Prechtl, 1984). They originate at 9 to 10 weeks gestation (deVries et al. 1982) and their developmental transformations in the first few months of postnatal life have been described (Hopkins and Prechtl, 1984). These investigators have promoted the concept of "Gestalt Perception", rather than invasive techniques or handling, to conduct evaluations of motor performance (Hopkins and Prechtl, 1984). Recently, Hadders-Algra and Prechtl (1992) have demonstrated that early postnatal changes in general movements are unrelated to the changes in the neurological repertoire, supporting the view that these two types of assessments provide information about either different aspects of development or behaviours under different environmental conditions.

In any case, the fetal movements that may be causally implicated in the mechanism of cephalic version, and therefore may explain breech presentation, may be described as

vigorous, spontaneous, and integrated, rather than frequent, elicited, and isolated. Hence, the emphasis on conducting measures of elicited responses early in life (e.g. Dubowitz' Assessment and *PRP*), rather than measures capturing spontaneous and integrated movements, may have masked the opportunity to identify other early motor behaviours that may be different between breech- and cephalic-presenting infants.

Implications

Pediatricians can assure the parents of morphologically normal term breech-presenting infants with birth weights greater than 2500 grams that alterations in joint angles will be transient with no known effects on early motor development. Similarly, if length is subnormal at the time of birth, excellent catch-up growth may be anticipated and early subnormal motor performance may be expected to normalize rapidly. No inherent differences in early physical and motor development among breech-presenting infants should be anticipated.

The co-existence of poor early growth and poor early motor development among breech-presenting infants may warrant closer inspection. The primary cause of both reduced fetal growth and reduced vigour may be placental insufficiency (Ingemarrson et al. 1990), thus predisposing the fetus to intrapartum asphyxia (Dunn, 1976a). The "less-than-optimal-intrauterine experience" or "intrauterine compromise" hypothesis may explain both the increased rates of childhood morbidity noted in the literature and the rapid "catch up" in growth and motor performance demonstrated by the infants in this study. This hypothesis also may explain the inconsistent and conflicting results of the investigations of the effect of mode of delivery on perinatal death rates for breech-presenting fetuses. If the intrauterine compromise is chronic and severe, as may have been the case for three of the infants in this study, mode of delivery may not affect the outcome, which has already been determined to be poor. If, however, the intrauterine compromise is of relatively short duration and mild, a rapid "catch up" may be expected, regardless of the mode of delivery. Although this study of 90 breech- and 90 cephalic-presenting infants did not detect an interaction between presentation and mode of delivery in the outcomes measured, the question which still arises is whether a "gray zone" of fetal

vulnerability exists within the wide spectrum of the hypothesized intrauterine compromise. Are there breech-presenting fetuses who are so vulnerable that the asphyxic event of vaginal delivery does cause injury? If so, the identification of vulnerable fetuses, and the subsequent reduction of a portion of the rates of perinatal mortality and childhood morbidity, may be possible through the implementation of careful antenatal assessment in selected cases of fetuses presenting by the breech.

Beginning at the most macroscopic level, one may ask whether the ultrasound evaluation of "general movements" is useful in identifying such vulnerable fetuses. Fetuses identified to have intrauterine growth retardation secondary to pregnancy induced hypertension have been noted to have a lower frequency of and reduction in the faster components of movement when compared to average for gestational age fetuses (Bekedam et al. 1985). An extreme reduction or cessation of movement has been found to signal severe compromise or impending intrauterine death; however, when cases with barely discernible movements are excluded, significant overlap between normal and reduced growth groups has been observed (Bekedam et al. 1985; Sival et al. 1992). Inter-individual differences blur the distinction between normal and abnormal fetuses (Bekedam et al. 1985). This range of variation probably precludes the usefulness of the assessment of "general movements" in identifying those at risk for injury from labour and delivery. Among the population of intrauterine growth retarded fetuses, the co-occurrence of reduced heart rate variability, late decelerations, and a deterioration of the repertoire of general movements has been observed (Sival et al. 1992) and this constellation of signs has been found to be associated with hypoxemia at birth (Bekedam et al. 1987). Clinically, the monitoring of heart rate variability may be more useful than the observational assessment of general movements in identifying vulnerable breech-presenting fetuses.

Secondly, investigations of the placenta may provide insight regarding fetal vulnerability to vaginal delivery. Grannum and associates (1979) first described a classification system of placental maturity based on ultrasound evaluations of changes in the integrity of the chorionic plate and alterations in echogenic densities in the placental substance and basal layer. They categorized normal changes as progressing from Grade 0

in the first and second trimesters, to Grade 1 around 30 to 32 weeks gestation, and finally to Grade 3 by the end of term gestation. They suggested that the placenta may mature more rapidly in abnormal pregnancies. In the context of knowledge that postmature placentas are associated with a higher risk of utero-placental insufficiency (Altschuler, 1993), ultrasound monitoring of placental maturation may be useful. The results of a randomized controlled trial have demonstrated that obstetricians' knowledge of the presence of a Grade 3 placenta, found to be present in 15 percent of an unselected pregnant population at 34 to 36 weeks gestation, was associated with a reduction in the risk of perinatal death (Odds Ratio = .26, 95 % confidence interval .08 - .81) (Proud and Grant, 1987).

Finally, evaluating the health status of breech-presenting fetuses may best be conducted through Doppler ultrasound of blood velocity signals, a procedure which provides information regarding the hemodynamics of the uterus and fetus (Marsal, 1994). The shape of the maximum velocity of the waveform is influenced by peripheral vascular resistance, blood viscosity, elasticity of the vessel walls, and heart function. The velocity of blood flow in the umbilical artery and the abdominal part of the fetal descending aorta is largely determined by vascular resistance in the placenta. Variations in waveforms in these vessels have been found to be associated with suboptimal fetal growth, the development of fetal distress, and adverse outcomes of delivery. For example, decreased, missing, or reversed flow of the diastolic velocity in the umbilical artery and/or the fetal descending aorta is associated with fetal hypoxemia (Marsal, 1994). A meta-analysis of Doppler velocimetry of the umbilical artery in pregnancies complicated by growth retardation and/or pregnancy induced hypertension indicates that the perinatal mortality among normally-formed infants reduces with its use (Odds Ratio = .51, 95% confidence interval .35 - .74) (Neilson, 1994). In a small sample study, Luterkort and Gennser (1987) found no differences in the basal pulse wave parameters of the fetal descending aorta between breech- and cephalic-presenting fetuses. It is not known whether this method would be useful in highly selected breech fetuses who are perceived to be most vulnerable.

Doppler velocimetry of other fetal vessels may be useful. Because the redistribution of the blood supply among fetuses with growth retardation in hypoxic situations results in preferential supply to the brain, measurement of fetal cerebral vessels may enhance the identification of those fetuses most at risk (Chang and Cheng, 1994; Marsal, 1994). It has also been suggested that the evaluation of fetal venous hemodynamics may provide early detection of impaired fetal oxygenation (Marsal, 1994). Based on the belief that intrapartum asphyxia is probably more damaging when superimposed on underlying hypoxia (Tyrrell et al. 1990), Doppler assessment of the hemodynamics of breech-presenting fetuses may lead to intervention that reduces the possible risk of fetal brain damage with vaginal delivery. This type of intervention may be useful in highly selected pregnancies only, for example, those complicated by both hypertension (Torres et al. 1995) and breech presentation.

This study was not designed to address the essential "breech dilemma" identified by obstetricians: which is the preferred mode of delivery for term breech-presenting fetuses? While the need for a randomized controlled trial continues to be emphasized (Weissman and Hagay, 1995), definitive knowledge of the optimal mode of delivery may remain elusive. In a recent survey of principal investigators associated with the Maternal-Fetal Medicine Units Networks in the United States, the authors concluded that the problem of the safety of a trial of labour for persistent term breech fetuses may never be adequately addressed due to feasibility constraints associated with investigators' reluctance to participate and the large sample size requirements due to the admittedly low incidence of adverse outcomes. Hannah and Hannah (1996) have recently launched an international randomized controlled trial of mode of delivery among selected term breech singletons with funding from the Medical Research Council of Canada. If the assessment of fetal vigour is found to be useful, careful antenatal evaluation of fetuses known to be in breech presentation, in addition to the classification of breech presentation, position of the fetal neck, volume of amniotic fluid, and estimation of fetal weight (Canadian Medical Association Consensus Conference, 1986), may contribute to mode of delivery decisions.

The results of this study also suggest that the observation of spontaneously generated movements, rather than scoring of elicited responses, may provide more useful

information. Evaluation of neurological status (Dubowitz' Assessment) and primitive reflexes (modified *Primitive Reflex Profile*) yielded nonsignificant differences between breech- and cephalic-presenting infants, concurring with the results of others regarding neonatal neurological examinations (DeJong and Stolte, 1982; Luterkort et al. 1986a) using Prechtl's neurological examination (Prechtl, 1977). Although Prechtl has since become a strong proponent of the observational assessment of spontaneous movement (e.g. Hopkins and Prechtl, 1984), his earlier neurological examination contains many elicited responses. One of the reasons for obtaining negative results for the assessment of neurological status and primitive reflexes as indices of motor performance may be due to the evoked nature of the motor behaviours. Growing consensus is developing among those interested in early motor development regarding the lack of clinical utility of assessments that are based on evoked responses or isolated motor capabilities (Bradley, 1994; Haley et al. 1993; Piper and Darrah, 1994). Instead, the observation of motor patterns of spontaneous and integrated activity conducted in the infant's or child's natural setting, with minimal handling, instruction, or other interference is advocated.

In keeping with the discussion of the utility of elicited versus spontaneous assessment of postnatal motor behaviour, predictors of fetal distress during labour among fetuses with recognized growth retardation have been found to be Pulsed Doppler ultrasound of fetal arteries and nonstress testing, and not contraction stress tests and vibroacoustic stimulation tests (Arabin et al. 1993).

Generalizability

Infants in the breech presentation cells clearly comprise convenience samples; virtually all eligible subjects were contacted by the recruiters. In contrast, infants in the cephalic presentation cells represent a type of systematic sample: the timing of recruitment was dependent upon the successful recruitment of a breech neonate. Still, for all four subgroups, the characteristics of families consenting to participate in the study is likely to be different from those declining. Specifically, only those parents interested in early child development, who lived reasonably close to the follow-up facility, and who anticipated flexible work schedules over the 18 month period of the study consented. The

impact of parental interest on early motor development is not known, although the infants from this volunteer sample did not obtain consistently higher motor scores than the normative sample of the *AIMS*.

Although the breech-presenting infants recruited for this study comprise a convenience sample, as a group, these infants have many characteristics representative of all breech neonates. Among fetuses in breech presentation, 53.1 percent have been reported to be female (Jonas and Roder, 1993), a proportion similar to this sample (52.2 percent). The observation that breech infants, regardless of mode of delivery, are born approximately one week earlier than cephalic-presenting infants has also been noted by others (Luterkort et al. 1984; Zhang and Schwingl, 1993). Breech-presenting infants are known to be four times more likely to be subsequently diagnosed with congenital dysplasia of the hip (Robinson, 1968). This sample contains four infants with hip dysplasia; all four had been breech.

Limitations

The purpose of this study was to determine whether inherent differences in the pattern of early motor development may be a possible contributing factor to fetal presentation at term. The method used is a causal-comparative method (Borg and Gall, 1989); two groups of infants who were different on one critical variable (presentation) were compared, and inferences about what influenced presentation were made, while accounting for possible effects of mode of delivery. Assuming that neuromotor functions are continuous from prenatal to postnatal life, neuromotor development was evaluated early in postnatal life and its relationship to presentation at birth examined. As stated in Chapter 2, if one is prepared to prospectively evaluate the necessarily large number of individuals to obtain a sufficient number who remain as breech, a preferred method would have been to engage in a study with the temporality reversed. One would closely observe the neuromotor development of fetuses *in utero* and relate this with the outcome of presentation at birth; however, aside from feasibility constraints, limitations in technology and measurement currently preclude this approach.

The resolution of the subnormal motor scores of breech-presenting infants between 6 weeks and 3 months has been attributed to liberation from a less-than-optimal intrauterine environment. As an alternative explanation, this early self righting may result from the influence of variables that are not present prior to birth, such as vision or socialization, which may stimulate the infant to explore and interact. Although this alternative explanation may explain *how* the breech-presenting infants caught up in motor performance, it does not explain *why* they were different in growth *and* motor development early in life.

Limitations also exist in the range of data collected and the method of analyses. A series of analyses evaluating possible effects of each dependent variable in isolation was conducted. A multivariate approach, such as logistic regression, may permit the testing of the significance of constellations of variables and interactions between variables that may be critical in explaining a failure to undergo cephalic version near the end of term gestation. For example, while maternal mechanical variables have been shown to be present in a small proportion of breech pregnancies (Luterkort et al. 1984), the interaction among variables such as the volume of amniotic fluid (Sival et al. 1990), fetal size, and the vigour of fetal whole body movements may provide more information than the sum of each individual component tested in isolation.

Future Research

Fetuses in breech presentation at the end of term gestation are identified to be a high risk group due to the associated elevated rates of perinatal mortality and childhood morbidity. While a portion of these outcomes may be inevitable, regardless of mode of delivery, it may be possible to identify a small subgroup of fetuses who may be vulnerable to the added asphyxia invoked by labour and vaginal delivery, whether they remain as breech or following successful external cephalic version. The assessment of the quality of "general movements" of breech- and cephalic-presenting infants may be possible with the development of obstetric ultrasound permitting real-time, three dimensional observation of the entire fetus at the end of gestation. It is not clear whether detailed investigations of this sort might benefit vulnerable fetuses in breech presentation.

Perhaps greater emphasis should be given to the investigation of fetal or placental circulatory insufficiency which may be causally implicated in, rather than simply associated with, reduced fetal vigour. The clinical utility of antenatal testing methods such as fetal heart rate monitoring, placentography, and Doppler ultrasound of fetal and umbilical vessels is yet to be established in this group of fetuses.

Conclusions

This is the first detailed comparative investigation of the postnatal physical and motor development of a large number of breech- and cephalic-presenting infants conducted by evaluators who were unaware of the infants' presentation and delivery histories. Despite reasonable support in the existing literature for a hypothesis that breech-presenting infants would be inherently different from cephalic-presenting infants in the pattern of early physical and motor development, persistent differences were not observed. An inherent difference in motor ability does not explain why some fetuses do not orient in cephalic presentation at the end of gestation. Instead, transient manifestations of poorer growth and motor development suggest that breech-presenting fetuses may lack sufficient general body strength to assume cephalic version. The rapid "catch up" in length and motor performance once in a nurturing extrauterine environment suggests that breech presentation may be a marker of intrauterine compromise. Breech-presenting fetuses at either end of the spectrum of severity of compromise may do equally well or equally poorly, regardless of mode of delivery. For a group of fetuses in the intermediate "gray zone", however, the mode of delivery decision may be critically influential. In the future, detailed investigation of the condition of breech-presenting fetuses at the end of gestation might result in the identification of a subgroup that may be vulnerable to the asphyxia associated with labour and delivery. Such information, when coupled with optimal obstetrical management, may reduce a portion of the higher rates of perinatal mortality and morbidity associated with breech pregnancies and minimize maternal morbidity associated with elective cesarean deliveries.

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Appendix 3A: Term Data Collection Form

Birth and Delivery	Coding
Number:	___
Gender: Male (1); Female (2)	_
Hospital of Birth: Royal Alexandra (1); UAH (2)	_
Gestational Age (weeks):	__
Birthweight (grams):	____
Presentation: Breech (1); Cephalic (2)	_
Classification:	
if breech, Frank (0); Complete (1); Incomplete (2); Double Footling (3); Single Footling (4); Unknown (5) — if cephalic, Vertex (6); Face (7); Brow (8)	_
Labour: No (0); Yes (1)	_
Onset: Spontaneous (1); Induced (2)	_
Progress: Normal (1); Augmented (2)	_
Delivery: Vaginal (1); Cesarean Section (2)	_
Type: Planned (if CS, primary) (1)	
Unplanned (after trial of labour if CS) (2)	_
If Breech:	
Head Position: Flexed (1); Hyperextended (2); Unknown (3)	_
And if had External Cephalic Version, not successful (0); successful (1)	_
Apgar Scores: 1 minute	__
5 minutes	__
Infant Birth Complications: Absent (0); Present (1) (note presence of cord prolapse, nuchal cord or arms, head entrapment, birth trauma, etc.)	_
Maternal Variables: Age	__
Parity	__
Known uterine abnormalities: No (0); Yes (1) (note type)	_
Oligohydramnios: No (0); Yes (1)	_
Polyhydramnios: No (0); Yes (1)	_
Newborn Examination	
Birth length (cm):	__
Head circumference (cm):	__
Ethnic Origin: Caucasian (1); Native (2); Oriental (3); Black (4);Other (5)	_
Infant Variables:	
Minor congenital anomalies: absent (0); present (1)	_
Number of minor congenital anomalies (make note of type)	__
Hypoxic Ischemic Encephalopathy: No (0); Yes (1)	_
if yes, Sarnat Stage (1); (2); (3)	_

Appendix 3B: Primitive Reflex Profile (adapted from Capute et al. 1978 and Allen and Capute 1986)

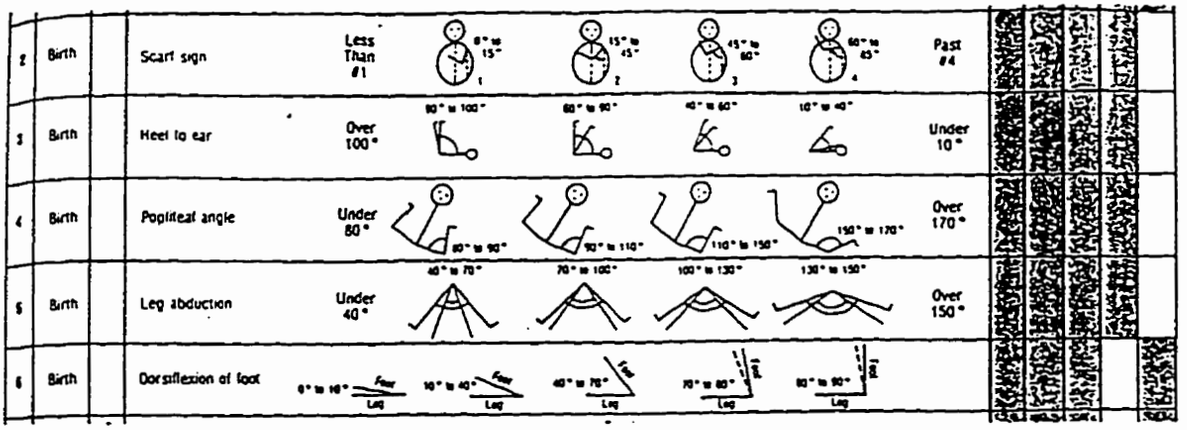
Abbreviations:

abd	abduction
add	adduction
ATNR	asymmetrical tonic neck reflex
curv	curvation
derotn	derotation
ext	extension
extr	extremity
flex	flexion
incr	increased
lat	laterally
LE	lower extremity
min	minimal
ML	midline
movt	movement
occ	occiput
pass	passive
prtr	protraction
retr	retraction
rotn	rotation
sec	seconds
sh	shoulder
SR: BoB	segmental roll, body on body
SR: HoB	segmental roll, head on body
STNR	symmetrical tonic neck reflex
TLP	tonic labyrinthine reflex in prone
TLS	tonic labyrinthine reflex in supine
UE	upper extremity

Primitive Reflex Profile (Capute et al. 1978, Allen and Capute, 1986) ID: _____ Date:_____

	0	1+	2+	3+	4+
ATNR	absent	Pass.rotn, no visible response Incr tone	Pass.rotn, visible ext/face flex/occ	to 180° ext UE + LE > 90° flex UE + LE	> 30 sec ext/face or flex/occ
STNR (neck flex + ext)	absent	Pass.movt, no visible response Incr tone	visible flex UE, ext LE/ ext UE, flex LE	as in 2+ with 180° ext or > 90° flex in > 1 extr	3+ response for > 30 sec
Positive Support	absent - flexion, no support	Weight 1-30 sec	Weight > 30 sec <5 sec equinus	equinus 5-30 sec	equinus > 30 sec
TLS (neck flex + ext)	absent	No visible response Incr tone	neck ext, sh retr/ neck flex, sh prtr < 5 sec	as in 2+, posture persists 5-30 sec	with flexion, sh retr or LE ext > 30 sec
TLP (neck flex + ext)	absent	Incr flex tone	neck flex, sh prtr, LE flex	with flex, sh under trunk, or hips/knees > 90° flex	as in 3+, > 30 sec
SR:HoB	body not follow when head > 30° past ML	rolls when head > 30° past ML (derotn)	rolls before head ML (derotn)	non-derotn (LE rotate before UE)	log-rolling
SR:BoB	body not follow when hips > 30° past ML	rolls when hips > 30° past ML (derotn)	rolls before hips ML (derotn)	non-derotn (UE rotate before LE)	log-rolling
Galant	absent	trunk curv >felt/seen	trunk curv < 45°	hips swing lat. > 45°	persistent hip elevation
Moro	absent or flexion	min arm ext/abd	ext/abd then UE add or wrist flex	2+ and back arches or 180° ext LE	marked opisthotonus
UE Grasp	absent	weak finger flex	strong finger flex	finger flex, elbow flex, traction	flex lifts infant off bed
LE Grasp	absent	weak toe flex	strong toe flex		
LE Placing	absent	initial flex only	initial flex/ weak ext	brisk flex/ strong, brisk ext	
Stepping	absent	equivocal	consistent reciprocal flex/ext	exaggerated flex/ext, easily elicited	

Appendix 3C: The French Angles Factor and Ankle Dorsiflexion (INFANIB, Ellison, 1994)



Appendix 3D: Assessment of Generalized Joint Laxity (from Beighton et al. 1989)

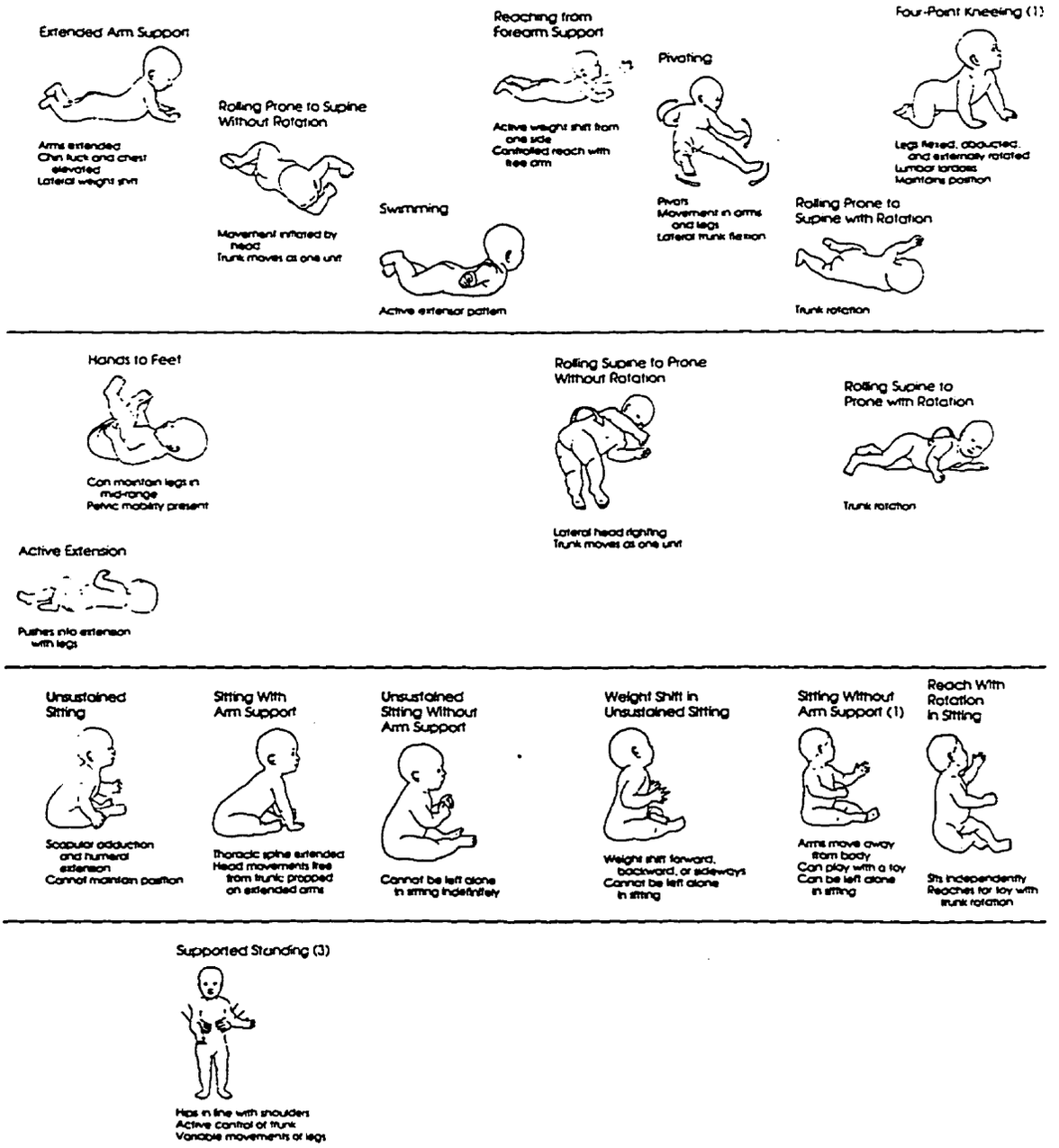
Name: _____ ID: ____

Date: _____

	Right	Left
Elbow Extension: sitting, humerus flexed forward 90°, extend elbow fully: > 5° hyperextension = 1 ≤ 5° hyperextension = 0	____	____
Knee Extension: supine, hip slightly flexed, extend knee fully: > 10° hyperextension = 1 ≤ 10° hyperextension = 0	____	____
Thumb-to-Wrist: sitting, humerus flexed forward 90°, elbow flexed 90°, flex wrist and attempt to contact tip of thumb to volar aspect of forearm: contact = 1 no contact = 0	____	____
5th Metacarpophalangeal (MCP) Extension: sitting, with forearm and palm on table, extend 5th MCP fully: > 90° = 1 ≤ 90° = 0	____	____

Total Laxity Score _____

Appendix 3E: Sample Portion of the Alberta Infant Motor Scale (Piper and Darrah, 1994)

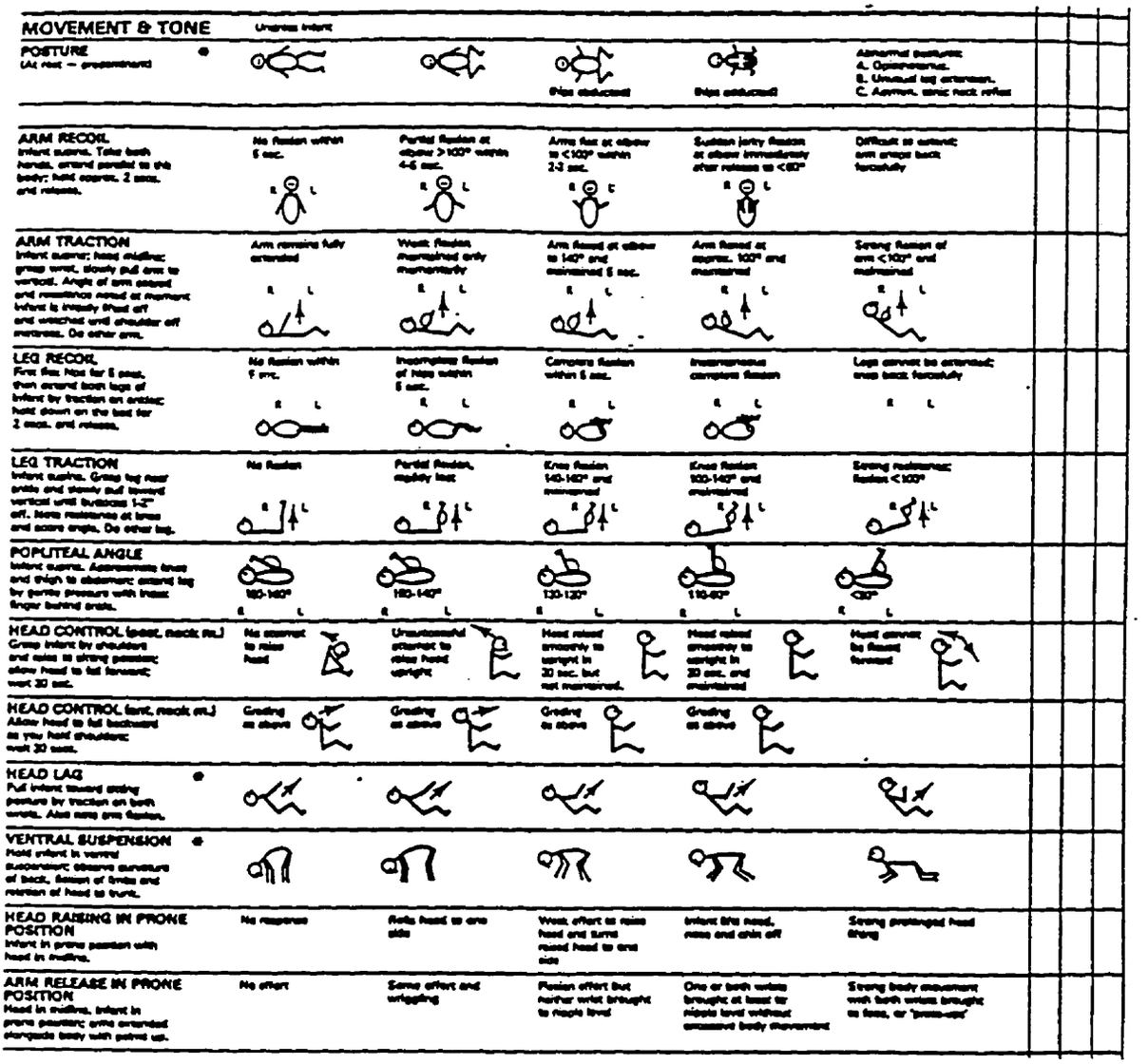


Appendix 3F: Peabody Developmental Motor Scales:

Sample from the Fine and Gross Motor Subscales (Folio and Fewell, 1983)

12-14 months continued	53. (A) Grasping Cubes		Place *two cubes* side-by-side on table. Say, "Get both of the blocks." *Criterion:* Secures both cubes with one hand.
	54. (C) Inserting Shape		Place *formboard* on table. Place *shapes* on table between child and board but not opposite correct holes. Say, "Put the shapes in the board." *Criterion:* Places one shape in board. *Additional Scoring:* If child inserts two shapes, score 2 on this item and on item 62. If child inserts all three shapes, score 2 on this item, on item 62, and on item 66.
15-17 months	55. (B) Unwrapping Cube	*for all items at this level:* sitting on examiner's lap at table	Place *cube* on table. Attract child's attention to cube by banging it three times. Then wrap cube in *tissue*. Say, "Get the block." *Criterion:* Secures cube by unwrapping.
	56. (C) Filling Cup		Place *cup* and *seven cubes* on table. Say, "Put the blocks in the cup." *Criterion:* Puts all cubes in cup.
	57. (C) Building Tower		Demonstrate building tower of *four cubes*. Leave standing. Place *eight cubes* on table. Say, "Build a tower like mine." *Criterion:* Builds tower of three or four cubes. *Additional Scoring:* If child completes tower of six to eight cubes, score 2 on this item and on item 67.
	58. (C) Imitating Scribble		Demonstrate making lines on *paper* with *marker*. Place *second sheet of paper* and marker in front of child. Say, "Do what I did." *Criterion:* Scribbles on paper. *Additional Scoring:* Observe grasp of marker for scoring next item.
15-17 months continued	73. (D) Walking Up Stairs	standing on steps near rail or wall	Stand several steps above child. Say, "Come to me." *Criterion:* Climbs four steps holding onto rail or wall and placing both feet on each step (marking time). *Additional Scoring:* If child ascends four steps by placing one foot on each step (alternating feet) and using rail or wall for support, score 2 on this item and on item 92.
	74. (D) Walking	standing	Run away from child. Say, "Catch me," in effort to evoke quick movement. *Criterion:* Walks 10 feet with fast walking steps using heel-toe gait. This movement time must be twice that of Item 72, the previous walking time.
	75. (D) Walking Backward	standing	Demonstrate pulling *pull-toy* while walking backward, looking at toy and calling attention to its action. Give cord to child. Say, "You pull it." *Criterion:* Walks backward five steps: one of two trials. May or may not pull toy while walking.
	76. (D) Walking Down Stairs	standing, four steps from bottom of stairs	Say, "Walk down the steps." *Criterion:* Descends four steps holding onto wall or rail and placing both feet on each step (marking time). *Additional Scoring:* If child descends four steps without support, placing both feet on each step (marking time), score 2 on this item and on item 102. If child descends steps without support by placing one foot on each step (alternating feet), score 2 on this item, on item 102, and on item 115.
	77. (E) Kicking Ball	standing	Demonstrate kicking *ball* by placing ball in front of foot and kicking. Place ball in front of child. Say, "You do it." *Criterion:* Steps on or kicks into ball in attempt to imitate kicking.

Appendix 3G: Movement and Tone Subsection of The Neurological Assessment of the Preterm and Full-term Newborn Infant (Dubowitz and Dubowitz, 1981)



Appendix 3H: Sample Size Calculations (Cohen, 1988)

These sample size calculations are based on the main dependent variable of interest: scores on the AIMS. The standard deviation for each monthly age range is different, therefore the magnitude of clinically significant differences in scores also varies with age. The table below lists the differences between two groups considered to be clinically significant, the standard deviation (sd), the effect size (d = difference / sd), and the effect size (f = d / 2), which is used for power analysis for ANOVA models. The estimates for a clinically significant difference corresponds to an f > .25 (medium effect size).

	Age in Months				
	3	**5**	**7**	**10**	**15**
Difference	2	3	4	3	1
sd	3.3	5.2	7.3	4.4	0.3
d	0.61	0.58	0.55	0.68	3.33
f	0.31	0.29	0.28	0.34	1.67

Main Effects: Following the example in Cohen (1988) in section 8.3.3 (Main Effects in Factorial and Complex Designs), the structure of this design is an I x J (presentation by mode of delivery), with two levels in each of the I and J, for a total number of cells equal to 4, and the proposal of n=39 subjects in each cell before dropouts. This gives the following table from which to proceed:

Effect	**denominator df**
I	$i - 1 = 1$
J	$j - 1 = 1$
Interaction of I x J	$(i - 1)(j - 1) = 1$
within cell (error)	$ij(n_c - 1) = 4(38) = 152$
Total	$ijn_c - 1 = 4(39) - 1 = 155$

Using equation 8.3.4, a value is calculated for n':

$$n' = \frac{\text{denominator df}}{u + 1} + 1$$

$$n' = \frac{152}{2 + 1} + 1$$

$$n' = 52$$

Using the appropriate table for u (2), alpha level (.05), and f (.25) (8.3.13), and n' = 52, and a cell size of 39, there is a power of .80 to detect main effects of both presentation and mode of delivery, if they exist.

Interactions: In Cohen (1988, p. 355), a different method for determining sample size for tests of interactions suggests a different calculation for u:

$$u = (k - 1)(r - 1)(p - 1)$$

where k, r, and p are the number of the interacting main effects. (k = presentation (2); r = mode of delivery (2); and p = repeated measures over time (6 weeks, and 3,5,7,10, and 15 months (6)).

Therefore $u = (2 - 1)(2 - 1)(6 - 1) = 5$, and with the alpha level = .05, f = .25, and a power of .80, one looks up the value for the sample size in the appropriate table (8.3.16) and finds that n = 35 is required.

Appendix 3I

Inter-rater Agreement:

Term Assessors (Raters 1 and 2)

Abbreviations:

ID	identification number
ATNR	asymmetrical tonic neck reflex
STNR	symmetrical tonic neck reflex
TLS	tonic labyrinthine reflex in supine
TLP	tonic labyrinthine reflex in prone
SR: HoB	segmental roll: head on body reflex
SR: BoB	segmental roll: body on body reflex
PRP	Primitive Reflex Profile
UE	upper extremity
LE	lower extremity
R1	rater 1
R2	rater 2

Assessment	Initial (July '93)				Follow-up	
Subject ID Number	**015**		**024**		**025**		**054**	
Rater	**R1**	**DB**	**R1**	**DB**	**R1**	**DB**	**R1**	**DB**
Dubowitz								
Posture	4	4	3	3	4	4	4	4
Arm Recoil	4	4	2	2	3	4	3	3
Arm Traction	4	3	2	2	3	3/4	3	3
Leg Recoil	3	3	3	3	3	4	4	4
Leg Traction	4	4	4	4	4	4	3	3
Popliteal Angle	2	3		2	2	2	4	5
Head Control Posterior	2	2	3	3	3	4	4	4
Head Control Anterior	2	2	2	2	3	3	3	3
Head Lag	3	2	2	1	2	2	3	2
Ventral Suspension	3	3	3	2	4	4	4	3
Head Raising in Prone	3	4	4	4	4	4	2	3
Arm Release in Prone	4	4	4	4	4	4	4	4
Knee Jerk	2	2	2	2	2	2	4	4
Palmar Grasp	4	4	3	4	3	2	4	4
Rooting	1	2	4	4	4	4	4	4
Sucking	3	3	4	4	4	4	4	4
Walking	4	4	4	4	4	4	4	4
Moro	4	4	4	4	4	4	3	4
Auditory Orientation	1	1	1	1	1	1	5	5
Visual Orientation	1	1	2	2	2	2		
Primitive Reflex Profile								
ATNR	0	0	0	0	0	0	0	0
STNR	0	0	0	0	0	0	0	0
Positive Support		0	1	1	2	2	1	1
TLS	1	1	2	2	0	0	0	0
TLP	0	0	0	0	0	0	0	0
SR: HoB	3	3	3	3	3	3	3	3
SR: BoB	3	3	3	3	3	3	3	3
Galant	2	2	0	0	0	1	1	1
PRP Moro	2	2	2	2	2	2	2	2
UE Grasp	3	3	3	3	1	1	3	3
LE Grasp	2	2	2	2	2	2	2	2
LE Placing	2	2	2	2	2	2	2	2
Stepping	2	2	2	2	2	2	2	2
INFANIB								
Scarf Sign	3	4	4	5	5	5	3	3
Heel to Ear	4	4	2	3	4	4	5	4
Popliteal Angle	5	6	5	5	5	5	6	6
Leg Abduction	4	3	4	3	4	3	4	2
Ankle Dorsiflexion	2	2	2	2	2	2	1	1
# Agree	29		31		32		31	
# Agree within 1	37		37		38		37	
# of Items	38		38		38		38	
% Agreement	76%		82%		84%		82%	
% Agreement within 1	97%		97%		100%		97%	
% Agreement Dubowitz	75%		80%		80%		75%	
% Agreement PRP	92%		100%		92%		100%	
% Agreement INFANIB	40%		40%		80%		60%	

Assessment	Initial (July '93)						Follow-up	
Subject ID Number	017		024		025		080	
Rater	R2	DB	R2	DB	R2	DB	R2	DB
Dubowitz								
Posture	3	3	3	3	4	4	4	4
Arm Recoil	3	3	3	2	3	4	3	3
Arm Traction	3	3	2	2	4	3/4	3	4
Leg Recoil	3	4	2	3	3	4	3	4
Leg Traction	3	3	3	4	4	4	4	4
Popliteal Angle	2	2	2	2	2	2	3	3
Head Control Posterior	3	3	3	3	4	4	4	4
Head Control Anterior	3	3	2	2	4	3	4	4
Head Lag	3	2	1	1	2	2	4	4
Ventral Suspension	3	3	2	2	3	4	3	3
Head Raising in Prone	3	3	4	4	3	4	4	4
Arm Release in Prone	4	4	4	4	4	4	4	4
Knee Jerk	2	2	2	2	2	2	2	2
Palmar Grasp	3	3	4	4	3	2	4	4
Rooting	4	4	4	4	3	4	3	3
Sucking	4	4	4	4	4	4	4	4
Walking	4	4	4	4	4	4	3	3
Moro	4	3	3	4	4	4	4	4
Auditory Orientation	3	4	1	1	1	1	3	3
Visual Orientation	3	4	3	2	2	2		
Primitive Reflex Profile								
ATNR	0	0	0	0	0	0	0	0
STNR	0	0	0	0	0	0	0	0
Positive Support	1	1	1	1	2	2	2	1
TLS	0	0	1	2	0	0	0	0
TLP	0	0	0	0	0	0	0	0
SR: HoB	3	3	3	3	3	3	3	3
SR: BoB	3	3	3	3	3	3	3	3
Galant	0	0	0	0	0	1	0	0
PRP Moro	2	1	1	2	2	2	2	2
UE Grasp	3	2	1	3	3	1	3	3
LE Grasp	2	2	2	2	2	2	2	2
LE Placing	2	2	2	2	2	2	2	2
Stepping	2	2	2	2	2	2	1	1
INFANIB								
Scarf Sign	3	3	5	5	5	5	5	5
Heel to Ear	4	4	3	3	4	4	4	4
Popliteal Angle	6	6	4	5	5	5	6	6
Leg Abduction	5	4	3	3	3	3	3	3
Ankle Dorsiflexion	2	1	2	2	2	2	2	2
# Agree	29		29		29		35	
# Agree within 1	38		37		37		38	
# of Items	38		38		38		38	
% Agreement	76%		76%		76%		92%	
% Agreement within 1	100%		97%		97%		100%	
% Agreement Dubowitz	75%		75%		65%		90%	
% Agreement PRP	85%		77%		85%		92%	
% Agreement INFANIB	60%		80%		100%		100%	

Appendix 3J

Inter-rater Agreement:

Follow-up Assessors at Various Ages (Raters 1 and 2)

Abbreviations:

ID	identification number
AIMS	Alberta Infant Motor Scale (scoring: 0 = not observed, 1 = observed)
P	AIMS prone item (with numerical suffix)
S	AIMS supine item (with numerical suffix)
Sit	AIMS sit item (with numerical suffix)
St	AIMS stand item (with numerical suffix)
ATNR	asymmetrical tonic neck reflex
STNR	symmetrical tonic neck reflex
TLS	tonic labyrinthine reflex in supine
TLP	tonic labyrinthine reflex in prone
SR: HoB	segmental roll: head on body
SR: BoB	segmental roll: body on body
UE	upper extremity
LE	lower extremity
INFANIB	items scored 1 through 6
PRP	Primitive Reflex Profile (scoring from 0 through 4)
PDMS	Peabody Developmental Motor Scales (scoring from 0 through 2)
MCP	metacarpophalangeal
R1	rater 1
R2	rater 2

6 Week Assessments	Initial (Summer 1993)						Summer'94	
Subject ID Number	**005**		**008**		**032**		**137**	
Rater	**R1**	**DB**	**R1**	**DB**	**R1**	**DB**	**R1**	**DB**
AIMS								
P1	1	1	1	1	1	1	-	-
P2	-	-	-	-	-	-	-	-
P3	-	-	-	-	-	-	1	1
P4							-	-
P5							-	-
S1	1	1	1	1	1	1	-	-
S2	1	1	1	1	1	1	1	1
S3	-	-	1	1	-	-	-	-
S4	-	-	-	-	-	-	-	-
S5			-	-				
Sit1	1	1	1	1	-	-	1	1
Sit2	-	-	-	-	-	-	-	-
Sit3	-	-	-	-			-	-
St1	1	1	1	1	1	1	1	1
St2	1	-	1	-	-	-	1	1
St3	-	-	-	-	-	-	-	-
St4	-		-				-	-
Primitive Reflex Profile								
ATNR	2	2	2	2	2	2	0	0
STNR	0	0	0	0	2	2	0	0
Positive Support	3	3	1	1	1	1	1	1
TLS	0	0	0	0	2	2	0	0
TLP	1	1	2	2	0	0	1	1
SR: HoB	3	3	1	3	1	2	1	2
SR: BoB	2	2	1	2	1	1	1	1
Galant	1	1	1	1	1	1	3	3
Moro	1	1	1	1	2	2	3	3
UE Grasp	3	3	1	1	1	1	4	4
LE Grasp	2	2	2	2	2	2	2	2
LE Placing	2	2	2	2	2	2	2	2
Stepping	2	2	2	2	1	1	1	1
INFANIB								
Scarf Sign	2	2	3	3	3	3	3	3
Heel to Ear	5	5	5	4	3	3	2	1
Popliteal Angle	5	5	5	5	5	5	5	5
Leg Abduction	2	2	4	4	2	2	3	4
Ankle Dorsiflexion	2	2	3	3	3	3	2	2
# Agree	31		29		29		31	
# Agree within 1	32		32		30		34	
Number of Items	32		33		30		34	
% Agreement	97%		88%		97%		91%	
%Agreement within 1	100%		97%		100%		100%	
% Agreement AIMS	93%		93%		100%		100%	
% Agreement PRP	100%		85%		92%		92%	
% Agreement INFANIB	100%		80%		100%		60%	

6 Week Assessments	Oct.'94	
Subject ID Number	**153**	
Rater	**R2**	**DB**
AIMS		
P1	-	-
P2	-	-
P3	1	1
P4	-	-
P5	-	-
S1	-	-
S2	1	1
S3	-	-
S4	-	-
S5		
Sit1	1	1
Sit2	-	-
Sit3	-	-
St1	1	1
St2	-	-
St3	-	-
St4		
Primitive Reflex Profile		
ATNR	0	0
STNR	1	0
Positive Support	1	1
TLS	0	2
TLP	0	0
SR: HoB	3	3
SR: BoB	0	0
Galant	1	2
Moro	2	2
UE Grasp	2	3
LE Grasp	1	2
LE Placing	2	2
Stepping	1	1
INFANIB		
Scarf Sign	3	5
Heel to Ear	4	2
Popliteal Angle	5	5
Leg Abduction	3	4
Ankle Dorsiflexion	2	2

# Agree	25
# Agree within 1	30
Number of Items	33
% Agreement	76%
%Agreement within 1	91%
% Agreement AIMS	100%
% Agreement PRP	62%
% Agreement INFANIB	40%

3 Month Assessments	Aug.'93		Sept.'93		May '94	
Subject ID Number	002		005		123	
Rater	R1	DB	R1	DB	R1	DB
AIMS P2	-	-	-	-	-	-
P3	-	-	-	-	-	-
P4	1	1	1	1	1	1
P5	-	1	1	1	-	-
P6	-	-	0	0	-	-
P7		-	0	0		
P8			1	1		
P9			-	-		
P10			-	-		
S2	-	-	-	-	-	-
S3	-	-	-	-	-	-
S4	1	1	1	1	1	1
S5	-	-	-	-	-	-
S6	1	-	-	-	-	-
S7	-	-				
S8	-	-				
Sit1	1	1	1	1	1	1
Sit2	1	1	1	1	-	-
Sit3	-	-	-	-	-	-
Sit4	-	-	-	-		
St1	-	-	-	-	-	-
St2	1	1	1	1	1	1
St3	-	-	-	-	-	-
St4	-	-	-	-	-	-
Primitive Reflex Profile						
ATNR	0	0	0	0	0	0
STNR	0	0	0	0	0	0
Positive Support	1	2	3	3	1	1
TLS	0	2	0	0	2	2
TLP	0	0	2	2	2	0
SR: HoB	2	1	1	1	1	2
SR: BoB	2	1	2	2	1	2
Galant	0	0	2	2	2	2
Moro	1	1	0	0	1	1
UE Grasp	0	1	3	3	2	1
LE Grasp	2	2	2	2	2	3
LE Placing	2	2	2	2	1	1
Stepping	2	2	2	2	0	0
INFANIB Scarf Sign	1	2	2	2	3	3
Heel to Ear	2	2	2	2	3	3
Popliteal Angle	6	6	5	5	5	5
Leg Abduction	3	3	3	3	5	4
Ankle Dorsiflexion	4	3	3	3	2	2
# Agree	30		40		29	
# Agree within 1	38		40		34	
Number of Items	39		40		35	
% Agreement	77%		100%		83%	
%Agreement within 1	97%		100%		97%	
% Agreement AIMS	91%		100%		100%	
% Agreement PRP	62%		100%		62%	
% Agreement INFANIB	60%		100%		80%	

3 Month Assessments	Dec.'94	
Subject ID Number	**151**	
Rater	**R2**	**DB**
AIMS		
P1	-	-
P2	-	-
P3	1	1
P4	-	1
P5	-	-
P6		-
S1	-	-
S2	-	-
S3	1	1
S4	-	-
S5	-	-
Sit1	1	1
Sit2	-	-
Sit3	-	-
St1	1	1
St2	-	1
St3	-	-
St4	-	-
Primitive Reflex Profile		
ATNR	0	0
STNR	0	0
Positive Support	0	1
TLS	0	0
TLP	0	0
SR: HoB	1	1
SR: BoB	1	2
Galant	2	2
Moro	0	1
UE Grasp	2	1
LE Grasp	2	2
LE Placing	2	2
Stepping	0	1
INFANIB		
Scarf Sign	6	5
Heel to Ear	3	3
Popliteal Angle	6	6
Leg Abduction	3	4
Ankle Dorsiflexion	1	2

# Agree	26
# Agree within 1	36
Number of Items	36
% Agreement	72%
%Agreement within 1	100%
% Agreement AIMS	89%
% Agreement PRP	62%
% Agreement INFANIB	40%

5 Month Assessments	Oct.'94		June '94	
Subject ID Number	140		119	
Rater	R1	DB	R2	DB
AIMS				
P2	-	-		
P3	-	-		
P4	1	1		
P5	1	1	-	-
P6	1	0	-	-
P7	0	0	1	1
P8	1	1	-	1
P9	-	-	-	-
P10	-	-		-
S2			-	-
S3	-	-	-	-
S4	-	-	1	1
S5	1	1	0	-
S6	1	1	1	-
S7	1	1	-	
S8	-	-	-	
S9	-	-		
Sit1	1	1	-	-
Sit2	1	0	-	-
Sit3	1	1	1	1
Sit4	-	-	1	1
Sit5	-	-	-	-
Sit6			-	-
St1	-	-	1	-
St2	1	1	-	-
St3	-	-	-	
St4	-	-		
Primitive Reflex Profile				
ATNR	2	2	0	0
STNR	0	0	0	0
Positive Support	1	2	0	0
TLS	0	0	0	0
TLP	2	2	1	1
SR: HoB	1	3	3	3
SR: BoB	1	1	3	2
Galant	1	1	2	2
Moro	1	0	0	0
UE Grasp	0	0	0	0
LE Grasp	2	2	2	2
LE Placing	1	1	0	1
Stepping	0	0	0	0
INFANIB				
Scarf Sign	4	4	3	3
Heel to Ear	1	1	3	5
Popliteal Angle	5	5	6	6
Leg Abduction	4	3	4	4
Ankle Dorsiflexion	2	2	2	2

Five Month Assessments (continued)

Subject ID Number	**140**	**119**
Rater	**R1/DB**	**R2/DB**
# Agree	37	34
# Agree within 1	42	39
Number of items	43	40
% Agreement	86%	85%
%Agreement within 1	98%	98%
% Agreement AIMS	92%	86%
% Agreement PRP	77%	85%
% Agreement INFANIB	80%	80%

7 Month Assessments	June '94		Dec. '94	
Subject ID Number	093		137	
Rater	R1	DB	R2	DB
AIMS				
P4	-	-		
P5	-	-		
P6	1	1		
P7	1	1		
P8	0	0		
P9	0	1		
P10	1	1		
P11	0	0		
P12	1	1	-	-
P13	-	-	-	-
P14	-	-	-	1
P15			-	0
P16			1	1
P17			1	1
P18			0	1
P19			0	1
P20			1	1
P21			-	-
S6	-	-		
S7	-	-	-	-
S8	1	1	-	-
S9	1	0	1	1
Sit6	-	-	-	-
Sit7	-	-	-	-
Sit8	1	1	-	1
Sit9	1	1	-	1
Sit10	-	-	-	0
Sit11	-	-	1	1
Sit12			1	-
St1	-	-		
St2	-	-		
St3	1	1	-	-
St4	-	-	-	-
St5	-	-	1	1
St6			1	1
St7			0	0
St8			1	1
St9			-	-
St10			-	-
INFANIB				
Scarf Sign	4	5	5	5
Heel to Ear	4	4	4	5
Popliteal Angle	6	6	6	6
Leg Abduction	5	5	5	5
Ankle Dorsiflexion	2	3	2	2

Seven Month Assessments (continued)		
Subject ID Number	**093**	**137**
Rater	**R1/DB**	**R2/DB**
# Agree	27	27
# Agree within 1	31	33
Number of Items	31	33
% Agreement	87%	82%
%Agreement within 1	100%	100%
% Agreement AIMS	92%	82%
% Agreement INFANIB	60%	80%

10 Month Assessments	April '94		May '94		June '94	
Subject ID Number	006		029		044	
Rater	R1	DB	R1	DB	R2	DB
AIMS						
P14	-	-			-	-
P15	-	-	-	-	-	-
P16	1	1	-	-	1	1
P17	1	1	1	1	1	1
P18	1	1	1	1	1	1
P19	1	0	1	1	1	1
P20	1	1	1	1	1	1
P21	-	-	-	-	1	-
S7	-	-	-	-	-	-
S8	-	-	-	-	-	-
S9	1	1	1	1	1	1
Sit8			-	-	1	-
Sit9	-	-	-	-	1	-
Sit10	-	-	1	1	1	-
Sit11	1	1	1	1	1	1
Sit12	-	1	1	-	1	-
St4	-	-				
St5	-	-				
St6	1	1	-	-	-	-
St7	1	1	-	-	-	-
St8	1	1	1	1	1	1
St9	-	0	1	1	1	1
St10	-	1	1	0	1	1
St11		-	1	1	-	-
St12		-	-	-	-	-
St13			-	-		
INFANIB						
Scarf Sign	4	5	4	4	4	4
Heel to Ear	4	5	5	5	4	3
Popliteal Angle	6	6	6	6	6	6
Leg Abduction	6	5	5	4	4	4
Ankle Dorsiflexion	3	4	2	2	1	2
# Agree	22		25		24	
# Agree within 1	29		28		28	
Number of Items	29		28		28	
% Agreement	76%		89%		86%	
%Agreement within 1	100%		100%		100%	
% Agreement AIMS	88%		91%		91%	
% Agreement INFANIB	20%		80%		60%	

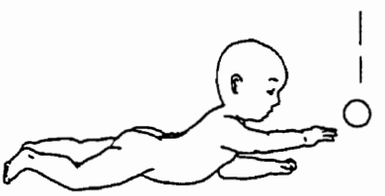
15 Month Assessments	Oct. '94		Oct. '94		Dec. '94	
Subject ID Number	029		030		069	
Rater	R1	DB	R1	DB	R1	DB
PDMS: Gross Motor Subscale						
61.	2	2	2	2	2	2
62.	2	2	2	2	2	2
63.	2	2	2	2	2	2
64.	2	2	2	2	2	2
65.	2	2	2	2	2	2
66.	2	2	2	2	2	2
67.	2	2	2	2	2	2
68.	2	2	2	2	2	2
69.	2	2	2	2	2	2
70.	2	2	2	2	2	2
71.	2	2	2	2	2	2
72.	2	1	2	2	2	1
73.	0	0	2	2	2	2
74.	1	1	0	1	2	1
75.	2	2	2	2	2	2
76.	0	0	0	1	0	1
77.	0	0	0	0	0	0
78.	2	2	1	0	2	2
79.	0	0	0	0	0	0
80.	2	1	0	0	0	0
81.	0	0	2	2	0	0
82.	2	2	2	2	2	2
83.	2	2	0	0	0	0
84.	0	0	0	0	0	0
85.	0	0	0	0	0	0
86.	0	1	0	0	0	0
87.	0	0	0	0	0	0
88.	0	0	0	0	0	0
89.	0	0	0	0	0	0
90.	0	0	0	0	0	0
Number Agree	27		27		27	
Number of Items	30		30		30	
% Agreement	90%		90%		90%	

15 Month Assessments	Oct. '94		Oct. '94		Dec. '94	
Subject ID Number	029		030		069	
Rater	R1	DB	R1	DB	R1	DB
PDMS: Fine Motor Subscale						
39.			2	2		
40.			2	2		
41.			2	2		
42.			2	2		
43.			2	2		
44.			2	2		
45.			2	2		
46.			2	2		
47.	2	2	2	2	2	2
48.	2	2	2	2	2	2
49.	2	2	0	0	2	2
50.	2	2	0	0	2	2
51.	2	2	2	2	2	2
52.	1	1	2	2	2	2
53.	2	2	2	2	2	2
54.	2	2	2	2	2	2
55.	1	1	2	2	2	2
56.	2	2	2	2	2	2
57.	0	0	0	0	0	0
58.	2	2	2	2	2	2
59.	2	2	2	2	2	2
60.	2	2	2	2	2	2
61.	2	2	2	2	2	2
62.	0	0	2	2	0	0
63.	2	2	2	2	2	2
64.	0	1	1	0	1	1
65.	0	0	0	0	1	0
66.	0	0	2	2	0	0
67.	0	0	0	0	0	0
68.	0	0	0	0	0	0
69.	0	0	0	0	0	0
70.	0	0	0	0	0	0
Number Agree	23		31		23	
Number of Items	24		32		24	
% Agreement	96%		97%		96%	

18 Month Assessments	**Dec. '94**	**Dec. 94**
Subject ID Number	**001**	**005**
Rater	**R1 DB**	**R1 DB**
Generalized Joint Laxity		
Right elbow extension	0 0	0 0
Left elbow extension	0 0	0 0
Right knee extension	0 0	0 0
Left knee extension	0 0	0 0
Right Thumb-to-Wrist	0 0	0 0
Left Thumb-to-Wrist	0 0	0 0
Right 5th MCP extension	1 1	0 0
Left 5th MCP extension	1 1	0 0
Total Laxity Score	2 2	0 0
% Agreement	100%	100%

Appendix 3K: Information Pamphlet

Early Motor Development



The purpose of this research is to closely examine the early development of babies born feet or bottom first (breech) and head first (cephalic). The results of this work will help us understand how the baby's position at birth is related to development.

The investigators involved in this study are Dr. Martha Piper (Professor, Faculty of Rehabilitation Medicine at the University of Alberta), Doreen Bartlett (Graduate Student, Faculty of Rehabilitation Medicine), Dr. Nan Okun (Perinatologist at the Royal Alexandra Hospital), Dr. Paul Byrne (Director of the Neonatal Intensive Care Unit at the University of Alberta Hospitals), and Dr. Joseph Watt (Developmental Pediatrician at the Glenrose Rehabilitation Hospital).

Each baby enrolled in the study will be assessed by a physical therapist at six weeks, and three, five, seven, ten, 15 and 18 months. During these assessments, your child's growth and motor skills such as rolling over, sitting up, crawling and walking will be measured. During the assessment, your baby's movements will be observed in different positions (such as lying on the tummy or lying on the back) in order that we might see how he/she moves. A pediatrician will also assess your baby at 18 months.

Feedback concerning the assessments will be provided to you. All of the assessments will be performed at the Faculty of Rehabilitation Medicine, University of Alberta. Each assessment will take approximately 45 minutes.

Your decision whether or not to participate in the study will in no way affect the other treatment or services your child receives. It goes without saying that we would like you to understand thoroughly what we are doing, so we welcome your questions. If you require additional information about the study you may contact one of the following people:

Dr. Martha Piper
Vice-President (Research)
University of Alberta. 492-5355

Doreen Bartlett
Department of Physical Therapy
University of Alberta. 492-4939

Participation is free of charge.

University of Alberta

Appendix 3L: Consent Form

Early Motor Development of Term Breech and
Cephalic Presenting Infants

Investigators: Dr. M. Piper, D. Bartlett, Dr. N. Okun, Dr. P. Byrne, Dr. J. Watt

Purpose: The purpose of this research is to closely examine the early development of babies born feet or bottom first (breech) and head first (cephalic) by measuring their growth, reflexes, joint movement, motor performance, and neurological development. The results of this work will help us understand how the baby's position at birth is related to development.

Your baby will be examined while in the hospital, and then at 6 weeks, and 3, 5, 7, 10, 15, and 18 months on a variety of developmental assessments by a physical therapist who will not be aware of the details of your baby's delivery. The follow-up assessments will be performed at the Faculty of Rehabilitation Medicine at the University of Alberta and each session will take less than 1 hour. These are physical examinations that will not harm your baby. You will be told how your child is developing. Information from your baby's birth will be recorded so we can describe the babies we will assess.

Consent: I, _____ (please print) agree to take part in the above project which has been completely described to me. I understand that my participation is voluntary and that I may withdraw from the study at any time without affecting the care my baby or I receive. I understand that this study will not harm my baby and that I will be given information about my baby's development. I understand that I should not discuss my baby's delivery with the physical therapist.

I understand that all records will be given a code number. No information identifying me or my baby will be released or printed, without my consent.

I have read and understood the information stated above. I sign this consent form willingly.

All questions that I had about the project have been answered. I understand that I may call Dr. Martha Piper (492-4939) or Doreen Bartlett (492-4939, or 432-7962 evenings) if I have more questions.

_____ _____
(Signature of Parent/Guardian) (Date)

_____ _____
(Signature of Witness) (Date)

_____ _____
(Signature of Investigator) (Date)

Appendix 4A

Infant, Maternal, and Delivery Characteristics:

1. **Cesarean-Breech Group**
2. **Cesarean-Cephalic Group**
3. **Vaginal-Breech Group**
4. **Vaginal-Cephalic Group**

Note: cell is blank if data not available

Abbreviations:

ID	identification number
G	gender: M = male, F = female
H	hospital: R = Royal Alexandra Hospital, U = University of Alberta Hospitals
GA	gestational age in weeks
BW	birth weight in grams
BL	birth length in centimetres
HCB	head circumference in centimetres at birth
Eth	ethnicity: 1 = Caucasian, 2 = Native, 3 = Oriental, 4 = Black, 5 = Other
Age	maternal age in years at the time of the infant's birth
Par	parity: number of children including this birth
Cl	classification if breech presentation: 0 = frank, 1 = complete, 2 = incomplete, 3 = double footling, 4 = single footling, 5 = not documented
Lab Pres	labour present: Y = yes, labour present, N = no, labour not present
Lab On	labour onset: 1 = spontaneous onset, 2 = induced
Lab Prog	labour progress: 1 = normal, 2 = augmented
Typ	type of delivery: 1= actual mode of delivery planned, 2 = actual mode of delivery unplanned
Ap1	Apgar score at 1 minute after birth
Ap5	Apgar score at 5 minutes after birth
Bc	birth complications: 0 = absent, 1 = present

4A-1. Cesarean-Breech Group

ID	G	H	GA	BW	BL	HCB	Eth	Age	Par	Cl	Lab Pres	Lab On	Lab Prog	Typ	Ap1	Ap5	Bc
1	M	R	38	2965	51.0	34.0	1	27	1	5	Y	1	1	1	8	9	0
4	M	R	38	3760			2	25	6	5	N			1	7	9	0
5	M	R	38	3600	46.0	34.0	1	25	1	5	N			1	4	7	0
6	M	R	40	3210	51.0	35.0	1	27	1	5	N			1	3	8	0
7	M	R	38	3470	49.0	35.0	1	30	2	5	N			1	8	9	0
10	F	R	37	3705	52.0	37.0	1	32	3	5	N			1	8	9	1
13	M	R	37	3260	47.0	36.0	1	34	3	5	N			1	9	9	0
22	M	U	38	2760	46.0	33.5	1	27	1	0	Y	1	1	2	3	8	0
25	F	R	39	3030	51.0	35.0	1	27	2	5	Y	1	1	1	8	9	0
27	M	U	40	4040	53.5		1	37	1	0	Y	1	1	1	7	9	0
30	M	R	39	3135	53.0	33.5	1	26	2	5	N			1	8	8	0
33	F	R	38	2865	44.0	34.0	1	18	1	4	N			1	5	9	0
34	M	R	38	3815	56.0	39.0	1	33	1	0	N			1	9	9	0
36	M	U	40	3930	54.0	35.0	3	35	2	3	Y	1	1	1	9	9	0
37	F	U	40	3490	48.5	34.0	1	15	2	0	Y	1	1	2	8	9	0
40	F	U	39	3110	48.0	36.3	1	23	1	3	Y	1		2	9	9	0
48	F	R	38	2700	49.0	35.0	1	41	1	5	N			1	9	9	0
49	M	R	38	3880	53.0	35.0	1	25	1	0	N			1	9	9	0
53	F	U	39	2880	48.0	34.0	1	34	2	3	Y	1	1	1	8	10	0
54	M	R	37	3397	47.0	37.0	1	28	4	5	N			1	8	9	0
55	F	R	38	3030	49.0	35.0	1	18	1	5	N			1	3	8	0
56	F	R	38	2820	45.5	32.0	1	32	3	0	N			1	8	8	0
57	M	R	38	2910	46.5		1	15	1	4	Y	1		1	4	7	0
59	F	U	38	3665	52.0	35.0	1	36	3	3	N			1	5	9	0
64	F	R	38	3390	55.0	36.5	1	24	1	0	N			1	9	9	0
67	F	R	38	2870	51.0	34.5	1	27	1	0	N			1	9	9	0
72	F	R	41	3900	55.0	36.0	1	28	1	0	Y	2		2	8	9	0
74	F	U	39	3090	49.0	35.5	1	31	1	3	N			1	9	10	0
80	M	R	41	4650	58.0	38.5	1	22	3	5	N			1	9	9	0
81	M	R	40	3870	54.0	39.0	1	18	1	5	N			1	9	9	0
84	F	U	38	3090	46.0	35.0	3	25	2	0	Y	1	1	1	7	9	0
91	F	R	38	3445	48.0	35.0	3	37	2	3	N			1	4	9	0
98	M	R	39	3875	54.5	36.5	1	37	1	0	N			1	8	9	0
100	F	R	39	3160	51.5	33.5	3	32	1	5	N			1	7	9	0
101	F	R	39	2734	47.0	34.5	4	25	1	3	N			1	5	7	0
102	F	R	39	3745	56.0	36.0	1	26	3	5	N			1	9	9	0
103	F	R	40	3365	53.0		1	35	1	5	N			1	6	7	0
104	M	R	39	3515	51.0	35.5	1	24	2	5	N			1	9	10	0
106	M	U	38	3500	53.0	35.0	1	34	1	0	Y	2	2	2	3	9	1
109	M	U	39	3400	51.0		1	29	2	0	N			1	8	9	0
119	F	U	38	3390	48.3	35.3	1	31	2	0	N			1	5	8	0
121	F	U	41	3950	53.0	37.0	1	30	1	5	N			1	6	9	0
122	F	U	38	3010	50.0	34.5	1	26	1	0	Y	1	1	1	9	10	0
124	F	U	39	3470	52.0	35.0	1	31	2	0	Y	1	1	2	6	9	0
125	M	U	38	3310	52.0	35.0	1	25	1	5	N			1	9	9	1
128	F	R	40	3405	55.0	34.5	4	31	1	5	N			1	8	9	0
133	F	R	38	2795	52.0	33.0	1	37	2	0	Y	1	1	2	5	8	0
140	F	U	39	3260	49.0	35.3	1	35	1	0	N			1	9	10	0
144[a]	F	R	38	2815	51.5	32.5	5	23	1	0	Y	1		1	9	9	0
147	M	U	39	3780	52.0	36.5	1	29	2	2	Y	2	2	2	7	9	1

[a] Ethnicity = East Indian.

4A-2. Cesarean-Cephalic Group

ID	G	H	GA	BW	BL	HCB	Eth	Age	Par	Lab Pres	Lab On	Lab Prog	Typ	Apl	Ap5	Bc
3	M	R	39	2885	48.5	35.0	1	31	3	N	0		1	7	9	0
12	M	R	41	4240	55.0	36.5	1	29	2	Y	2	2	2	3	8	0
15	F	R	40	3265	49.0	35.5	1	29	1	Y	1	1	2	8	9	0
16	F	R	41	3620	55.5	35.0	1	26	1	Y	1	2	2	7	9	0
17	M	R	39	3595	52.0	36.0	1	24	2	Y	1		2	9	10	0
19	M	R	41	3565	55.0	37.0	1	31	1	Y	2		2	3	9	0
20	M	U	41	3850	54.0	38.0	1	22	1	Y	1	2	2	9	9	0
23	F	R	39	3960	54.0	37.0	1	29	2	Y	1	2	2	8	9	0
26	M	U	42	4460	55.0	39.5	1	38	1	Y	1	1	2	8	9	0
29	M	R	38	3700	53.0	37.0	1	27	2	Y	1	2	2	4	7	0
39	F	U	40	3870	51.0	35.5	1	32	2	Y	1	2	2	8	9	0
42	M	R	42	3380	50.0	35.0	1	27	1	Y	2	2	2	8	9	1
50	F	U	40	3860	52.0	35.0	1	29	1	Y	2	2	2	9	9	0
51	F	R	39	3480	52.0	34.5	1	33	2	N			1	9	9	0
52	F	U	40	3830	52.0	34.0	1	36	1	Y	1	2	2	9	10	0
58	M	R	40	3580	51.0	36.0	4	30	1	Y	1	2	2	9	9	0
66[a]	F	R	39	3290	51.0	34.5	5	35	1	Y	1	2	2	8	9	0
73	F	R	40	4010	55.0	36.0	1	27	3	Y	2		2	8	9	0
75	F	U	38	3810	51.5	35.0	1	19	1	Y	2	2	2	9	9	0
76	M	R	39	3490	52.0	34.0	3	29	1	Y	1		2	5	9	1
78[a]	F	R	40	4220	54.0	36.0	5	36	2	Y	1	2	2	8	9	0
82	F	U	40	4420	52.1	37.2	1	33	3	Y	1	2	2	9	9	0
83	F	U	40	3350	52.0	34.5	1	32	1	Y	1	2	2	8	9	0
86	F	R	39	3215	54.0	32.5	3	37	1	Y	2	2	2	7	9	0
88	M	R	41	4370	54.0	36.0	1	24	1	Y	1	2	2	5	7	0
89	M	R	42	4295	53.0	38.0	1	20	1	Y	2	2	2	8	9	0
93	F	R	40	3840	49.0	34.5	1	26	1	Y	2		2	3	9	0
95	F	R	38	3346	45.5	30.5	3	35	2	N			1	7	9	0
99	M	R	41	4515	56.0	37.5	1	32	1	Y	2	1	2	8	9	0
105	F	R	42	3480	57.5	34.0	2	21	1	Y	1	2	2	7	9	0
107	F	R	39	3960	57.0	35.0	4	30	1	Y	1	2	2	7	9	0
110[b]	F	R	39	3020	51.0	33.5	5	40	2	Y	1	2	2	6	9	0
112	M	R	38	3975	55.0	35.0	1	21	1	Y	2	2	2	8	9	0
113	M	U	39	3660	54.0	35.0	1	35	1	Y	1		2	3	9	0
114	M	U	38	3790	53.0	35.5	1	30	2	N			1	8	9	0
115[b]	F	R	40	3495	50.0	34.0	5	30	1	Y	2	2	2	7	9	0
123	F	U	39	3420	52.5	36.0	1	31	1	Y	1	2	2	9	9	0
126	M	U	39	3770	54.0	36.0	1	37	1	Y	1		1	10	10	0
130	F	R	40	3435	53.0	33.5	1	27	1	Y	1	2	2	3	7	0
131	M	R	41	4605	58.0	37.5	1	24	1	Y	2		2	7	9	0
132	M	R	39	2990	51.5	34.5	4	30	2	Y	1	1	2	5	9	0
134	F	U	39	3310	49.0	34.0	3	37	3	N			1	9	9	0
137	F	U	39	4330	54.0	35.5	1	37	2	Y	1	1	1	5	9	0
138	F	R	38	3685	51.0	33.0	1	30	1	N			1	9	9	0
139	M	R	40	3705	53.5	35.0	1	29	1	Y	2	2	2	8	9	0
142	F	U	37	3810	54.0	36.0	1	30	1	Y	2	2	2	8	9	0
143	F	U	40	3425	51.0	37.0	1	28	1	Y	1	2	2	7	9	0
145	F	R	41	3485	55.0	35.5	1	36	3	N			1	8	9	0
148[a]	M	U	39	3040	52.0	35.0	5	24	4	N			1	9	10	0
149	M	U	40	3240	51.0	35.0	1	27	1	Y	1	2	2	4	8	0

[a] Ethnicity = East Indian.
[b] Ethnicity = Hispanic.

4A-3. Vaginal-Breech Group

ID	G	H	GA	BW	BL	HCB	Eth	Age	Par	Cl	Lab On	Lab Prog	Typ	Ap1	Ap5	Bc
8	F	U	40	3420	51.0	33.5	1	27	3	5	1			8	9	0
14	F	U	40	3225	52.0	34.0	1	26	1	5	1	1		10	10	0
18	M	R	41	4190	55.0	37.5	1	27	3	5	2	1		4	7	0
21	M	R	37	3225	52.0	35.0	1	28	2	4	1	1				0
31	M	R	39	3350	55.5	36.0	1	29	1	5	2	2		2	7	1
35	F	R	38	3160	49.5	34.5	1	25	2	5	1	2		5	8	0
38	F	U	39	3380	50.0	35.5	1	24	1	0	1	2		1	8	1
43	F	U	40	2810	45.5	33.0	1	26	1	0	1	1		3	9	0
45	M	U	37	2725	50.0		1	37	2	0	1	1		6	10	0
60	M	U	37	2745	49.0	33.0	1	28	1	0	1	1		8	9	0
61	M	U	40	3715	51.0	37.5	1	28	3	0	1	2		7	9	0
65	F	R	38	2665	48.0	32.5	1	30	2	5	1	1		8	9	0
68	F	U	39	3495	54.5	34.5	1	35	3	0	1	1		9	9	0
77	M	R	38	2640	47.0	33.5	2	34	3	5	1			8	9	0
79	M	R	40	4690	55.0	36.5	1	25	2	0	2	2		6	8	1
85	F	R	40	3030	51.0	32.0	1	25	1	5	1	1		8	9	0
92	M	U	40	3270	53.0	36.0	1	30	1	0	1	1		7	9	0
96	M	R	39	3215	53.0	35.0	3	29	3	5	1	2		9	9	0
108	F	R	38	2585	52.0	33.0	3	30	2	5	1	1		6	9	0
116	F	R	40	3160	48.5	34.0	1	21	1	5	1	1		3	7	0
118	M	U	37	3055	50.0	34.0	1	33	2	3	1	1		2	6	0
127	M	U	39	3240	50.5	35.0	1	35	2	0	1	1		4	7	0
135	M	R	39	3705	53.0	34.0	1	29	1	1	1	2	1	2	8	0
136	M	U	39	3750	53.0	36.0	1	24	1	0	1	1		9	9	0
146	M	R	37	3000	53.0	34.5	1	43	1	5	1	2		8	9	0
150	F	R	41	3055	49.5	36.0	1	32	2	5	1	1		9	9	0
151	M	U	38	3300	52.0	34.0	1	20	1	0	2	2		5	9	0
154	M	R	40	2860	54.0	35.0	1	34	1	5	1	1		6	9	0
157	F	U	37	2875	47.0	34.0	1	25	2	0	1	2		6	8	0
159	F	U	40	4540	51.5	36.0	1	29	3	0	1	1		9	9	0
161	F	R	39	2940	48.0	34.0	1	25	1	5	1			8	9	0
163[a]	M	R	38	3350	50.0	34.0	5	21	2	5	1	1		8	9	0
164	M	U	38	3175	50.5	35.0	1	34	3	0	1	1		7	8	0
166	F	U	39	3635	51.5	34.5	1	31	2	0	1	2		9	9	0
170	F	R	41	2950	48.5	35.0	2	28	3	0	1	1		9	9	0
171[a]	F	R	40	3250	48.5	35.5	5	27	2	5	1	1		8	10	1
172	F	R	38	2815	48.0	32.0	3	26	2	5	2	1		8	9	0
175	M	U	39	3500	51.0	35.0	1	29	3	0	1	1		5	7	0
177	F	U	40	3790	51.0		1	24	3	0	1	2		3	8	0
179	M	R	40	3445	53.0	34.5	1	28	1	0	1	2		7	9	0

[a] Ethnicity = Lebanese.

4A-4. Vaginal-Cephalic Group

ID	G	H	GA	BW	BL	HCB	Eth	Age	Par	Lab On	Lab Prog	Typ	Ap1	Ap2	Bc
2	M	R	40	4055	53.0	37.0	1	28	2	1	1	1	9	9	0
9	F	U	38	3245	48.0	33.0	1	32	2	1	1		8	9	0
11	F	U	42	3385	53.0	36.0	4	31	1	2	1		9	9	0
24	M	R	41	4265	53.5	36.0	1	28	1	1	2		9	9	0
28[a]	M	R	39	3265	49.5	32.5	5	32	4	1	1		8	9	0
32	M	R	39	3460	53.0	33.0	1	31	3	1	1		9	10	0
41	F	R	39	3440	50.0	35.0	2	25	2	1	2		9	10	0
44	M	U	38	3235	51.5	35.0	1	31	1	2	2		8	8	0
46	F	U	41	3180	52.5	33.0	1	31	1	1	1		7	9	0
47	F	U	40	3780	54.0	35.5	1	28	1	1	2		9	9	0
62	M	U	38	3845	50.0	39.0	1	31	3	2	2		9	9	0
63	M	U	40	3580	55.0	35.0	1	22	1	1	1		7	9	0
69	F	U	40	3810	56.0	35.5	1	34	3	1	1		9	9	0
70	M	R	41	2900	49.5	33.0	1	30	2	2	2		9	10	0
71	F	R	41	3675	48.0	36.0	1	25	1	2	2		8	9	0
87	F	R	37	3355	51.0	34.0	1	30	1	1	2		9	9	0
90	M	R	37	3005	50.0	35.0	1	21	1	1	1		3	6	1
94	M	U	40	2900	51.0	35.0	1	25	1	1	1		7	9	0
97	M	R	38	3730	54.5	36.0	1	28	2	1	1		8	9	0
111	F	R	40	3505	54.0	35.0	2	22	3	2	2		9	9	0
117	F	R	38	3075	50.0	36.5	1	22	1	1	2	1	8	9	0
120	M	U	40	3430	50.0	34.0	1	29	2	1	2		8	9	0
129	M	U	40	3385	53.0	35.0	1	38	2	1	1		6	9	0
141	M	U	39	3775	48.5	36.0	1	27	1	2	2		8	8	1
152	M	U	38	3580	51.0	35.5	1	27	2	1	1		9	10	0
153	F	R	40	3400	51.0	34.0	1	32	1	2	2		8	9	0
155	M	R	39	3075	50.0	35.0	1	33	2	1	1		9	9	0
156	M	R	41	4190	55.0	35.0	1	34	3	2	1		7	8	1
158	F	U	40	4360	55.0	34.5	1	33	1	1	1		9	9	0
160	F	U	38	3705	52.0	34.5	1	21	2	1	1		9	9	0
162	F	R	40	2905	50.5	32.0	1	30	2	1	1		9	9	0
165	M	U	38	3770	52.0	35.0	1	35	3	1	1		8	9	0
167	F	R	39	3730	56.0	36.5	1	19	1	1	2		9	9	0
168	F	R	42	2610	47.0	35.0	1	34	1	2	1		9	9	0
169[b]	F	U	40	3080	48.0	33.0	5	26	1	1	2		7	9	0
173	F	R	41	3160	52.5	34.2	1	34	2	2	1		8	9	0
174	M	R	40	3135	50.0	34.0	1	38	2	1	1		9	9	0
176	M	U	41	2985	52.0	34.0	1	26	1	1	2		9	9	0
178	F	U	41	3065	50.0	34.5	1	30	2	2	2		8	10	0
180	M	R	40	3240	52.0	32.0	1	29	1	1	1		6	8	1

[a] Ethnicity = Philipino.
[b] Ethnicity = East Indian.

Appendix 4B

Initial Assessment:
Selected Items from the Dubowitz' Assessment

1. **Cesarean-Breech Group**
2. **Cesarean-Cephalic Group**
3. **Vaginal-Breech Group**
4. **Vaginal-Cephalic Group**

Note: cell is blank if data not available

Abbreviations:

ID	identification number
CA	chronological age in hours

Dubowitz' Items: (all items have been coded from the left starting at 1, except for walking, which is coded 1,3.4,5)

POS	posture
AR	arm recoil
AT	arm traction
LR	leg recoil
LT	leg traction
POP	popliteal angle
HCP	head control (posterior neck muscles)
HCA	head control (anterior neck muscles)
HL	head lag
VS	ventral suspension
HRP	head raising in prone position
ARP	arm release in prone position
KJ	knee jerk
PG	palmar grasp
RT	rooting
SK	sucking
WK	walking
MR	Moro reflex
AO	auditory orientation
VO	visual orientation

4B-1. Cesarean-Breech Group

ID	CA	POS	AR	AT	LR	LT	POP	HCP	HCA	HL	VS	HRP	ARP	KJ	PG	RT	SK	WK	MR	AO	VO
1	104	3	3	3	4	3	4	3	3	2	2	3	4	2	4	2	4	4	3	2	1
4	44	3	3	3	4	3	3	2	3	1	2	3	4	2	4	4	4	1	4	1	1
5	43	4	3	4	3	2	2	2	3	4	2	3	4	2	4	3	4	1	3		
6	52	4	3	3	4	4	4	3	3	4	3	4	4		4	3	4	4	3		
7	92	3	3	5	4	3	1	1	3	4	4	4	4	2	4	3	2	4	4	2	1
10	75	4	3	3	3	3	3	2	1	2	2	2	4	2	3	3	4	3	4	1	3
13	69	4	3	2	4	2	2	2	3	2	2	2	4	2	4	4	4	3	4		
22	115	4	3	4	4	4	1	3	3	4	2	3	4	2	4	3	4	4	2	1	1
25	54	4	4	3	4	4	2	4	3	2	4	4	4	2	2	4	4	4	4	1	2
27	224	4	4	3	2	3	2	4	2	3	4	4	4	2	4	4	4	4	4	2	3
30	46	4	3	4	4	5	3	3	3	4	3	3	4	2	4	4	4	4	2	2	2
33	55	4	3	3	3	4	3	4	2	4	4	4	3	2	3	3	4	4	3	1	2
34	70	4	3	5	4	4	2	4	4	3	3	2	3	2	4	4	4	4	4	3	3
36	87	4	2	3	4	3	3	3	2	3	4	3	4		4	4	4	4	4	1	3
37	46	4	3	5	4	4	1	3	3	4	3	2	4	2	4	2	2	4	4	1	1
40	32	4	3	3	4	4	3	4	2	3	4	4	4	2	4	3	4	4	4	1	2
48	27	4	4	5	3	4	4	1	1	2	3	1	4	2	4	2	4	4	3	3	4
49	98	4	4	4	3	4	5	3	3	4	3	2	4	2	4	4	4	4	4	3	3
53	45	4	3	3	4	3	4	2	3	3	4	2	4	2	4	4	3	1	4		
54	75	4	3	3	4	3	4	4	3	3	4	2	4	3	4	4	4	4	3	5	
55	36	4	4	3	3	4	3	3	2	2	4	4	4	2	4	3	4	4	4	3	
56	54	3	4	3	4	3	3	2	3	2	3	2	4	3	4	4	4	4	4	3	1
57	79	4	3	4	3	3	2	2	2	3	3	3	4	2	4	4	4	4	3	3	1
59	96	4	3	2	3	2	1	2	3	1	2	2	4	2	3	3	4	1	4		
64	91	4	3	2	3	3	1	2	3	2	2	2	4	2	2	3	4	4	3	1	1
67	69	4	4	4	4	3	3	2	2	3	3	4	4	2	4	4	4	4	4	3	1
72	59	3	3	3	4	3	2	1	1	2	3	2	4	2	3	3	3	3	4	1	1
74	55	4	2	4	4	4	4	2	3	3	3	4	4	2	4	4	4	1	4		
80	48	4	3	3	3	4	3	4	4	4	3	4	4	2	4	3	4	3	4	3	
81																					
84	94	4	2	3	3	3	2	2	3	4	2	3	4	2	4	4	4	4	2	3	4
91	42	3	3	3	4	3	3	2	2	3	3	3	4	2	4	4	4	4	4	3	1
98	37	4	3	4	4	3	3	4	4	4	3	2	4	3	4	3	4	4	4	3	
100	45	4	2	3	2	3	2	3	2	3	3	3	4	2	2	3	4	1	2	2	2
101	94	4	3	2	4	2	2	2	1	2	3	2	4	1	3	4	4	4	4	3	1
102	91	4	3	3	4	3	3	4	4	3	3	4	4	2	4	4	4	4	3	4	1
103																					
104	53	4	4	3	4	4	4	4	3	4	4	4	4	2	4	4	4	4	4	3	1
106	87	4	3	3	4	3	3	3	3	3	4	4	4	2	2	4	4	3	4	4	3
109	54	4	3	4	4	5	4	2	3	5	2	5	4	2	4	4	4	3	4	4	3
119	42	4	3	4	4	4	1	4	4	4	4	3	4	2	4	4	4	3	4	3	4
121	80	4	3	3	3	3	3	3	3	4	3	2	4	2	4	4	4	3	4	2	3
122	63	3	2	3	4	5	2	2	3	2	3	2	4	2	2	3	4	3	4	3	2
124	69	4	3	3	4	5	4	4	3	5	3	3	4	2	4	4	4	1	4	4	3
125	56	4	3	4	4	4	3	3	3	3	3	3	3	2	4	4	4	3	4	5	2
128	50	3	3	3	3	3	2	4	2	2	3	2	4	2	3	3	4	3	3	3	
133	49	4	3	2	3	2	2	3	2	1	2	3	4	2	4	3	4	4	3	2	2
140	120	4	2	4	3	4	4	3	3	4	3	4	4	2	4	4	4	3	4	2	4
144	159	4	4	4	4	4	3	3	4	3	4	3	4	2	4	3	3	4	4	3	3
147	54	4	4	5	4	4	3	4	4	3	3	3	4	2	4	4	4	3	4	2	2

4B-2. Cesarean-Cephalic Group

ID	CA	POS	AR	AT	LR	LT	POP	HCP	HCA	HL	VS	HRP	ARP	KJ	PG	RT	SK	WK	MR	AO	VO
3	73	3	4	2	4	3	3	1	3	2	1	2	3	2	4	4	4	4	4	4	1
12	80	4	3	3	4	4	4	4	4	2	3	4	4		3	2	4	4	2	1	1
15	46	4	4	3	3	4	3	2	2	2	3	4	4	2	4	2	3	4	4	1	1
16	96	4	3	4	3	3	4	3	3	3	2	3	3	2	4	4	4	3	4	1	
17	66	3	3	3	4	3	2	3	3	2	3	3	4	2	3	4	4	4	3	4	4
19	71	4	3	4	3	5	5	3	4	3	3	3	4	2	4	1	4	3	2	2	4
20	59	3	2	5	2	4	5	2	2	3	3	2	4	2	4	3	4	3	2	2	3
23	138	4	2	3	4	4	2	2	3	3	2	2	4	2	3	4	4	3	2	3	3
26	171	4	4	5	2	4	5	4	4	3	2	3	4	2	4	4	4	1	4	3	3
29	72	4	3	4	4	4	4	2	3	2	2	4	3	2	4	4	4	4	2	2	3
39	66	4	3	2	3	4	4	3	3	4	2	2	4	2	3	4	4	4	4	1	3
42	68	4	4	4	4	4	4	3	3	3	3	4	4	3	4	4	4	4	4	4	1
50	253	4	3	2	2	3	3	2	3	3	2	3	4	2	4	4	4	3	4	2	3
51	72	3	4	3	3	3	3	4	3	4	3	4	4	3	3	4	4	4	4	3	1
52	62	4	4	3	4	3	3	4	4	3	4	2	4	1	4	3	3	4	3	3	1
58	39	4	3	3	3	4	4	3	2	2	3	3	3	2	3	4	4	3	3	0	3
66	40	4	3	4	4	4	4	4	4	4	4	4	4	2	4	3	4	4	3	4	1
73	58	4	4	3	4	3	3	3	3	2	3	4	4	2	4	3	3	4	3	3	5
75	73	4	3	4	3	4	4	2	3	3	4	4	4	2	4	4	4	3	4	5	4
76	90	4	3	3	3	3	3	4	2	3	3	4	4	2	4	4	4	4	4	3	1
78	58	4	3	3	4	4	4	4	4	4	4	4	4	2	4	4	4	4	4	3	1
82	54	4	2	3	4	5	3	4	4	3	4	3	4	2	4	4	4	4	4	3	2
83	161	4	3	3	3	3	2	4	3	4	2	4	3	2	4	4	3	1	4	3	4
86	67	3	2	2	3	2	2	1	2	2	1	3	3	2	3	3	4	3	2	2	2
88	63	3	3	3	3	4	3	3	2	4	3	4	4	2	3	4	4	4	4	1	2
89	16	3	3	3	2	4	2	3	3	3	4	4	4	2	4	3	4	3	3	1	2
93	38	4	3	3	4	4	4	4	3	4	3	4	4	2	4	4	4	4	3	3	1
95	54	3	2	3	3	3	2	2	3	2	3	3	4		3	3	4	3	4	2	1
99	55	4	3	4	4	3	3	4	4	3	4	4	4	2	4	4	4	4	4	4	1
105	41	4	3	3	2	4	2	3	2	4	3			2	2	3	4	4	3		
107	85	4	2	2	2	4	3	2	2	2	2	3	4	2	2	3	4	4	3	2	3
110	69	4	3	3	3	4	4	3	3	3	4	3	4	2	3	3	4	3	3	1	2
112	87	4	3	3	3	3	4	3	3	3	3	3	3	2	3	3	4	4	4	1	2
113	89	4	4	4	3	5	5	2	3	3	3	3	4	2	4	4	4	1	4	4	3
114	75	4	4	5	4	3	5	2	3	3	2	2	3	2	4	4	4	1	4	4	4
115	92	4	2	1	2	3	4	4	4	2	2	2	4	4	3	4	4	1	4	3	1
123	92	3	3	3	4	4	2	2	3	4	2	3	4	2	4	4	4	3	3	2	
126	42	4	4	4	3	4	4	4	3	2	2	3	4	2	4	4	4	3	4		
130	89	4	3	4	3	3	4	3	3	3	2	4	4	2	4	4	4	1	4	3	2
131	37	4	3	4	2	4	3	2	2	3	3	3	3	3	4	4	4	3	4	1	1
132	55	4	4	3	4	4	3	4	4	4	3	4	4	2	4	4	4	3	4	1	3
134	63	3	3	3	2	4	3	2	3	2	2	3	4	2	3	3	4	4	4	2	2
137	62	1	3	3	2	3	2	2	3	2	2	4	4	2	3	4	4	4	2	3	4
138	74	4	3	4	3	4	4	3	3	4	3	4	4	2	4	4	4	1	4	2	3
139	8	4	3	3	4	4	2	2	3	5	3	3	3	2	4	1	1	4	4	2	2
142	48	4	2	3	4	3	2	4	3	3	2	3	4	2	4	4	4	3	2	3	3
143	77	4	2	3	3	3	3	2	3	4	3	3	4	2	4	4	4	1	4	2	
145	98	3	3	2	3	3	3	3	3	2	3	3	4	2	2	3	4	3	3	3	2
148	49	4	3	2	3	3	2	3	3	2	3	3	4	2	3	3	4	4	4	1	2
149	180	4	3	4	2	3	2	4	4	4	4	4	4	2	4	4	4	1	4	3	3

4B-3. Vaginal-Breech Group

ID	CA	POS	AR	AT	LR	LT	POP	HCP	HCA	HL	VS	HRP	ARP	KJ	PG	RT	SK	WK	MR	AO	VO
8	32	4	3	4	4	3	1	2	3	3	4	2	4	2	4	4	4	4	4	2	2
14	42	4	3	2	4	2	1	4	4	3	3	3	4	2	4	4	3	4	3	2	3
18	27	4	4	3	3	3	3	4	2	3	4	4	4	2	4	3	4	3	4	2	3
21	56	4	3	3	3	4	3	3	2	4	2	2	4		2	4	4	4	4	2	3
31	74	4	3	4	4	5	1	2	3	2	2	4	3	2	4	4	3	4	3	2	3
35	54	4	3	3	4	4	1	2	3	3	4	3	3	2	4	4	3	3	3	1	2
38	37	4	3	3	4	5	1	4	4	3	3	3	3	2	4	4	4	4	4	3	3
43	48	3	3	5	4	5	1	4	4	4	4	4	4	2	4	4	4	4	2	2	2
45	48	4	2	4	2	3	4	2	3	3	2	3	4	2	4	4	4	4	2		
60	38	4	3	5	4	5	1	3	4	4	4	2	4	2	4	4	4	4	4	2	2
61	96	4	3	5	4	3	3	3	3	3	4	3	4	2	4	4	4	4	4	2	2
65	38	4	3	4	3	4	2	2	2	2	2	3	4		4	3	4	4	2	1	1
68	49	4	3	4	4	4	1	2	1	3	3	3	4	2	4	4	4	1	4	4	2
77	51	4	4	4	4	4	4	4	2	3	3	2	4	1	4	1	3	4	3	3	1
79	81	3	3	3	4	3	4	4	2	3	3	2	4	2	4	4	3	4	4	3	1
85	57	4	3	2	3	3	1	3	3	3	3	2	4	2	2	2	4	3	3	2	1
92	49	4	3	4	4	3	1	3	3	3	4	2	4	2	2	2	4	3	4	2	1
96	22	3	2	3	2	4	2	3	3	2	3	2	4	2	3	3	4	3	4	3	2
108	21	4	2	2	2	2	2	2	2	2	2	2	4	2	3	2	3	3	2	1	1
116	52	4	3	4	3	3	2	4	3	2	3	3	4	2	2	3	4	3	2	2	1
118	41	4	4	4	4	4	4	4	4	3	2	4	3	1	4	1	4	3	4	1	4
127	43	4	4	3	4	3	1	2	3	4	3	4	4	2	3	4	4	4	4	3	3
135	23	4	3	2	2	3	2	2	3	2	2	2	3	2	2	2	4	3	3	2	1
136	124	4	3	4	4	4	2	3	3	3	2	2	4	2	4	4	4	3	4	3	4
146	185	4	4	4	4	4	2	2	3	3	2	3	4	2	4	4	4	3	4	3	3
150	163	4	4	4	3	4	2	2	3	5	3	3	4	2	4	4	4	4	4	2	3
151	96	4	3	3	3	4	4	2	2	3	2	4	4	2	3	4	4	1	4	2	3
154	92	4	3	4	4	5	3	3	3	3	3	3	4	2	4	4	4	4	4	2	1
157	40	3	3	3	4	3	1	4	3	3	3	4	4	2	4	4	4	1	4	2	3
159	240	3	3	3	2	3	3	3	3	3	3	2	4	2	3	3	4	3	3	2	2
161	168	3	3	2	2	3	2	3	3	2	3	3	4	2	3	3	4	3	3	2	2
163	134	3	2	2	3	3	3	2	3	3	2	2	3	2	2	3	3	4	2	2	1
164	96	2	3	2	2	3	3	3	2	2	3	3	4	2	3	3	4	3	3	2	2
166	168	4	3	3	3	3	3	3	3	3	3	3	4	2	3	3	3	4	4	1	2
170	240	2	2	2	2	3	2	3	3	1	3	3	3	2	2	3	3	4	2	1	2
171	384	4	3	2	2	4	4	2	2	2	3	2	3	2	2	3	3	4	2	2	
172	144	4	3	3	3	4	3	2	1	2	2	3	4	2	2			4	4		
175	264	3	3	3	3	4	4	3	3	3		4	4	2	4	3	4	4	3	1	2
177	168	3	3	2	2	2	2	2	2	2	3	3	4	2	3	3	4	4	3	3	3
179	96	3	3	3	3	3	3	3	3	3	3	3	4	2	4	3	4	4	3	1	2

4B-4. Vaginal-Cephalic Group

ID	CA	POS	AR	AT	LR	LT	POP	HCP	HCA	HL	VS	HRP	ARP	KJ	PG	RT	SK	WK	MR	AO	VO
2	28	4	3	4	4	5	4	3	2	3	3	4	4	2	4	2	3	4	3	1	3
9	59	4	3	2	4	4	3	2	3	2	4	4	3	2	3	3	4	3	3	1	4
11	54	4	3	2	3	3	2	2	3	2	3	3	4	2	4	4	3	1	3	3	3
24	50	3	2	2	3	4	2	3	2	1	2	4	4	2	4	4	4	4	4	1	2
28	29	4	4	4	4	5	5	4	4	5	5	3	4	2	4	4	3	4	4	2	3
32	34	4	3	3	3	3	2	1	2	2	2	3	4	2	2	3	3	3	3	1	2
41	50	4	3	3	3	3	2	2	3	2	3	3	3	2	4	4	4	4	4	3	1
44	32	4	3	5	4	5	3	3	3	5	3	2	4	2	4	4	5	3	2	2	2
46	33	4	3	5	3	4	5	2	3	3	3	3	4	2	4	4	4	1	4		
47	114	4	4	5	4	4	5	2	3	3	4	3	4	2	4	4	4	3	4	3	3
62	59	4	3	5	4	3	2	2	3	3	3	4	4	2	3	4	4	1	3		
63	38	4	3	5	4	4	1	4	4	2	4	4	4	2	5	4	4	1	3		
69	39	4	4	4	4	4	2	2	3	5	2	4	4	2	3	4	4	1	4	5	3
70	44	3	4	4	4	4	4	4	3	3	4	3	4	2	4	4	4	4	3	3	1
71	41	4	3	4	3	4	4	3	2	3	3	2	4		4	4	4	4	4	3	1
87	64	3	3	2	2	3	2	2	3	2	3	3	3	2	2	3	4	3	3	1	2
90	36	4	4	4	4	4	4	4	2	3	4	4	4	2	4	3	1	4	4	3	1
94	37	4	4	5	4	4	1	2	3	3	3	4	4	3	4	4	4	4	4	3	3
97	93	3	3	3	3	4	3	3	2	3	3	2	4	2	4	1	4	4	4	3	1
111	47	4	3	4	3	4	4	3	3	4	3	3	3	2	3	3	4	3	3	2	2
117	40	4	3	2	1	3	2	2	2	1	2	1	2	2	2	3	4	4	3	1	1
120	37	3	3	3	3	5	5	1	1	3	2	2	3	2	4	4	4	3	4	3	3
129	42	4	4	4	4	3	4	4	3	4	4	3	4	2	4	4	4	3	4	2	4
141	35	4	2	4	4	4	5	4	3	4	3	4	4	2	4	4	4	1	4	2	1
152	77	4	3	4	4	4	2	4	4	3	2	3	4	2	4	4	4	3	4	3	3
153	86	4	2	2	4	4	5	4	3	2	4	4	4	2	4	4	3	1	4	4	3
155	50	4	4	5	3	4	5	2	3	3	2	4	4	2	4	4	4	4	4	3	3
156	46	4	3	3	3	4	5	3	3	3	2	4	4	2	3	4	3	3	4	3	3
158	34	4	3	4	4	4	5	3	3	3	5	4	4	2	4	4	4	3	4	2	3
160	192	2	3	3	3	4	4	3	3	3	3	3	4	2	4	3	4	4	3	2	2
162	96	2	3	2	2	3	4	1	2	2	2	2	2	2	2	3	4	4	3	2	
165	216	3	3	3	3	4	2	3	3	3	3	4	4	2	3	3	4	3	4	2	2
167	96	3	3	4	3	4	4	3	3	3	3	3	4	2	3	3	4	4	3	2	2
168	600	3	3	3	3	4	4	3	3	3	3	4	4	2	3	3	4	4	3	3	2
169	216	4	3	3	2	3	3	3	3	3	3	3	4	2	3	3	4	4	3	1	2
173	93	4	3	3	2	4	4	3	3	3	3	3	4	2	4	3	4	4	3	3	2
174	97	4	3	3	3	3	3	3	3	3	2	3	4	2	3	3	4	4	3	2	1
176	264	3	3	2	2	3	3	3	3	2	3	3	4	2	2	3	4	4	3	1	2
178	336	3	3	2	3	3	3	3	2	2	3	3	4	2	3	3	4	4	3	2	3
180	91	3	3	3	3	4	3	3	3	2	2	4	4	2	3	3	4	4	3	2	2

Appendix 4C

Initial Assessment: Primitive Reflex Profile and the Joint Angles from the INFANIB

1. **Cesarean-Breech Group**
2. **Cesarean-Cephalic Group**
3. **Vaginal-Breech Group**
4. **Vaginal-Cephalic Group**

Note: cell is blank if data not available

Abbreviations:

ID	identification number

Primitive Reflex Profile Items: (all items have been coded from the left starting at 0)

ATN	asymmetrical tonic neck reflex
STN	symmetrical tonic neck reflex
SUP	positive supporting reaction
TLS	tonic labyrinthine reflex in supine
TLP	tonic labyrinthine reflex in prone
HOB	segmental roll, head on body reaction
BOB	segmental roll, body on body reaction
GAL	Galant reflex
MOR	Moro reflex
UEG	upper extremity grasp reflex
LEG	lower extremity grasp reflex
LEP	lower extremity placing reflex
STP	stepping reflex

INFANIB Items (all items have been coded from the left starting at 1)

SCF	scarf sign
HE	heel to ear
PA	popliteal angle
ABD	leg abduction
DF	dorsiflexion of foot

4C-1. Cesarean-Breech Group

ID	ATN	STN	SUP	TLS	TLP	HOB	BOB	GAL	MOR	UEG	LEG	LEP	STP	SCF	HE	PA	ABD	DF
1	0	0	0	0	0	3	3	2	2	3	1	2	2	2	2	6	3	2
4	0	2	0	0	0	1	2	2	1	3	2	1	0	5	3	4	3	1
5	0	0	0	0	0	3	1	0	2	3	2	1	0	2	3	5	3	2
6	2	0	1	0	0	3	3	0	2	3	2	2	2	3	3	5	2	2
7	0	0	1	0	0	3	3	1	1	3	2	1	2	4	5	6	4	3
10	0	0	1	0	0	3	3	0	1	1	2	2	1	3	4	5	4	1
13	0	0	1	0	0	3	3	2	2	3	1	2	1	4	5	6	4	1
22	0	0	1	0	0	3	3	0	1	3	2	2	2	4	5	6	2	1
25	0	0	2	0	0	3	3	1	2	1	2	2	2	5	4	5	3	2
27	0	0	1	0	0	3	3	1	2	3	2	2	2	5	4	5	4	2
30	0	0	1	0	0	3	3	0	1	3	2	2	2	2	3	5	3	1
33	0	0	2	0	0	3	3	0	2	2	1	2	2		4	5	3	2
34	0	0	1	0	0	3	3	3	2	3	2	2	2	3	4	5	2	2
36	0	0	1	0	0	3	3	1	1	3	2	2	2	5	2	4	2	2
37	0	0	1	0	0	3	3	0	2	3	1	2	2	4	5	6	2	1
40	0	0	1	0	0	3	3	2	2	3	1	1	2	4	5	6	3	1
48	0	0	1	0	0	3	3	2	2	2	2	2	2	5	4	5	4	1
49	0	0	1	1	1	3	3	1	2	3	2	2	2	3	3	3	3	2
53	0	0	0	2	0	3	3	1	2	3	2	2	0	3	2	5	2	2
54	0	0	1	0	0	3	3	1	2	3	2	2	2	3	5	6	4	1
55	0	0	1	0	0	3	3	2	2	2	2	2	2	3	3	6	2	2
56	0	0	1	0	0	3	3	2	2	3	2	2	2	5	5	6	5	1
57	0	0	1	0	1	3	3	1	2	2	2	2	2	4	5	6	3	2
59	0	0	0	0	0	1	2	0	2	2	2	2	0	4	5	6	4	2
64	0	0	1	0	0	3	3	0	2	1	2	2	2	5	5	5	3	2
67	0	0	1	0	0	3	3	2	2	2	2	2	2	4	4	5	4	1
72	0	0	0	0	0	3	3	2	2	2	2	2	2	4	5	6	5	2
74	0	0	0	0	0	3	3	1	2	3	2	1	0	2	2	5	2	2
80	0	0	2	0	0	3	3	0	2	3	2	2	1	5	4	6	3	2
81																		
84	0	0	1	0	0	3	3	1	1	3	2	2	2	4	5	6	3	1
91	0	0	1	0	0	3	3		2	2	2	2	2	5	5	5	4	1
98	0	0	1	0	0	3	3	1	2	2	2	2	2	4	5	6	5	1
100	0	0	1	0	0	3	3	0	1	1	2	1	0	5	4	4	3	2
101	0	0	1	0	0	3	3	1	2	2	2	1	2	5	5	5	4	1
102	0	0	1	0	0	3	3	2	2	2	2	2	2	5	5	5	4	2
103																		
104	0	0	1	0	0	3	3	1	2	2	2	2	2	5	4	4	4	2
106	0	0	1	0	0	3	3	0	2	1	1	2	1	4	2	5	3	1
109	0	0	1	0	0	3	3	1	2	3	2	2	1	2	2	6	2	2
119	0	0	1	0	0	3	3	0	2	3	2	1	1	4	5	6	2	1
121	0	0	1	2	0	3	3	2	2	3	2	2	1	3	3	5	2	1
122	0	0	1	1	0	3	3	0	2	1	1	2	1	6	5	6	2	2
124	0	0	1	0	0	3	3	2	2	3	2	2	0	2	3	6	3	1
125	0	0	0	0	0	3	3	0	2	3	2	2	0	5	1	4	2	1
128	0	0	1	0	0	3	3	0	2	2	2	2	1	4	3	5	2	2
133	0	0	1	0	0	3	3	0	2	2	2	2	2	3	4	3	3	2
140	0	0	1	0	0	3	3	2	2	3	2	2	1	2	2	6	2	1
144	0	0	1	0	0	3	3	0	2	3	2	2	2	3	2	5	2	1
147	0	0	1	0	0	3	3	0	2	3	2	1	1	2	3	6	3	1

4C-2. Cesarean-Cephalic Group

ID	ATN	STN	SUP	TLS	TLP	HOB	BOB	GAL	MOR	UEG	LEG	LEP	STP	SCF	HE	PA	ABD	DF
3	0	0	1	0	0	0	3	2	2	3	2	2	2	3	4	5	4	1
12	0	0	1	0	0	3	3	3	1	1	1	2	2	3	2	6	4	2
15	0	0	0	1	0	3	3	2	2	3	2	2	2	4	4	1	3	2
16	0	0	1	0	0	3	3	2	2	3	2	1	1	3	1	3	3	2
17	0	0	1	0	0	3	3	0	1	2	2	2	2	3	4	6	4	1
19	0	0	1	0	0	3	3	1	2	3	1	2	1	2	1	4	2	1
20	0	0	0	0	0	3	3	2	1	3	2	1	1	2	2	2	2	1
23	0	0	1	1	0	3	2	2	1	2	2	2	1	5	4	6	3	1
26	0	0	1	1	0	1	1	2	2	3	2	2	0	4	2	5	3	1
29	0	0	1	0	0	3	3	2	1	3	2	2	2	5	2	5	2	1
39	0	0	1	0	0	3	3	2	2	1	2	2	2	5	2	5	2	2
42	0	0	1	0	1	3	3	2	2	3	2	2	2	4	4	5	4	2
50	0	0	1	0	0	3	3	2	2	3	1	2	1	3	3	5	2	2
51	0	0	1	1	0	3	3	0	2	2	2	2	2	4	4	5	4	1
52	0	0	1	0	0	3	3	1	2	3	2	2	2	4	4	5	4	2
58	0	0	1	0	0	3	3	0	2	3	2	2	2	4	3	3	2	2
66	0	0	1	0	0	3	3	0	2	2	2	2	2	4	4	5	4	
73	0	0	1	1	0	3	3	0	2	3	2	2	2	5	4	5	4	1
75	0	0	1	0	0	3	3	2	2	3	2	2	1	3	2	5	1	1
76	0	0	1	0	0	3	3	2	2	2	2	2	2	4	4	5	4	1
78	0	0	1	0	0	3	3	2	2	3	2	2	2	5	5	4	4	1
82	0	0	1	0	0	3	3	1	2	3	2	2	2	2	4	6	2	1
83	0	0	1	0	0	3	3	2	2	3	2	2	0	2	4	6	2	1
86	0	0	1	0	0	3	3	1	2	2	2	2	1	5	4	3	3	1
88	0	0	2	1	0	3	3	0	2	3	2	2	2	4	5	3	3	1
89	0	0	0	0	0	3	3	0	2	3	2	2	1	3	3	4	3	2
93	0	0	1	1	0	3	3	0	2	2	2	2	2	3	4	4	4	1
95	0	0	0	0	0	3	3	0	2	2	2	2	1	5	4	4	2	2
99	0	0	1	0	1	3	3	0	2	2	2	2	2	4	5	5	4	2
105	0	0	1	0	0	3	3	0	1	1	2	2	2	4	4	4	3	2
107	0	0	1	0	0	3	2	0	2	1	2	2	2	4	3	4	3	2
110	0	0	1	0	0	3	3	0	2	2	2	2	1	5	3	3	3	2
112	0	0	1	0	0	3	3	0	2	2	2	2	2	5	3	3	3	2
113	0	0	1	0	0	3	3	0	2	3	2	1	0	4	2	5	2	2
114	0	1	1	2	0	0	3	2	2	3	1	1	0	4	2	5	3	1
115	0	0	1	0	0	3	3	2	2	2	2	1	0	2	2	6	3	2
123	0	0	1	0	0	3	3	2	1	3	2	2	1	2	3	6	2	1
126	0	0	1	0	0	3	3	2	2	3	2	2	1	2	2	5	2	1
130	0	0	1	1	0	3	2	1	2	3	2	1	0	2	2	5	2	1
131	0	0	1	2	0	3	3	0	0	3	2	1	1	3	1	4	2	2
132	0	0	1	0	0	3	3	2	2	3	2	2	1	2	2	5	2	1
134	0	0	0	0	0	3	1	1	2	2	2	2	2	4	3	4	3	1
137	1	1	0	2	0	3	2	0	1	2	2	2	2	6	4	6	4	1
138	0	0	0	0	0	3	3	2	2	3	2	0	0	4	2	4	2	2
139	0	0	1	0	0	3	3	0	2	3	2	1	2	2	4	6	2	1
142	0	0	1	2	0	3	2	1	1	3	2	2	1	3	4	6	2	2
143	0	0	0	0	0	3	3	0	2	3	2	1	0	4	2	5	2	2
145	0	0	1	0	0	3	3	0	2	1	1	2	1	3	3	4	2	1
148	0	0	2	0	0	3	3	0	2	2	2	2	2	4	3	3	2	1
149	0	0	1	0	0	3	3	2	2	3	2	2	0	2	2	5	3	1

4C-3. Vaginal-Breech Group

ID	ATN	STN	SUP	TLS	TLP	HOB	BOB	GAL	MOR	UEG	LEG	LEP	STP	SCF	HE	PA	ABD	DF
8	0	0	0	0	0	3	3	2	1	3	2	2	2	2	5	6	2	1
14	0	0	1	0	0	3	3	1	2	3	1	2	2	5	6	6	5	1
18	1	0	1	0	0	3	3	0	2	3	2	1	1	2	2	5	3	2
21	0	0	1	1	0	3	3	2	2	1	1	2	2	2	2	6	2	1
31	0	0	1	0	0	3	3	1	1	3	1	2	2	5	5	6	3	1
35	0	0	1	0	0	3	3	3	2	3	2	2	1	2	5	6	2	2
38	0	0	1	0	0	3	3	0	2	3	2	2	2	5	6	6	2	1
43	0	1	1	1	0	3	3	0	1	2	2	2	2	2	5	6	4	1
45	2	0	1	0	0	3	3	0	1	3	1	2	2	4	3	6	2	1
60	0	0	1	0	0	3	3	0	1	3	2	2	2	3	5	6	2	2
61	0	0	1	0	0	3	3	2	2	3	2	2	2	3	3	5	2	2
65	0	0	1	0	0	3	3	0	1	2	2	2	2	5	4	3	2	3
68	0	0	1	0	0	3	3	2	2	3	2	2	1	5	5	6	4	1
77	0	0	1	0	0	3	3	1	2	2	2	2	2	4	5	5	4	1
79	0	0		0	0	3	3	0	2	2	2	2	2	5	5	5	5	1
85	0	0	1	0	0	3	3	0	2	1	2	2	1	5	5	5	2	2
92	0	0	1	0	0	3	3	1	2	1	1	1	1	5	5	6	4	2
96	0	0	1	0	0	3	3	0	2	1	2	2	1	3	3	4	3	3
108	0	0	1	0	0	3	3	0	1	1	2	1	1	4	5	5	2	1
116	0	0	1	0	0	3	3	0	1	1	2	2	1	5	3	4	3	2
118	0	0	0	0	0	3	3	0	2	3	2	1	1	5	1	4	2	2
127	0	0	1	2	0	3	3	1	2	1	2	2	2	4	5	6	2	1
135	0	0	1	0	0	3	3	0	2	1	2	2	1	4	4	3	4	2
136	0	0	1	1	0	3	3	1	2	3	1	2	1	2	5	5	2	1
146	0	0	1	0	0	3	3	1	2	3	2	2	1	3	4	6	3	1
150	0	0	1	0	0	3	3	1	2	3	2	2	2	5	5	6	2	1
151	0	0	0	0	0	3	2	2	2	2	1	2	0	3	3	6	2	1
154	0	0	1	0	0	3	3	0	2	3	1	2	2	2	3	6	2	2
157	0	0	1	2	0	2	2	0	2	3	2	2	0	5	5	6	5	1
159	0	0	1	0	0	3	3	0	2	2	2	2	2	3	3	3	2	3
161	0	0	1	0	0	3	3	1	2	2	2	2	1	3	2	4	3	1
163	0	0	1	0	0	3	3	0	2	1	2	2	2	5	3	4	3	1
164	0	0	1	0	0	1	1	0	2	2	2	2	1	4	4	4	4	2
166	0	0	1	0	0	3	3	0	2	2	2	2	2	4	3	4	3	2
170	0	0	1	0	0	3	3	0	2	1	2	2	2	4	4	4	3	2
171	0	0	1	0	0	3	3	1	2	1	2	2	2	4	3	3	2	1
172	0	0	1	0	0	3	3	0	2	1	1	2	2	5	3	4	3	2
175	0	0	1	0	0	3	3	0	2	2	2	2	2	3	3	3	3	2
177	0	0	2	0	0	3	3	0	2	2	2	2	2	4	3	4	3	2
179	0	0	1	0	0	3	3	0	2	2	2	2	2	4	3	3	3	2

4C-4. Vaginal-Cephalic Group

ID	ATN	STN	SUP	TLS	TLP	HOB	BOB	GAL	MOR	UEG	LEG	LEP	STP	SCF	HE	PA	ABD	DF
2	0	0	1	0	0	3	3	2	2	3	2	2	2	2	2	4	3	2
9	0	0	1	0	0	0	3	2	2	1	2	2	1	5	3	5	2	1
11	0	0	1	0	0	0	3	0	2	3	2	0	0	4	3	5	3	2
24	0	0	1	2	1	3	3	0	2	3	2	2	2	5	3	5	3	2
28	0	0	1	0	0	3	3	2	1	3	2	1	2	2	2	3	2	1
32	0	0	1	0	0	1	3	0	1	1	2	2	1	4	4	5	3	2
41	0	0	1	1	0	3	3	2	2	3	2	2	2	4	4	5	4	1
44	2	2	1	2	2	3	3	2	1	3	2	2	1	4	2	5	3	2
46	0	0	0	1	0	3	2	2	2	3	2	2	0	2	2	3	2	1
47	0	0	1	1	0	2	3	1	2	3	2	2	1	3	2	5	4	1
62	0	0	1	0	0	3	2	2	2	2	2	2	0	5	4	6	3	1
63	0	0	0	0	0	3	3	2	2	4	2	0	0	3	5	6	4	1
69	0	0	0	0	0	3	3	0	1	2	2	2	1	4	5	6	2	1
70	0	0	1	0	0	3	3	2	2	2	2	2	2	5	5	5	4	1
71	0	0	1	0	0	3	3	0	2	2	2	2	2	5	5	5	4	2
87	0	0	1	0	0	3	3	0	2	1	2	2	1	4	3	4	3	2
90	0	0	1	0	0	3	3	0	2	2	2	2	2	5	4	4	3	1
94	0	0	1	0	0	3	3	1	2	3	2	2	2	4	5	6	3	1
97	0	0	1	0	0	3	3	1	2	2	2	2	2	5	5	5	5	1
111	0	0	1	0	0	3	3	0	2	2	2	2	1	3	3	3	2	2
117	0	0	1	0	0	3	3	0	2	1	2	2	2	4	3	5	3	2
120	0	0	1	0	0	3	2	1	2	3	2	2	2	4	1	5	2	1
129	0	0	1	0	0	3	3	1	2	3	2	1	1	2	2	5	2	2
141	0	0	0	1	0	2	2	0	2	3	2	0	0	2	1	5	2	1
152	0	0	1	1	0	3	2	2	2	3	1	2	1	5	4	6	2	2
153	0	1	1	1	0	3	3	1	2	3	2	2	0	2	1	4	2	1
155	0	1	1	1	0	3	3	2	2	3	1	2	2	3	2	5	2	1
156	0	0	1	1	0	2	3	1	2	2	2	1	1	2	1	5	3	2
158	0	0	1	0	0	3	3	0	2	3	2	2	1	2	1	4	3	1
160	0	0	2	0	0	3	3	0	2	2	2	2	2	2	3	3	3	2
162	0	0	1	0	0	3	3	0	2	1	2	2	2	5	3	4	3	1
165	0	0	1	0	0	3	3	1	2	2	2	2	1	3	3	4	3	2
167	0	0	1	0	0	3	3	0	2	2	2	2	2	5	3	3	2	2
168	0	0	1	0	0	3	3	0	2	2	2	2	2	4	3	3	2	2
169	0	0	2	0	0	3	3	0	2	2	2	2	2	3	3	3	3	2
173	0	0	1	0	0	3	3	0	2	2	2	2	2	4	3	3	3	2
174	0	0	1	0	0	3	3	0	2	2	2	2	2	4	3	4	3	1
176	0	0	1	0	0	3	3	0	2	1	2	2	2	4	3	3	3	3
178	0	0	1	0	0	3	3	1	2	1	2	2	2	4	3	4	3	2
180	0	0	1	0	0	3	3	0	2	2	2	2	2	4	3	3	3	2

Appendix 4D

6 Week Assessment:
Growth and AIMS Scores

1. **Cesarean-Breech Group**
2. **Cesarean-Cephalic Group**
3. **Vaginal-Breech Group**
4. **Vaginal-Cephalic Group**

Note: cell is blank if data not available

Abbreviations:

ID	identification number
CA	chronological age in days
L	length in centimetres
W	weight in kilograms
HC	head circumference in centimetres

AIMS Items: (coded 0 if not observed; 1 if observed)

P	prone item
P1	Prone Lying (1)
P2	Prone Lying (2)
P3	Prone Prop
S	supine item
S1	Supine Lying (1)
S2	Supine Lying (2)
S3	Supine Lying (3)
S4	Supine Lying (4)
SIT	sit item
SIT1	Sitting with Support
SIT2	Sitting with Propped Arms
SIT3	Pull to Sit
SIT4	Unsustained Sitting
ST	stand item
ST1	Supported Standing (1)
ST2	Supported Standing (2)

4D-1. Cesarean-Breech Group

ID	CA	L	W	HC	P1	P2	P3	S1	S2	S3	S4	SIT1	SIT2	SIT3	SIT4	ST1	ST2
1	45	54.0	3.9	38.5	1	0	0	1	0	0	0	1	0	0	0	1	0
4	43	57.0	4.8	37.6	1	0	0	1	1	0	0	1	0	0	0	1	0
5	41	52.5	3.9	38.0	1	0	0	1	1	0	0	1	0	0	0	1	0
6	43	54.5	4.5	37.0	1	0	0	1	1	0	0	0	0	0	0	1	0
7	42	56.0		38.5	1	1	0	1	1	1	0	1	0	0	0	1	0
10	44	58.5	4.1	39.5	1	0	0	1	1	1	0	0	0	0	0	1	0
13	40	55.5	5.2	39.0	1	1	0	1	1	0	0	0	0	0	0	1	0
22	47	54.0	4.6	38.5	1	1	0	1	1	0	0	0	0	0	0	1	0
25	42	55.0	4.5	37.5	1	1	0	1	1	1	0	1	0	0	0	1	1
27	44	58.5	5.3	40.5	1	1	0	1	1	0	0	1	0	0	0	1	1
30	43	54.5	4.7	39.0	1	0	0	1	1	1	0	1	0	0	0	1	1
33	49	55.5	3.9	38.0	1	1	0	1	1	0	0	1	0	0	0	1	0
34	41	56.0	5.1	40.5	1	0	0	1	1	1	0	1	0	0	0	1	0
36	47	55.5	4.5	38.5	1	1	1	1	1	1	0	1	1	0	0	1	1
37	43	54.0	4.9	37.0	1	0	0	1	1	0	0	0	0	1	0	1	0
40	45	55.5	4.7	39.0	1	0	0	1	1	0	0	1	0	0	0	1	1
48	41	51.5	4.1	38.0	1	0	0	1	1	0	0	0	0	0	0	1	0
49	42	54.5	4.5	39.0	1	0	0	1	1	0	0	1	0	0	0	1	0
53	45	53.0	4.3	37.5	1	1	0	1	1	1	0	1	1	0	0	1	1
54	46	55.0	5.7	41.0	1	1	0	1	1	1	0	1	0	0	0	1	1
55	42	52.5	3.6	37.0	1	1	0	1	1	1	0	0	0	0	0	1	0
56																	
57	46	53.0	4.5	38.5	1	0	0	1	1	1	0	1	0	0	0	1	0
59																	
64																	
67	41	54.5	4.0	37.5	1	1	0	1	1	0	0	1	0	0	0	1	0
72	39	58.0	4.9	40.0	1	1	0	1	1	1	1	1	0	0	0	1	0
74	45	53.5	4.5	39.1	1	1	0	1	1	1	0	1	0	0	0	1	1
80	49	59.0	6.8	40.8	1	0	0	1	1	1	0	1	0	1	0	1	1
81																	
84	48	52.5	4.4	39.3	1	0	0	1	1	1	0	1	0	0	0	1	0
91	43	55.0	5.2	37.9	1	0	0	1	1	0	0	0	0	0	0	1	0
98	43	57.0	5.4	39.5	1	1	0	1	1	1	0	1	0	0	0	1	1
100	43	53.0	5.0	38.3	1	0	0	1	1	1	0	0	0	0	0	1	0
101	46	54.0		38.7	1	0	0	1	1	1	0	0	0	0	0	1	0
102	46	58.0	5.0	39.0	1	1	0	1	1	1	0	0	0	0	0	1	0
103	43	57.0	4.3	38.9	1	0	0	1	1	1	0	1	0	0	0	1	0
104	42	56.0	4.6	37.8	1	1	1	1	1	1	0	0	0	0	0	1	0
106	45	57.0	4.8	39.2	1	1	1	1	1	0	0	0	0	0	0	1	0
109	43	56.0	5.1	40.0	1	1	0	1	1	1	0	1	0	0	0	1	0
119	43	51.5	4.2	37.8	1	0	0	1	1	1	0	0	0	0	0	1	0
121	44	56.0	4.8	39.1	1	1	0	1	1	1	0	1	0	0	0	1	1
122	42	55.0	4.3	37.2	1	1	0	1	0	0	0	0	0	0	0	1	0
124	42	57.0	4.7	38.2	1	1	0	1	1	1	0	1	0	0	0	1	0
125	44	56.5	5.0	39.8	1	0	0	1	1	0	0	0	0	0	0	1	0
128	37	57.0	4.8	37.5	1	0	0	1	1	1	0	0	0	0	0	1	0
133																	
140	42	54.5	4.1	38.2	1	0	0	1	1	0	0	1	0	0	0	1	0
144	43	53.0	3.5	35.9	1	0	0	1	1	0	0	0	0	0	0	1	0
147	46	57.5	5.4	40.3	1	1	0	1	1	1	0	1	0	0	0	1	1

4D-2. Cesarean-Cephalic Group

ID	CA	L	W	HC	P1	P2	P3	S1	S2	S3	S4	SIT1	SIT2	SIT3	SIT4	ST1	ST2
3	49	55.5	4.8	38.5	1	0	0	1	1	1	0	0	0	0	0	1	0
12	42	58.0	5.2	39.0	1	1	0	1	1	1	0	1	0	0	0	1	1
15	43	56.5	5.2	38.5	1	1	0	1	1	1	0	1	0	0	0	1	1
16																	
17	63	57.0	4.9	40.0	1	1	1	1	1	1	1	1	1	0	0	1	1
19																	
20	42	58.0	5.0	41.5	1	0	0	1	1	1	0	1	0	0	0	1	1
23	43	58.0	5.0	39.0	1	0	0	1	1	1	0	0	0	0	0	1	0
26	43	58.0	5.0	40.5	1	1	0	1	1	1	0	1	0	0	0	1	1
29	42	58.0	5.5	41.0	1	1	0	1	1	1	0	1	1	0	0	1	1
39																	
42	42	58.0	5.2	38.5	1	1	0	1	1	1	0	1	0	0	1	1	0
50	41	58.5	4.9	39.5	1	0	0	1	1	0	0	1	0	0	0	1	1
51	45	54.5	4.3	38.0	1	0	0	1	1	0	0	0	0	0	0	1	0
52	46	60.4	5.7	37.2	1	1	1	1	1	1	0	1	0	0	0	1	1
58	44	57.5	5.0	40.0	1	1	0	1	1	1	0	1	1	0	0	1	1
66	44	54.0	5.2	38.5	1	1	0	1	1	1	0	1	0	0	0	1	1
73	46	56.5	5.7	40.3	1	0	0	1	1	1	0	1	0	0	0	1	1
75																	
76	40	54.5	4.8	38.3	1	1	0	1	1	1	0	1	0	0	0	1	1
78	43	59.5		39.1	1	1	0	1	1	1	0	1	1	0	0	1	1
82	46	56.0	5.5	40.1	1	1	1	1	1	1	0	1	0	0	0	1	1
83	46	55.0	4.5	38.3	1	1	0	1	1	1	0	1	1	0	0	1	1
86																	
88	43	60.0	5.9	40.7	1	1	0	1	1	1	0	1	0	0	0	1	0
89																	
93	43	54.0	4.4	37.3	1	0	0	1	1	0	0	1	0	0	0	1	0
95																	
99	48	60.5	6.6	41.0	1	1	0	1	1	1	0	1	0	0	0	1	0
105																	
107	42	58.0	5.1	38.2	1	1	0	1	1	1	0	1	0	0	0	1	1
110	43	53.5	4.3	37.6	1	0	0	1	0	0	0	0	0	0	0	1	0
112	42	59.5	5.1	39.3	1	0	0	1	0	0	0	1	0	0	0	1	0
113	46	58.9	5.2	39.2	1	0	0	1	1	0	0	1	0	0	0	1	1
114	48	57.5		39.0	1	1	0	1	1	0	0	1	0	1	0	1	0
115	42	54.0	4.4	37.7	1	0	0	1	1	1	0	0	0	0	0	1	0
123																	
126	41	58.5	4.2	39.0	1	1	0	1	1	0	0	1	0	0	0	1	0
130	41	55.5	4.3	38.0	1	0	0	1	1	1	0	0	0	0	0	1	0
131																	
132	50	55.0	4.7	38.4	1	1	0	1	1	1	0	1	0	0	0	1	1
134	49	54.5	4.8	38.0	1	1	0	1	1	1	0	1	1	0	0	1	1
137	42	59.0	5.4	39.0	1	1	1	1	1	0	0	1	0	0	0	1	1
138	42	57.5	4.4	37.0	1	1	0	1	1	1	0	1	0	0	0	1	1
139	44	57.5	4.5	37.8	1	0	0	1	1	1	0	1	0	0	0	1	0
142	38	56.5	4.4	39.0	1	0	0	1	1	0	0	0	0	0	0	1	0
143	50	56.0	4.7	37.3	1	1	0	1	1	1	0	1	0	0	0	1	1
145																	
148	48	57.0	4.1	38.8	1	0	0	1	1	1	0	1	0	0	0	1	1
149	42	56.0	4.0	38.0	1	1	0	1	1	0	0	1	0	0	0	1	0

4D-3. Vaginal-Breech Group

ID	CA	L	W	HC	P1	P2	P3	S1	S2	S3	S4	SIT1	SIT2	SIT3	SIT4	ST1	ST2
8	44	58.0	4.8	36.0	1	0	0	1	1	1	0	1	0	0	0	1	0
14	41	54.5	5.1	37.5	1	0	0	1	1	0	0	1	0	0	0	1	0
18	40	59.5	6.0	40.5	1	1	0	1	1	1	0	1	0	0	0	1	1
21	40	58.5	4.1	40.0	1	0	0	1	1	0	0	0	0	0	0	1	0
31	43	53.5	5.0	40.0	1	0	0	1	1	1	0	1	0	0	0	1	0
35																	
38	43	54.0	4.6	39.0	1	0	0	1	1	1	0	1	0	0	0	1	0
43	43	51.0	3.4	35.5	1	1	1	1	1	1	0	0	0	0	0	1	0
45	46	53.5	4.3	38.0	1	0	0	1	1	0	0	0	0	0	0	1	0
60	45	52.0	4.5	38.0	1	1	0	1	1	0	0	1	0	0	1	1	1
61	45	59.0	6.3	41.5	1	1	0	1	1	1	0	1	1	0	0	1	1
65	44	56.0	4.5	38.0	1	1	0	1	1	0	0	1	0	0	0	1	0
68	42	56.5	5.0	38.5	1	1	1	1	1	1	0	1	1	1	1	1	1
77																	
79	45	60.5	5.7	40.0	1	1	0	1	1	1	0	1	0	0	0	1	0
85	48	55.0	4.1	38.3	1	0	0	1	1	0	0	1	0	0	0	1	1
92	44	57.0	5.1	40.4	1	1	0	1	1	0	0	0	0	0	0	1	0
96	42	54.5	4.3	37.4	1	1	0	1	1	0	0	0	0	0	0	1	0
108	41	52.0	4.0	36.7	1	0	0	1	1	1	0	0	0	0	0	1	0
116	42	55.0	4.0	38.5	1	0	0	1	1	0	0	0	0	0	0	1	0
118	43	56.5	5.0	39.0	1	0	0	1	0	0	0	0	0	0	0	1	0
127																	
135	50	59.0	5.6	40.2	1	1	1	1	1	1	0	1	0	0	0	1	1
136	44	57.5	5.0	39.2	1	1	0	1	1	1	0	1	0	0	0	1	0
146	43	55.0	4.6	37.8	1	0	0	1	1	0	0	0	0	0	0	1	0
150	43	52.5	4.9	39.0	1	0	0	1	1	1	0	1	0	0	0	1	1
151	44	55.0	4.5	38.0	1	1	1	1	1	0	0	1	0	0	0	1	0
154	40	55.5	4.4	39.0	1	0	0	1	1	0	0	1	0	0	0	1	0
157	45	54.0	4.1	38.0	1	0	0	1	1	1	0	0	0	0	0	1	0
159	43	58.0		39.2	1	1	0	1	1	1	0	1	0	0	0	1	0
161	42	51.5	4.7	38.3	1	1	0	1	1	0	0	1	0	0	0	1	1
163	41	55.0	3.9	37.1	1	0	0	1	1	1	0	0	0	0	0	1	0
164	42	55.0	4.5	39.0	1	0	0	1	1	1	0	1	0	0	0	1	1
166	42		4.3	36.5	1	0	0	1	1	0	0	0	0	0	0	1	0
170	37	54.0	4.0	37.8	1	1	0	1	1	0	0	0	0	0	0	1	1
171	41	56.0	4.2	38.0	1	0	0	1	1	0	0	1	0	0	0	1	1
172	42	55.0	4.4	35.5	1	0	0	1	1	0	0	0	0	0	0	1	0
175	43	56.5	4.7	36.0	1	1	1	1	1	0	0	1	0	0	0	1	1
177	43	54.0	4.9	38.6	1	1	1	1	1	0	0	1	0	0	0	1	1
179	39	57.0	5.0	38.4	1	1	1	1	1	0	0	0	0	0	0	1	0

4D-4. Vaginal-Cephalic Group

ID	CA	L	W	HC	P1	P2	P3	S1	S2	S3	S4	SIT1	SIT2	SIT3	SIT4	ST1	ST2
2	42	57.0	5.3	39.5	1	1	0	1	1	1	0	1	0	0	0	1	1
9	44	54.5		38.5	1	0	0	1	1	0	0	0	0	0	0	1	0
11	41	61.0	4.6	39.5	1	0	0	1	1	1	0	0	0	0	0	1	0
24	48	58.5	6.2	39.5	1	1	1	1	0	1	0	1	0	0	0	1	1
28	43	55.5	4.7	38.0	1	1	1	1	1	1	0	1	0	0	1	1	1
32	43	55.5	4.0	39.0	1	0	0	1	1	0	0	0	0	0	0	1	0
41	42	55.0	4.6	38.0	1	1	0	1	1	1	0	1	0	0	0	1	1
44	43	56.0	4.6	38.5	1	0	0	1	1	1	0	1	1	0	0	1	1
46	43	55.5	4.7	38.5	1	1	1	1	1	1	0	1	0	0	0	1	1
47	42	59.0	5.4	38.0	1	1	0	1	1	1	0	0	0	0	0	1	0
62	46	56.5	5.9	40.5	1	1	0	1	1	0	0	1	0	0	0	1	1
63	42	57.5	5.5	39.0	1	1	1	1	1	1	0	1	0	0	0	1	1
69	44	58.5	4.8	39.0	1	0	0	1	1	1	0	1	0	0	0	1	0
70	43	54.5	4.3	37.5	1	1	0	1	1	1	0	1	0	0	0	1	1
71	43	52.5	4.7	39.0	1	0	0	1	1	0	0	1	0	0	0	1	0
87	43	56.0	4.8	38.7	1	1	1	1	1	1	0	1	0	0	0	1	0
90	47	56.0	4.7	39.2	1	1	1	1	1	1	0	1	1	0	0	1	1
94	40	53.5	4.4	39.0	1	0	0	1	0	0	0	0	0	0	0	1	0
97	44	60.0	5.7	38.9	1	1	0	1	1	1	0	1	0	0	0	1	1
111																	
117	42	53.0	3.6	40.3	1	0	0	1	1	0	0	0	0	0	0	1	0
120	46	58.0	4.8	37.7	1	1	1	1	1	1	0	0	0	0	0	0	0
129	41	57.0	5.1	40.0	1	0	0	1	0	0	0	1	0	0	0	1	1
141	45	56.0	4.6	38.8	1	1	1	1	1	1	0	1	1	0	0	1	1
152	44	59.0	5.5	39.8	1	1	0	1	1	1	0	1	0	0	0	1	1
153	42	56.0	4.6	37.6	1	1	1	1	1	0	0	1	0	0	0	1	1
155	43	56.0	4.4	38.3	1	1	0	1	1	0	0	0	0	0	0	1	0
156	42	61.0	5.1	40.4	1	0	0	1	1	0	0	0	0	0	0	1	0
158	43	57.5	5.1	37.0	1	1	1	1	1	1	0	1	0	0	0	1	1
160	43	56.5	5.6	39.0	1	1	1	1	1	0	0	1	0	0	0	1	1
162	44	53.0	4.4	37.0	1	1	0	1	1	1	0	0	0	0	0	1	0
165	46	53.0	4.9	38.7	1	1	0	1	1	1	0	1	0	0	0	1	1
167	39	57.5	4.6	38.5	1	1	0	1	1	0	0	1	0	0	0	1	1
168	42	52.0	3.7	36.0	1	1	0	1	1	1	0	1	0	0	0	1	1
169	46	58.0	4.7	37.0	1	0	0	1	1	1	0	1	0	0	0	1	1
173	46	54.5	4.2	37.6	1	0	0	1	1	1	0	0	0	0	0	1	0
174	45	57.5	4.9	39.0	1	1	0	1	1	0	0	1	0	0	0	1	0
176	43	57.0	5.0	39.0	1	0	0	1	1	1	0	1	0	0	0	1	1
178	42	57.0	4.6	38.0	1	1	1	1	1	1	0	1	0	0	0	1	1
180	43	57.5	5.4	37.9	1	1	0	1	1	1	0	0	0	0	0	1	1

Note: Subject 63 received credit for P4, in addition to the scores above.

Appendix 4E

6 Week Assessment: Primitive Reflex Profile and the Joint Angles from the INFANIB

1. **Cesarean-Breech Group**
2. **Cesarean-Cephalic Group**
3. **Vaginal-Breech Group**
4. **Vaginal-Cephalic Group**

Note: cell is blank if data not available

Abbreviations:

ID	identification number

Primitive Reflex Profile Items: (all items have been coded from the left starting at 0)

ATN	asymmetrical tonic neck reflex
STN	symmetrical tonic neck reflex
SUP	positive supporting reaction
TLS	tonic labyrinthine reflex in supine
TLP	tonic labyrinthine reflex in prone
HOB	segmental roll, head on body reaction
BOB	segmental roll, body on body reaction
GAL	Galant reflex
MOR	Moro reflex
UEG	upper extremity grasp reflex
LEG	lower extremity grasp reflex
LEP	lower extremity placing reflex
STP	stepping reflex

INFANIB Items (all items have been coded from the left starting at 1)

SCF	scarf sign
HE	heel to ear
PA	popliteal angle
ABD	leg abduction
DF	dorsiflexion of foot

4E-1. Cesarean-Breech Group

ID	ATN	STN	SUP	TLS	TLP	HOB	BOB	GAL	MOR	UEG	LEG	LEP	STP	SCF	HE	PA	ABD	DF
1	0	0	3	0	0	3	3	2	1	3	2	2	2	3	5	5	2	2
4	2	0	1	0	2	3	1	3	1	3	1	3	2	2	3	5	2	1
5	2	0	3	0	1	3	2	1	1	3	2	2	2	2	5	5	2	2
6	2	2	3	2	2	1	2	0	2	2	2	2	2	2	3	5	3	4
7	2	0	1	2	0	3	2	2	1	2	2	2	0	5	2	5	2	3
10	2	0	1	0	0	2	1	0	2	3	2	1	1	5	3	5	3	2
13	2	0	1	2	0	3	2	2	1	1	2	0	0	3	3	5	3	2
22	0	0	1	2	0	3	2	0	1	3	2	2	0	5	3	6	3	2
25	0	0	1	0	0	2	2	1	1	2	2	3	0	5	2	5	2	3
27	0	0	0	0	0	3	2	0	2	0	2	2	0	4	2	5	3	3
30	2	0	1	0	0	2	2	2	1	3	2	2	1	3	2	5	2	3
33	2	0	1	0	0	3	2	0	1	2	2	0	0	3	3	6	2	3
34	2	0	1	2	0	2	2	1	1	1	2	1	1	4	2	6	4	3
36	2	2	3	0	0	2	2	1	0	2	2	1	0	3	1	5	2	3
37	0	0	1	0	0	1	2	2	2	4	2	2	0	4	3	5	2	2
40	0	0	1	0	0	3	2	2	1	1	2	0	0	4	3	6	3	2
48	0	0	1	0	0	3	2	2	1	1	2	2	1	5	4	6	2	2
49	2	0	1	0	0	3	2	1	2	3	2	1	1	3	2	5	2	2
53	2	0	2	0	0	3	2	2	1	3	2	1	1	4	2	5	1	3
54	0	0	1	0	0	3	2	2	1	1	2	1	1	2	2	5	2	2
55	2	0	1	0	0	3	2	0	1	1	2	1	2	3	2	6	2	2
56																		
57	0	0	2	0	1	3	3	1		2	2	2	0	2	2	5	3	3
59																		
64																		
67	2	0	1	0	0	2	2	1	2	3	2	0	0	4	2	5	2	2
72	2	0	1	0	0	2	2	2	1	2	2	0	0	3	4	6	4	2
74	0	0	1	0	0	2	2	1	1	1	2	1	2	3	2	5	2	2
80	0	0	3	0	0	2	2	0	1	3	2	1	1	2	3	6	3	3
81																		
84	2	0	2	0	0	3	2	2	1	3	2	1	0	3	2	5	3	2
91	0	0	3	0	0	3	3	2	2	2	1	2	0	5	2	5	2	2
98	0	0	1	0	0	3	3	1	2	1	2	1	0	3	3	6	3	2
100	0	0	1	1	0	3	2	2	2	3	2	0	0	3	4	6	4	2
101	0	1	1	1	0	2	2	0	2	2	2	1	0	3	3	6	3	3
102	2	0	2	0	0	3	2	2	1	1	2	2	1	4	2	5	3	2
103	0	0	3	0	0	3	3	2	1	2	2	1	1	3	2	5	2	3
104	1	0	2	0	0	3	3	2	2	1	2	0	1	4	1	5	2	3
106	0	0	1	2	0	3	3	1	1	2	2	1	0	3	4	5	2	2
109	1	0	1	0	2	3	3	0	1	3	2	1	0	2	1	5	2	1
119	0	0	1	0	0	3	3	2	2	2	2	1	0	3	1	5	2	2
121	2	0	1	0	0	1	2	1	1	2	2	1	0	2	1	5	2	2
122	0	0	1	0	0	3	3	2	2	2	2	1	0	3	3	6	2	2
124	1	0	1	0	0	3	3	2	2	2	2	2	0	5	3	6	3	2
125	0	0	1	0	0	3	3	2	2	1	2	1	1	5	1	5	2	3
128	0	0	1	0	0	3	3	2	1	3	2	1	0	4	2	6	3	2
133																		
140	2	0	1	0	0	3	3	1	1	2	2	1	0	3	2	5	2	2
144	2	0	1	0	0	3	3	2	1	3	2	2	1	2	2	5	2	2
147	0	0	1	0	0	3	1	0	1	1	1	2	1	2	1	5	2	2

4E-2. Cesarean-Cephalic Group

ID	ATN	STN	SUP	TLS	TLP	HOB	BOB	GAL	MOR	UEG	LEG	LEP	STP	SCF	HE	PA	ABD	DF
3	2	0	1	2	0	1	2	2	1	3	2	0	1	3	2	5	3	3
12	0	0	1	2	1	2	2	3	1	1	2	3	1	2	2	4	3	3
15	0	0	1	0	0	2	2	0	1	3	2	1	1	5	3	5	3	3
16																		
17	0	0	1	0	0	2	2	0	1	2	2	2	2	3	2	5	3	2
19																		
20	0	0	1	2	0	3	3	2	1	3	2	1	1	5	3	6	3	2
23	0	0	1	0	0	3	2	2	1	3	2	1	0	5	2	6	4	2
26	0	0	1	0	0	3	2	2	2	1	2	2	1	5	2	5	3	2
29	0	2	1	2	2	2	2	2	2	1	1	3	1	2	2	2	3	2
39																		
42	2	0	1	0	0	2	2	2	1	3	2	0	0	3	2	6	3	2
50	2	0	1	0	0	3	2	1	1	3	2	2	2	3	2	5	2	3
51	2	0	1	1	0	2	2	2	2	1	2	2	0	5	3	6	2	2
52	2	0	1	0	0	2	2	1	1	3	2	0	0	3	2	5	2	3
58	0	0	1	0	0	2	2	2		1	2	1	2	3	2	5	2	2
66	0	0	2	0	0	2	2	2	1	1	2	1	0	3	2	6	4	2
73	1	0	2	0	2	2	2	1	1	1	2	1	1	3	2	6	2	2
75																		
76	0	0	1	2	0	2	2	3	1	3	2	2	2	3	2	5	3	2
78	0	0	2	0	0	2	2	2	1	1	2	1	2	3	2	5	2	4
82	1	0	2	0	0	2	2	1	1	2	2	1	0	3	2	5	3	1
83	1	0	1	0	0	2	2	2	1	1	2	1	1	3	2	5	2	2
86																		
88	2	0	1	2	0	1	1	2	1	3	2	2	2	5	2	6	4	1
89																		
93	2	1	1	1	0	3	1	0	1	1	1	2	1	4	4	6	4	2
95																		
99	0	0	1	0	0	3	2	1	1	1	2	2	1	4	2	5	2	3
105																		
107	0	0	1	0	0	3	2	2	1	2	2	1	0	4	1	5	3	2
110	0	0	1	0	0	1	1	2	2	1	1	2	2	2	2	2	3	1
112	0	0	1	1	1	3	1	0	0	2	1	2	1	2	2	2	3	2
113	2	0	1	0	0	3	3	0	0	1	2	1	1	4	1	4	3	2
114	0	0	2	0	0	3	3	2	2	3	2	2	1	3	1	5	2	2
115	0	0	1	0	0	3	3	2	1	3	2	2	0	3	2	6	3	2
123																		
126	1	0	1	0	1	3	3	2	2	3	2	2	1	2	2	5	2	2
130	0	0	3	1	3	3	1	1	2	1	2	2	1	5	3	6	4	2
131																		
132	2	0	1	0	0	3	3	2	2	2	2	2	1	5	1	5	3	2
134	2	0	2	1	0	3	1	2	1	2	2	2	1	2	3	6	2	2
137	0	0	1	0	1	1	1	2	2	3	2	2	1	3	2	5	3	2
138	0	0	1	0	0	3	3	2	2	1	2	1	1	3	2	5	3	3
139	1	0	1	1	0	3	3	2	1	1	2	1	0	4	1	5	2	2
142	2	0	2	2	0	3	3	1	1	3	2	2	2	3	2	5	2	3
143	0	0	1	0	0	3	2	1	1	2	2	2	0	3	2	5	2	2
145																		
148	0	0	1	0	0	2	2	0	1	2	2	2	2	3	1	5	2	2
149	1	0	1	1	0	3	3	2	1	2	2	1	0	2	1	5	3	2

4E-3. Vaginal-Breech Group

ID	ATN	STN	SUP	TLS	TLP	HOB	BOB	GAL	MOR	UEG	LEG	LEP	STP	SCF	HE	PA	ABD	DF
8	2	0	1	0	2	1	1	1	1	1	2	2	2	3	5	5	4	3
14	2	0	1	0	0	3	3	2	1	1	2	1	1	5	5	6	4	2
18	0	0	1	2	0	2	2	0	1	2	2	0	0	5	2	5	4	3
21	2	0	1	2	0	2	2	2	2	3	2	1	0	5	2	5	2	3
31	0	0	1	0	2	2	3	1	0	2	1	0	0	2	3	6	3	2
35																		
38	2	0	2	0	0	3	3	1	1	2	2	2	2	3	3	6	2	3
43	2	0	1	2	0	3	2	2	2	1	2	1	1	3	2	5	2	2
45	2	0	1	2	0	3	2	0	2	3	2	2	2	3	2	5	2	2
60	0	0	1	0	0	3	2	1	2	3	2	2	2	3	2	6	3	2
61	1	0	1	0	0	2	2	2	1	3	2	0	0	4	3	6	3	2
65	2	0	1	0	0	2	2	2	1	2	2	2	2	4	2	5	2	2
68	0	0	1	0	0	2	2	2	1	1	2	2	2	4	3	6	3	2
77																		
79	0	0	1	1	0	2	2	2	1	1	2	2	2	3	2	5	3	1
85	0	0	1	2	0	1	2	0	1	2	2	0	0	3	2	5	2	2
92	0	0	1	0	0	3	3	1	1	1	2	2	1	3	2	5	4	2
96	1	0	3	0	0	3	2	2	1	1	2	1	0	5	2	5	3	3
108	1	0	1	0	0	3	3	2	2	2	2	1	1	4	2	6	2	2
116	0	0	1	0	0	3	1	2	2	2	2	1	1	5	1	5	2	2
118	0	0	2	0	2	3	1	1	1	1	2	2	1	3	1	5	2	2
127																		
135	1	0	1	2	0	3	3	0	2	1	2	1	0	5	1	5	2	2
136	0	0	1	2	0	3	3	2	1	2	2	2	1	5	2	6	2	2
146	0	0	1	0	0	3	3	0	2	1	2	1	0	3	2	6	3	1
150	2	0	1	1	0	3	2	2	2	3	2	2	1	2	4	6	4	2
151	2	0	1	0	1	3	3	1	2	2	2	2	1	3	1	4	2	2
154	2	0	1	2	0	3	3	2	2	3	2	2	1	3	1	5	2	2
157	0	0	1	2	0	3	2	0	2	1	2	2	1	5	3	6	3	2
159	0	0	1	1	0	3	2	2	2	3	2	2	0	2	2	5	3	2
161	2	0	1	0	3	3	1	2	1	3	2	2	2	2	2	6	3	2
163	1	0	1	1	0	3	1	0	1	2	2	1	1	4	1	5	3	2
164	2	0	1	0	0	3	3	1	2	1	1	1	1	3	2	5	5	2
166	2	0	1	0	0	3	3	2	2	1	2	2	1	3	1	5	4	2
170	1	0	1	0	0	3	3	2	1	2	2	2	0	2	2	5	3	1
171	2	0	1	0	0	4	1	2	2	2	2	0	1	3	1	5	3	1
172	2	0	1	0	1	3	1	2	2	3	2	2	2	4	3	5	5	2
175	2	0	1	0	1	3	1	2	0	3	2	2	2	3	2	5	3	2
177	2	0	1	0	1	3	1	2	1	1	1	1	1	4	3	6	4	2
179	2	0	1	2	0	3	3	0	1	2	2	1	1	3	2	5	3	2

4E-4. Vaginal-Cephalic Group

ID	ATN	STN	SUP	TLS	TLP	HOB	BOB	GAL	MOR	UEG	LEG	LEP	STP	SCF	HE	PA	ABD	DF
2	2	0	1	2	2	0	1	2	2	3	2	2	2	3	2	4	1	2
9	2	0	1	0	0	2	2	2	1	3	2	1	1	5	3	4	3	2
11	2	0	2	1	0	2	2	2	1	3	2	1	1	5	3	6	4	2
24	0	0	1	0	0	2	2	0	0	1	1	2	1	2	3	5	3	3
28	0	0	1	0	0	3	2	0	0	1	2	2	0	3	3	5	3	3
32	2	2	1	2	0	1	1	1	2	1	2	2	1	3	3	5	2	3
41	0	0	1	0	0	3	2	2	2	2	2	2	0	5	2	5	3	2
44	0	0	3	0	0	3	2	2	1	3	2	2	1	3	2	5	2	3
46	2	0	1	0	0	2	2	2	1	2	2	2	2	2	2	5	2	2
47	0	0	1	0	0	2	1	2	1	2	2	2	1	4	2	4	2	2
62	2	0	2	2	0	3	1	0	1	3	2	1	1	3	2	5	3	3
63	0	0	1	0	0	2	2	1	1	1	2	0	0	4	3	6	3	2
69	0	0	1	1	1	1	2	1		2	2	2	0	3	3	6	3	2
70	0	0	2	2	0	2	2	2	1	1	2	1	0	4	3	5	3	3
71	0	0	1	0	0	3	2	1	1	2	2	2	1	3	4	6	3	2
87	0	0	2	0	0	2	2	0	1	2	2	2	1	4	2	5	3	2
90	0	0	1	0	0	2	2	2	1	2	2	2	2	6	3	6	3	3
94	0	2	1	2	0	3	1	2	2	2	2	2	2	4	3	5	3	2
97	2	0	1	0	0	2	2	2	1	3	2	1	1	4	2	5	4	2
111																		
117	0	0	1	2	0	3	3	0	1	3	2	1	0	3	2	6	2	2
120	2	0	0	1	0	3	1	0	1	2	1	0	0	4	1	5	2	2
129	0	0	1	1	2	3	3	2	0	2	1	2	1	3	2	5	3	2
141	1	0	1	2	0	3	3	0	2	2	2	0	2	4	1	5	2	2
152	0	0	1	0	0	3	3	1	1	1	1	1	1	5	2	5	4	2
153	0	1	1	0	0	2	0	2	2	2	1	2	1	4	2	5	3	2
155	0	0	1	0	0	3	2	2	2	1	1	2	2	4	2	5	2	2
156	2	0	1	0	2	3	2	2	2	2	1	2	0	5	1	4	2	2
158	1	0	1	0	0	3	2	1	1	2	2	1	0	4	1	5	4	2
160	0	0	1	2	0	3	3	2	1	1	2	1	1	4	3	6	4	2
162	2	0	1	0	1	3	3	0	2	3	1	2	2	3	2	5	5	2
165	0	0	1	0	0	3	3	0	0	0	2	2	1	3	1	5	2	2
167	1	0	1	0	0	3	3	2	1	2	2	1	1	3	2	5	2	2
168	1	0	1	0	0	3	1	0	1	2	1	1	1	3	1	5	2	2
169	2	0	1	0	0	3	3	2	1	1	1	1	1	4	2	5	3	2
173	2	0	1	0	0	3	3	2	0	2	1	2	1	4	2	5	4	2
174	2	0	1	0	1	3	1	1	1	3	2	2	1	4	3	6	3	1
176	0	0	1	0	0	3	3	1	0	2	1	2	1	4	1	5	2	3
178	0	0	1	1	2	2	1	2	1	2	2	1	1	4	1	5	4	2
180	2	0	1	1	0	3	1	1	1	3	2	1	0	3	1	5	3	2

Appendix 4F

3 Month Assessment:
Growth and AIMS Scores

1. **Cesarean-Breech Group**
2. **Cesarean-Cephalic Group**
3. **Vaginal-Breech Group**
4. **Vaginal-Cephalic Group**

Note: cell is blank if data not available

Abbreviations:

ID	identification number
CA	chronological age in days
L	length in centimetres
W	weight in kilograms
HC	head circumference in centimetres

AIMS Items: (coded 0 if not observed; 1 if observed)

P	prone: all infants received credit for P1, none received credit for P6 or P7
P2	Prone Lying (2)
P3	Prone Prop
P4	Forearm Support (1)
P5	Prone Mobility
P8	Rolling Prone to Supine without Rotation
S	supine: all infants, except as noted, received credit for S1 - S3
S4	Supine Lying (4)
S5	Hands to Knees
S6	Active Extension
SIT	sit: all infants, except as noted, received credit for SIT1
SIT2	Sitting with Propped Arms
SIT3	Pull to Sit
SIT4	Unsustained Sitting
ST	stand: all infants, except as noted, received credit for ST1
ST2	Supported Standing (2)
ST3	Supported Standing (3)

4F-1. Cesarean-Breech Group

ID	CA	L	W	HC	P2	P3	P4	P5	P8	S4	S5	S6	SIT2	SIT3	SIT4	ST2	ST3
1	96	60.0	5.2	41.7	1	1	0	0	0	1	0	0	1	1	0	1	0
4																	
5	91	57.0	5.0	40.5	1	1	1	1	1	1	0	0	1	0	0	1	0
6	92	59.5	6.2	40.5	0	0	0	0	0	0	0	0	0	0	0	0	0
7	91	62.0	6.8	40.5	1	1	1	1	0	1	0	0	1	0	0	1	1
10	99	63.5	5.5	41.5	1	1	1	0	0	1	1	1	0	1	0	1	1
13	92	61.0	6.9	41.5	1	1	1	1	0	0	0	1	1	0	1	1	1
22	91	61.5	6.3	40.5	1	1	1	1	1	0	0	0	1	0	0	1	0
25	99	61.0		40.0	1	1	1	0	0	1	0	1	1	1	1	1	0
27	93	61.0	6.4	42.5	1	1	1	0	0	1	0	0	0	0	1	0	0
30	94	62.0	6.8	41.5	1	1	1	1	0	1	0	0	1	1	1	1	0
33	93	58.5	6.4	39.5	1	1	0	0	0	0	0	0	1	1	1	1	0
34	91	61.0	6.0	42.0	1	1	0	0	0	0	0	0	1	0	1	1	1
36	93	59.5	6.0	40.2	1	0	0	0	0	1	0	0	1	1	0	1	1
37																	
40																	
48	96	57.0	5.3	40.2	1	1	0	0	0	1	1	0	0	1	1	1	0
49	98	60.0	6.4	42.0	1	1	0	0	0	1	0	0	1	1	1	1	0
53	94	56.5	4.6	38.8	1	1	0	0	0	0	0	0	1	1	1	1	0
54	99	60.2	7.1	44.5	1	1	1	1	0	1	0	0	1	1	1	1	0
55	92	56.0	4.5	38.8	1	1	1	1	1	1	0	0	0	1	0	1	0
56																	
57																	
59																	
64																	
67	90	58.5	5.2	39.8	1	0	0	0	0	1	0	0	0	0	0	1	0
72																	
74	87	58.5	6.1	41.7	1	0	0	0	0	1	0	0	1	1	0	1	0
80	97	65.5	9.3	43.2	1	1	0	0	0	0	0	0	1	1	0	1	0
81																	
84																	
91	98	61.5	7.0	40.3	1	1	0	0	0	0	0	0	1	0	0	1	0
98	92	62.5	6.6	41.5	1	1	0	0	0	0	0	0	1	1	0	1	0
100	90	58.0	7.7	39.8	1	1	0	0	0	0	0	0	0	0	0	1	0
101	90	59.5	5.4	41.6	1	1	0	0	0	0	0	0	0	0	0	1	0
102	92	63.0	5.9	41.1	1	1	0	0	0	0	0	0	0	0	0	1	0
103	91	59.5	5.2	40.7	0	0	0	0	0	1	0	0	0	0	0	1	0
104	91	61.5	6.1	40.5	1	1	1	1	0	0	0	0	1	1	0	1	0
106	98	62.0	6.1	41.5	1	1	0	0	0	1	0	0	0	0	0	1	0
109	90	60.0	5.9	42.0	1	1	0	0	0	0	0	0	0	1	0	1	0
119	89	54.0	4.7	38.5	1	1	0	0	0	0	0	0	0	1	0	1	0
121	88	60.5	5.9	40.9	1	0	0	0	0	1	0	0	0	1	0	1	0
122	90	60.5	5.2	39.2	1	1	1	0	1	1	1	0	0	1	1	1	0
124	93	62.0	6.0	40.6	1	1	0	0	0	1	0	0	0	0	1	1	0
125	88	63.0	6.8	42.3	1	1	0	0	0	1	0	0	0	0	0	1	0
128	94	64.0	7.7	39.9	1	1	0	0	0	1	0	0	1	0	0	1	0
133																	
140	97	60.0	5.4	40.8	1	0	0	0	0	1	1	0	0	1	0	1	0
144																	
147	95	63.5	7.3	42.0	1	1	1	0	1	0	0	0	1	0	0	1	0

Notes: Subject 6 did not receive credit for S3; Subject 103 did not receive credit for SIT1; Subject 27 did not receive credit for ST1.
Subject 10 received credit for S8, in addition to the scores above.

4F-2. Cesarean-Cephalic Group

ID	CA	L	W	HC	P2	P3	P4	P5	P8	S4	S5	S6	SIT2	SIT3	SIT4	ST2	ST3
3	93	60.5	6.4	40.5	1	1	0	0	0	0	0	0	1	0	1	1	0
12	91	63.0	6.1	41.0	1	1	1	1	0	1	1	1	1	1	0	1	0
15	93	60.5	6.1	41.0	1	1	1	1	0	1	1	0	1	0	0	1	1
16																	
17																	
19	97	60.0	5.8	42.0	1	1	0	0	0	0	0	0	1	1	1	1	0
20	91	62.0	6.2	44.0	1	1	0	0	0	1	0	1	0	0	0	1	0
23	95	61.5	5.9	41.0	1	1	0	0	0	0	0	0	1	1	0	1	1
26	93	60.5	6.5	42.5	1	0	0	0	0	1	0	0	0	0	1	1	1
29	87	61.5	6.9	42.5	1	1	0	0	0	0	0	1	0	0	0	1	0
39																	
42	90	61.5	6.1	40.0	1	1	0	0	0	1	1	0	1	1	0	1	0
50	90	61.0	6.1	40.9	1	1	1	1	0	1	1	0	1	1	1	1	0
51	93	58.0	5.2	40.1	1	1	0	0	0	1	0	1	1	1	0	1	0
52	104	64.0	7.1	39.3	1	1	0	0	0	1	0	0	0	1	0	1	0
58	95	62.0	6.8	42.3	1	1	1	1	0	0	0	0	1	1	1	1	0
66	92	58.5	6.4	40.1	1	1	1	1	0	1	0	0	1	1	0	1	0
73	88	60.0	6.6	42.2	1	0	0	0	0	0	0	0	1	1	0	1	0
75																	
76																	
78	93	61.5		40.6	1	1	0	0	0	1	1	0	1	1	1	1	0
82	91	60.0	6.1	42.0	1	1	1	1	0	1	1	0	0	1	1	1	0
83	95	60.0	5.7	40.6	1	1	1	1	0	1	0	0	1	1	1	1	0
86																	
88	93	64.5	6.4	42.6	1	1	1	1	0	1	0	0	0	1	0	1	0
89	106	62.0	6.4	43.3	1	1	1	1	0	1	0	0	1	1	0	1	0
93	95	58.5	5.5	39.9	1	1	1	1	0	1	0	0	1	1	0	1	0
95																	
99	91	66.5	8.3	43.2	1	1	1	1	0	1	0	0	1	1	0	1	0
105																	
107	91	61.5	5.9	39.5	1	1	0	0	0	1	0	0	0	0	0	1	0
110	92	55.5	5.2	40.0	1	1	1	1	0	0	0	0	0	0	0	1	0
112	94	66.0	6.1	42.5	1	1	0	0	0	1	0	0	1	0	0	1	0
113	91	63.0	6.1	41.2	1	0	0	0	0	0	0	0	0	0	0	1	0
114	122	66.0	7.9	42.3	1	0	0	0	0	1	1	0	0	0	0	1	0
115	91	58.5	5.6	39.9	1	1	0	1	0	1	0	0	0	0	0	1	0
123	90	62.0	6.4	41.8	1	1	0	0	0	0	0	0	0	0	0	1	0
126	90	61.5	5.9	42.0	1	0	0	0	0	0	0	0	1	0	0	1	0
130	93	60.5	4.8	40.6	0	0	0	0	0	0	0	0	0	0	0	0	0
131																	
132	94	60.0	5.7	40.8	1	0	0	0	0	1	1	0	0	1	0	1	0
134	92	60.0	6.2	40.0	1	1	1	1	0	1	0	0	1	1	0	1	0
137	93	62.5	6.5	41.0	1	1	1	1	0	1	1	1	0	0	0	1	0
138	88	62.0	5.6	38.0	1	1	0	0	0	1	0	0	0	0	0	1	0
139	91	59.5	4.8	39.2	0	0	0	0	0	1	0	0	0	1	0	1	0
142	93	62.5	6.2	41.5	1	0	0	0	0	0	0	0	0	0	0	1	0
143	91	58.5	5.0	38.7	1	1	1	0	0	1	0	0	0	1	0	1	0
145																	
148	104	62.0		41.5	1	1	1	1	1	1	1	1	0	0	0	1	1
149	98	60.5	5.2	40.4	1	1	1	0	0	1	0	0	1	1	0	1	0

4F-3. Vaginal-Breech Group

ID	CA	L	W	HC	P2	P3	P4	P5	P8	S4	S5	S6	SIT2	SIT3	SIT4	ST2	ST3
8	93	62.0	5.8	38.5	1	1	1	1	0	1	1	0	1	1	1	1	0
14	95	61.0	6.0	41.0	1	1	1	0	0	0	0	0	1	0	0	1	0
18	93	63.0	7.5	43.0	1	1	1	1	0	1	1	1	1	1	0	1	1
21	94	63.0	5.9	43.0	1	1	0	0	0	0	0	0	0	0	0	1	0
31	85	59.5	5.8	42.1	1	1	0	0	0	1	0	0	1	0	0	1	0
35																	
38	93	59.0	5.6	41.0	1	1	1	1	1	1	1	0	1	1	0	1	0
43	93	54.5	4.5	38.0	1	1	0	0	0	1	1	1	1	1	1	1	1
45	94	59.5	6.0	40.5	1	1	0	0	0	0	0	0	1	0	0	1	0
60	93	57.0	6.3	40.7	1	1	1	1	0	0	0	0	1	1	0	1	0
61	97	64.0	7.5	43.0	1	0	0	0	0	1	0	0	1	0	1	1	0
65	92	57.5	5.2	39.4	1	1	1	0	0	1	0	0	0	1	0	1	0
68	90	61.0	6.4	40.3	1	0	0	0	0	0	0	0	0	1	0	1	0
77																	
79	99	65.0	6.7	42.3	1	1	0	0	0	0	0	0	0	1	0	1	0
85	94	59.0	5.3	40.1	1	1	0	0	0	1	0	0	1	1	1	1	0
92	93	62.0	5.9	42.7	1	1	1	1	0	0	0	0	0	0	0	1	0
96	92	59.5	5.7	40.0	1	0	0	0	0	1	0	0	1	0	0	1	0
108	89	56.5	5.5	39.0	1	1	0	0	0	1	0	0	0	1	0	1	0
116	91	61.0	5.3	40.0	1	1	0	0	0	1	1	0	0	0	0	1	0
118	89	62.0	6.6	41.0	0	0	0	0	0	0	0	0	0	0	0	0	0
127	90	62.0	6.9	41.2	1	0	0	0	0	1	1	0	0	0	1	1	0
135	92	63.5	7.0	42.2	1	1	0	0	0	1	0	0	0	1	0	1	0
136	92	62.0	6.0	41.3	0	0	0	0	0	1	1	0	1	1	1	1	0
146	93	60.5	6.2	41.0	1	1	0	0	0	0	0	0	0	0	0	1	0
150	93	58.0		40.6	1	1	0	0	0	0	0	0	1	1	1	1	0
151	93	59.5	5.2	40.1	1	1	0	0	0	0	0	0	0	0	0	0	0
154	94	62.5	5.8	41.1	1	1	0	0	0	1	0	0	0	0	0	1	0
157	88	58.0	5.1	39.4	1	1	0	0	0	1	0	0	0	1	0	1	0
159	91	64.0		41.5	0	0	0	0	0	1	0	0	0	0	0	1	0
161	88	54.5	5.7	40.0	1	1	0	1	0	0	0	0	1	0	1	1	0
163																	
164	91	60.5	5.4	40.7	1	1	0	0	0	1	0	0	1	0	0	1	0
166	90	59.0		38.9	1	1	0	0	0	1	1	1	0	1	0	1	0
170																	
171	90	58.5	5.9	39.8	1	0	0	0	0	0	0	0	0	0	0	1	0
172	88	60.5	5.3	38.5	0	0	0	0	0	1	1	0	0	0	0	0	0
175	92	62.0	6.5	42.0	1	0	0	0	0	1	0	0	0	1	0	1	0
177	97	60.0	6.7	42.7	1	1	0	1	0	1	0	0	1	1	0	1	1
179	91	63.0	7.6	41.5	1	1	0	0	1	1	0	0	1	1	0	1	0

Notes: Subject 108 did not receive credit for SIT1.
Subject 38 received credit for S7, in addition to the scores above.

4F-4. Vaginal-Cephalic Group

ID	CA	L	W	HC	P2	P3	P4	P5	P8	S4	S5	S6	SIT2	SIT3	SIT4	ST2	ST3
2	91	61.5	6.2	42.0	1	1	1	0	0	1	0	1	1	0	0	1	0
9	93	59.0		40.0	1	0	0	0	0	0	0	0	1	0	1	1	1
11	94	65.0		42.0	1	1	1	1	0	1	1	1	1	0	0	1	0
24	93	61.5	7.2	41.0	1	1	1	1	0	1	0	0	1	1	0	1	1
28	92	59.0	6.0	41.0	1	1	0	0	0	1	0	0	1	1	1	1	0
32	93	59.0	5.0	41.5	1	0	0	0	0	0	0	0	0	0	0	1	1
41	93	60.0	6.4	40.0	1	1	1	1	0	1	0	0	1	1	0	1	0
44	93	60.0	6.0	41.0	1	1	0	0	0	1	0	0	1	0	0	1	0
46	93	59.5	6.0	39.9	1	1	1	1	0	1	0	0	1	1	0	1	0
47	93	61.5	6.7	40.0	1	1	0	0	0	0	0	0	0	0	0	0	0
62	94	60.5	7.0	42.7	1	1	0	0	0	1	0	0	1	1	0	1	0
63	94	64.0	7.9	41.9	1	1	1	1	1	1	0	0	1	1	0	1	0
69	92	61.5	6.0	41.1	1	1	0	0	0	1	0	0	0	0	0	1	0
70	92	58.0	5.2	39.9	1	1	0	0	0	0	0	0	0	0	1	1	1
71	91	56.0	5.5	41.2	1	0	0	0	0	0	0	0	0	1	0	1	0
87	93	59.5	5.8	41.0	0	0	0	0	0	1	0	0	0	0	0	1	0
90	94	61.0	6.1	41.5	0	0	0	0	0	0	0	0	0	0	0	1	0
94	97	59.5	5.7	42.5	1	1	1	1	1	1	0	0	0	1	0	1	0
97	93	65.5	6.8	40.7	1	1	1	1	0	1	0	0	0	0	0	1	0
111																	
117	91	58.0	5.5	43.5	1	1	0	0	0	1	0	0	0	0	0	1	0
120	90	61.0	6.3	40.1	1	0	0	0	0	0	0	0	0	0	0	1	0
129	93	62.5	6.8	42.2	1	1	1	0	0	1	0	0	1	0	0	1	0
141	93	61.5	6.0	40.8	1	0	0	0	0	1	0	0	0	0	0	1	0
152	94	63.0	6.9	42.0	1	1	0	0	0	1	0	0	1	1	0	1	0
153	91	59.5	5.7	40.0	1	1	0	0	0	1	0	0	0	0	0	1	0
155	93	60.0	5.0	40.1	1	0	0	0	0	0	0	0	0	0	0	1	0
156	95	65.0	6.2	42.2	1	1	0	0	0	1	0	0	0	0	0	1	0
158	92	62.0	6.5	38.5	1	1	0	0	0	1	0	0	1	1	0	1	0
160	95	62.5	7.4	41.6	1	1	1	0	0	1	0	0	1	1	0	1	0
162	88	60.5	5.7	38.2	1	1	0	0	0	0	0	0	0	0	0	1	0
165	88	61.0	5.7	40.8	1	0	0	0	0	1	0	0	0	0	0	1	0
167	89	61.5	6.2	40.7	1	0	0	0	0	1	0	0	1	0	0	1	0
168	92	55.0	5.0	38.6	1	1	0	0	0	1	1	0	1	0	0	1	0
169	89	63.5		38.5	1	1	0	0	0	1	1	0	1	1	0	1	0
173	91	58.0	6.2	40.4	1	1	0	0	0	1	0	0	0	0	0	1	0
174	91	61.0	6.4	41.2	1	1	1	1	0	0	0	0	0	0	0	1	0
176	95	62.0	6.5	41.8	1	1	1	0	1	1	0	0	1	0	0	1	0
178	91	63.0	5.2	40.2	1	1	0	0	0	1	1	0	0	0	0	1	0
180	91	62.0	6.1	40.4	1	1	1	1	0	1	0	0	1	0	0	1	0

Notes: Subject 47 did not receive credit for ST1.
Subject 11 received credit for S7, in addition to the scores above.

Appendix 4G

3 Month Assessment: Primitive Reflex Profile and the Joint Angles from the INFANIB

1. **Cesarean-Breech Group**
2. **Cesarean-Cephalic Group**
3. **Vaginal-Breech Group**
4. **Vaginal-Cephalic Group**

Note: cell is blank if data not available

Abbreviations:

ID	identification number

Primitive Reflex Profile Items: (all items have been coded from the left starting at 0)

ATN	asymmetrical tonic neck reflex
STN	symmetrical tonic neck reflex
SUP	positive supporting reaction
TLS	tonic labyrinthine reflex in supine
TLP	tonic labyrinthine reflex in prone
HOB	segmental roll, head on body reaction
BOB	segmental roll, body on body reaction
GAL	Galant reflex
MOR	Moro reflex
UEG	upper extremity grasp reflex
LEG	lower extremity grasp reflex
LEP	lower extremity placing reflex
STP	stepping reflex

INFANIB Items (all items have been coded from the left starting at 1)

SCF	scarf sign
HE	heel to ear
PA	popliteal angle
ABD	leg abduction
DF	dorsiflexion of foot

4G-1. Cesarean-Breech Group

ID	ATN	STN	SUP	TLS	TLP	HOB	BOB	GAL	MOR	UEG	LEG	LEP	STP	SCF	HE	PA	ABD	DF
1	0	0	1	0	0	2	2	0	1	1	2	2	0	5	3	6	3	3
4																		
5	0	0	3	0	2	1	2	2	0	3	2	2	2	2	2	5	3	3
6	3	0	3	0	0	3	1	1	1	2	2	0	3	3	2	6	4	3
7	2	0	1	0	0	1	2	0	1	1	2	1	0	3	3	6	3	3
10	0	0	3	0	0	2	2	0	0	1	2	0	0	4	3	6	3	2
13	0	0	1	0	0	2	2	2	1	1	1	2	0	3	3	6	4	3
22	0	0	1	0	0	2	2	2	1	0	2	0	0	3	2	6	3	2
25	0	0	3	0	0	2	2	1	1	2	2	0	0	3	3	6	3	3
27	2	0	0	0	0	2	2	2	1	1	2	1	0	3	3	6	4	2
30	0	0	1	0	0	2	2	1	1	2	2	2	2	5	2	6	3	2
33	0	0	2	0	0	3	2	0	1	3	2	2	2	3	2	6	2	3
34	0	0	2	0	0	2	2	0	1	2	2	1	2	3	3	6	2	3
36	0	0	1	0	0	2	2	0	1	1	1	1	0	3	2	6	3	3
37																		
40																		
48	0	0	2	0	0	2	2	0	0	1	2	1	1	4	4	6	3	2
49	0	0	2	0	0	2	2	1	1	1	2	2	2	4	2	5	3	3
53	0	0	2	0	0	2	2	0	1	2	2	0	2	5	2	6	3	3
54	0	0	1	0	0	2	2	1	2	1	2	2	1	4	3	6	4	2
55	0	0	2	0	0	3	1	0	1	1	2	2	1	4	2	6	4	2
56																		
57																		
59																		
64																		
67	0	0	1	0	0	2	2	0	2	0	2	2	0	3	2	5	2	2
72																		
74	0	0	1	0	1	3	1	2	1	2	2	2	1	4	2	5	3	3
80	0	0	2	0	0	1	2	0	1	1	1	2	0	5	2	6	4	3
81																		
84																		
91	0	0	2	0	0	0	2	0	1	1	2	1	0	4	2	6	3	2
98	2	0	1	0	0	3	2	0	2	1	2	1	0	3	1	5	2	2
100	1	0	1	0	0	2	2	0	1	1	1	0	0	3	3	6	4	2
101	0	0	1	0	0	0	1	0	1	1	2	1	0	5	3	6	4	2
102	0	0	3	1	0	3	1	1	1	1	2	2	0	4	2	6	4	2
103	2	0	1	0	0	3	1	0	1	1	2	1	0	3	3	6	4	2
104	2	0	2	0	0	3	2	1	1	2	2	1	0	3	1	5	3	3
106	0	0	1	0	0	3	2	0	1	1	2	1	0	3	2	5	3	2
109	0	0	1	0	0	3	3	1	1	1	1	1	1	2	1	5	2	2
119	0	0	1	0	0	3	1	0	0	1	2	2	2	2	2	5	3	3
121	0	0	2	0	0	2	2	0	1	1	2	2	0	3	2	6	3	2
122	0	0	2	2	0	1	2	1	1	1	1	2	1	3	2	6	2	2
124	0	0	2	0	0	3	2	2	1	1	2	1	0	3	4	6	3	2
125	0	0	2	0	0	3	2	2	1	0	1	1	0	3	1	5	2	2
128	0	0	1	0	0	1	2	0	1	1	1	1	0	4	2	6	4	2
133																		
140	0	0	1	0	0	2	1	2	1	1	1	1	0	3	2	5	3	2
144																		
147	2	0	1	0	0	3	1	1	1	1	2	2	0	2	1	5	5	3

4G-2. Cesarean-Cephalic Group

ID	ATN	STN	SUP	TLS	TLP	HOB	BOB	GAL	MOR	UEG	LEG	LEP	STP	SCF	HE	PA	ABD	DF
3	2	0	1	0	0	1	2	2	1	2	2	1	0	3	2	6	4	3
12	0	0	2	0	0	2	2	0	1	2	2	2	2	3	2	6	2	2
15	0	0	1	0	0	2	2	1	1	0	2	2	0	3	2	6	3	2
16																		
17																		
19	0	0	1	0	0	2	2	2	1	0	2	2	2	3	2	5	3	2
20	0	0	1	0	0	2	2	0	1	1	2	1	0	5	2	6	4	2
23	0	0	2	0	0	2	2	1	1	2	2	1	0	5	4	6	5	2
26	0	0	1	0	0	2	2	0	1	0	1	2	2	2	3	6	4	2
29	0	0	2	1	0	1	2	1	1	1	1	2	2	4	3	5	4	2
39																		
42	0	0	2	0	0	2	2	0	1	1	1	2	0	3	3	6	4	2
50	0	0	1	0	0	2	2	0	1	2	2	2	2	3	2	6	4	3
51	0	0	2	2	0	2	2	0	1	1	2	2	1	5	3	6	4	2
52	0	0	2	0	0	2	1	0	1	0	2	2	1	3	2	6	3	3
58	0	0	2	0	0	2	2	1	1	0	2	1	0	3	2	5	3	3
66	0	0	2	0	0	1	2	1	1	2	2	2	1	3	2	6	4	2
73	0	0	2	0	0	1	1	1	0	1	1	2	1	3	2	5	3	2
75																		
76																		
78	0	0	2	0	0	2	2	0	1	0	2	1	0	3	2	6	3	2
82	0	0	1	0	0	3	2	0	1	1	1	1	0	4	3	6	3	2
83	0	0	1	0	0	2	2	1	1	1	2	2	0	3	2	6	3	3
86																		
88	0	0	1	0	0	1	2	2	1	0	2	2	1	4	2	6	4	1
89	0	0	1	0	0	3	2	0	1	1	1	2	0	3	1	5	3	2
93	0	0	1	0	0	3	2	0	1	1	2	1	1	4	2	5	4	2
95																		
99	1	0	2	0	0	3	2	1	1	2	2	2	1	4	1	5	2	3
105																		
107	0	0	1	0	1	3	1		0	2	2	2	2	3	3	2	5	2
110	0	0	1	1	0	3	1	2	0	2	2	2	2	3	3	6	5	1
112	0	0	1	0	1	1	3	2	0	2	2	2	2	5	2	5	4	2
113	2	0	1	0	0	1	1	0	1	2	2	2	0	5	2	6	5	2
114	0	0	2	0	0	3	2	2	2	1	1	0	0	3	3	6	3	2
115	0	0	1	2	0	3	2	2	1	1	2	1	0	3	2	5	4	2
123	0	0	1	2	2	1	1	2	1	2	1	1	0	3	3	5	5	2
126	0	0	2	0	0	3	1	0	1	2	1	2	2	2	1	5	3	2
130	0	0	0	0	0	1	0	1	1	1	2	2	0	5	3	6	4	1
131																		
132	1	0	1	0	0	3	3	2	1	1	2	1	0	3	1	5	3	2
134	0	0	2	0	0	2	2	0	1	2	2	2	2	5	3	6	4	2
137	0	0	1	0	0	3	3	2	1	1	2	2	0	4	3	6	4	2
138	0	0	2	0	0	3	2	0	1	1	2	1	0	2	2	5	3	3
139	0	0	1	0	0	3	1	2	1	0	2	2	1	3	2	6	2	2
142	2	0	1	1	0	3	3	1	1	1	1	2	0	3	2	5	2	3
143	0	0	2	0	0	3	1	1	1	1	1	1	0	2	1	5	3	3
145																		
148	2	0	1	0	0	3	1	1	0	1	2	2	1	3	2	6	3	2
149	0	0	2	0	0	3	1	0	1	0	2	2	1	5	2	5	3	2

4G-3. Vaginal-Breech Group

ID	ATN	STN	SUP	TLS	TLP	HOB	BOB	GAL	MOR	UEG	LEG	LEP	STP	SCF	HE	PA	ABD	DF
8	0	0	1	0	0	2	2	1	1	1	2	2	0	3	3	6	3	2
14	2	0	1	0	0	2	2	0	1	1	1	2	0	5	4	6	4	2
18	0	0	3	0	0	2	1	0	1	2	2	0	0	3	2	6	4	3
21	0	0	1	0	0	2	2	1	1	1	2	2	1	3	2	5	2	3
31	0	0	1	0	1	3	2	0	0	2	1	2	1	3	3	6	4	2
35																		
38	0	0	1	0	0	3	1	0	1	1	1	1	2	3	3	6	4	2
43	0	0	2	0	0	2	2	0	1	1	2	0	1	3	2	6	4	2
45	0	0	2	1	0	2	2	2	1	2	2	2	2	4	2	6	3	3
60	1	0	1	0	0	1	2	0	1	2	2	1	1	3	2	6	3	2
61	0	0	1	0	0	1	2	1	1	2	2	1	0	4	2	6	3	3
65	0	0	2	0	0	1	1	0	1	1	2	2	0	3	2	5	2	2
68	0	0	2	0	0	1	2	1	1	1	2	2	0	3	3	6	4	3
77																		
79	0	0	1	0	0	2	2	1	1	1	2	1	1	5	2	5	3	1
85	0	1	2	1	0	2	2	0	1	1	2	1	0	5	4	6	3	2
92	0	0	2	0	0	3	3	0	1	1	2	2	0	3	2	6	3	2
96	0	0	3	0	0	3	3	2	1	2	2	1	0	5	2	6	3	3
108	0	0	1	0	0	3	2	0	1	2	2	2	0	4	3	6	4	2
116	0	0	1	0	0	3	1	2	0	1	2	2	0	3	3	5	5	3
118	0	0	1	0	0	3	1	1	0	1	2	2	2	3	1	5	3	2
127	0	0	1	0	0	3	2	0	2	1	1	2	1	3	2	6	2	2
135	0	0	1	0	0	3	2	0	1	1	2	2	0	4	2	5	3	2
136	0	0	1	0	0	3	2	0	1	1	1	0	0	3	2	6	2	2
146	2	0	1	0	0	3	2	1	1	2	2	1	0	3	2	6	4	2
150	0	0	2	0	0	2	2	1	1	1	2	2	1	3	3	6	3	3
151	0	0	0	0	0	1	1	2	0	2	2	2	0	6	3	6	3	1
154	0	0	1	0	0	3	1	0	0	2	2	2	0	3	1	5	3	2
157	0	0	1	0	0	3	1	0	1	1	2	2	0	2	1	5	4	2
159	2	0	1	2	0	4	1	1	0	3	2	2	0	3	2	6	5	3
161	0	0	1	0	1	3	1	1	1	1	2	2	0	2	3	6	4	2
163																		
164	0	0	1	0	1	3	1	0	2	1	1	2	0	4	3	6	4	2
166	0	0	1	0	0	3	2	0	2	2	2	2	1	5	2	5	4	2
170																		
171	0	0	1	0	0	3	2	2	1	2	2	2	1	3	2	5	3	2
172	0	0	1	0	0	3	2	0	1	1	2	1	0	3	2	5	4	2
175	0	0	1	0	1	3	1	3	0	1	2	2	2	4	2	5	4	3
177	0	0	1	1	0	2	1	1	2	2	2	0	0	3	3	6	4	2
179	2	0	1	0	1	3	1	1	0	1	1	2	0	2	3	6	4	2

4G-4. Vaginal-Cephalic Group

ID	ATN	STN	SUP	TLS	TLP	HOB	BOB	GAL	MOR	UEG	LEG	LEP	STP	SCF	HE	PA	ABD	DF
2	0	0	1	0	0	1	2	0	1	0	2	2	2	1	2	6	3	4
9	0	0	1	0	0	2	2	2	1	3	2	0	0	3	3	6	4	2
11	0	0	1	0	0	2	1	0	0	0	1	2	0	4	4	6	4	3
24	0	0	1	0	0	2	2	0	0	0	2	2	0	3	3	5	4	3
28	0	0	3	0	0	2	2	0	1	0	1	2	2	3	2	6	4	2
32	0	0	2	0	0	2	2	1	1	1	2	2	2	5	3	6	1	2
41	0	0	1	0	0	2	2	0	0	2	2	2	0	3	3	6	3	2
44	0	0	1	0	0	2	2	2	1	1	2	2	0	4	2	5	3	3
46	0	0	3	0	0	2	2	1	1	2	2	2	1	4	2	6	4	2
47	0	0	0	0	0	2	2	1	1	0	2	0	0	4	2	5	3	2
62	0	0	2	0	0	2	2	0	0	1	2	2	0	4	2	6	4	2
63	0	0	1	0	0	2	1	1	2	2	2	2	2	3	3	6	4	2
69	0	0	2	0	0	2	2	1	2	0	1	0	0	5	3	6	3	2
70	0	0	1	0	0	2	2	1	1	0	1	1	0	3	3	6	4	2
71	2	0	2	0	0	1	2	1	1	2	2	1	1	3	3	6	4	2
87	0	0	1	0	0	3	2	0	1	1	2	1	0	4	2	5	4	2
90	0	0	1	0	0	3	3	2	0	1	1	1	0	3	3	5	4	2
94	0	0	2	0	0	3	2	0	1	1	2	1	1	5	2	6	4	2
97	0	0	1	0	0	1	2	0	1	1	2	1	0	4	2	6	4	2
111																		
117	0	2	3	2	1	3	1	1	1	2	2	2	1	3	3	6	5	2
120	0	0	1	2	0	1	1	0	1	1	2	0	1	3	1	6	3	2
129	0	0	1	0	0	1	1	1	1	1	2	2	0	5	2	6	3	2
141	0	0	2	0	0	2	2	1	1	1	1	1	1	3	1	4	2	3
152	0	0	2	0	0	2	2	0	1	1	2	2	0	3	3	6	3	2
153	3	0	2	0	1	3	1	0	0	1	2	2	1	3	2	5	3	3
155	1	0	1	0	2	3	3	2	1	2	2	2	1	4	1	5	3	2
156	0	0	1	0	0	3	1	0	1	1	2	0	0	5	2	5	3	2
158	0	0	1	0	0	3	2	2	1	2	2	2	0	3	1	5	3	2
160	0	0	2	0	0	3	1	1	0	1	1	2	1	4	1	5	4	2
162	1	0	2	1	0	1	2	0	1	1	1	2	1	2	1	5	3	2
165	0	0	1	0	0	3	1	2	0	2	2	2	1	3	1	5	4	2
167	0	0	1	0	0	3	0	0	0	3	1	2	2	4	3	6	5	2
168	0	0	1	0	0	3	1	1	0	2	2	2	1	4	2	5	4	2
169	0	0	1	0	1	3	1	1	0	1	2	2	0	4	3	6	5	3
173	0	0	1	0	0	3	1	0	0	1	1	2	1	2	2	5	5	3
174	0	0	1	0	1	3	1	0	1	2	2	2	0	4	3	6	4	2
176	0	0	3	0	1	3	1	3	0	2	2	2	0	3	2	5	4	3
178	0	0	2	0	0	3	1	0	1	2	2	2	1	4	2	5	4	2
180	2	0	1	0	0	1	1	2	0	2	2	2	1	3	3	6	5	3

Appendix 4H

5 Month Assessment:
Growth and AIMS Scores

1. **Cesarean-Breech Group**
2. **Cesarean-Cephalic Group**
3. **Vaginal-Breech Group**
4. **Vaginal-Cephalic Group**

Note: cell is blank if data not available

Abbreviations:

ID	identification number
CA	chronological age in days
L	length in centimetres
W	weight in kilograms
HC	head circumference in centimetres

AIMS Items: (coded 0 if not observed; 1 if observed)

P	prone: all infants, except as noted, received credit for P1-P4
P5	Prone Mobility
P6	Forearm Support (2)
P7	Extended Arm Support
P8	Rolling Prone to Supine without Rotation
P9	Swimming
P10	Reaching from Forearm Support
P12	Rolling Prone to Supine with Rotation
S	supine: all infants, except as noted, received credit for S1 - S4
S5	Hands to Knees
S6	Active Extension
S7	Hands to Feet
S8	Rolling Supine to Prone without Rotation
S9	Rolling Supine to Prone with Rotation
SIT	sit: all infants, except as noted, received credit for SIT1-SIT3
SIT4	Unsustained Sitting
SIT5	Sitting with Arm Support
SIT7	Weight Shift in Unsustained Sitting
ST	stand: all infants, except as noted, received credit for ST1-ST2
ST3	Supported Standing (3)

4H-1. Cesarean-Breech Group

ID	CA	L	W	HC	P5	P6	P7	P8	P9	P10	P12	S5	S6	S7	S8	S9	SIT4	SIT5	SIT6	SIT7	ST3
1	157	66.5	7.5	44.0	1	0	0	0	0	0	0	1	1	0	0	0	1	1	0	0	0
4																					
5	152	60.0	6.3	42.6	1	1	1	0	0	0	0	1	0	0	0	0	1	1	1	0	1
6	157	65.0	8.0	42.3	1	1	1	1	1	0	1	1	1	0	1	1	1	0	0	0	1
7	155	67.0		43.1	1	1	1	0	1	0	0	1	1	0	0	0	1	1	0	0	1
10	152	64.5		43.4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1
13	154	64.0	7.9	43.8	1	1	1	1	0	0	0	1	1	0	0	0	1	1	0	0	1
22	153	65.5		42.7	1	1	1	1	0	0	0	1	1	0	1	0	1	1	0	0	1
25	153	65.0	6.8	41.5	1	1	1	0	1	0	0	1	1	0	1	0	1	0	0	0	1
27	154	67.5	8.3	44.6	1	1	1	0	0	0	0	1	0	1	0	0	1	1	0	0	0
30	150	65.0	7.7	43.8	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1
33	151	63.5	8.7	42.2	1	1	1	1	0	0	0	1	1	1	0	1	1	1	0	0	1
34	156	65.0	6.4	43.7	1	0	0	0	0	0	0	1	1	1	0	0	1	1	0	0	1
36	152	63.5		42.4	1	1	1	0	0	0	0	1	1	0	0	0	1	1	0	0	1
37																					
40	155	61.5	7.0	43.0	1	0	1	0	0	0	0	1	1	0	0	0	1	1	1	1	1
48	160	62.0	6.1	43.0	1	1	0	1	0	0	0	1	1	1	0	0	1	1	0	0	0
49	159	65.0	6.5	44.2	1	0	0	0	0	0	0	1	1	1	0	0	1	1	1	0	1
53	155	60.5	5.4	41.1	1	0	0	1	0	0	0	1	1	0	0	0	1	0	0	0	0
54	148	62.5	7.1	45.4	1	0	0	1	0	0	0	1	1	1	0	0	1	1	1	0	1
55	155	61.0	6.2	40.7	1	1	1	1	1	0	0	1	1	0	0	0	1	1	0	0	0
56																					
57																					
59																					
64																					
67	153	63.5	6.4	41.7	1	1	0	0	0	0	0	1	1	1	0	0	1	1	0	0	1
72																					
74	154	66.0	7.5	44.0	1	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0
80	153	70.0	10.0	44.1	1	1	0	1	0	0	0	1	1	1	1	0	1	1	0	0	1
81																					
84																					
91	154	65.5	8.1	42.6	1	1	1	0	1	0	0	1	1	0	0	0	1	1	0	0	0
98	155	67.0	8.2	45.0	1	1	0	0	0	0	0	1	0	1	0	0	1	1	1	0	1
100	146	62.0		41.7	1	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0
101	153	65.0	7.1	44.0	1	1	0	0	1	0	0	1	1	0	1	0	1	0	0	0	0
102	153	68.0	7.3	43.2	1	0	0	0	1	0	0	1	1	1	1	0	1	0	0	0	0
103	152	62.5	6.6	42.0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0
104	151	66.5	7.1	42.5	1	1	1	0	0	0	0	1	1	1	0	0	1	1	0	0	0
106	160	68.0	7.3	43.8	0	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0
109	166	66.5	7.2	45.2	1	1	1	0	0	0	0	1	1	1	0	0	1	1	1	0	1
119	144	58.0	5.0	40.6	1	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
121	151	66.0	7.0	42.5	1	0	0	1	0	0	0	1	1	1	0	0	1	0	0	0	0
122	152	66.5	6.8	42.1	1	1	0	1	0	0	0	1	1	1	0	0	1	1	1	1	0
124	151	66.0	7.1	42.5	1	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	1
125	151	68.0	8.3	44.5	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	1
128	151	68.5	9.2	41.4	1	1	0	0	0	0	0	1	1	1	1	0	1	1	1	0	1
133																					
140	154	65.5	6.8	42.8	1	1	0	1	0	0	0	1	1	1	0	0	0	0	0	0	0
144																					
147	163	68.5	8.6	45.0	1	1	0	1	0	0	0	1	1	1	1	0	1	1	1	0	1

Notes: Subject 74 did not receive credit for SIT3; Subject 119 did not receive credit for ST1 or ST2.
Subject 10 received credit for P14, in addition to the scores above.

4H-2. Cesarean-Cephalic Group

ID	CA	L	W	HC	P5	P6	P7	P8	P9	P10	P12	S5	S6	S7	S8	S9	SIT4	SIT5	SIT6	SIT7	ST3
3	154	65.5	7.9	42.4	1	1	1	0	1	0	0	1	1	0	0	1	1	1	0	0	1
12	153	68.0	7.5	42.9	1	1	1	1	1	0	0	1	0	1	1	0	1	1	0	0	1
15	155	63.5	6.9	43.1	1	1	0	0	0	0	0	1	1	1	1	1	1	1	0	0	1
16																					
17																					
19	154	65.0	6.9	44.3	1	1	1	0	0	0	0	1	0	1	0	0	1	1	1	1	1
20	153	67.0	7.5	46.0	1	1	0	0	0	0	0	1	1	1	0	0	1	0	0	0	1
23	152	65.0	6.7	42.4	1	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0
26	153	65.0	8.0	44.4	1	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0
29	154	64.0	8.4	45.5	1	1	1	1	1	0	0	1	1	1	1	1	1	1	0	0	0
39																					
42	154	65.0	6.9	42.0	1	1	0	1	0	0	0	1	1	1	1	0	0	0	0	0	0
50	154	67.0	6.8	42.5	1	1	1	0	1	1	0	1	1	1	1	1	1	1	1	0	1
51	153	62.5	5.7	42.5	1	1	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0
52	154	67.5	8.0	40.4	1	1	0	1	0	0	0	1	1	0	0	0	1	1	0	0	0
58	153	68.0	7.9	44.3	1	1	1	0	0	0	0	1	1	1	0	0	1	1	0	0	0
66	157	64.0	7.6	42.2	1	1	0	0	0	0	0	1	1	1	0	0	1	1	0	0	0
73	154	66.5	7.8	45.2	1	0	0	1	0	0	0	1	1	1	0	0	0	0	0	0	0
75																					
76																					
78	152	67.0		42.5	1	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1	1
82	157	71.0	7.4	43.8	1	1	1	1	0	0	0	1	1	1	0	0	1	1	0	0	0
83	151	65.0	6.9	42.5	1	1	1	1	0	0	0	1	1	1	1	0	1	1	0	0	0
86																					
88	150	66.5	7.1	44.3	1	1	0	0	1	0	0	1	1	1	1	0	0	0	0	0	0
89	147	64.0	7.2	44.8	1	0	0	0	0	0	0	1	1	1	0	0	1	1	1	0	1
93	151	62.0	6.4	41.0	1	1	0	0	1	0	0	1	0	0	1	0	1	1	0	0	1
95																					
99	172	76.0	11.0	46.5	1	1	1	1	0	1	0	1	1	1	1	0	1	1	1	0	1
105																					
107	153	65.0	6.5	41.0	1	1	1	0	1	1	0	1	1	1	0	0	1	1	0	0	0
110	153	59.0	6.1	42.0	1	1	1	0	1	0	0	1	1	1	1	0	0	0	0	0	0
112	152	71.0	7.7	44.7	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0
113	152	67.0	7.5	43.5	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	1
114	157	67.5	8.2	43.4	1	1	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0
115	153	64.0	6.5	41.4	1	1	0	0	0	0	0	1	1	1	0	0	1	1	1	1	1
123																					
126	156	69.0	7.7	43.7	0	0	0	0	0	0	0	1	1	1	0	0	1	1	0	0	0
130	153	64.0	6.4	42.8	1	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0
131																					
132	154	64.0	6.3	42.6	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	0	0
134	154	63.5	6.6	42.0	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	0	0
137	153	66.5	7.7	42.0	1	1	1	0	1	1	0	1	1	1	0	1	1	1	1	1	0
138	155	68.0	7.0	41.0	1	1	1	0	1	0	0	1	1	1	1	0	1	0	0	0	1
139	157	63.0	5.4	41.2	1	0	0	1	0	0	0	1	1	1	1	0	1	0	0	0	0
142	154	66.5	7.3	43.2	1	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0
143	154	64.5	6.8	41.3	1	1	1	0	1	0	0	1	1	0	0	0	1	1	0	0	0
145																					
148	155	65.5		43.6	1	1	1	1	0	0	0	1	1	0	0	0	1	1	0	0	1
149	150	64.5	6.2	42.0	1	0	0	1	0	0	0	1	1	1	0	0	0	0	0	0	0

Notes: Subjects 112 and 126 did not receive credit for P4; Subject 26 did not receive credit for SIT2. Subject 29 received credit for P13; Subject 19 received credit for SIT8, in addition to the scores above.

4H-3. Vaginal-Breech Group

ID	CA	L	W	HC	P5	P6	P7	P8	P9	P10	P12	S5	S6	S7	S8	S9	SIT4	SIT5	SIT6	SIT7	ST3
8	158	68.0	7.4	40.8	1	1	1	0	1	0	0	1	1	1	0	0	1	1	1	0	1
14	152	66.0	7.1	41.7	1	1	0	0	0	0	1	1	1	1	0	1	1	1	1	0	1
18	155	68.0	9.0	45.7	1	1	1	1	1	0	0	1	1	1	1	0	1	1	0	0	1
21	154	67.0		46.0	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0
31	159	66.0	7.3	44.5	1	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0
35																					
38	154	62.0	6.4	42.9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1
43	156	59.0	5.5	40.0	1	1	1	0	0	0	0	1	1	0	1	0	1	1	0	0	0
45	156	64.5	6.8	42.5	1	0	0	0	0	0	0	1	1	0	0	0	1	1	0	0	1
60	153	62.5	7.4	42.8	1	1	1	1	1	1	0	0	1	0	0	0	1	1	1	0	1
61	153	68.0	8.2	45.0	1	0	0	0	0	0	0	1	1	0	0	0	1	1	1	1	0
65	157	63.5	6.2	41.2	1	1	1	0	0	0	0	1	1	1	1	0	1	1	0	0	1
68	155	67.5	7.4	42.5	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
77																					
79	152	68.0	7.8	44.4	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
85	152	64.0	6.4	42.0	1	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0
92	151	68.0	7.6	44.5	1	1	1	1	1	0	0	1	0	1	0	0	0	0	0	0	1
96	152	65.0	6.6	42.3	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
108	152	62.5	7.0	41.2	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
116	155	65.0	6.3	41.8	1	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0
118	153	66.5	8.0	42.5	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
127	154	67.0	8.4	43.5	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
135	154	67.0	8.2	44.0	1	1	0	0	1	0	0	1	1	1	0	0	1	1	1	1	1
136	156	66.5	6.1	43.0	1	1	0	1	0	0	0	1	1	1	1	0	1	0	0	0	0
146	162	65.5	7.1	43.0	1	1	0	0	0	0	0	1	1	1	1	0	1	1	0	0	1
150	154	62.5		43.0	1	0	0	0	0	0	0	1	1	1	0	0	1	1	0	0	0
151	155	64.0	6.3	41.6	1	1	1	1	1	0	0	1	1	1	0	0	0	0	0	0	0
154	150	66.5	6.7	43.5	1	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0
157	151	62.5	6.1	41.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
159	152	65.5	6.6	42.8	1	1	0	1	0	0	0	1	1	1	1	0	1	0	0	0	1
161	149	60.0	6.9	42.0	1	1	0	0	0	0	0	1	1	0	1	0	1	1	1	0	0
163																					
164	150	65.5	6.2	43.0	1	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0
166	153	63.5		40.5	1	1	1	1	0	0	0	1	1	1	1	0	1	1	0	0	1
170																					
171	152	70.0	6.7	43.5	0	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	1
172	153	65.0	6.1	40.8	1	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0
175	151	65.0	8.0	43.5	1	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0	1
177	151	63.0	7.5	43.0	1	1	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0
179	151	68.5	9.5	43.5	1	1	0	0	0	0	0	1	1	1	1	0	1	1	1	1	0

Notes: Subjects 127 and 157 did not receive credit for P4; Subject 157 did not receive credit for SIT2; Subjects 118 and 127 did not receive credit for SIT3.

4H-4. Vaginal-Cephalic Group

ID	CA	L	W	HC	P5	P6	P7	P8	P8	P10	P12	S5	S6	S7	S8	S9	SIT4	SIT5	SIT6	SIT7	ST3
2	154	65.0	7.6	44.0	1	1	1	0	0	0	0	1	1	0	0	0	1	1	0	0	0
9	150	59.0		42.4	1	1	1	0	1	0	0	1	0	0	0	0	1	1	1	0	1
11	153	66.0	6.6	43.5	1	1	0	0	0	0	1	1	1	1	1	0	1	1	0	0	1
24	154	66.5	8.6	42.9	1	0	0	0	0	0	0	1	0	1	0	0	1	1	0	0	1
28	152	65.0	6.8	42.4	1	1	1	0	1	1	0	1	1	1	1	0	1	1	0	0	0
32	155	64.0	5.6	42.6	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
41	154	65.0	8.1	41.8	1	1	0	0	0	0	0	1	0	1	0	0	1	1	1	0	0
44	159	65.0	7.2	43.3	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0
46	156	63.5	7.1	41.7	1	1	1	0	1	0	0	1	1	1	0	0	1	1	0	0	1
47	154	66.5	7.9	42.0	1	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0
62	158	66.0	8.5	45.3	1	1	0	0	0	0	1	1	1	1	0	0	1	1	1	0	1
63	152	69.5	9.3	44.2	1	1	0	1	0	0	0	1	1	1	1	0	1	1	1	0	0
69	153	65.5	6.9	42.9	1	0	0	1	0	0	0	1	1	1	0	0	1	1	0	0	0
70	158	62.5	5.9	41.5	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	0	1
71	154	60.0	6.8	43.2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
87	144	65.5	6.9	43.0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0
90	156	66.0	7.1	44.0	1	1	1	1	0	0	0	1	1	1	0	0	1	1	0	0	1
94	151	64.0	6.8	44.2	1	1	0	1	0	0	0	1	1	1	1	0	1	0	0	0	1
97	152	68.5	7.8	42.7	1	1	0	0	0	0	0	1	1	1	0	0	1	1	1	0	0
111																					
117	154	64.0	7.6	45.6	1	1	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0
120	146	66.0	7.5	42.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
129	156	66.5	8.1	44.2	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	0	1
141	154	65.5	7.0	42.6	1	0	0	1	0	0	0	1	1	0	0	0	1	0	0	0	0
152	151	65.5	7.7	44.0	1	1	0	0	0	0	0	1	1	1	1	0	1	1	0	0	1
153	153	64.0	7.3	42.3	1	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0
155	155	64.0	6.1	42.5	1	1	1	1	0	0	0	1	1	1	0	0	0	0	0	0	0
156	150	67.0	7.3	43.7	1	0	0	0	1	0	0	1	1	1	0	0	0	0	0	0	0
158	148	65.0	7.3	40.5	1	1	1	1	0	0	0	1	1	1	1	0	1	1	1	0	1
160	150	65.0	8.2	43.0	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1
162	151	64.5	7.4	41.1	1	1	1	1	1	0	0	1	1	0	1	0	0	0	0	0	0
165	144	65.0	6.6	43.1	1	1	0	1	0	0	1	1	1	1	1	0	0	0	0	0	1
167	152	66.5	7.0	43.0	1	1	1	1	0	0	0	1	1	1	0	0	1	1	0	0	1
168	160	61.5	6.5	41.6	1	1	0	0	0	0	0	1	0	0	0	0	1	1	1	0	1
169	150	68.0	7.3	39.9	1	1	1	1	1	0	1	1	1	1	1	0	1	0	0	0	1
173	151	64.5	7.8	42.2	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
174	153	68.0	7.7	43.0	1	0	0	0	0	0	0	1	0	1	0	0	1	1	0	0	1
176	151	66.5	7.8	44.0	1	1	0	1	0	0	0	1	1	1	1	0	1	0	0	0	1
178	155	68.5	7.1	42.9	1	1	0	1	0	0	0	1	1	1	1	0	0	0	0	0	0
180	151	65.5	8.1	42.6	1	0	0	0	0	0	0	1	1	1	0	0	1	1	0	0	0

Notes: Subject 71 did not receive credit for S4; Subject 156 did not receive credit for SIT2; Subject 120 did not receive credit for SIT3.
Subject 160 received credit for P11 and P14, in addition to the scores above.

Appendix 4I

5 Month Assessment: Primitive Reflex Profile and the Joint Angles from the INFANIB

1. **Cesarean-Breech Group**
2. **Cesarean-Cephalic Group**
3. **Vaginal-Breech Group**
4. **Vaginal-Cephalic Group**

Note: cell is blank if data not available

Abbreviations:

ID	identification number

Primitive Reflex Profile Items: (all items have been coded from the left starting at 0)

ATN	asymmetrical tonic neck reflex
STN	symmetrical tonic neck reflex
SUP	positive supporting reaction
TLS	tonic labyrinthine reflex in supine
TLP	tonic labyrinthine reflex in prone
HOB	segmental roll, head on body reaction
BOB	segmental roll, body on body reaction
GAL	Galant reflex
MOR	Moro reflex
UEG	upper extremity grasp reflex
LEG	lower extremity grasp reflex
LEP	lower extremity placing reflex
STP	stepping reflex

INFANIB Items (all items have been coded from the left starting at 1)

SCF	scarf sign
HE	heel to ear
PA	popliteal angle
ABD	leg abduction
DF	dorsiflexion of foot

4I-1. Cesarean-Breech Group

ID	ATN	STN	SUP	TLS	TLP	HOB	BOB	GAL	MOR	UEG	LEG	LEP	STP	SCF	HE	PA	ABD	DF
1	0	0	2	0	0	2	1	0	1	0	1	2	0	4	4	6	4	3
4																		
5	0	0	2	0	0	2	2	0	1	0	1	2	2	3	3	6	3	3
6	0	0	2	0	0	2	2	0	1	0	2	0	0	3	2	6	4	3
7	0	0	1	0	0	2	2	1	1	0	1	2	0	5	3	6	4	3
10	0	0	1	0	0	2	2	0	0	0	2	2	1	4	4	6	4	2
13	0	0	2	0	0	1	2	0	1	0	1	1	0	5	4	6	4	2
22	0	0	2	0	0	2	2	0	1	0	2	1	0	4	4	6	4	2
25	0	0	2	0	0	2	2	1	0	0	2	2	0	4	3	6	3	3
27	0	0	1	0	0	2	1	0	0	0	1	0	0	5	3	6	5	1
30	0	0	2	0	0	2	2	1	1	1	2	2	1	5	3	6	3	2
33	0	0	2	0	0	2	2	0	0	2	1	2	1	4	4	6	4	3
34	0	0	2	0	0	1	1	1	0	0	2	2	2	5	2	6	3	3
36	0	0	2	0	0	2	2	2	0	0	1	2	1	5	4	6	4	2
37																		
40	0	0	1	0	0	2	2	0	0	0	1	0	0	5	5	6	5	2
48	0	0	1	0	0	2	2	0	1	0	1	2	0	4	4	6	4	2
49	0	0	2	0	0	2	2	1	0	0	1	0	0	4	2	6	3	2
53	0	0	2	0	0	3	2	0	1	1	1	2	0	5	3	6	4	3
54	0	0	1	0	0	2	2	0	1	0	2	1	0	4	4	6	5	1
55	0	0	2	0	0	2	2	0	1	0	2	1	0	4	3	6	4	3
56																		
57																		
59																		
64																		
67	0	0	2	0	0	2	2	0	0	0	2	2	0	4	4	6	4	3
72																		
74	0	0	2	0	0	1	1	0	0	0	2	3	0	5	3	6	4	2
80	0	0	2	0	0	2	2	0	1	0	2	2	0	5	3	6	4	2
81																		
84																		
91	0	0	2	0	0	3	2	0	0	1	1	1	0	3	3	6	4	2
98	0	0	1	0	0	1	1	0	0	0	1	2	1	3	2	5	4	3
100	0	0	1	0	0	2	2	0	0	0	1	0	0	3	3	6	4	2
101	0	0	2	0	0	2	2	0	1	0	1	2	0	5	4	6	4	2
102	0	0	2	0	0	2	1	0	0	0	1	2	0	4	3	6	4	2
103	0	0	2	0	0	3	1	0	0	0	2	2	0	5	4	6	4	2
104	0	0	2	0	0	2	2	0	0	0	2	2	0	2	3	6	3	3
106	0	0	1	0	0	0	0	0	0	0	1	2	0	3	2	6	4	2
109	0	0	2	0	0	3	1	0	0	0	2	2	2	4	3	6	3	2
119	0	0	0	0	1	3	3	2	0	0	2	0	0	3	3	6	4	2
121	0	0	1	0	0	3	1	0	1	0	1	2	0	5	4	6	4	3
122	0	0	1	0	0	2	2	0	1	0	2	0	0	5	4	6	4	2
124	0	0	1	0	0	3	2	0	0	0	2	2	0	5	4	6	5	2
125	0	0	1	0	0	3	1	0	1	0	1	2	0	3	2	6	3	3
128	0	0	2	0	0	3	1	0	1	0	1	2	0	4	3	6	3	3
133																		
140	2	0	1	0	2	1	1	1	1	0	2	1	0	4	1	5	4	2
144																		
147	0	0	2	0	0	3	2	1	1	0	2	2	0	4	4	6	5	3

4I-2. Cesarean-Cephalic Group

ID	ATN	STN	SUP	TLS	TLP	HOB	BOB	GAL	MOR	UEG	LEG	LEP	STP	SCF	HE	PA	ABD	DF
3	0	0	2	0	0	2	2	0	1	0	2	1	1	5	4	6	5	3
12	0	0	2	0	0	2	2	2	0	1	2	2	2	4	2	6	3	3
15	0	0	1	0	0	2	2	0	1	0	1	0	0	4	5	6	4	2
16																		
17																		
19	0	0	2	0	0	1	1	0	0	0	2	1	1	5	5	6	5	2
20	0	0	1	0	0	1	1	1	0	0	1	2	0	5	5	6	4	3
23	1	0	2	0	1	3	1	0	0	2	2	1	0	4	4	6	5	5
26	0	0	1	0	0	2	1	0	0	0	1	1	0	5	3	6	5	2
29	0	0	1	0	0	1	1	0	0	0	1	1	0	5	4	6	4	2
39																		
42	0	0	1	0	0	3	1	0	0	0	2	2	1	5	4	6	5	1
50	0	0	1	0	0	2	2	1	0	0	1	2	0	5	5	6	4	3
51	0	0	2	0	0	2	2	1	1	1	0	1	0	5	5	6	5	2
52	0	0	2	0	0	2	2	0	1	0	2	2	0	3	3	6	4	3
58	0	0	2	0	0	3	2	1	0	0	2	2	0	3	3	6	4	3
66	0	0	2	0	0	3	2	1	0	0	1	2	0	4	3	6	4	3
73	0	0	2	0	0	1	1	1	0	1	2	2	0	3	3	6	3	2
75																		
76																		
78	0	0	2	0	0	3	2	1	0	0	2	2	0	3	3	6	3	3
82	0	0	2	0	0	3	2	0	0	0	2	0	0	4	4	6	4	2
83	0	0	2	0	0	3	2	0	1	0	2	2	0	3	3	6	4	2
86																		
88	0	0	1	0	0	3	1	1	1	0	2	2	0	5	5	6	5	1
89	0	0	3	0	0	3	2	0	0	1	1	2	0	4	3	6	4	2
93	0	0	1	0	0	1	1	0	0	0	1	2	0	4	5	6	6	2
95																		
99	0	0	1	0	0	2	2	0	0	0	2	2	0	2	3	5	4	3
105																		
107	0	0	1	0	0	3	1	0	1	0	2	1	0	5	4	6	4	2
110	0	0	1	0	0	0	2	0	0	2	2	2	1	4	4	6	5	1
112	0	0	1	0	0	3	3	0	1	0	1	2	0	5	2	6	3	2
113	0	0	2	0	0	0	0	2	0	0	2	2	0	5	3	6	3	2
114	0	0	2	0	0	3	2	0	0	0	2	1	0	3	3	6	4	2
115	0	0	1	0	0	2	1	1	0	0	1	2	0	5	5	6	6	2
123																		
126	0	0	2	0	0	3	1	0	1	0	1	2	0	5	2	6	3	2
130	0	0	1	0	0	2	1	0	1	0	1	2	0	5	3	6	5	2
131																		
132	0	0	2	0	0	3	2	0	1	0	1	2	0	5	3	6	3	2
134	0	0	2	0	0	3	2	1	0	0	1	2	2	4	3	6	4	2
137	0	0	1	0	0	2	1	0	0	0	2	2	0	4	3	6	6	2
138	0	0	2	0	0	3	2	0	1	0	1	1	0	4	3	6	4	4
139	1	0	2	0	0	3	1	1	1	1	2	2	1	5	2	6	3	2
142	0	0	1	0	0	3	1	0	1	0	1	2	0	2	2	6	5	3
143	0	0	1	0	0	1	1	0	1	0	1	1	0	3	3	6	4	3
145																		
148	0	0	1	0	0	2	2	0	1	0	2	2	0	4	2	6	3	2
149	0	0	2	0	0	3	1	2	1	0	2	2	1	5	2	5	5	2

4I-3. Vaginal-Breech Group

ID	ANT	STN	SUP	TLS	TLP	HOB	BOB	GAL	MOR	UEG	LEG	LEP	STP	SCF	HE	PA	ABD	DF
8	0	0	1	0	0	2	2	0	0	0	1	0	0	5	3	6	4	2
14	0	0	2	0	0	2	1	0	0	0	1	0	0	5	5	6	4	3
18	0	0	2	0	0	2	2	0	0	0	2	2	0	4	5	6	5	3
21	0	0	1	0	0	2	2	0	1	0	1	2	1	4	3	6	3	3
31	0	0	2	0	1	2	2	1	0	0	1	2	1	4	4	6	5	3
35																		
38	0	0	2	0	0	2	2	0	1	0	1	2	0	5	5	6	5	2
43	0	0	2	0	0	2	1	0	0	0	2	2	2	3	4	6	5	1
45	0	0	2	0	0	2	2	0	0	0	1	1	0	5	4	6	4	2
60	0	0	2	0	0	2	2	0	0	0	1	2	0	4	2	6	3	2
61	0	0	2	0	0	3	2	1	0	0	2	2	0	5	3	6	4	3
65	0	0	2	0	0	3	2	2	0	0	2	2	0	3	3	6	3	2
68	2	0	2	0	0	3	2	0	0	2	2	1	0	3	4	6	2	2
77																		
79	0	0	1	0	0	3	2	0	0	0	2	2	0	4	3	6	4	2
85	0	0	2	0	0	3	2	1	0	0	1	0	0	6	5	6	4	2
92	0	0	2	0	0	3	1	0	0	0	2	2	0	5	3	6	4	3
96	0	0	2	0	0	3	1	2	0	0	2	1	0	4	4	6	5	3
108	0	0	2	0	0	2	2	0	1	1	2	1	1	4	3	6	4	3
116	0	0	2	0	0	3	0	1	0	0	2	1	0	5	4	6	3	2
118	0	0	1	0	0	3	2	0	0	0	1	2	1	3	3	6	3	3
127	0	0	1	0	0	3	3	1	1	0	1	2	0	4	3	6	3	2
135	0	0	1	0	0	2	2	0	0	0	2	2	0	4	3	6	5	2
136	0	0	2	0	0	3	2	0	0	0	1	2	0	2	2	6	4	2
146	0	0	1	0	0	3	2	0	0	0	2	2	0	5	2	6	4	2
150	0	0	2	0	0	3	2	0	0	0	1	2	1	3	2	6	4	2
151	2	0	1	0	2	3	1	0	0	0	1	2	0	3	4	6	6	2
154	2	0	1	0	1	3	1	0	0	3	2	2	0	3	3	6	4	3
157	0	0	1	0	1	1	1	0	0	0	2	2	0	4	3	6	5	2
159	0	0	1	0	0	1	1	0	0	2	2	0	0	4	3	6	5	3
161	0	0	1	0	1	3	1	0	0	0	2	2	0	4	3	6	5	2
163																		
164	0	0	1	0	0	3	1	0	0	0	2	2	0	4	4	6	3	3
166	0	0	1	0	0	3	1	0	0	0	2	2	0	4	4	6	5	2
170																		
171	0	0	1	0	0	1	1	0	0	0	1	2	0	4	3	6	5	2
172	2	0	2	0	1	3	1	0	0	0	2	2	0	4	4	6	5	2
175	0	0	1	0	0	1	1	0	0	0	2	2	1	3	2	5	4	3
177	0	0	1	0	1	1	1	0	0	1	1	2	0	3	3	6	5	2
179	0	0	1	0	0	3	1	0	0	1	2	2	1	3	3	6	6	2

4I-4. Vaginal-Cephalic Group

ID	ATN	STN	SUP	TLS	TLP	HOB	BOB	GAL	MOR	UEG	LEG	LEP	STP	SCF	HE	PA	ABD	DF
2	0	0	2	0	0	1	1	1	0	0	2	2	0	4	3	6	4	3
9	0	0	1	0	0	2	2	0	1	0	1	0	0	5	2	6	3	2
11	0	0	1	0	0	2	1	0	1	1	1	0	0	4	4	6	4	3
24	0	0	2	0	0	2	2	1	0	0	1	2	0	3	3	6	4	3
28	0	0	3	0	0	2	2	0	0	0	1	2	0	4	4	6	4	2
32	0	0	1	0	0	1	1	0	0	0	1	1	1	5	3	6	4	1
41	2	0	1	0	0	0	1	0	0	0	1	0	0	4	4	6	4	2
44	0	0	1	0	0	2	2	0	0	0	2	1	0	5	4	6	4	2
46	0	0	1	0	0	2	2	1	0	0	2	2	0	4	4	6	4	2
47	0	0	2	0	0	2	2	1	1	0	1	1	0	4	2	6	3	2
62	0	0	1	0	0	2	2	0	1	0	2	2	0	3	4	6	4	2
63	0	0	1	0	0	2	2	0	0	0	2	1	1	4	3	6	4	2
69	0	0	2	0	0	3	2	0	0	0	2	2	0	5	3	6	4	2
70	0	0	1	0	0	3	2	0	1	0	1	1	0	3	2	6	4	3
71	0	0	2	0	1	3	2	0	0	1	2	0	0	2	3	6	3	1
87	0	0	1	0	0	3	2	0	0	1	2	2	0	3	4	6	5	2
90	0	0	2	0	0	3	1	0	0	0	2	2	0	4	3	6	4	3
94	0	0	1	0	0	3	2	1	0	0	1	0	0	4	3	6	4	2
97	0	0	1	0	0	1	1	0	0	0	1	2	0	6	4	6	5	2
111																		
117	0	0	2	0	0	3	1	0	0	0	2	2	0	4	3	6	4	3
120	0	0	2	0	0	2	1	0	0	0	1	1	0	5	3	6	5	2
129	0	0	3	0	0	2	2	2	0	0	1	2	1	4	3	6	3	3
141	0	0	3	0	0	2	1	0	1	0	1	0	1	4	1	5	4	3
152	2	0	1	0	2	1	1	0	0	1	2	2	1	4	3	6	5	2
153	0	0	2	0	0	3	1	1	0	0	0	1	0	4	3	6	5	2
155	0	0	1	0	0	3	1	0	0	0	2	2	0	4	2	5	4	3
156	0	0	1	0	2	3	1	0	0	2	2	2	0	5	2	5	4	2
158	0	0	1	0	0	1	1	0	0	0	2	2	1	3	3	6	5	2
160	0	0	1	0	0	1	1	1	0	0	2	2	1	4	3	6	6	2
162	0	0	1	0	0	1	1	0	0	0	1	2	0	3	3	6	5	3
165	0	0	2	0	0	3	2	0	1	0	1	2	0	6	2	6	3	3
167	0	0	1	0	0	1	1	0	0	0	2	2	0	4	3	6	5	2
168	0	0	1	0	0	3	1	0	1	0	2	2	0	5	3	6	4	2
169	0	0	2	0	0	3	1	0	0	0	1	2	1	4	4	6	5	3
173	2	0	2	0	0	1	1	0	0	1	2	2	0	3	3	6	4	2
174	0	0	1	0	0	3	1	0	0	0	2	2	0	5	2	5	6	3
176	0	0	1	0	0	1	1	0	0	0	2	2	0	4	2	5	5	3
178	0	0	1	0	0	4	1	2	0	0	2	2	0	3	2	5	6	2
180	0	0	1	0	0	3	1	0	0	1	2	2	1	4	3	6	5	2

Appendix 4J

7 Month Assessment:
Growth and AIMS Prone Scores

1. **Cesarean-Breech Group**
2. **Cesarean-Cephalic Group**
3. **Vaginal-Breech Group**
4. **Vaginal-Cephalic Group**

Note: cell is blank if data not available

Abbreviations:

ID	identification number
CA	chronological age in days
L	length in centimetres
W	weight in kilograms
HC	head circumference in centimetres

AIMS Prone Items: (coded 0 if not observed: 1 if observed)

P	prone: all infants, except as noted, received credit for P1-P6
P7	Extended Arm Support
P8	Rolling Prone to Supine without Rotation
P9	Swimming
P10	Reaching from Forearm Support
P11	Pivoting
P12	Rolling Prone to Supine with Rotation
P13	Four-Point Kneeling (1)
P14	Propped Lying on Side
P15	Reciprocal Crawling
P16	Four-Point Kneeling to sitting or Half-Sitting
P17	Reciprocal Creeping (1)
P18	Reaching from Extended Arm Support
P19	Four-Point Kneeling (2)
P20	Modified Four-Point Kneeling

4J-1. Cesarean-Breech Group

ID	CA	L	W	HC	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20
1	213	70.0	8.3	45.5	1	1	1	1	0	1	0	0	0	0	0	0	0	0
4																		
5	226	67.0	8.2	44.2	1	1	1	1	0	1	1	0	0	0	0	0	0	0
6	220	68.0		43.5	1	1	1	1	1	1	1	0	0	0	0	0	0	0
7	216	71.5	11.4	44.3	1	1	1	1	1	1	1	1	0	0	0	0	0	0
10	215	68.5		45.7	1	1	1	1	1	1	1	1	1	0	1	0	0	0
13	215	67.5	8.7	45.4	1	1	1	1	1	0	0	0	0	0	0	0	0	0
22	216	68.0	8.4	44.2	1	1	1	1	1	1	1	1	0	0	0	0	0	0
25	215	69.5	7.3	42.4	1	1	1	1	1	0	0	0	0	0	0	0	0	0
27	213	73.0	9.3	46.8	1	1	1	1	0	1	0	0	0	0	0	0	0	0
30	218	68.0	8.5	45.6	1	1	1	1	0	1	0	0	0	0	0	0	0	0
33	214	69.5	9.5	43.2	1	1	1	1	1	1	1	1	1	1	1	1	0	0
34																		
36	216	68.0		43.3	1	0	0	0	0	0	0	0	0	0	0	0	0	0
37																		
40	215	66.5	7.6	44.5	1	1	1	1	0	0	0	0	0	0	0	0	0	0
48	214	67.0	7.0	44.0	1	1	1	1	1	1	0	0	0	0	0	0	0	0
49	210	68.0	8.4	45.4	1	1	0	0	0	1	0	0	0	0	0	0	0	0
53	213	64.5	6.5	42.7	1	1	1	1	0	0	0	0	0	0	0	0	0	0
54	221	67.5	8.4	47.0	1	1	1	1	0	1	0	0	0	0	0	0	0	0
55	211	65.5	7.1	42.2	1	1	1	1	1	0	0	0	0	0	0	0	0	0
56																		
57																		
59																		
64																		
67	223	67.0	7.4	43.1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
72																		
74	215	69.0	8.5	45.1	1	1	1	1	0	1	1	0	0	0	0	0	0	0
80	213	71.5	10.8	44.0	1	1	1	1	1	1	1	1	0	1	0	0	0	0
81																		
84																		
91	212	68.0	8.9	44.3	1	0	1	0	0	0	0	0	0	0	0	0	0	0
98	212	72.0	8.9	46.0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
100																		
101																		
102	214	71.5	8.7	45.1	1	0	1	1	0	0	0	0	0	0	0	0	0	0
103	213	67.0	7.7	43.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
104	213	71.0	7.8	43.5	0	0	1	0	0	0	0	0	0	0	0	0	0	0
106	214	70.0	8.2	45.0	1	0	1	1	1	0	0	0	0	0	0	0	0	0
109	209	68.0	7.5	45.6	1	1	1	1	0	1	0	0	0	0	0	0	0	0
119	216	63.0	6.3	43.3	1	1	1	1	1	0	1	0	0	0	0	0	0	0
121	213	69.0	7.5	43.5	1	1	1	1	1	0	1	1	0	0	0	0	0	0
122	211	68.5	7.5	43.2	1	1	1	0	0	0	0	0	0	0	0	0	0	0
124	213	68.0	7.5	43.5	1	0	1	0	0	0	0	0	0	0	0	0	0	0
125	207	71.0	9.5	46.3	1	1	1	1	1	0	0	0	0	0	0	0	0	0
128	213	73.5	9.5	42.9	1	1	1	1	1	1	0	0	1	0	0	0	0	0
133																		
140	216	69.5	7.9	44.0	0	1	0	1	0	1	0	0	0	0	0	0	0	0
144																		
147	217	71.5	9.3	46.0	1	1	1	1	1	1	1	1	0	0	0	0	0	0

Notes: Subject 103 did not receive credit for P6.

4J-2. Cesarean-Cephalic Group

ID	CA	L	W	HC	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20
3	215	68.0	8.7	43.9	1	1	1	1	1	1	0	1	1	0	0	0	0	0
12	219	70.5	8.1	44.0	1	1	1	1	1	1	1	1	0	1	1	1	0	0
15	215				1	1	1	1	1	1	0	0	0	0	0	0	0	0
16																		
17																		
19	217	68.5	7.7	45.5	1	1	1	1	1	0	0	0	0	0	0	0	0	0
20	216	71.0	8.8	48.0	1	1	1	1	0	1	0	0	0	0	0	0	0	0
23	216	68.0	7.5	44.0	1	1	1	1	1	1	1	0	0	0	0	0	0	0
26	224	70.0	9.2	46.0	1	1	1	1	0	0	0	0	0	0	0	0	0	0
29	217	69.0	9.3	47.3	1	1	1	1	1	1	1	1	1	1	1	1	0	1
39																		
42	217	67.5	7.7	43.6	1	1	1	1	0	0	0	0	0	0	0	0	0	0
50	210	70.0	7.4	43.8	1	1	1	1	0	0	0	0	0	0	0	0	0	0
51	213	69.0	6.7	43.2	1	0	1	1	0	0	0	0	0	0	0	0	0	0
52	217	71.0	9.0	42.8	1	1	1	1	1	1	0	1	0	0	0	0	0	0
58	213	71.0	8.8	45.5	1	1	1	1	1	0	0	0	0	0	0	0	0	0
66	213	67.5	8.0	43.3	1	1	1	1	1	0	1	0	0	0	1	0	0	0
73	213	68.5	8.7	46.4	1	0	1	0	0	0	0	0	0	0	0	0	0	0
75																		
76																		
78	208	69.0	7.2	43.2	1	0	1	0	0	0	0	0	0	0	0	0	0	0
82	213	65.5	7.8	44.6	1	1	1	1	1	1	0	0	0	0	0	0	0	0
83	217	68.5		43.4	1	1	1	1	1	0	1	1	0	0	1	0	0	0
86																		
88	214	69.5	8.3	45.8	1	0	1	1	1	0	0	0	0	0	0	0	0	0
89	213	67.0	8.0	46.5	1	1	1	1	1	0	1	0	0	0	0	0	0	0
93	214	63.0	7.1	43.0	1	0	0	1	0	1	0	0	0	0	0	0	0	0
95																		
99	216	77.0	12.0	47.8	1	1	1	1	1	1	1	1	0	0	0	0	0	0
105																		
107	216	69.5	7.4	42.2	1	0	0	1	0	0	0	0	0	0	0	0	0	0
110	213	63.0	7.1	43.5	1	1	1	1	1	0	1	0	1	0	0	0	0	0
112	215	75.0	8.9	46.2	1	1	1	1	1	1	0	1	0	0	0	0	0	0
113	213	70.0	8.4	45.6	0	0	0	0	0	1	0	0	0	0	0	0	0	0
114	207	71.0	10.0	45.1	1	0	1	1	0	1	0	0	0	0	0	0	0	0
115	216	66.0	7.0	42.5	1	1	1	1	1	1	1	1	1	1	1	0	0	0
123																		
126	216	73.0	8.4	45.5	0	0	0	0	0	1	0	0	0	0	0	0	0	0
130	216	67.5	7.0	44.5	1	0	1	0	0	0	0	0	0	0	0	0	0	0
131																		
132	213	66.5	7.3	44.0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
134	219	66.0	7.8	43.0	1	1	1	1	1	1	1	0	0	0	0	0	0	0
137	215	68.0	8.3	44.5	1	1	1	1	1	1	1	1	1	1	1	1	1	1
138	215	71.0	8.1	42.7	1	1	1	1	1	1	1	1	0	1	0	0	0	0
139																		
142	218	70.0	8.2	45.7	1	0	0	0	0	0	0	0	0	0	0	0	0	0
143	214	68.5	7.9	42.4	1	1	1	1	1	1	1	1	0	0	0	0	0	0
145																		
148	222	67.0		45.5	1	1	1	1	1	0	1	0	0	0	0	0	0	0
149	213	66.5	6.5	43.2	1	0	0	0	0	0	0	0	0	0	0	0	0	0

4J-3. Vaginal-Breech Group

ID	CA	L	W	HC	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20
8	214	68.5	8.0	41.6	1	1	1	1	0	0	1	1	0	1	0	0	0	0
14	220	71.0	7.5	42.8	1	1	1	1	1	1	1	1	0	1	1	1	0	0
18	213	71.0	10.0	47.0	1	1	1	1	1	0	1	0	0	0	0	0	0	0
21	217	71.0	8.2	48.0	1	1	1	1	0	1	0	0	0	0	0	0	0	0
31	216				0	1	0	0	0	1	0	0	0	0	0	0	0	0
35																		
38	217	65.0	7.0	44.5	1	1	1	1	1	1	1	1	1	1	1	0	0	0
43	217	60.5	6.3	41.3	1	1	1	1	1	0	1	0	0	0	0	0	0	0
45	216	68.0	8.0	43.9	1	0	1	1	1	0	0	0	0	0	0	0	0	0
60	213	66.0	8.7	45.0	1	1	1	1	0	0	1	0	0	0	0	0	0	0
61	214	72.5	9.4	46.0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
65	213	67.0	7.2	43.5	1	1	1	1	1	0	1	1	0	0	1	0	0	0
68	213	71.0	8.7	43.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
77																		
79	212	71.5	8.7	45.5	1	1	1	1	0	1	0	1	0	0	0	0	0	0
85	215	68.0	7.2	43.0	1	1	1	1	1	1	1	1	1	1	1	0	0	1
92	213	71.0	8.8	46.3	1	1	1	1	1	0	0	0	0	0	0	0	0	0
96	216	68.5	7.6	44.2	1	1	1	1	1	0	1	0	0	0	0	0	0	0
108	217	65.0	7.9	42.7	1	0	0	1	0	0	0	0	0	0	0	0	0	0
116	214	67.5	7.0	43.5	0	1	1	0	0	1	0	0	0	0	0	0	0	0
118	212	70.5	8.9	45.0	1	1	1	1	1	1	0	0	0	0	0	0	0	0
127	216	72.0	9.2	44.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
135	216	71.5	9.9	44.5	1	1	1	1	1	1	1	0	0	1	0	0	0	0
136	211	70.0	8.1	45.2	1	1	1	1	0	1	0	0	0	0	0	0	0	0
146	213	67.5	7.3	44.2	1	0	0	0	0	0	0	0	0	0	0	0	0	0
150	213	64.0	8.1	45.0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
151	218	66.0	7.5	43.5	1	1	1	1	1	1	1	1	0	1	1	0	0	0
154	215	71.0	7.8	45.1	1	1	1	1	0	0	0	1	0	0	0	0	0	0
157	214	66.5	7.1	42.5	1	0	0	0	0	0	0	0	0	0	0	0	0	0
159	215	68.5	7.4	44.1	1	1	0	1	0	1	0	0	0	0	0	0	0	0
161	211	63.5	7.6	43.6	1	1	1	1	1	0	0	0	0	0	0	0	0	0
163																		
164	217	68.0	7.0	44.4	1	1	1	1	1	1	1	1	0	1	1	0	0	0
166	217	66.0	6.3	41.5	1	1	1	1	1	1	1	1	1	1	1	1	0	1
170																		
171	215	68.0	9.1	43.0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
172	216	67.5	6.8	42.5	1	0	1	1	0	0	0	0	0	0	0	0	0	0
175	211	69.0	8.9	45.1	0	1	0	0	0	1	0	0	0	0	0	0	0	0
177	218	65.5	7.8	44.9	1	1	1	1	0	0	0	0	0	0	0	0	0	0
179	213	72.5	10.8	45.0	1	1	0	1	0	1	1	0	0	0	0	0	0	0

Note: Subject 61 did not receive credit for P6.

4J-4. Vaginal-Cephalic Group

ID	CA	L	W	HC	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20
2	211	69.0	9.1	46.2	1	1	1	0	0	0	0	0	0	0	0	0	0	0
9	211	65.0		43.9	1	1	1	1	0	0	0	0	0	0	0	0	0	0
11	221	70.0	7.3	45.3	1	1	1	1	1	1	1	1	0	1	0	0	0	0
24	216	69.5	9.3	44.3	1	1	1	1	1	1	0	0	0	0	0	0	0	0
28	215	67.0	7.7	44.0	1	1	1	1	1	0	1	1	1	1	1	0	0	0
32	215	67.0	6.3	43.8	1	1	1	1	1	1	0	1	0	0	0	0	0	0
41	215	68.0	9.6	43.5	1	0	1	1	0	0	0	0	0	0	0	0	0	0
44	215	69.5	7.8	44.2	1	1	1	1	1	0	1	1	0	0	0	0	0	0
46	213	66.5	7.9	42.8	1	0	1	1	0	0	0	0	0	0	0	0	0	0
47	212	68.5	8.5	43.8	1	1	1	1	0	0	0	0	0	0	0	0	0	0
62	214	68.5	9.5	47.1	1	0	1	1	0	0	0	0	0	0	0	0	0	0
63	214	73.5	10.0	44.6	1	1	1	1	1	1	1	1	0	0	0	0	0	0
69	213	71.0	8.2	45.0	1	1	1	1	0	1	0	0	0	0	0	0	0	0
70	213	65.5	6.7	42.3	1	0	1	0	0	1	0	0	0	0	0	0	0	0
71	213	63.0	7.5	44.5	1	0	0	0	0	0	0	0	0	0	0	0	0	0
87	213	68.9	7.6	44.7	1	0	1	1	0	0	0	0	0	0	0	0	0	0
90	211	68.5	7.8	45.2	1	1	1	1	0	0	0	0	0	0	0	0	0	0
94	211	68.0	7.5	46.0	1	1	1	1	1	0	1	1	0	0	1	0	0	0
97	214	72.0	8.9	44.5	1	1	1	1	0	0	0	0	0	0	0	0	0	0
111																		
117	214	67.0	8.7	47.4	1	1	1	1	1	1	0	0	0	0	0	0	0	0
120	213	68.5	8.1	43.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
129	216	69.0	9.0	45.0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
141	213	68.0	7.4	44.5	1	1	1	1	0	1	0	0	0	0	0	0	0	0
152	212	68.0	8.6	45.4	1	1	1	1	1	1	1	0	0	1	0	0	0	0
153	216	67.0	7.8	43.0	1	1	1	0	0	0	0	0	0	0	0	0	0	0
155																		
156	213	69.0	8.7	45.3	1	0	1	0	0	0	0	0	0	0	0	0	0	0
158	211	68.0	8.3	42.3	1	1	1	1	1	1	1	1	1	1	1	1	0	1
160	212	67.0	8.7	44.1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
162	214	68.0	7.9	42.6	1	1	1	1	1	1	1	1	1	1	1	1	0	0
165	221	69.0	7.7	45.0	1	1	1	1	1	0	0	0	1	0	0	0	0	0
167	213	69.0	7.2	44.0	1	1	1	1	1	0	1	0	0	1	1	0	0	0
168	214	64.0	7.4	42.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
169	214	65.0	9.1	42.0	1	1	1	1	1	1	1	1	1	1	1	1	1	0
173	218		8.8		1	1	1	1	1	1	1	1	0	1	0	0	0	0
174	213	71.5	8.7	44.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
176	211	70.5	8.8	45.2	1	1	1	1	0	0	1	1	0	0	0	0	0	0
178	216	69.0	7.6	43.6	1	1	1	1	0	0	0	0	0	0	0	0	0	0
180	214	68.5	9.2	44.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix 4K

7 Month Assessment: AIMS Supine, Sitting and Standing Scores, and Joint Angles from the INFANIB

1. **Cesarean-Breech Group**
2. **Cesarean-Cephalic Group**
3. **Vaginal-Breech Group**
4. **Vaginal-Cephalic Group**

Note: cell is blank if data not available

Abbreviations:

ID identification number

AIMS Items: (coded 0 if not observed; 1 if observed)

S	supine: all infants, except as noted, received credit for S1 - S6
S7	Hands to Feet
S8	Rolling Supine to Prone without Rotation
S9	Rolling Supine to Prone with Rotation
SIT	sit: all infants, except as noted, received credit for SIT1-SIT6
SIT7	Weight Shift in Unsustained Sitting
SIT8	Sitting without Arm Support (1)
SIT9	Reach with Rotation in Sitting
SIT10	Sitting to Prone
SIT11	Sitting to Four-Point Kneeling
ST	stand: all infants, received credit for ST1-ST2
ST3	Supported Standing (3)
ST4	Pulls to Stand with Support
ST5	Pulls to Stand/Stands
ST6	Supported Standing with Rotation
ST7	Cruising without Rotation
ST8	Half-Kneeling

INFANIB Items (all items have been coded from the left starting at 1)

SCF	scarf sign
HE	heel to ear
PA	popliteal angle
ABD	leg abduction
DF	dorsiflexion of foot

4K-1. Cesarean-Breech Group

ID	S7	S8	S9	SIT7	SIT8	SIT9	SIT10	SIT11	ST3	ST4	ST5	ST6	ST7	ST8	SCF	HE	PA	ABD	DF
1	1	1	1	0	0	0	0	0	1	0	0	0	0	0	5	4	6	4	3
4																			
5	1	1	0	1	1	1	1	0	1	0	0	0	0	0	4	3	6	4	3
6	1	1	1	1	1	1	1	0	1	0	0	0	0	0	5	5	6	5	3
7	1	1	0	1	0	0	0	0	1	0	0	0	0	0	5	4	6	4	3
10	1	1	1	1	1	0	1	0	1	1	1	0	0	0	5	5	6	5	2
13	1	1	1	1	1	1	0	0	0	0	0	0	0	0	5	3	6	5	2
22	1	1	1	1	0	0	0	0	1	0	0	0	0	0	4	4	6	5	2
25	1	1	0	0	0	0	0	0	1	0	0	0	0	0	4	3	6	4	3
27	1	1	0	1	0	0	0	0	1	0	0	0	0	0	4	4	6	4	3
30	1	1	0	1	0	0	0	0	1	0	0	0	0	0	5	3	6	4	2
33	1	1	1	1	0	0	0	0	1	1	0	0	0	0	4	4	6	4	3
34																			
36	1	0	0	1	1	1	0	0	1	0	0	0	0	0	4	4	6	4	2
37																			
40	1	1	1	1	1	1	0	0	1	0	0	0	0	0	5	5	6	5	3
48	1	1	0	1	1	0	1	0	0	0	0	0	0	0	5	5	6	5	2
49	1	0	0	1	1	1	0	0	1	0	0	0	0	0	5	4	6	4	3
53	1	1	0	1	0	0	0	0	1	0	0	0	0	0	4	4	6	4	3
54	1	1	1	1	1	1	0	0	1	0	0	0	0	0	4	4	6	5	2
55	1	1	0	1	0	0	0	0	0	0	0	0	0	0	4	5	6	5	3
56																			
57																			
59																			
64																			
67	1	1	1	1	1	1	1	0	1	1	0	0	0	0	3	4	6	4	2
72																			
74	1	1	1	1	1	0	1	0	1	0	0	0	0	0	3	3	6	4	3
80	1	1	1	1	1	1	1	1	1	0	0	0	0	0	3	3	6	6	3
81																			
84																			
91	0	0	0	1	1	1	0	0	1	0	0	0	0	0	4	4	6	4	2
98	1	1	0	1	1	1	0	1	1	0	0	0	0	0	3	3	6	3	3
100																			
101																			
102	1	1	0	0	0	0	1	0	0	0	0	0	0	0	5	5	6	5	2
103	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2	5	6	5	2
104	1	0	0	1	1	0	1	0	1	0	0	0	0	0	5	4	6	5	5
106	1	1	0	1	0	0	0	0	1	0	0	0	0	0	4	2	6	4	3
109	1	1	1	1	1	1	1	0	1	0	0	0	0	0	5	3	6	3	2
119	1	1	0	1	1	0	1	0	0	0	0	0	0	0	4	4	6	5	2
121	1	1	1	1	1	1	1	0	1	0	0	0	0	0	5	4	6	4	3
122	1	0	0	1	1	1	0	0	1	0	0	0	0	0	5	4	6	4	2
124	1	1	0	1	1	0	0	0	0	0	0	0	0	0	5	4	6	6	2
125	1	1	0	1	1	0	1	0	1	0	0	0	0	0	3	3	6	3	3
128	1	1	0	1	1	1	1	0	1	0	0	0	0	0	4	3	6	4	3
133																			
140	1	1	0	1	0	0	0	0	0	0	0	0	0	0	4	4	6	5	2
144																			
147	1	1	1	1	0	0	1	0	1	0	0	0	0	0	5	4	6	6	3

Notes: Subject 91 did not receive credit for S5; Subject 104 did not receive credit for S6.

4K-2. Cesarean-Cephalic Group

ID	S7	S8	S9	SIT7	SIT8	SIT9	SIT10	SIT11	ST3	ST4	ST5	ST6	ST7	ST8	SCF	HE	PA	ABD	DF
3	1	1	1	1	1	1	1	0	1	0	0	0	0	0	5	4	6	5	2
12	1	1	1	1	0	0	0	0	1	1	0	0	0	0	5	4	6	3	3
15	1	1	1	1	1	1	0	0	1	0	0	0	0	0	5	4	6	5	1
16																			
17																			
19	1	0	0	1	1	1	1	0	0	0	0	0	0	0	5	4	6	5	2
20	1	1	0	1	1	1	0	0	1	0	0	0	0	0	4	4	6	5	3
23	1	1	1	1	0	0	0	0	1	0	0	0	0	0	5	4	6	5	2
26	1	1	0	1	1	0	0	0	1	0	0	0	0	0	5	4	6	5	2
29	1	1	1	1	1	1	0	1	0	0	0	0	0	0	4	4	6	4	2
39																			
42	1	1	0	1	1	1	1	0	1	0	0	0	0	0	5	4	6	3	2
50	1	1	1	1	1	1	0	0	1	0	0	0	0	0	4	4	6	3	3
51	1	1	0	1	1	1	0	0	1	0	0	0	0	0	5	5	6	5	3
52	1	1	1	1	1	1	0	0	1	0	0	0	0	0	5	3	5	4	5
58	1	1	0	0	0	0	0	0	0	0	0	0	0	0	4	3	6	5	3
66	1	1	1	1	1	1	1	0	1	1	1	1	0	0	3	3	6	4	3
73	1	0	0	1	1	1	0	0	1	0	0	0	0	0	3	2	6	3	3
75																			
76																			
78	1	1	0	1	1	1	1	0	1	0	0	0	0	0	4	4	6	4	2
82	1	1	0	0	0	0	0	0	1	0	0	0	0	0	3	5	6	4	2
83	1	1	1	1	1	1	1	0	1	0	0	0	0	0	5	4	6	5	2
86																			
88	1	1	1	1	1	1	0	0	1	0	0	0	0	0	4	5	6	6	2
89	1	1	1	1	1	1	1	0	1	0	0	0	0	0	3	4	6	4	2
93	1	1	1	1	1	1	0	0	1	0	0	0	0	0	4	4	6	5	2
95																			
99	1	1	1	1	0	0	1	0	1	0	0	0	0	0	3	2	6	3	3
105																			
107	0	0	0	1	1	1	0	0	1	0	0	0	0	0	5	4	6	6	2
110	1	1	1	1	1	1	1	0	1	1	1	1	1	1	5	5	6	6	2
112	1	1	1	1	0	0	0	0	1	0	0	0	0	0	5	4	6	4	2
113	1	0	0	1	1	1	0	0	1	0	0	0	0	0	6	4	6	5	2
114	1	1	1	0	0	0	0	0	0	0	0	0	0	0	3	3	6	4	3
115	1	1	1	1	1	1	0	1	1	1	0	0	0	0	4	5	6	6	2
123																			
126	1	0	0	1	0	0	0	0	1	0	0	0	0	0	4	3	6	5	3
130	1	1	0	0	0	0	0	0	0	0	0	0	0	0	6	5	6	6	2
131																			
132	1	1	1	1	1	0	0	1	1	1	1	0	0	1	5	5	6	5	2
134	1	1	1	1	1	0	1	0	1	0	0	0	0	0	3	1	5	5	4
137	1	1	1	1	1	1	1	1	1	1	1	1	0	1	5	4	6	5	2
138	1	1	1	1	1	0	1	0	1	0	0	0	0	0	5	5	6	6	3
139																			
142	1	0	0	0	0	0	0	0	0	0	0	0	0	0	5	4	6	5	3
143	1	1	1	0	0	0	0	0	0	0	0	0	0	0	4	3	6	5	5
145																			
148	1	1	1	1	1	1	0	1	1	0	0	0	0	0	3	3	6	4	2
149	1	1	0	1	1	0	0	0	0	0	0	0	0	0	6	4	6	5	2

Notes: Subject 130 did not receive credit for SIT6.
Subject 52 received credit for SIT12 in addition to the scores above.

4K-3. Vaginal-Breech Group

ID	S7	S8	S9	SIT7	SIT8	SIT9	SIT10	SIT11	ST3	ST4	ST5	ST6	ST7	ST8	SCF	HE	PA	ABD	DF
8	1	1	1	1	1	1	0	0	1	0	0	0	0	0	5	4	6	5	2
14	1	1	1	1	1	1	1	1	1	1	0	0	0	1	5	5	6	5	2
18	1	1	1	1	1	1	0	0	1	0	0	0	0	0	5	4	6	4	3
21	1	1	1	0	0	0	0	0	1	0	0	0	0	0	5	4	6	4	3
31	1	1	0	1	1	0	0	0	1	0	0	0	0	0	4	4	6	5	4
35																			
38	1	1	1	1	1	1	1	1	1	1	0	0	0	0	5	5	6	4	2
43	1	1	1	1	1	1	0	0	0	0	0	0	0	0	5	4	6	5	2
45	1	1	0	1	1	1	0	0	1	0	0	0	0	0	5	5	6	5	2
60	1	1	1	1	1	1	1	0	1	0	0	0	0	0	4	3	5	4	2
61	1	0	0	1	1	1	1	0	0	0	0	0	0	0	4	4	6	5	3
65	1	1	1	1	0	0	0	0	1	0	0	0	0	0	5	4	6	3	5
68	1	0	0	1	0	0	0	0	0	0	0	0	0	0	5	5	6	5	2
77																			
79	1	1	1	1	0	0	0	0	0	0	0	0	0	0	6	4	6	6	2
85	1	1	1	1	0	0	1	0	1	1	0	0	0	1	3	5	6	5	2
92	1	1	1	1	1	1	1	0	1	0	0	0	0	0	5	4	6	5	3
96	1	1	1	1	0	0	1	0	1	0	0	0	0	0	5	5	6	6	3
108	1	1	0	1	0	0	0	0	1	0	0	0	0	0	4	3	6	6	3
116	1	1	0	1	1	0	0	0	1	0	0	0	0	0	5	5	6	5	3
118	1	1	0	1	1	0	0	0	1	0	0	0	0	0	5	3	6	5	3
127	1	1	0	0	0	0	0	0	0	0	0	0	0	0	5	4	6	5	2
135	1	1	1	1	1	1	0	1	1	0	0	0	0	0	4	3	6	5	2
136	1	1	1	1	1	0	1	0	1	0	0	0	0	0	5	5	6	5	2
146	1	0	0	1	1	0	0	0	1	0	0	0	0	0	5	3	6	5	2
150	1	0	0	1	1	1	0	0	1	0	0	0	0	0	4	3	6	5	3
151	1	1	0	1	1	1	1	0	1	0	0	0	0	0	4	5	6	6	1
154	1	1	1	1	1	1	0	0	1	0	0	0	0	0	5	4	6	6	2
157	1	1	0	1	1	0	0	0	0	0	0	0	0	0	5	4	6	6	2
159	1	1	0	1	1	1	1	0	1	0	0	0	0	0	5	5	6	4	2
161	1	1	1	1	1	1	1	0	1	0	0	0	0	0	5	5	6	6	2
163																			
164	1	1	1	1	1	0	1	1	1	0	0	0	0	0	4	3	6	5	3
166	1	1	1	1	1	1	1	1	1	1	1	1	0	1	3	5	6	6	2
170																			
171	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	6	5	2
172	1	1	0	1	1	0	0	0	1	0	0	0	0	0	4	3	6	5	3
175	1	1	0	1	0	0	0	0	1	0	0	0	0	0	3	2	5	3	3
177	1	0	0	1	1	1	0	0	0	0	0	0	0	0	3	3	6	5	2
179	1	1	0	1	1	1	1	0	1	0	0	0	0	0	3	3	6	6	2

Notes: Subject 127 did not receive credit for SIT5 or SIT6.
Subject 166 received credit for SIT12 and ST9 in addition to the scores above.

4K-4. Vaginal-Cephalic Group

ID	S7	S8	S9	SIT7	SIT8	SIT9	SIT10	SIT11	ST3	ST4	ST5	ST6	ST7	ST8	SCF	HE	PA	ABD	DF
2	1	0	0	1	1	0	0	0	0	0	0	0	0	0	4	3	6	5	3
9	1	1	0	1	1	1	0	0	1	0	0	0	0	0	5	4	6	5	2
11	1	1	1	1	1	1	1	1	1	1	1	0	0	0	5	4	6	5	3
24	1	1	0	1	1	1	1	0	1	0	0	0	0	0	4	3	6	4	4
28	1	1	1	0	0	0	0	0	1	0	0	0	0	0	4	4	6	4	3
32	1	1	1	0	0	0	0	0	0	0	0	0	0	0	6	4	6	4	2
41	1	0	0	1	1	1	0	0	1	0	0	0	0	0	4	4	6	4	3
44	1	1	0	1	1	0	0	0	0	0	0	0	0	0	5	3	6	4	3
46	1	1	0	1	1	1	0	0	1	0	0	0	0	0	4	5	6	5	2
47	1	0	0	1	1	1	0	0	1	0	0	0	0	0	5	2	6	4	2
62	1	1	1	1	1	1	0	0	1	0	0	0	0	0	5	5	6	5	2
63	1	1	1	1	1	0	0	0	1	0	0	0	0	0	5	4	6	5	3
69	1	1	1	1	0	0	0	0	0	0	0	0	0	0	5	4	6	5	2
70	1	0	0	1	0	0	0	0	1	0	0	0	0	0	4	4	6	4	3
71	1	0	0	1	0	0	0	0	1	0	0	0	0	0	4	5	6	6	1
87	1	0	0	1	1	1	0	0	1	0	0	0	0	0	5	5	6	5	2
90	1	1	0	1	1	0	1	0	1	0	0	0	0	0	3	4	6	4	3
94	1	1	1	1	1	0	1	0	1	0	0	0	0	0	4	4	6	5	3
97	1	0	0	1	1	1	1	0	1	0	0	0	0	0	3	3	6	6	2
111																			
117	1	1	1	1	0	0	0	0	1	0	0	0	0	0	5	4	6	6	2
120	1	1	0	1	1	0	1	0	0	0	0	0	0	0	5	4	6	5	2
129	1	1	1	1	1	1	0	1	1	1	1	0	1	0	5	2	6	4	3
141	1	1	0	1	0	0	0	0	1	0	0	0	0	0	4	3	6	5	3
152	1	1	0	1	1	1	0	1	1	0	0	0	0	0	4	4	6	6	2
153	1	1	0	1	1	1	0	0	0	0	0	0	0	0	4	3	6	5	3
155																			
156	0	0	0	1	1	1	0	0	0	0	0	0	0	0	4	3	6	5	2
158	1	1	1	1	1	1	0	1	1	1	1	1	1	1	4	5	6	6	2
160	1	1	1	1	1	1	0	1	1	1	1	1	0	0	5	4	6	6	2
162	1	1	1	1	1	1	0	1	1	1	1	1	1	1	5	4	6	5	2
165	1	1	1	0	0	0	0	0	1	0	0	0	0	0	4	3	6	5	3
167	1	1	0	1	1	1	0	1	1	0	0	0	0	0	5	5	6	6	2
168	1	0	0	1	1	0	0	0	1	0	0	0	0	0	4	3	6	6	2
169	1	1	1	1	1	1	0	1	1	1	1	1	0	0	3	5	6	6	3
173	1	1	1	1	1	0	0	0	1	0	0	0	0	0	4	4	6	6	3
174	1	0	0	1	1	0	0	0	1	0	0	0	0	0	3	3	6	4	2
176	1	1	0	1	1	1	1	1	1	0	0	0	0	0	4	3	6	5	3
178	1	0	0	1	1	1	0	0	1	0	0	0	0	0	5	5	6	6	2
180	1	0	0	1	0	0	0	0	0	0	0	0	0	0	3	3	6	6	2

Notes: Subject 44 did not receive credit for S6; Subject 165 did not receive credit for SIT5 or SIT6.

Appendix 4L

10 Month Assessment:
Growth, Joint Angles from the INFANIB, and AIMS Prone Scores

1. **Cesarean-Breech Group**
2. **Cesarean-Cephalic Group**
3. **Vaginal-Breech Group**
4. **Vaginal-Cephalic Group**

Note: cell is blank if data not available

Abbreviations:

ID	identification number
CA	chronological age in days
L	length in centimetres
W	weight in kilograms
HC	head circumference in centimetres

INFANIB Items (all items have been coded from the left starting at 1)

SCF	scarf sign
HE	heel to ear
PA	popliteal angle
ABD	leg abduction
DF	dorsiflexion of foot

AIMS Prone Items: (coded 0 if not observed; 1 if observed)

P	prone: all infants, except as noted, received credit for P1-P12
P13	Four-Point Kneeling (1)
P14	Propped Lying on Side
P15	Reciprocal Crawling
P16	Four-Point Kneeling to sitting or Half-Sitting
P17	Reciprocal Creeping (1)
P18	Reaching from Extended Arm Support
P19	Four-Point Kneeling (2)
P20	Modified Four-Point Kneeling
P21	Reciprocal Creeping (2)

4L-1. Cesarean-Breech Group

ID	CA	L	W	HC	SCF	HE	PA	ABD	DF	P13	P14	P15	P16	P17	P18	P19	P20	P21
1	305	76.0	9.2	47.3	5	5	6	4	3	1	1	1	1	1	1	1	1	1
4																		
5	306	70.5	9.0	46.1	3	4	6	5	3	1	1	1	1	1	1	1	0	0
6	306	73.0	9.8	45.0	5	5	6	5	4	1	1	1	1	1	1	0	1	0
7	306	78.0	11.4	45.6	5	4	6	4	3	1	1	1	1	1	1	1	1	0
10	304	75.5	8.6	46.8	5	5	6	4	3	1	1	1	1	1	1	0	0	0
13	305	73.0	10.5	46.6	4	4	6	5	2	1	1	1	1	1	1	0	1	0
22	305	72.0	9.2	45.5	5	3	5	5	3	1	1	1	1	1	1	1	1	0
25	308	73.5		44.0	4	4	6	4	2	1	1	1	1	1	1	1	0	0
27	304	76.5	10.9	49.2	5	4	6	5	2	1	1	1	1	1	0	0	0	0
30	304	72.0	9.0	47.0	4	3	6	5	3	1	1	1	1	0	0	1	0	0
33	305	72.0		44.0	4	5	6	3	3	1	1	0	1	1	1	0	0	0
34	305	72.0	8.4	47.0	5	4	6	5	4	1	1	1	1	0	1	0	1	0
36	307	73.0	9.4	45.0	4	3	6	6	3	1	1	1	1	1	1	1	1	0
37																		
40	310	70.0		45.7	4	5	6	4	3	1	1	1	1	1	1	1	1	1
48	308	70.5	7.7	45.7	4	5	6	5	2	1	1	1	1	1	1	0	0	0
49	299	71.5	9.2	47.1	5	4	6	4	2	1	1	1	1	0	1	1	1	0
53	306	70.0	7.8	44.4	5	5	6	5	3	1	1	1	1	1	1	0	1	0
54	305	71.5	9.7	48.3	5	3	6	3	2	1	1	1	1	1	1	0	1	0
55	305	68.5	8.5	44.0	5	5	6	5	2	1	1	1	1	1	1	1	1	0
56																		
57																		
59																		
64																		
67	310	72.0	8.2	44.4	5	5	6	5	3	1	1	1	1	1	1	1	1	1
72																		
74	299	73.5	9.3	45.6	4	3	6	4	3	1	1	1	1	1	1	0	1	0
80	304	75.5	11.6	46.0	5	5	6	4	2	1	1	1	1	1	1	1	1	0
81																		
84																		
91	304	72.0	9.7	45.9	5	4	6	5	2	1	1	1	1	1	1	1	1	0
98	305	75.0	9.1	47.5	4	2	5	5	4	1	1	1	1	1	1	1	1	1
100																		
101																		
102	306	76.5	10.0	46.5	5	5	6	5	3	1	1	1	1	1	1	1	1	0
103	305	72.0	8.3	45.2	5	4	6	6	2	1	1	1	1	1	0	1	1	0
104	305	75.0	8.6	45.5	4	5	6	5	3	1	1	1	1	1	0	1	0	0
106	304	76.0	9.4	46.5	3	2	5	5	2	1	1	1	1	1	1	1	1	1
109	306	71.5	7.9	47.2	5	5	6	4	2	1	1	1	1	1	1	1	1	0
119	300	65.5	7.7	45.0	4	3	6	5	3	1	1	1	1	1	0	0	1	0
121	298	73.0	8.5	44.8	5	5	6	5	2	1	1	1	1	1	1	1	0	1
122	306	73.5	9.3	45.0	4	4	6	5	3	1	1	1	1	0	1	0	1	0
124	305	71.5	8.7	44.5	4	4	6	5	2	1	1	1	1	1	0	0	1	0
125	297	77.0	11.2	48.2	5	4	6	5	3	1	1	1	1	1	0	0	0	0
128	304	75.5	10.2	44.3	5	5	6	5	2	1	1	1	1	1	1	1	1	0
133																		
140	302	73.0	8.9	45.0	3	3	6	5	2	1	1	0	1	0	0	0	0	0
144																		
147	301	74.0	10.6	46.5	5	4	6	6	2	1	1	1	1	1	1	1	1	0

4L-2. Cesarean-Cephalic Group

ID	CA	L	W	HC	SCF	HE	PA	ABD	DF	P13	P14	P15	P16	P17	P18	P19	P20	P21
3	309	73.0	10.0	45.4	3	4	6	3	3	1	1	1	1	1	0	0	0	0
12	307	73.5	8.7	45.4	4	3	6	3	3	1	1	1	1	1	1	1	1	1
15	306	72.0	8.7	46.2	6	5	6	6	3	1	1	1	1	1	1	1	1	1
16																		
17																		
19	304	73.5	9.4	48.6	5	5	6	6	2	1	1	1	1	1	1	1	1	0
20	306	76.0	10.1	48.8	6	5	6	6	3	1	1	1	1	1	1	1	1	0
23	306	73.0	9.1	45.8	6	5	6	5	2	1	1	1	1	1	1	1	1	1
26	305	73.0	9.8	47.5	5	3	6	6	2	1	1	1	1	1	1	0	0	0
29	305	72.0	10.6	49.0	4	5	6	5	2	1	1	1	1	1	1	1	1	0
39																		
42	304	72.5	8.4	45.0	4	3	6	5	3	1	1	1	1	1	1	1	1	1
50	309	72.5	8.6	45.0	3	5	6	4	3	1	1	1	1	0	0	0	1	0
51	309	70.5	7.2	45.4	5	5	6	6	2	1	1	1	1	1	1	1	1	1
52	308	76.0	10.2	43.7	5	5	6	4	4	1	1	1	1	1	1	1	1	1
58																		
66	300	70.5	8.5	44.4	4	4	6	5	3	1	1	1	1	1	1	1	1	1
73	304	72.0	9.6	47.6	4	4	6	5	3	1	1	1	1	1	1	1	1	0
75																		
76																		
78	303	73.5		44.7	6	5	6	5	2	1	1	1	1	1	1	1	1	1
82	306	70.5	8.2	45.6	5	5	6	6	2	1	1	1	0	0	0	0	0	0
83	305	72.5	9.1	45.2	5	4	6	5	2	1	1	1	1	1	1	1	1	1
86																		
88	304	74.5	10.1	48.0	5	5	6	5	2	1	1	1	1	1	1	1	1	0
89	310	72.0	8.3	47.8	4	4	6	4	4	1	1	1	1	1	1	1	1	1
93	298	68.0	8.0	43.5	5	5	6	5	2	1	1	1	1	1	1	1	1	0
95																		
99	305	82.5	13.1	49.5	4	2	5	5	3	1	1	1	1	1	1	1	0	0
105																		
107	304	72.5	8.2	43.5	5	5	6	6	2	1	1	1	1	1	1	1	1	0
110	307	69.5	8.0	45.7	5	5	6	6	2	1	1	1	1	1	1	1	1	0
112	306	79.5	10.6	48.0	6	5	6	5	2	1	1	1	1	1	1	1	1	0
113	305	72.0	8.8	47.3	6	5	6	6	2	1	1	1	1	1	0	0	1	0
114	310	78.0	12.7	46.5	5	4	6	6	2	0	1	0	0	0	0	0	0	0
115	305	70.0	8.0	44.3	6	5	6	6	2	1	1	1	1	1	1	1	1	1
123																		
126	304	77.0	9.3	47.0	5	3	6	5	3	0	0	0	0	0	0	0	0	0
130	311	71.0	8.1	46.3	4	5	6	6	2	1	1	1	1	1	0	1	0	0
131																		
132	310	70.5	8.5	46.3	5	3	6	5	3	1	1	1	1	1	1	1	1	0
134	304	68.5	8.4	44.7	3	3	6	6	3	1	1	1	1	1	1	0	1	0
137	306	72.0	9.1	45.5	5	5	6	6	2	1	1	1	1	1	1	1	1	0
138	305	76.8	9.8	43.5	5	5	6	6	3	1	1	1	1	1	1	1	0	0
139																		
142	303	74.5	8.9	46.6	5	4	6	6	2	1	1	1	1	1	0	0	0	0
143	305	71.5	8.9	44.0	5	4	6	5	3	1	1	1	1	1	1	1	0	0
145																		
148	308	73.5		46.8	5	5	6	6	2	1	1	1	1	1	1	1	1	1
149	304	71.0	7.2	44.6	6	3	6	6	2	1	1	1	1	1	0	0	0	0

4L-3. Vaginal-Breech Group

ID	CA	L	W	HC	SCF	HE	PA	ABD	DF	P13	P14	P15	P16	P17	P18	P19	P20	P21
8	310	75.0	9.1	43.2	5	4	6	4	2	1	1	1	1	1	1	1	1	1
14	305	75.0		44.0	5	5	6	6	2	1	1	1	1	1	1	1	1	1
18	303	72.5	11.4	47.7	5	5	6	5	2	1	1	1	1	1	0	0	0	0
21	299	72.0		49.3	5	4	6	4	2	1	1	1	1	1	1	1	1	1
31	305	72.0	9.3	47.0	4	4	6	5	3	1	1	1	1	1	1	1	0	0
35																		
38	304	68.5	7.2	45.4	5	5	6	4	3	1	1	1	1	1	1	1	1	1
43	305	65.5	7.1	42.5	5	5	6	6	2	1	1	1	1	1	1	0	1	0
45	305	74.0	8.4	45.3	5	5	6	5	2	1	0	0	1	0	0	0	0	0
60	305	69.5	9.9	46.5	4	2	5	4	2	1	1	1	1	1	1	0	0	0
61	304	76.5	10.9	47.9	5	4	6	4	2	1	1	1	1	1	1	1	1	0
65	307	72.5	8.6	44.1	4	4	6	4	3	1	1	1	1	1	1	0	1	0
68	307	76.0	9.8	45.5	5	4	6	4	2	0	0	0	0	0	0	0	0	0
77																		
79																		
85	305	71.0	8.3	44.0	5	5	6	6	2	1	1	1	1	1	1	1	1	1
92	301	77.0	10.0	48.0	6	5	6	6	3	1	1	1	1	1	1	1	1	0
96	306	73.0	8.4	46.2	6	5	6	6	3	1	1	1	1	1	0	0	0	0
108	302	70.0	8.6	43.8	5	5	6	5	3	1	1	1	1	1	0	0	1	0
116	303	71.5	8.3	45.0	6	6	6	6	2	1	1	1	1	1	0	1	1	0
118	307	76.0	10.4	46.9	6	4	6	5	2	1	1	1	1	1	0	0	1	0
127	307	74.0	10.4	46.0	3	3	6	6	2	1	1	1	1	1	0	1	0	0
135	303	76.0	11.0	48.5	5	4	6	6	2	1	1	1	1	1	1	1	1	0
136	301	75.0	9.8	46.0	3	2	5	5	2	1	1	1	1	1	0	1	1	0
146	304	70.0	8.3	45.4	4	2	5	4	3	1	1	1	1	1	0	0	0	0
150	306	73.0	9.4	46.5	4	5	6	6	3	1	1	1	1	1	1	1	1	0
151	303	67.5	8.2	44.7	5	5	6	6	2	1	1	1	1	1	0	0	1	0
154	299	74.5	8.8	46.2	5	4	6	6	3	1	1	1	1	1	1	1	1	0
157	311	71.0	8.3	45.0	6	5	6	6	1	1	1	1	1	1	0	0	1	0
159	301	69.0		45.0	4	2	6	5	3	1	1	1	1	1	1	1	1	0
161	306	67.0	8.7	45.0	4	6	6	6	2	1	1	1	1	1	1	0	1	0
163																		
164	301	71.5	7.5	46.0	3	4	6	6	3	1	1	1	1	1	1	1	1	0
166	303	67.0	7.2	44.0	5	4	6	6	2	1	1	1	1	1	1	1	1	0
170																		
171	303	68.0		45.5	5	5	6	6	2	0	0	0	0	0	0	0	0	0
172	306	71.0	7.7	43.5	3	5	6	6	2	1	1	1	1	1	1	0	0	0
175	304	73.0	10.1	47.0	4	3	6	5	3	1	1	1	1	1	0	0	1	0
177	307	71.0	10.0	46.0	4	4	6	6	2	1	1	1	1	1	0	1	0	0
179	304	76.0	12.3	46.8	3	4	6	6	2	1	1	1	1	1	1	1	1	0

Notes: Subject 68 did not receive credit for P8-P12; Subject 171 did not receive credit for P8-P11.

4L-4. Vaginal-Cephalic Group

ID	CA	L	W	HC	SCF	HE	PA	ABD	DF	P13	P14	P15	P16	P17	P18	P19	P20	P21
2	305	73.5	10.0	47.9	5	3	6	4	3	1	0	1	1	1	0	0	0	0
9	302	71.5	9.5	46.2	5	4	6	4	2	1	1	1	1	1	1	1	1	1
11	303	75.0		46.0	5	5	6	5	3	1	1	1	1	1	1	1	1	1
24	308	74.0	10.6	45.2	5	4	6	5	3	1	1	1	1	1	1	1	1	1
28	306	72.5	8.4	45.1	5	5	6	4	2	1	1	1	1	1	1	1	1	1
32	306	69.5	7.0	45.0	6	5	6	5	2	1	1	1	0	0	0	0	0	0
41	305	72.0	10.6	45.1	5	5	6	5	2	1	1	1	1	1	1	1	1	1
44	305	73.0	8.5	45.4	4	4	6	4	2	1	1	1	1	1	1	1	1	1
46	300	70.0	8.4	43.9	5	5	6	5	2	1	1	1	1	1	1	1	1	1
47	302	74.0	9.0	45.0	4	3	6	4	3	0	0	0	0	0	0	0	0	0
62	304	74.0	10.4	48.0	5	4	6	5	2	1	1	1	1	1	1	0	1	0
63	303	77.0	11.1	46.8	5	5	6	5	3	1	1	1	1	1	1	1	1	0
69	302	73.5	8.7	45.6	4	4	6	5	3	1	1	1	1	1	1	0	1	0
70	309	68.0	7.7	44.6	5	5	6	6	3	1	1	1	1	0	0	0	1	0
71	304	66.5	8.7	46.5	4	5	6	6	2	1	0	1	1	0	0	0	0	0
87	305	72.0	9.2	48.5	4	5	6	6	2	1	1	1	1	1	0	0	0	0
90	306	72.5	8.6	47.0	4	4	6	5	3	1	1	1	1	1	1	1	1	0
94	302	70.5	8.1	47.6	5	5	6	4	3	1	1	1	1	1	1	1	1	1
97	304	76.5	9.8	45.5	4	3	6	6	2	1	1	1	1	1	1	0	1	0
111																		
117																		
120	301	71.0	8.6	44.5	4	5	6	6	2	1	1	1	1	1	0	0	0	0
129	306	72.5	9.3	47.0	4	2	5	4	3	1	1	1	1	1	1	1	1	0
141	303	72.0	8.9	45.8	5	4	6	5	3	1	1	1	1	1	0	1	1	0
152	304	72.0	9.4	47.0	5	4	6	5	4	1	1	1	1	1	1	1	1	1
153	303	70.0	8.5	44.6	5	4	6	5	4	1	1	1	1	1	1	1	1	1
155																		
156	302	73.5	10.0	46.6	6	4	6	5	2	1	1	1	1	1	0	0	1	0
158	299	72.0	8.9	43.4	6	5	6	6	3	1	1	1	1	1	1	1	1	0
160	307	73.0	10.2	45.5	4	4	6	6	2	1	1	1	1	1	1	1	1	1
162	305	71.5	8.8	44.2	3	4	6	5	3	1	1	1	1	1	1	1	1	0
165	306	75.0	8.4	46.8	4	3	6	5	2	1	1	1	0	1	0	0	0	0
167	305	72.0	8.4	45.3	3	5	6	6	2	1	1	1	1	1	0	0	1	0
168	304	67.5	8.2	44.5	5	3	6	6	2	1	1	1	1	1	0	0	0	0
169	305	71.5		42.0	5	5	6	6	3	1	1	1	1	1	1	1	1	1
173	302	68.0	9.5	45.0	4	3	6	5	2	1	1	1	1	1	1	1	1	0
174	307	75.0	9.7	45.5	4	3	6	3	3	1	0	0	1	0	0	0	0	0
176	297	74.4	10.1	47.0	3	3	6	5	3	1	1	1	1	1	1	1	1	1
178	308	72.5	8.6	45.2	3	4	6	6	3	1	1	1	1	1	0	0	1	0
180	304	73.5	9.3	45.4	4	6	6	6	2	1	1	0	1	0	0	0	0	0

Notes: Subject 47 did not receive credit for P8, P11 or P12; Subject 174 did not receive credit for P9, P11, or P12; Subject 180 did not receive credit for P12.

Appendix 4M

10 Month Assessment:
AIMS Supine, Sitting, and Standing Scores

1. **Cesarean-Breech Group**
2. **Cesarean-Cephalic Group**
3. **Vaginal-Breech Group**
4. **Vaginal-Cephalic Group**

Note: cell is blank if data not available

Abbreviations:

ID identification number

AIMS Items: (coded 0 if not observed; 1 if observed)

S	supine: all infants received credit for S1 - S6
S7	Hands to Feet
S8	Rolling Supine to Prone without Rotation
S9	Rolling Supine to Prone with Rotation
SIT	sit: all infants, except as noted, received credit for SIT1-SIT8
SIT9	Reach with Rotation in Sitting
SIT10	Sitting to Prone
SIT11	Sitting to Four-Point Kneeling
SIT 12	Sitting without Arm Support (2)
ST	stand: all infants, except as noted, received credit for ST1-ST3
ST4	Pulls to Stand with Support
ST5	Pulls to Stand/Stands
ST6	Supported Standing with Rotation
ST7	Cruising without Rotation
ST8	Half-Kneeling
ST9	Controlled Lowering from Standing
ST10	Cruising with Rotation
ST11	Stands Alone
ST12	Early Stepping
ST13	Standing from Modified Squat
ST14	Standing from Quadriped Position
ST15	Walks Alone
ST16	Squat

4M-1. Cesarean-Breech Group

ID	S7	S8	S9	SIT9	SIT10	SIT11	SIT12	ST4	ST5	ST6	ST7	ST8	ST9	ST10	ST11	ST12	ST13	ST14	ST15	ST16
1	1	1	1	1	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0
4																				
5	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	0	0	0
6	1	1	1	1	1	1	0	1	1	1	1	1	0	1	0	0	0	0	0	0
7	1	1	1	1	0	1	0	1	1	1	1	1	1	1	0	0	0	0	0	0
10	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	0	0	0
13	1	1	1	1	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0
22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
25	1	1	1	1	0	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0
27	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
30	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
34	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
36	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1	0	0	0	0	0
37																				
40	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	0	0	0	0
48	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
49	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
53	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
54	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	0	0	0	0	0
55	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	0	0	0	0	0
56																				
57																				
59																				
64																				
67	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1
72																				
74	1	1	1	1	0	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0
80	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
81																				
84																				
91	1	1	1	1	0	1	0	1	1	0	1	1	0	0	0	0	0	0	0	0
98	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
100																				
101																				
102	1	1	1	1	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0
103	1	1	1	1	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0
104	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	0	0	0	0	0
106	1	1	1	1	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0
109	1	1	1	1	0	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0
119	1	1	1	0	0	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0
121	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	0	0	0
122	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1	0	0	0	0	0
124	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
125	1	1	1	1	0	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0
128	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
133																				
140	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
144																				
147	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0

Note: Subject 103 did not receive credit for ST3.

4M-2. Cesarean-Cephalic Group

ID	S7	S8	S9	SIT9	SIT10	SIT11	SIT12	ST4	ST5	ST6	ST7	ST8	ST9	ST10	ST11	ST12	ST13	ST14	ST15	ST16
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
12	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	0	0	0	0	0
15	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
16																				
17																				
19	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
20	1	1	1	1	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0
23	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
26	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
39																				
42	1	1	1	1	1	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0
50	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
51	1	1	1	1	1	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0
52	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
58																				
66	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
73	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0
75																				
76																				
78	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
82	1	1	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
83	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1	0	0	0	0	0
86																				
88	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1	0	0	0	0	0
89	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0
93	1	1	1	1	0	1	0	1	1	1	1	1	0	1	0	0	0	0	0	0
95																				
99	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
105																				
107	1	1	1	1	0	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0
110	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
112	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1	0	0	0	0	0
113	1	1	0	1	0	1	0	1	1	1	1	0	1	0	0	0	0	0	0	0
114	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
115	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
123																				
126	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
130	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
131																				
132	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
134	1	1	1	1	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0
137	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
138	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
139																				
142	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
143	1	1	1	1	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0
145																				
148	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0
149	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0

Notes: Subject 114 did not receive credit for SIT8; Subjects 126 and 130 did not receive credit for ST3.

4M-3. Vaginal-Breech Group

ID	S7	S8	S9	SIT9	SIT10	SIT11	SIT12	ST4	ST5	ST6	ST7	ST8	ST9	ST10	ST11	ST12	ST13	ST14	ST15	ST16
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
14	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
18	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
21	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	0	0	0	0	0
31	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
35																				
38	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
43	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
45	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	1	1	1	1	0	1	0	1	1	1	1	1	1	1	0	0	0	0	0	0
61	1	1	1	1	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0
65	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
68	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
77																				
79																				
85	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
92	1	1	1	1	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0
96	1	1	1	1	0	1	0	1	1	0	1	1	1	0	0	0	0	0	0	0
108	1	1	1	1	0	1	0	1	1	1	1	1	0	1	0	0	0	0	0	0
116	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
118	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1	0	0	0	0	0
127	1	1	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
135	1	1	1	1	0	1	0	1	1	1	1	1	1	1	0	0	0	0	0	0
136	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
146	1	1	1	1	1	1	0	1	1	1	0	1	0	0	0	0	0	0	0	0
150	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
151	1	1	1	1	0	1	0	1	1	1	1	1	1	1	0	0	0	0	0	0
154	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
157	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
159	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
161	1	1	1	1	0	1	0	1	1	1	1	1	1	1	0	0	0	0	0	0
163																				
164	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
166	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
170																				
171	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
172	1	1	1	1	0	1	0	1	1	1	1	1	0	0	0	0	0	0	0	0
175	1	1	1	1	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0
177	1	1	1	1	0	1	0	1	1	1	1	1	1	1	0	0	0	0	0	0
179	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0

4M-4. Vaginal-Cephalic Group

ID	S7	S8	S9	SIT9	SIT10	SIT11	SIT12	ST4	ST5	ST6	ST7	ST8	ST9	ST10	ST11	ST12	ST13	ST14	ST15	ST16
2	1	0	0	1	1	1	0	1	1	1	1	1	1	1	0	0	0	0	0	0
9	1	1	1	1	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
24	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	0	0	0	0	0
28	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
32	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0
41	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
44	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
46	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
47	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	1	1	1	1	1	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0
63	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
69	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
70	1	0	0	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
71	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
87	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
90	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
94	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1
97	1	1	1	1	0	1	0	1	1	1	0	1	1	0	0	0	0	0	0	0
111																				
117																				
120	1	1	1	1	0	1	0	1	1	1	0	1	0	0	0	0	0	0	0	0
129	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1	1	0	0	0	0
141	1	1	1	1	0	1	0	1	1	1	1	1	0	0	1	0	0	0	0	0
152	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0
153	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
155																				
156	1	1	1	1	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0
158	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
160	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1
162	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
165	1	1	1	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0
167	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
168	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
169	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
173	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	0	0	0	0
174	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
176	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1
178	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
180	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix 4N
15 Month Assessment:
Growth, Joint Angles from the INFANIB, AIMS Scores, and Peabody Developmental Motor Scales Scores

1. **Cesarean-Breech Group**
2. **Cesarean-Cephalic Group**
3. **Vaginal-Breech Group**
4. **Vaginal-Cephalic Group**

Note: cell is blank if data not available

Abbreviations:

ID	identification number
CA	chronological age in days
L	length in centimetres
W	weight in kilograms
HC	head circumference in centimetres

INFANIB Items (all items have been coded from the left starting at 1)

SCF	scarf sign
HE	heel to ear
PA	popliteal angle
AB	leg abduction
DF	dorsiflexion of foot

AIMS Scores:

AIM	Total score: maximum of 58 (infants obtaining a lower total score all received fewer credits in the stand subsection only)

Peabody Developmental Motor Scales Scores

B	Balance raw score (note: all children received full scores for "Reflexes")
NL	Nonlocomotor raw score
LC	Locomotor raw score
RP	Receipt and Propulsion of Objects raw score
TGM	Total Gross Motor raw score
GR	Grasping raw score
HU	Hand Use raw scrore
EH	Eye-hand Coordination raw score
MD	Manual Dexterity raw score
TFM	Total Fine Motor raw score

4N-1. Cesarean-Breech Group

ID	CA	L	W	HC	SCF	HE	PA	AB	DF	AIM	B	NL	LC	RP	TGM	GR	HU	EH	MD	TFM
1	461	78.5	11.9	49.0	4	3	6	5	3	58	26	64	36	8	158	42	40	32	4	118
4																				
5	459	78.0	10.3	47.3	4	4	6	4	3	58	28	64	40	10	166	42	40	38	6	126
6	457	79.0	10.8	47.2	6	5	6	6	3	55	24	62	28	2	140	38	37	33	5	113
7	455	81.0		46.8	5	5	6	5	3	58	26	64	35	6	155	40	41	38	7	126
10	455	77.0	10.5	48.6	5	5	6	5	3	58	26	64	35	8	157	41	38	36	6	121
13	458	79.0	11.0	48.3	6	5	6	5	2	58	27	62	37	8	158	42	43	36	6	127
22	459	79.5	10.5	47.1	5	3	6	5	2	58	27	62	32	10	155	41	41	33	6	121
25	456	80.0	10.5	45.4	5	4	6	5	3	57	24	62	26	2	138	42	39	33	5	119
27	457	81.0	13.6	49.5	5	5	6	5	3	58	26	62	33	5	150	42	40	34	6	122
30	457	77.5	10.2	48.3	6	4	6	6	4	58	26	64	34	5	153	42	39	38	4	123
33	445	78.0		45.8	6	5	6	5	3	58	26	62	35	6	153	40	40	39	7	126
34	456	76.5	10.7	48.3	5	4	6	5	3	58	27	64	37	6	158	40	44	33	7	124
36	453	80.0	11.0	46.3	5	4	6	4	3	58	27	62	38	6	157	42	42	38	8	130
37																				
40	458	76.0		46.7	4	4	6	4	3	58	26	62	34	6	152	42	39	36	6	123
48																				
49	458	79.0	11.0	47.9	6	5	6	5	5	58	26	62	35	6	153	42	40	35	3	120
53	457	77.0		46.3	6	5	6	5	3	58	26	62	32	6	150	41	41	34	6	122
54	458	76.0	10.1	49.5	4	4	6	6	2	58	29	63	40	12	168	42	45	40	10	137
55	457	74.0	9.4	45.3	6	5	6	6	2	58	26	62	36	6	154	41	41	31	6	119
56																				
57																				
59																				
64																				
67	460	78.0	9.4	46.4	6	5	6	6	3	58	28	63	40	8	163	42	43	35	9	129
72																				
74	450	78.0	10.8	45.5	6	3	6	5	3	58	26	62	30	4	146	42	40	35	9	126
80	465	81.5	12.8	46.0	4	4	6	6	3	58	26	62	32	4	148	42	41	34	6	123
81																				
84																				
91	457	76.5	10.5	47.5	6	3	6	5	2	58	26	62	34	7	153	42	43	33	9	127
98	455	78.0	11.3	49.5	3	2	5	5	3	58	28	62	41	9	164	41	42	33	6	122
100																				
101																				
102	456	84.0	11.8	48.5	6	5	6	6	3	58	26	64	34	5	153	42	41	34	7	124
103	459	76.0	9.5	45.7	6	4	6	6	3	58	26	62	29	4	145	40	41	35	6	122
104	458	79.5	9.8	46.5	6	5	6	6	3	58	26	62	40	9	161	42	41	34	6	123
106	458	79.5	10.6	47.0	5	3	6	5	3	58	26	62	35	6	153	41	41	35	6	123
109	456	74.0	8.9	46.5	6	3	6	4	2	58	24	62	28	4	142	40	39	32	6	117
119	438	71.5	9.0	49.5	5	5	6	5	3	58	24	62	30	2	142	42	39	37	6	124
121	456	79.0	10.6	48.5	5	5	6	6	5	58	30	63	42	7	166	42	42	37	8	129
122	455	79.0	10.1	45.6	4	3	6	5	2	58	26	64	40	8	162	41	41	34	8	124
124	453	78.5	10.1	46.5	4	4	6	6	3	58	26	64	34	4	152	41	39	29	6	115
125	453	81.0	12.1	49.6	5	2	5	5	3	58	26	63	37	6	156	40	40	33	6	119
128	450	82.0	11.6	45.5	6	3	6	5	3	58	26	63	37	7	157	42	39	34	6	121
133																				
140	463	78.5	10.4	46.2	4	3	6	5	3	58	24	62	26	4	140	42	41	40	7	130
144																				
147	457	80.5	11.6	48.0	6	4	6	6	3	58	28	62	41	10	165	42	41	35	4	122

4N-2. Cesarean-Cephalic Group

ID	CA	L	W	HC	SCF	HE	PA	AB	DF	AIM	B	NL	LC	RP	TGM	GR	HU	EH	MD	TFM
3	459	78.5	10.3	46.6	5	4	6	4	3	58	26	64	42	9	165	40	37	34	7	118
12	462	80.0	10.0	47.0	5	3	6	5	3	58	26	62	38	8	158	39	38	33	4	114
15	458	78.5	10.5	48.0	5	4	6	5	4	58	26	62	39	8	159	42	41	34	7	124
16																				
17																				
19	457	78.5	10.1	48.0	5	5	6	6	2	58	26	62	35	8	155	41	41	31	6	119
20	460	81.0	12.1	50.9	6	5	6	6	3	58	27	62	37	10	160	42	43	39	7	131
23	457	79.5	11.3	46.7	6	4	6	6	2	58	27	64	40	8	163	42	41	32	6	121
26	465	79.5	10.8	48.3	6	5	6	6	3	58	29	62	36	5	156	42	41	34	6	123
29	458	77.5	12.7	50.4	3	4	6	5	3	58	26	62	35	8	155	42	39	33	6	120
39																				
42	462	78.5	10.4	47.2	6	4	6	5	3	58	29	62	38	9	162	40	42	37	9	128
50	454	71.0	10.0	46.3	5	5	6	4	3	58	28	62	35	6	155	40	41	33	7	121
51	457	75.0	8.9	46.5	6	5	6	6	2	58	26	62	33	7	152	42	42	40	7	131
52	451	83.5	12.4	45.0	6	3	6	5	3	58	27	62	38	8	159	42	43	40	7	132
58																				
66	452	75.5	10.0	45.6	5	3	5	5	3	58	27	63	36	6	156	41	41	34	6	122
73	451	77.5	10.3	48.2	6	5	6	6	3	58	26	63	36	4	153	42	41	34	7	124
75																				
76																				
78	460	76.5		47.5	5	4	6	6	3	58	26	62	40	10	162	42	41	32	8	123
82	459	76.5	9.9	46.3	3	5	6	6	3	58	26	62	30	5	147	42	41	31	6	120
83	458	75.0		48.0	4	4	6	6	3	58	26	62	39	7	158	42	40	30	6	118
86																				
88	463	82.5	13.2	49.4	6	4	6	5	3	58	26	62	38	8	158	42	40	32	6	120
89	454	77.0	9.6	47.5	4	3	6	4	3	58	26	62	39	6	157	42	41	30	5	118
93	458	75.5	9.7	45.0	4	5	6	5	3	58	27	62	38	10	161	42	40	30	6	118
95																				
99	458	88.5	16.5	51.0	3	2	6	5	4	58	26	62	38	6	156	42	42	32	6	122
105																				
107	453	78.5	9.5	45.5	6	5	6	6	3	58	26	62	38	6	156	41	41	35	6	123
110	451	72.0	8.1	47.0	6	5	6	6	3	58	26	62	37	4	153	41	38	29	6	114
112	456	84.5	13.4	49.5	5	3	6	5	3	58	26	62	35	4	151	42	41	31	5	119
113	452	79.0	10.2	49.0	6	5	6	6	2	58	26	63	36	8	157	41	40	33	6	120
114	452	75.0	14.5	49.5	3	3	6	6	3	52	19	62	22	4	131	41	39	28	4	112
115	455	76.5	9.5	45.0	4	5	6	6	3	58	26	62	38	5	155	42	40	36	6	124
123																				
126	453	83.0	10.7	47.0	3	1	5	5	3	52	20	62	21	4	131	40	40	28	4	112
130	458	74.0	9.3	47.2	5	3	6	5	3	58	26	62	37	9	158	40	41	35	6	122
131																				
132	456	77.5	10.1	47.9	6	4	6	5	3	58	26	64	37	4	155	42	40	34	6	122
134	456	76.0	9.9	46.3	6	4	6	5	3	58	26	62	39	6	157	42	39	33	6	120
137	453	79.0	11.8	47.9	5	5	6	6	2	58	28	62	40	7	161	42	39	34	7	122
138	452	83.4	12.2	44.6	6	5	6	6	3	58	26	64	35	8	157	42	42	36	8	128
139																				
142	461	81.0	11.2	47.8	5	3	6	6	3	56	24	62	28	2	140	40	41	33	6	120
143	452	79.5	11.3	45.6	6	4	6	6	3	58	26	64	37	8	159	41	44	31	6	122
145																				
148	458	76.0		47.0	3	4	6	6	3	58	26	62	42	12	166	42	41	33	6	122
149	458	77.0	8.2	45.9	6	4	6	6	3	58	26	62	37	7	156	42	44	39	9	134

4N-3. Vaginal-Breech Group

ID	CA	L	W	HC	SCF	HE	PA	AB	DF	AIM	B	NL	LC	RP	TGM	GR	HU	EH	MD	TFM
8	458	81.0	9.7	43.9	6	4	6	5	2	58	26	64	39	8	161	39	40	32	7	118
14	456	78.0	9.5	45.3	5	4	6	5	2	58	28	62	34	4	152	42	40	34	6	122
18	453	81.0	13.6	49.8	5	5	6	5	3	53	21	62	25	2	134	42	39	40	6	127
21	461	79.0	10.9	51.0	5	5	6	4	3	58	26	62	35	8	155	37	42	35	6	120
31	459	78.5	11.1	48.7	5	4	6	4	3	58	27	62	38	5	156	40	41	32	6	119
35																				
38	457	74.0	8.8	47.0	5	5	6	5	3	58	28	62	38	9	161	42	43	35	9	129
43	461	71.3	8.6	44.0	5	5	6	5	2	58	26	62	35	6	153	42	38	34	6	120
45	460	78.5	10.0	46.8	5	5	6	5	3	58	27	64	32	8	155	42	40	39	7	128
60	456	76.5	11.5	48.5	5	3	6	4	3	58	26	64	35	10	159	42	41	33	6	122
61	458	83.0	12.6	48.4	5	5	6	5	3	58	28	64	36	4	156	41	41	33	9	124
65	457	78.0	10.4	46.7	6	5	6	6	3	58	26	64	36	8	158	41	43	33	9	126
68	457	83.0	11.4	47.0	6	5	6	5	3	58	27	62	38	8	159	42	40	33	7	122
77																				
79																				
85	454	76.5	10.3	45.6	4	5	6	6	2	58	26	62	33	8	153	40	39	28	5	112
92	458	83.5	12.0	49.6	6	4	6	6	3	58	26	64	37	6	157	42	40	30	4	116
96	459	78.5	10.0	47.6	5	3	6	6	3	58	26	62	36	8	156	42	41	34	6	123
108	453	74.0	10.2	46.2	4	4	6	6	3	58	26	62	34	5	151	40	39	30	5	114
116	457	79.0	9.6	46.3	6	5	6	6	3	58	26	62	35	6	153	42	41	35	9	127
118	456	81.0	11.9	48.2	5	4	6	5	3	58	26	62	41	5	158	41	39	33	6	119
127	460	81.5	11.7	47.0	5	4	6	4	3	58	26	62	34	6	152	42	41	33	5	121
135	456	82.5	13.2	49.2	5	5	6	5	3	58	26	62	41	10	163	40	40	35	6	121
136	456	83.0	11.2	47.9	5	4	6	5	3	58	26	62	32	6	150	41	42	38	6	127
146	459	75.0	9.4	47.2	5	4	6	5	3	58	27	62	33	6	152	40	41	33	9	123
150	456	78.5	11.7	48.0	5	5	6	6	3	58	27	62	40	12	165	42	41	40	8	131
151	456	75.5	10.5	46.4	5	4	6	6	3	58	26	62	38	8	158	40	41	37	6	124
154	459	79.5	10.2	47.7	4	3	6	6	3	58	26	62	38	5	155	42	41	34	6	123
157	457	76.5	9.0	45.7	3	4	6	6	2	58	26	62	35	8	155	42	41	34	6	123
159	455	74.0	10.0	47.5	4	3	6	5	2	56	26	62	28	5	145	42	38	36	6	122
161	457	70.5	9.1	46.5	5	5	6	6	3	58	26	62	40	6	158	42	43	36	6	127
163																				
164	454	77.0	8.7	47.8	5	3	6	6	3	58	26	62	40	10	162	42	41	38	6	127
166	460	72.0	8.6	45.0	5	5	6	6	3	58	26	64	40	9	163	42	42	32	6	122
170																				
171	453	81.0	11.8	46.0	4	4	6	5	3	56	24	62	28	5	143	42	42	34	4	122
172	456	78.0	8.6	45.4	5	5	6	6	2	58	26	62	36	6	154	42	41	37	6	126
175	454	80.5	11.6	47.6	4	3	6	5	3	58	26	62	42	11	165	42	41	33	6	122
177																				
179	458	84.0	14.7	48.2	3	4	6	5	5	58	25	64	39	8	161	41	41	36	6	124

4N-4. Vaginal-Cephalic Group

ID	CA	L	W	HC	SCF	HE	PA	AB	DF	AIM	B	NL	LC	RP	TGM	GR	HU	EH	MD	TFM
2	457	80.0	11.9	49.0	4	3	6	5	3	58	26	64	40	5	159	42	41	33	6	122
9	460	77.5		47.8	6	5	6	5	3	58	26	64	35	6	155	38	40	35	6	119
11	453	79.0	10.0	47.6	5	5	6	5	3	58	26	62	38	6	156	40	40	34	6	120
24	457	82.0	12.0	48.5	5	2	5	5	3	58	26	63	39	10	162	42	38	36	8	124
28	457	77.0	9.6	46.9	6	4	6	5	3	58	26	62	38	7	157	40	40	42	8	130
32	461	76.0	9.5	47.2	5	5	6	6	3	58	26	62	30	6	148	41	38	34	4	117
41	465	79.5	12.7	46.5	4	5	6	6	4	58	27	64	38	8	161	42	40	33	8	123
44	457	78.0	10.0	46.6	6	5	6	6	3	58	26	64	35	6	155	42	44	41	10	137
46	457	76.5	10.0	45.8	5	5	6	5	2	58	27	62	33	6	152	42	43	42	7	134
47	457	80.5	10.5	46.2	5	4	6	4	2	58	29	62	32	8	155	42	39	35	7	123
62	456	77.0	11.4	49.4	5	5	6	6	2	58	29	62	38	8	161	42	41	35	6	124
63	455	84.0	13.5	48.5	5	5	6	6	2	58	28	62	38	10	162	42	41	34	6	123
69	457	82.0	10.4	47.0	6	4	6	5	3	58	26	62	36	6	154	42	41	34	7	124
70	455	73.5	8.9	46.0	5	5	6	6	3	58	28	62	35	6	155	41	40	31	6	118
71																				
87	459	78.5	11.8	49.0	5	4	6	6	3	58	26	62	33	6	151	41	41	28	5	115
90	457	78.0	10.4	48.7	6	4	6	6	3	58	26	62	41	4	157	42	39	35	6	122
94	454	74.5	8.7	48.6	4	5	6	5	2	58	26	62	35	11	158	42	40	33	7	122
97	455	83.0	11.5	47.4	3	5	6	6	3	58	26	62	32	8	152	41	41	38	6	126
111																				
117																				
120	452	75.0	10.0	46.0	6	5	6	6	3	58	26	62	33	6	151	40	39	33	6	118
129	456	79.5	11.4	48.1	6	3	6	6	3	58	26	62	35	8	155	42	44	42	7	135
141	461	77.0	10.8	47.8	5	3	6	6	3	58	26	62	36	6	154	40	40	32	6	118
152	455	76.0	10.1	48.3	5	3	6	6	3	58	28	62	41	11	166	42	41	32	5	120
153	454	76.0	10.7	46.0	3	3	6	5	3	58	26	62	36	7	155	42	40	38	6	126
155																				
156	459	75.0	11.5	48.0	5	4	6	6	2	58	26	62	40	6	158	42	43	38	6	129
158	458	77.5	10.0	44.4	4	5	6	6	3	58	26	63	39	8	160	40	41	32	6	119
160	458	80.0	11.6	47.0	4	4	6	6	2	58	26	62	37	8	157	42	41	35	6	124
162	451	77.5	10.4	45.8	3	3	6	5	3	58	26	64	36	6	156	40	40	33	4	117
165	458	78.0	10.0	48.0	5	3	6	5	3	58	26	62	35	6	153	42	41	37	6	126
167	452	78.0	9.8	47.0	3	4	6	6	2	58	26	62	35	5	152	40	40	31	6	117
168	454	71.5	9.6	46.0	5	3	6	6	3	58	26	64	36	8	158	41	41	32	6	120
169	455	81.0	10.0	45.0	5	5	6	6	3	58	28	62	41	10	165	42	42	40	6	130
173	455	76.0	11.4	47.5	4	5	6	6	3	58	26	62	42	8	162	42	44	38	6	130
174	457	82.0	10.7	47.4	3	3	6	5	3	58	26	62	32	8	152	42	40	33	6	121
176	453	80.0	11.8	48.5	3	3	6	5	5	58	26	62	41	10	163	42	42	36	6	126
178	455	79.0	9.9	47.0	6	5	6	6	3	58	26	63	36	5	154	42	39	36	5	122
180	457	76.0	10.1	46.4	3	5	6	6	3	58	26	63	36	8	157	40	39	33	6	118

Appendix 4O
18 Month Assessment:
Growth, Joint Laxity Scores, and Final Neurological Outcome

1. **Cesarean-Breech Group**
2. **Cesarean-Cephalic Group**
3. **Vaginal-Breech Group**
4. **Vaginal-Cephalic Group**

Note: cell is blank if data not available

Abbreviations:

ID	identification number
CA	chronological age in days
L	length in centimetres
W	weight in kilograms
HC	head circumference in centimetres

Joint Laxity Score: bilateral sum, each joint is scored "0" if below criterion, or "1" if above (see form contained in Appendix 3D)

EE	elbow extension
KE	knee extension
TTW	thumb-to-wrist
MCP	5th metacarpophalangeal extension
TL	total laxity score

Final Outcome:

NEURO	Pediatrician's summary: Normal = 0, Suspicious = 1, Abnormal = 2
WALK	Age walked, to the closest half month, based on parent report

4O-1. Cesarean-Breech Group

ID	CA	L	W	HC	EE	KE	TTW	MCP	TL	NEURO	WALK
1	558	87.5	12.4	49.9	0	0	0	2	2	0	12.5
4											
5	538	80.0	10.9	48.4	0	0	0	0	0	0	9.5
6	579	84.0	11.9	47.2	0	0	0	0	0	1	12.0
7	572	88.5	14.3	48.4	0	2	2	2	6	0	12.0
10	569	84.5	11.0	49.7	2	2	2	2	8	0	9.5
13	565	82.5	12.0	49.2	0	2	2	0	4	0	11.0
22	561	82.0	10.7	47.8	0	0	2	2	4	0	12.5
25	561	85.0	10.5	46.0	0	0	2	0	2	0	14.0
27	549	85.0	13.0	50.7	0	0	2	0	2	0	13.0
30	546	79.0	10.5	49.0	0	0	0	2	2	0	12.0
33	550	82.0	10.2	46.8	0	0	2	0	2	0	10.5
34	554	80.0	10.7	50.0	0	0	0	0	0	0	12.5
36	558	83.0	11.8	47.0	0	0	2	0	2	0	11.5
37											
40	558	78.0	10.2	47.3	0	2	2	2	6	0	10.5
48											
49	536	78.5	11.3	48.5	0	0	2	0	2	0	12.0
53	551	80.0	9.5	46.2	0	0	0	0	0	0	13.0
54	540	80.0	10.7	49.8	0	0	2	0	2	0	12.0
55	537	77.0	9.9	45.6	0	2	0	0	2	0	12.0
56											
57											
59											
64											
67	551	78.5	10.0	46.6	0	0	2	0	2	0	9.5
72											
74	595	86.0	12.2	49.0	0	0	2	0	2	0	13.5
80	561	82.5	13.6	47.8	0	0	2	2	4	0	12.0
81											
84											
91	549	80.5	11.8	46.3	0	0	2	0	2	0	12.0
98	563	84.0	12.5	50.8	0	0	0	0	0	0	10.0
100											
101											
102	545	88.5	13.2	48.6	0	0	2	2	4	0	13.0
103	546	81.0	10.3	47.1	0	0	2	0	2	0	14.5
104	535	85.0	10.6	47.5	0	0	2	0	2	0	10.5
106	535	85.5	11.7	49.2	0	0	2	2	4	0	12.0
109	555	77.0	9.5	49.0	0	0	0	0	0	1	13.0
119	560	76.0	9.7	47.0	0	0	2	2	4	0	13.0
121	544	83.0	11.3	46.7	0	0	0	0	0	0	10.0
122	539	82.0	10.7	46.8	0	0	2	2	4	0	11.0
124	537	81.0	10.8	49.5	0	0	0	0	0	0	11.5
125	551	86.0	13.1	50.6	0	0	0	0	0	0	11.0
128	557	88.5	12.9	46.5	0	0	2	0	2	0	10.5
133											
140	540	81.5	10.8	47.5	0	0	2	0	2	0	14.0
144											
147	563	84.0	12.2	50.1	0	0	2	2	4	0	11.0

4O-2. Cesarean-Cephalic Group

ID	CA	L	W	HC	EE	KE	TTW	MCP	TL	NEURO	WALK
3	582	82.0	11.1	47.6	0	0	1	1	4	0	9.0
12	566	84.5	10.4	47.8	0	2	2	2	6	0	11.5
15	562	82.5	10.8	49.1	0	0	0	0	0	0	10.5
16											
17											
19	560	82.5	11.4	49.4	0	0	2	2	4	0	11.5
20	558	85.0	12.7	51.8	0	2	2	2	6	0	12.5
23	540	84.0	11.2	47.8	0	0	2	2	4	0	10.5
26	556	82.5	12.3	48.6	0	0	0	0	0	0	13.0
29	547	81.5	12.8	51.0	0	2	2	2	6	0	11.0
39											
42	542	81.0	10.5	47.6	0	0	2	0	2	0	11.0
50	552	83.0	10.5	47.0	0	0	0	0	0	0	12.5
51	551	79.0	9.1	47.0	2	2	2	2	8	0	14.0
52	547	88.5	13.4	46.1	0	0	1	0	1	0	11.5
58											
66	551	81.0	11.0	46.3	0	0	2	0	2	0	12.5
73	539	79.0	11.3	49.4	0	0	2	2	4	0	12.0
75											
76											
78	565	83.0	12.1	47.6	0	0	2	2	4	0	11.0
82	559	80.5	10.3	46.9	0	0	2	0	2	0	14.0
83	549	82.0	11.3	47.5	0	0	2	0	2	0	10.5
86											
88	564	89.0	13.6	50.5	0	0	2	0	2	0	10.5
89	541	79.5	10.1	49.2	0	0	0	0	0	0	10.0
93	542	77.0	9.7	46.0	0	0	2	0	2	0	12.0
95											
99	563	95.0	17.1	51.6	0	0	0	0	0	0	12.0
105											
107	534	82.0	10.2	45.9	0	0	2	0	2	0	12.0
110	528	74.5	9.5	46.9	0	1	2	2	5	0	10.0
112											
113	553	81.0	11.0	49.0	0	0	2	2	4	0	12.5
114	551	85.0	16.2	49.0	0	0	2	2	4	0	16.0
115	539	79.5	10.1	45.9	2	0	2	2	6	0	10.0
123											
126	536	84.5	11.6	49.8	0	0	2	0	2	1	
130	566	79.0	9.5	47.3	0	0	0	0	0	0	13.5
131											
132	563	83.0	11.1	48.4	0	0	0	0	0	0	11.0
134	556	79.5	10.9	47.0	0	0	2	0	2	0	11.0
137	545	82.5	12.8	48.0	0	0	2	2	4	0	11.0
138	543	87.0	13.1	45.6	0	0	2	0	2	0	13.0
139											
142	536	84.5	12.3	49.0	0	0	0	0	0	0	14.5
143	637	88.0	12.3	46.6	0	0	0	0	0	0	13.5
145											
148	554	84.0	11.7	48.8	0	0	2	0	2	0	11.0
149	550	79.0	8.6	46.4	0	0	2	0	2	0	12.5

4O-3. Vaginal-Breech Group

ID	CA	L	W	HC	EE	KE	TTW	MCP	TL	NEURO	WALK
8	527	82.0	10.4	44.5	0	0	0	0	0	0	10.0
14	566	83.0	10.3	46.3	0	0	2	2	4	0	14.0
18	560	84.0	14.3	51.3	0	0	2	1	3	0	16.5
21	567	86.0	12.2	52.0	0	0	0	0	0	0	11.5
31	547	81.5	11.1	49.7	0	0	1	2	3	0	10.5
35											
38	547	77.5	8.9	47.4	0	0	0	0	0	0	9.5
43	562	72.5	8.8	44.5	0	0	2	2	4	0	13.0
45	592	82.0	11.4	47.6	0	0	2	0	2	0	12.0
60	552	80.0	12.2	49.1	0	0	2	0	2	0	11.5
61	553	84.5	13.1	48.9	0	0	2	0	2	0	11.5
65	554	83.5	10.4	46.4	0	0	2	0	2	0	10.0
68	549	87.5	12.3	48.4	0	0	2	0	2	0	13.0
77											
79											
85	546	80.5	10.8	45.9	0	0	0	2	2	0	13.0
92	546	85.0	13.0	50.3	0	0	0	0	0	0	12.5
96	534	81.0	10.5	47.7	0	0	2	0	2	0	12.0
108	534	77.5	10.2	46.4	0	0	2	0	2	0	14.0
116	563	80.5	10.1	46.3	0	0	2	2	4	0	13.5
118	575	86.5	13.1	49.3	0	0	2	2	4	0	10.5
127	554	84.5	12.3	48.6	0	0	2	0	2	0	13.5
135	555	85.0	14.0	49.6	0	0	2	2	4	0	11.0
136	547	85.0	11.3	47.6	0	0	0	0	0	0	12.5
146	550	85.5	9.6	48.0	0	0	2	0	2	0	13.0
150	555	82.0	12.0	48.4	0	0	2	2	4	0	10.5
151	547	79.5	10.7	47.0	0	0	2	2	4	0	11.0
154	530	84.0	10.8	48.2	0	0	0	0	0	0	11.5
157	552	79.5	9.8	49.6	0	0	2	2	4	0	14.0
159	562	81.5	11.0	47.5	0	0	2	2	4	0	15.5
161	620	77.0	9.7	48.0	0	0	2	2	4	0	12.0
163											
164	532	79.5	9.4	48.5	0	0	2	0	2	0	11.0
166	552	79.5	9.0	45.8	0	0	2	2	4	0	11.5
170											
171	545	84.5	12.7	46.6	0	0	2	2	4	0	14.5
172	559	81.0	9.2	46.0	0	0	2	2	4	0	11.0
175	568	82.5	12.6	48.8	0	0	0	0	0	0	11.5
177											
179	536	87.0	15.1	49.0	0	0	2	2	4	0	11.0

4O-4. Vaginal-Cephalic Group

ID	CA	L	W	HC	EE	KE	TTW	MCP	TL	NEURO	WALK
2	558	84.0	12.4	50.0	0	0	0	0	0	0	11.0
9	570	83.5	12.6	48.4	0	0	0	2	2	0	11.5
11	570	82.5	10.5	48.0	0	2	2	0	4	0	11.0
24	552	85.0	12.0	48.2	0	0	2	2	4	0	10.0
28	551	79.0	10.3	47.2	0	0	2	0	2	0	11.0
32	550	80.0	10.0	48.0	0	0	2	0	2	0	14.0
41	571	85.0	13.5	47.1	0	0	0	0	0	0	10.5
44	556	83.0	11.1	47.4	0	0	2	0	2	0	13.0
46	553	80.0	10.4	45.9	0	2	2	0	4	0	13.0
47	555	83.0	10.6	46.7	0	0	2	0	2	0	12.5
62	551	81.0	12.0	50.0	0	2	2	0	4	0	12.0
63	550	89.0	13.7	48.0	0	0	2	0	2	0	10.5
69	549	85.5	12.2	48.3	0	0	2	0	2	0	13.0
70	529	77.0	9.4	47.1	0	0	2	0	2	0	13.0
71											
87	600	85.0	12.7	50.2	0	0	2	2	4	0	14.0
90	558	82.5	10.9	49.8	0	0	2	0	2	0	11.0
94	539	78.5	9.6	49.5	0	0	2	0	2	0	10.5
97	565	89.0	13.3	48.2	0	2	2	0	4	0	14.0
111											
117											
120	546	79.5	10.0	46.8	0	0	2	2	4	0	11.5
129	566	82.0	11.6	48.5	0	0	0	0	0	0	9.5
141	536	81.5	11.3	48.5	0	0	2	0	2	0	11.0
152	543	79.0	10.5	48.6	0	0	2	2	4	0	9.5
153	542	80.5	11.6	47.0	0	0	2	0	2	0	12.0
155											
156	549	80.0	11.8	48.5	0	0	0	0	0	0	12.0
158	549	81.0	10.2	45.2	0	0	0	0	0	0	12.0
160	551	82.5	12.4	47.5	0	0	2	2	4	0	10.0
162	550	81.0	11.1	46.5	0	0	0	2	2	0	11.0
165	564	82.0	10.4	48.3	0	0	2	0	2	0	13.5
167	565	83.0	10.4	48.0	0	0	2	2	4	0	12.0
168	540	79.0	10.3	47.0	0	0	2	2	4	0	12.5
169	556	86.5	13.0	44.5	0	0	2	2	4	0	11.0
173	550	85.0	11.5	47.0	0	0	2	2	4	0	10.5
174	550	87.0	11.8	48.0	0	0	2	2	4	0	14.0
176	547	84.0	12.1	49.0	0	0	0	2	2	0	9.5
178	554	84.0	10.8	47.5	0	0	2	2	4	0	12.5
180	536	81.5	12.1	47.0	0	0	0	2	2	0	14.5

Appendix 4P: Comparability of Initial Characteristics of the Study Groups

I. Nominal Level Variables (Chi-Square Tests)

Variable	df	Value of Chi^2	p
Gender	3	1.29	
Hospital of Birth	3	2.43	
Ethnicity	3	3.07	
Parity	6	7.79	
Between Breech Groups			
Type of Presentation	2	2.93	
Between C-S Delivery Groups			
Experience of Labour	1	25.84	< .001
Mode of Delivery Planned	1	41.03	< .001
Between Vaginal Delivery Groups			
Labour Onset	1	3.66	
Labour Progress	1	.44	

II. Ordinal Level Variables (Kruskal-Wallis 1-Way ANOVA; Mann-Whitney U tests as post hocs)

Variable			Value of Chi^2 (corrected for ties)	p
Apgar Score at 1 Minute			13.89	.003
Apgar Score at 5 Minutes			6.57	
Post Hoc Procedures	U	W	z	p
Apgar Score at 1 Minute				
V-B:V-C	428.5	1208.5	-3.56	< .001
C-C:V-C	684.0	2136.0	-2.67	.008
C-B:V-C	735.5	2084.5	-2.25	
C-B:C-C	1202.0	2573.0	- .34	
C-B:V-B	788.5	1568.5	-1.57	
C-C:V-B	810.5	1590.5	-1.39	

III. Interval Level Variables (ANOVAs)

Variable and Source	df	MS	F	p
Gestational Age at Birth (2-way)				
Presentation	1	32.09	23.54	< .001
Delivery	1	.42	.31	
Presentation by Delivery	1	1.73	1.27	
Subjects within Pr x D	176	1.36		
Maternal Age (1-way)				
Between	3	20.01	.75	
Within	176	26.55		

Notes: Nonsignificant p values are left blank; C-S = cesarean-section; V-B = vaginal-breech; V-C = vaginal-cephalic; C-C =cesarean-cephalic; C-B = cesarean-breech; Pr x D = interaction between presentation by delivery.

Appendix 4Q: Comparability Between Those Attending All Sessions and Those Missing One or More of the Sessions

I. Nominal Level Variables (Chi-Square Tests)

Variable	df	Value of Chi^2	p
Presentation	1	.03	
Mode of Delivery	1	7.68	.006
Birth Complications	1	.93	
Hospital of Birth	1	11.05	< .001
Gender	1	1.45	
Ethnicity	1	9.02	.003
Parity	2	.04	

II. Ordinal Level Variables (Mann-Whitney U test)

Variable	U	W	z	p
Apgar Score at 1 Minute	2929	3964	-.29	

III. Interval Level Variables (t-tests)

Variable	df	t	p
Maternal Age	178	-2.24	.03
Gestational Age at Birth	178	.07	

Notes: Nonsignificant p values are left blank.

Appendix 4R: Comparability of Chronological Age at Assessment

Age and Source	df	MS	F	p
Birth				
Presentation	1	45.60	.01	
Delivery	1	21560.70	4.43	.04
Presentation by Delivery	1	876.78	.18	
Subjects within Pr x D	174	4870.95		
6 Weeks				
Presentation	1	8.20	1.37	
Delivery	1	18.29	3.06	
Presentation by Delivery	1	.06	.01	
Subjects within Pr x D	155	5.99		
3 Months				
Presentation	1	1.78	.18	
Delivery	1	31.31	3.18	
Presentation by Delivery	1	.31	.03	
Subjects within Pr x D	148	9.84		
5 Months				
Presentation	1	4.17	.33	
Delivery	1	19.87	1.57	
Presentation by Delivery	1	10.34	.83	
Subjects within Pr x D	149	12.53		
7 Months				
Presentation	1	1.57	.18	
Delivery	1	9.25	1.08	
Presentation by Delivery	1	15.58	1.81	
Subjects within Pr x D	144	8.57		
10 Months				
Presentation	1	8.22	1.12	
Delivery	1	28.26	3.84	
Presentation by Delivery	1	22.17	3.01	
Subjects within Pr x D	142	7.37		
15 Months				
Presentation	1	.04	.01	
Delivery	1	6.42	.52	
Presentation by Delivery	1	10.17	.83	
Subjects within Pr x D	139	12.33		
18 Months				
Presentation	1	.21	.001	
Delivery	1	6.78	.03	
Presentation by Delivery	1	13.32	.05	
Subjects within Pr x D	138	246.44		

Note: Pr x D= interaction of presentation by delivery.
Nonsignificant p values are left blank.

Appendix 4S: Effect of Initial Non-Comparability Among Groups

	t-tests (delivered by C-S; experienced labour / not)			Correlations with Ap1	
Variable	**df**	**t**	**p**	**r**	**p**
Dubowitz' Items					
Posture	95	-.49		-.10	
Arm Recoil	95	.75		-.06	
Arm Traction	95	-.02		-.02	
Leg Recoil	95	.92		-.04	
Leg Traction	95	-1.89		-.03	
Popliteal Angle	95	-.73		.11	
Head Control Posterior	95	-1.32		-.12	
Head Control Anterior	95	-.73		-.06	
Head Lag	71	-.31		-.02	
Ventral Suspension	95	-.48		.04	
Head Raising in Prone	65	-1.68		-.21	.01
Arm Release in Prone	94	.17		.11	
Palmar Grasp	95	-.17		-.01	
Rooting	95	.39		.05	
Walking	95	-.36		.07	
Moro	94	1.84		.15	
Auditory Orientation	87	1.72		.04	
Visual Orientation	79	-1.02		-.02	
Primitive Reflex Profile Items					
Asymmetrical Tonic Neck	95	.73		-.16	
Symmetrical Tonic Neck	45	1.01		-.05	
Positive Support	95	-.26		-.07	
Tonic Labyrinthine (Supine)	91	-1.11		-.04	
Tonic Labyrinthine (Prone)	95	-.63		.03	
Head on Body	44	-1.70		-.08	
Body on Body	95	-.38		.01	
Galant	94	-.18		.11	
Moro	95	1.38		.12	
Upper Extremity Grasp	95	-.86		.03	
Lower Extremity Grasp	95	.51		.08	
Lower Extremity Placing	65	-1.09		.08	
Stepping	95	-.62		.10	

Note: C-S = cesarean-section; Ap1 = Apgar score at 1 minute.
Nonsignificant p values left blank.
Some of the items in the t-tests had unequal variance, therefore degrees of freedom adjusted.

Appendix 4T: Effect of Attrition: Comparison of Initial Results

Variable	t-tests (Between those who left and those who stayed) df	t	p
Size at Birth			
Weight	178	.14	
Length	177	.27	
Head Circumference	171	.45	
Dubowitz' Items			
Posture	176	-.55	
Arm Recoil	176	-.58	
Arm Traction	176	-.99	
Leg Recoil	176	-1.36	
Leg Traction	176	-2.73	
Popliteal Angle	176	-1.36	
Head Control Posterior	176	-3.15	.002
Head Control Anterior	176	-2.37	
Head Lag	176	-1.99	
Ventral Suspension	175	-1.53	
Head Raising in Prone	175	-3.52	.001
Arm Release in Prone	56	-2.82	
Knee Jerk	169	-.73	
Palmar Grasp	176	-1.34	
Rooting	175	-1.49	
Sucking	54	-1.25	
Walking	176	1.26	
Moro	176	-.89	
Auditory Orientation	163	-.79	
Visual Orientation	153	-.94	
Primitive Reflex Profile Items			
Asymmetrical Tonic Neck	134	-2.17	
Symmetrical Tonic Neck	51	.95	
Positive Support	175	-.19	
Tonic Labyrinthine (Supine)	176	-.62	
Tonic Labyrinthine (Prone)	176	-.54	
Head on Body	176	-.22	
Body on Body	146	2.06	
Galant	175	.16	
Moro	176	-.23	
Upper Extremity Grasp	176	-1.38	
Lower Extremity Grasp	176	.29	
Lower Extremity Placing	176	.38	
Stepping	176	1.42	
INFANIB Items			
Scarf	83	1.13	
Heel to Ear	176	1.20	
Popliteal Angle	176	-.42	
Hip Abduction	176	.37	
Dorsiflexion	175	-.43	

Note: Nonsignificant p values left blank.
Some of the items in the t-tests had unequal variance, therefore degrees of freedom adjusted.

Appendix 4U: ANOVA Summary of the Dubowitz' Assessment Conducted at Term

Item and Source	df	MS	F	p
Posture				
Gestational Age	1	.01	.03	
Chronological Age in Hours	1	2.75	10.13	.002
Presentation	1	.24	.87	
Delivery	1	.44	1.62	
Presentation by Delivery	1	.06	.24	
Subjects within Pr x D	172	.27		
Arm Recoil				
Gestational Age	1	.02	.05	
Chronological Age in Hours	1	.07	.21	
Presentation	1	.01	.03	
Delivery	1	.02	.05	
Presentation by Delivery	1	.23	.69	
Subjects within Pr x D	172	.33		
Arm Traction				
Gestational Age	1	.01	.01	
Chronological Age in Hours	1	6.16	7.94	
Presentation	1	.01	.01	
Delivery	1	.44	.57	
Presentation by Delivery	1	1.37	1.77	
Subjects within Pr x D	172	.78		
Leg Recoil				
Gestational Age	1	2.35	4.8	
Chronological Age in Hours	1	6.96	14.20	< .001
Presentation	1	1.30	2.65	
Delivery	1	.32	.64	
Presentation by Delivery	1	2.09	4.26	
Subjects within Pr x D	172	.49		
Leg Traction				
Gestational Age	1	.94	1.75	
Chronological Age in Hours	1	1.18	2.29	
Presentation	1	1.38	2.67	
Delivery	1	1.23	2.38	
Presentation by Delivery	1	.15	.28	
Subjects within Pr x D	172	.52		
Popliteal Angle				
Gestational Age	1	5.34	4.67	
Chronological Age in Hours	1	.46	.40	
Presentation	1	21.49	18.80	< .001
Delivery	1	1.50	1.31	
Presentation by Delivery	1	3.64	3.17	
Subjects within Pr x D	172	1.14		
Head Control Posterior				
Gestational Age	1	3.17	4.20	
Chronological Age in Hours	1	.28	.38	
Presentation	1	.25	.34	
Delivery	1	.28	.37	
Presentation by Delivery	1	.08	.11	
Subjects within Pr x D	172	.76		

Notes: Nonsignificant p values left blank. Pr x D = interaction of Presentation and Delivery.

ANOVA Summary of the Dubowitz' Assessment Conducted at Term (continued)

Item and Source	df	MS	F	p
Head Control Anterior				
Gestational Age	1	.32	.64	
Chronological Age in Hours	1	.02	.04	
Presentation	1	1.00	1.99	
Delivery	1	.53	1.06	
Presentation by Delivery	1	.75	1.49	
Subjects within Pr x D	172	.50		
Head Lag				
Gestational Age	1	.76	.99	
Chronological Age in Hours	1	1.50	1.94	
Presentation	1	.17	.22	
Delivery	1	.89	1.15	
Presentation by Delivery	1	.08	.10	
Subjects within Pr x D	172	.77		
Ventral Suspension				
Gestational Age	1	2.87	5.24	
Chronological Age in Hours	1	1.10	2.00	
Presentation	1	1.55	2.83	
Delivery	1	.06	.11	
Presentation by Delivery	1	2.17	3.96	
Subjects within Pr x D	171	.55		
Head Raising in Prone				
Gestational Age	1	2.15	3.51	
Chronological Age in Hours	1	.01	.01	
Presentation	1	3.39	5.52	
Delivery	1	.30	.49	
Presentation by Delivery	1	.09	.14	
Subjects within Pr x D	171	.61		
Arm Release in Prone				
Gestational Age	1	.19	1.19	
Chronological Age in Hours	1	.00	.00	
Presentation	1	.65	4.00	
Delivery	1	.32	2.00	
Presentation by Delivery	1	.20	1.27	
Subjects within Pr x D	171	.16		
Knee Jerk				
Gestational Age	1	.16	1.79	
Chronological Age in Hours	1	.03	.39	
Presentation	1	.06	.68	
Delivery	1	.25	2.85	
Presentation by Delivery	1	.03	.31	
Subjects within Pr x D	165	.09		
Palmar Grasp				
Gestational Age	1	.13	.25	
Chronological Age in Hours	1	3.60	7.30	.008
Presentation	1	.00	.00	
Delivery	1	1.45	2.94	
Presentation by Delivery	1	.59	1.20	
Subjects within Pr x D	172	.49		

Notes: Nonsignificant p values left blank. Pr x D = interaction of Presentation and Delivery.

ANOVA Summary of the Dubowitz' Assessment Conducted at Term (continued)

Item and Source	df	MS	F	p
Rooting				
Gestational Age	1	.03	.06	
Chronological Age in Hours	1	.19	.36	
Presentation	1	.29	.54	
Delivery	1	.79	1.47	
Presentation by Delivery	1	.24	.44	
Subjects within Pr x D	171	.54		
Sucking				
Gestational Age	1	.06	.25	
Chronological Age in Hours	1	.04	.17	
Presentation	1	.08	.33	
Delivery	1	.34	1.33	
Presentation by Delivery	1	.02	.08	
Subjects within Pr x D	171	.26		
Walking				
Gestational Age	1	.01	.01	
Chronological Age in Hours	1	1.52	1.42	
Presentation	1	1.64	1.54	
Delivery	1	.34	.31	
Presentation by Delivery	1	.03	.03	
Subjects within Pr x D	172	1.07		
Moro				
Gestational Age	1	.04	.08	
Chronological Age in Hours	1	1.30	2.69	
Presentation	1	.06	.12	
Delivery	1	.65	1.35	
Presentation by Delivery	1	1.09	2.25	
Subjects within Pr x D	172	.48		
Auditory Orientation				
Gestational Age	1	.41	.41	
Chronological Age in Hours	1	.12	.12	
Presentation	1	.45	.44	
Delivery	1	2.88	2.84	
Presentation by Delivery	1	.94	.92	
Subjects within Pr x D	159	1.01		
Visual Orientation				
Gestational Age	1	.43	.43	
Chronological Age in Hours	1	1.33	1.34	
Presentation	1	1.58	1.59	
Delivery	1	.04	.04	
Presentation by Delivery	1	.18	1.8	
Subjects within Pr x D	149	.99		

Notes: Nonsignificant p values left blank. Pr x D = interaction of Presentation and Delivery.

Appendix 4V: Summary of the 3-Way Repeated Measures Analyses of Growth Parameters

Item and Source	df	MS	F	p
Weight				
Between Subjects				
Gestational Age	1	21.04	3.51	
Presentation	1	1.93	.09	
Delivery	1	3.98	.32	
Presentation by Delivery	1	2.81	.66	
Subjects within Pr x D	109	5.99		
Within Subjects				
Time	7	862.32	2676.31	< .001
Time by Presentation	7	.53	1.66	
Time by Delivery	7	.19	.59	
Time by Pr x D	7	.29	.90	
Time x Subjects within Pr x D	770	.32		
Length				
Between Subjects				
Gestational Age	1	127.07	3.26	
Presentation	1	12.09	.31	
Delivery	1	29.36	.75	
Presentation by Delivery	1	.66	.02	
Subjects within Pr x D	128	39.03		
Within Subjects				
Time	7	15206.22	6356.55	< .001
Time by Presentation	7	11.97	5.00	< .001
Time by Delivery	7	1.54	.64	
Time by Pr x D	7	2.11	.88	
Time x Subjects within Pr x D	903	2.39		
Head Circumference				
Between Subjects				
Gestational Age	1	3.57	.29	
Presentation	1	4.05	.33	
Delivery	1	13.61	1.09	
Presentation by Delivery	1	.10	.01	
Subjects within Pr x D	125	12.44		
Within Subjects				
Time	7	2587.02	6002.02	< .001
Time by Presentation	7	.39	.90	
Time by Delivery	7	1.58	3.68	.001
Time by Pr x D	7	.09	.20	
Time x Subjects within Pr x D	882	.43		

Notes: Nonsignificant p values left blank. Pr x D = interaction of Presentation by Delivery.

Summary of the 3-Way Repeated Measures Analyses of Growth Parameters (continued)

Post-hoc Analyses using the Dunn Method of Multiple Comparisons

Length

Comparison 1. Presentation Groups: Birth to 6 Weeks

		Breech (birth)	**Cephalic (birth)**	**Breech (6 weeks)**	**Cephalic (6 weeks)**
	Mean	50.83	52.20	55.33	56.69
	Contrast (C)	+ 1	- 1	- 1	+ 1
	n	80	99	81	77
	C x Mean	+ 50.83	- 52.20	- 55.33	+ 56.69
	Sum of C x Mean	- .01			
Numerator	(Sum of C x Mean)^2	.0001			
	$\frac{C^2}{n}$	.0125	.0101	.0123	.0130
	Sum of $\frac{C^2}{n}$	.0479			
	MS_w (from MANOVA)	2.39			
Denominator	MS_w x Sum of $\frac{C^2}{n}$	.1145			
F Ratio	F (obs)	.0009			
	Square Root of F (obs)	.0296			
t (crit)	- for 4 comparisons	df= 333	alpha = .05	2.529	

t (obs) < t (crit), therefore nonsignificant

Notes: C = contrast; obs = observed; crit = critical.

MS_w = value from MANOVA run with no covariates.

Summary of the 3-Way Repeated Measures Analyses of Growth Parameters (continued)

Post-hoc Analyses using the Dunn Method of Multiple Comparisons

Length

Comparison 2. Presentation Groups: 6 Weeks to 3 Months

		Breech (6 weeks)	**Cephalic (6 weeks)**	**Breech (3 months)**	**Cephalic (3 months)**
	Mean	55.33	56.69	60.39	60.99
	Contrast (C)	+ 1	- 1	- 1	+ 1
	n	81	77	74	78
	C x Mean	+ 55.33	- 56.69	-60.39	+ 60.99
	Sum of C x Mean	- .76			
Numerator	(Sum of C x Mean)^2	.5776			
	$\frac{C^2}{n}$	.0123	.0130	.0135	.0128
	Sum of $\frac{C^2}{n}$	.0516			
	MS_w (from MANOVA)	2.39			
Denominator	MS_w x Sum of $\frac{C^2}{n}$	.1233			
F Ratio	F (obs)	4.6845			
	Square Root of F (obs)	2.1644			
t (crit)	- for 4 comparisons	df= 306	alpha = .05	2.529	

t (obs) < t (crit), therefore nonsignificant

Notes: C = contrast; obs = observed; crit = critical.

MS_w = value from MANOVA run with no covariates.

Summary of the 3-Way Repeated Measures Analyses of Growth Parameters (continued)

Post-hoc Analyses using the Dunn Method of Multiple Comparisons

Length

Comparison 3. Presentation Groups: 3 to 5 Months

		Breech (3 months)	**Cephalic (3 months)**	**Breech (5 months)**	**Cephalic (5 months)**
	Mean	60.39	60.99	65.07	65.53
	Contrast (C)	+ 1	- 1	- 1	+ 1
	n	74	78	75	78
	C x Mean	+ 60.39	- 60.99	- 65.07	+ 65.53
	Sum of C x Mean	- .14			
Numerator	(Sum of C x Mean)^2	.0196			
	$\frac{C^2}{n}$	.0135	.0128	.0133	.0128
	Sum of $\frac{C^2}{n}$	.0524			
	MS_w (from MANOVA)	2.39			
Denominator	MS_w x Sum of $\frac{C^2}{n}$	.1252			
F Ratio	F (obs)	.1565			
	Square Root of F (obs)	.3957			
t (crit)	- for 4 comparisons	df= 301	alpha = .05	2.529	

t (obs) < t (crit), therefore nonsignificant

Notes: C = contrast; obs = observed; crit = critical.

MS_w = value from MANOVA run with no covariates.

Summary of the 3-Way Repeated Measures Analyses of Growth Parameters (continued)

Post-hoc Analyses using the Dunn Method of Multiple Comparisons

Length

Comparison 4. Presentation Groups: 5 to 7 Months

		Breech (5 months)	**Cephalic (5 months)**	**Breech (7 months)**	**Cephalic (7 months)**
	Mean	65.07	65.53	68.55	68.55
	Contrast (C)	+ 1	- 1	- 1	+ 1
	n	75	78	71	74
	C x Mean	+ 65.07	- 65.53	- 68.55	+ 68.55
	Sum of C x Mean	- .46			
Numerator	(Sum of C x Mean)^2	.2116			
	$\frac{C^2}{n}$	.0133	.0128	.0148	.0135
	Sum of $\frac{C^2}{n}$	.0544			
	MS_w (from MANOVA)	2.39			
Denominator	MS_w x Sum of $\frac{C^2}{n}$	.1300			
F Ratio	F (obs)	1.6277			
	Square Root of F (obs)	1.2758			
t (crit)	- for 4 comparisons	df= 294	alpha = .05	2.529	

t (obs) < t (crit), therefore nonsignificant

Notes: C = contrast; obs = observed; crit = critical.

MS_w = value from MANOVA run with no covariates.

Summary of the 3-Way Repeated Measures Analyses of Growth Parameters (continued)

Post-hoc Analyses using the Dunn Method of Multiple Comparisons

Length

Comparison 5. Presentation Groups: Birth to 3 Months

		Breech (birth)	**Cephalic (birth)**	**Breech (3 months)**	**Cephalic (3 months)**
	Mean	50.83	52.20	60.39	60.99
	Contrast (C)	+ 1	- 1	- 1	+ 1
	n	80	99	74	78
	C x Mean	+ 50.83	- 52.20	- 60.39	+ 60.99
	Sum of C x Mean	- .77			
Numerator	$(\text{Sum of C x Mean})^2$	.5929			
	$\frac{C^2}{n}$	.0125	.0101	.0135	.0128
	Sum of $\frac{C^2}{n}$	.0489			
	MS_w (from MANOVA)	2.39			
Denominator	MS_w x Sum of $\frac{C^2}{n}$	.1169			
F Ratio	F (obs)	5.0719			
	Square Root of F (obs)	2.2521			
t (crit)	- for 5 comparisons	df= 327	alpha = .05	2.61	

t (obs) < t (crit), therefore nonsignificant

Notes: C = contrast; obs = observed; crit = critical.

MS_w = value from MANOVA run with no covariates.

Summary of the 3-Way Repeated Measures Analyses of Growth Parameters (continued)

Post-hoc Analyses using the Dunn Method of Multiple Comparisons

Length

Comparison 6. Presentation Groups: Birth to 5 Months

		Breech (birth)	**Cephalic (birth)**	**Breech (5 months)**	**Cephalic (5 months)**
	Mean	50.83	52.20	65.05	65.50
	Contrast (C)	+ 1	- 1	- 1	+ 1
	n	80	99	75	78
	C x Mean	+ 50.83	- 52.20	- 65.05	+ 65.50
	Sum of C x Mean	- .92			
Numerator	(Sum of C x Mean)^2	.8464			
	$\frac{C^2}{n}$	.0125	.0101	.0133	.0128
	Sum of $\frac{C^2}{n}$	.0487			
	MS_w (from MANOVA)	2.39			
Denominator	MS_w x Sum of $\frac{C^2}{n}$	.1164			
F Ratio	F (obs)	7.2715			
	Square Root of F (obs)	2.697			
t (crit)	- for 5 comparisons	df= 328	alpha = .05	2.675	

t (obs) > t (crit), therefore statistically significant

Notes: C = contrast; obs = observed; crit = critical.

MS_w = value from MANOVA run with no covariates.

Summary of the 3-Way Repeated Measures Analyses of Growth Parameters (continued)

Post-hoc Analyses using the Dunn Method of Multiple Comparisons

Head Circumference

Comparison 1. Delivery Groups: Birth to 6 Weeks

		Vaginal (birth)	**Cesarean (birth)**	**Vaginal (6 weeks)**	**Cesarean (6 weeks)**
	Mean	34.67	35.29	38.47	38.72
	Contrast (C)	+ 1	- 1	- 1	+ 1
	n	78	93	76	83
	C x Mean	+ 34.67	- 35.29	- 38.47	+ 38.72
	Sum of C x Mean	- .37			
Numerator	(Sum of C x Mean)^2	.1369			
	$\frac{C^2}{n}$	.0128	.0108	.0132	.0120
	Sum of $\frac{C^2}{n}$	.0488			
	MS_w (from MANOVA)	.43			
Denominator	MS_w x Sum of $\frac{C^2}{n}$	.0210			
F Ratio	F (obs)	6.5190			
	Square Root of F (obs)	2.55			
t (crit)	- for 2 comparisons	df= 326	alpha = .05	2.265	

t (obs) > t (crit), therefore statistically significant

Notes: C = contrast; obs = observed; crit = critical.

MS_w = value from MANOVA run with no covariates.

Summary of the 3-Way Repeated Measures Analyses of Growth Parameters (continued)

Post-hoc Analyses using the Dunn Method of Multiple Comparisons

Head Circumference

Comparison 2. Delivery Groups: 6 Weeks to 3 Months

		Vaginal (6 weeks)	**Cesarean (6 weeks)**	**Vaginal (3 months)**	**Cesarean (3 months)**
	Mean	38.47	38.72	40.81	40.97
	Contrast (C)	+ 1	- 1	- 1	+ 1
	n	76	83	75	77
	C x Mean	+ 38.47	- 38.72	- 40.81	+ 40.97
	Sum of C x Mean	- .09			
Numerator	(Sum of C x Mean)^2	.0081			
	$\frac{C^2}{n}$	.0132	.0120	.0133	.0130
	Sum of $\frac{C^2}{n}$	.0515			
	MS_w (from MANOVA)	.43			
Denominator	MS_w x Sum of $\frac{C^2}{n}$	.0221			
F Ratio	F (obs)	.3665			
	Square Root of F (obs)	.6054			
t (crit)	- for 2 comparisons	df= 307	alpha = .05	2.265	

t (obs) < t (crit), therefore nonsignificant

Notes: C = contrast; obs = observed; crit = critical.

MS_w = value from MANOVA run with no covariates.

Appendix 4W: Summary of the 3-Way Repeated Measures Analyses of Primitive Reflex Profile Items

Item and Source	df	MS	F	p
Asymmetrical Tonic Neck				
Between Subjects				
Cahrs and GA	2	.05	.11	
Presentation	1	1.48	3.39	
Delivery	1	.38	.87	
Presentation by Delivery	1	.03	.07	
Subjects within Pr x D	142	.44		
Within Subjects				
Time	3	22.87	54.70	< .001
Time by Presentation	3	.42	1.00	
Time by Delivery	3	.39	.93	
Time by Pr x D	3	.08	.19	
Time x Subjects within Pr x D	432	.42		
Symmetrical Tonic Neck				
Between Subjects				
Cahrs and GA	2	.07	1.19	
Presentation	1	.12	2.05	
Delivery	1	.03	.42	
Presentation by Delivery	1	.10	1.75	
Subjects within Pr x D	142	.06		
Within Subjects				
Time	3	.20	3.38	
Time by Presentation	3	.03	.50	
Time by Delivery	3	.06	.96	
Time by Pr x D	3	.07	1.09	
Time x Subjects within Pr x D	432	.06		
Positive Supporting				
Between Subjects				
Cahrs and GA	2	1.17	2.95	
Presentation	1	.39	.99	
Delivery	1	.79	2.00	
Presentation by Delivery	1	.67	1.69	
Subjects within Pr x D	141	.40		
Within Subjects				
Time	3	10.39	36.72	< .001
Time by Presentation	3	.05	.16	
Time by Delivery	3	.32	1.13	
Time by Pr x D	3	.18	.63	
Time x Subjects within Pr x D	429	.28		

Notes: Nonsignificant p values left blank. Cahrs and GA = chronological age in hours and gestational age (covariates). Pr x D = interaction of Presentation and Delivery.

Summary of the 3-Way Repeated Measures Analyses of Primitive Reflex Profile Items (continued)

Item and Source	df	MS	F	p
Tonic Labyrinthine Supine				
Between Subjects				
Cahrs and GA	2	.58	1.82	
Presentation	1	.82	2.58	
Delivery	1	.27	.85	
Presentation by Delivery	1	.46	1.44	
Subjects within Pr x D	142	.32		
Within Subjects				
Time	3	7.44	26.69	< .001
Time by Presentation	3	.27	.98	
Time by Delivery	3	.31	1.31	
Time by Pr x D	3	.09	.32	
Time x Subjects within Pr x D	432	.28		
Tonic Labyrinthine Prone				
Between Subjects				
Cahrs and GA	2	.02	.09	
Presentation	1	.00	.01	
Delivery	1	.91	3.95	
Presentation by Delivery	1	.07	.32	
Subjects within Pr x D	142	.23		
Within Subjects				
Time	3	1.41	7.78	< .001
Time by Presentation	3	.12	.68	
Time by Delivery	3	.12	.67	
Time by Pr x D	3	.20	1.08	
Time x Subjects within Pr x D	432	.18		
S R: Head on Body				
Between Subjects				
Cahrs and GA	2	2.34	3.79	
Presentation	1	1.48	2.40	
Delivery	1	.46	.75	
Presentation by Delivery	1	1.22	1.97	
Subjects within Pr x D	142	.62		
Within Subjects				
Time	3	13.43	28.40	< .001
Time by Presentation	3	.33	.70	
Time by Delivery	3	.48	1.01	
Time by Pr x D	3	.53	1.13	
Time x Subjects within Pr x D				

Notes: Nonsignificant p values left blank. Cahrs and GA = chronological age in hours and gestational age (covariates). Pr x D = interaction of Presentation and Delivery; SR = segmental rolling.

Summary of the 3-Way Repeated Measures Analyses of Primitive Reflex Profile Items (continued)

Item and Source	df	MS	F	p
S R: Body on Body				
Between Subjects				
Cahrs and GA	2	2.09	5.88	.004
Presentation	1	.95	2.66	
Delivery	1	.94	2.65	
Presentation by Delivery	1	.04	.11	
Subjects within Pr x D	142	.36		
Within Subjects				
Time	3	52.73	162.93	< .001
Time by Presentation	3	.11	.35	
Time by Delivery	3	.31	.97	
Time by Pr x D	3	.08	.24	
Time x Subjects within Pr x D	432	.32		
Galant				
Between Subjects				
Cahrs and GA	2	.45	.62	
Presentation	1	2.64	3.61	
Delivery	1	3.12	4.27	
Presentation by Delivery	1	.73	1.00	
Subjects within Pr x D	140	.73		
Within Subjects				
Time	3	24.54	42.84	< .001
Time by Presentation	3	.17	.29	
Time by Delivery	3	.89	1.56	
Time by Pr x D	3	.58	1.01	
Time x Subjects within Pr x D	426	.57		
Moro				
Between Subjects				
Cahrs and GA	2	.08	.34	
Presentation	1	.43	1.77	
Delivery	1	2.44	9.99	.002
Presentation by Delivery	1	.00	.01	
Subjects within Pr x D	140	.24		
Within Subjects				
Time	3	60.64	277.10	< .001
Time by Presentation	3	.81	3.70	
Time by Delivery	3	.94	4.28	
Time by Pr x D	3	.34	1.57	
Time x Subjects within Pr x D	426	.22		

Notes: Nonsignificant p values left blank. Cahrs and GA = chronological age in hours and gestational age (covariates). Pr x D = interaction of Presentation and Delivery; S R = segmental rolling.

Summary of the 3-Way Repeated Measures Analyses of Primitive Reflex Profile Items (continued)

Item and Source	df	MS	F	p
Upper Extremity Grasp				
Between Subjects				
Cahrs and GA	2	.03	.05	
Presentation	1	.00	.01	
Delivery	1	.05	.09	
Presentation by Delivery	1	.02	.04	
Subjects within Pr x D	142	.53		
Within Subjects				
Time	3	131.65	258.13	< .001
Time by Presentation	3	.43	.85	
Time by Delivery	3	1.56	3.06	
Time by Pr x D	3	.15	.29	
Time x Subjects within Pr x D	432	.51		
Lower Extremity Grasp				
Between Subjects				
Cahrs and GA	2	.02	.10	
Presentation	1	.07	.31	
Delivery	1	.04	.20	
Presentation by Delivery	1	.07	.34	
Subjects within Pr x D	142	.21		
Within Subjects				
Time	3	3.60	22.76	< .001
Time by Presentation	3	.45	2.88	
Time by Delivery	3	.25	1.57	
Time by Pr x D	3	.18	1.12	
Time x Subjects within Pr x D	432	.16		
Lower Extremity Placing				
Between Subjects				
Cahrs and GA	2	1.50	2.83	
Presentation	1	1.31	2.47	
Delivery	1	.15	.29	
Presentation by Delivery	1	1.64	3.09	
Subjects within Pr x D	142	.53		
Within Subjects				
Time	3	4.18	10.97	< .001
Time by Presentation	3	.72	1.88	
Time by Delivery	3	.09	.24	
Time by Pr x D	3	.14	.36	
Time x Subjects within Pr x D	432	.38		

Notes: Nonsignificant p values left blank. Cahrs and GA = chronological age in hours and gestational age (covariates). Pr x D = interaction of Presentation and Delivery.

Summary of the 3-Way Repeated Measures Analyses of Primitive Reflex Profile Items (continued)

Item and Source	df	MS	F	p
Stepping				
Between Subjects				
Cahrs and GA	2	.28	.41	
Presentation	1	.34	.50	
Delivery	1	.25	.37	
Presentation by Delivery	1	.36	.52	
Subjects within Prx D	142	.69		
Within Subjects				
Time	3	34.40	80.85	< .001
Time by Presentation	3	.47	1.10	
Time by Delivery	3	.97	2.28	
Time by Pr x D	3	.41	.96	
Time x Subjects within Pr x D	432	.43		

Notes: Nonsignificant p values left blank. Cahrs and GA = chronological age in hours and gestational age (covariates). Pr x D = interaction of Presentation and Delivery.

Appendix 4X: Summary of the 3-Way Repeated Measures Analyes of Joint Angle Data and 2-Way Analyses of Joint Laxity Scores

Item and Source	df	MS	F	p
INFANIB Items				
Scarf Sign				
Between Subjects				
Cahrs and GA	2	1.34	.95	
Presentation	1	.46	.32	
Delivery	1	.01	.01	
Presentation by Delivery	1	.77	.55	
Subjects within Pr x D	130	1.41		
Within Subjects				
Time	6	44.80	56.51	< .001
Time by Presentation	6	.38	.47	
Time by Delivery	6	1.09	1.37	
Time by Pr x D	6	.54	.68	
Time x Subjects within Pr x D	792	.79		
Heel to Ear				
Between Subjects				
Cahrs and GA	2	6.25	3.08	
Presentation	1	4.63	2.28	
Delivery	1	1.21	.60	
Presentation by Delivery	1	6.00	2.96	
Subjects within Pr x D	131	2.03		
Within Subjects				
Time	6	95.45	148.29	< .001
Time by Presentation	6	1.56	2.42	
Time by Delivery	6	.29	.45	
Time by Pr x D	6	.64	1.00	
Time x Subjects within Pr x D	798	.64		
Popliteal Angle				
Between Subjects				
Cahrs and GA	2	1.81	4.83	.01
Presentation	1	4.37	11.63	.001
Delivery	1	.07	.18	
Presentation by Delivery	1	.00	.01	
Subjects within Pr x D	131	.38		
Within Subjects				
Time	6	30.51	104.60	< .001
Time by Presentation	6	1.61	5.52	< .001
Time by Delivery	6	.58	1.99	
Time by Pr x D	6	.08	.26	
Time x Subjects within Pr x D	798	.29		

Notes: Nonsignificant p values left blank. Cahrs and GA = chronological age in hours and gestational age (covariates). Pr x D = interaction of Presentation and Delivery.

Summary of the 3-Way Repeated Measures Analyes of Joint Angle Data and 2-Way Analyses of Joint Laxity Scores (continued)

Item and Source	df	MS	F	p
INFANIB Items				
Hip Abduction				
Between Subjects				
Cahrs and GA	2	3.08	2.16	
Presentation	1	6.52	4.57	
Delivery	1	7.85	5.50	
Presentation by Delivery	1	4.65	3.26	
Subjects within Pr x D	131	1.43		
Within Subjects				
Time	6	158.39	337.29	< .001
Time by Presentation	6	.25	.54	
Time by Delivery	6	1.22	2.60	
Time by Pr x D	6	.82	1.74	
Time x Subjects within Pr x D	798	.47		
Ankle Dorsiflexion				
Between Subjects				
Cahrs and GA	2	1.71	1.93	
Presentation	1	1.73	1.96	
Delivery	1	.56	.63	
Presentation by Delivery	1	2.02	2.28	
Subjects within Pr x D	130	.89		
Within Subjects				
Time	6	23.58	89.31	< .001
Time by Presentation	6	.15	.57	
Time by Delivery	6	.15	.56	
Time by Pr x D	6	.22	.81	
Time x Subjects within Pr x D	792	.26		
French Angles Factor				
Between Subjects				
Cahrs and GA	2	12.69	1.29	
Presentation	1	.92	.09	
Delivery	1	12.83	1.30	
Presentation by Delivery	1	30.07	3.05	
Subjects within Pr x D	130	9.87		
Within Subjects				
Time	6	1041.07	304.39	< .001
Time by Presentation	6	9.30	2.72	.013
Time by Delivery	6	3.83	1.12	
Time by Pr x D	6	2.43	.71	
Time x Subjects within Pr x D	792	3.42		

Notes: Alpha levels significant by Bonferroni's Correction (.01) for individual items, or .05 for French Angles Factor. Nonsignificant p values left blank. Cahrs and GA = chronological age in hours and gestational age (covariates). Pr x D = interaction of Presentation and Delivery.

Summary of the 3-Way Repeated Measures Analyes of Joint Angle Data and 2-Way Analyses of Joint Laxity Scores (continued)

Post-hoc Analyses using the Dunn Method of Multiple Comparisons

French Angles

Comparison 1. Presentation Groups: Birth to 6 Weeks

		Breech (birth)	**Cephalic (birth)**	**Breech (6 weeks)**	**Cephalic (6 weeks)**
	Mean	15.65	13.95	13.70	13.45
	Contrast (C)	+ 1	- 1	- 1	+ 1
	n	88	90	82	77
	C x Mean	+ 15.65	- 13.95	- 13.70	+ 13.45
	Sum of C x Mean	1.45			
Numerator	(Sum of C x Mean)^2	2.1025			
	$\frac{C^2}{n}$	.0114	.0111	.0122	.0130
	Sum of $\frac{C^2}{n}$	.0477			
	MS_w (from MANOVA)	3.42			
Denominator	MS_w x Sum of $\frac{C^2}{n}$	.1631			
F Ratio	F (obs)	12.89			
	Square Root of F (obs)	3.59			
t (crit)	- for 2 comparisons	df= 333	alpha = .05	2.265	

t (obs) > t (crit), therefore statistically significant

Notes: C = contrast; obs = observed; crit = critical.

MS_w = value from MANOVA run with no covariates.

Summary of the 3-Way Repeated Measures Analyes of Joint Angle Data and 2-Way Analyses of Joint Laxity Scores (continued)

Post-hoc Analyses using the Dunn Method of Multiple Comparisons

French Angles

Comparison 2. Presentation Groups: 10 to 15 Months

		Breech (10 months)	**Cephalic (10 months)**	**Breech (15 months)**	**Cephalic (15 months)**
	Mean	19.65	20.05	20.4	20.4
	Contrast (C)	+ 1	- 1	- 1	+ 1
	n	72	74	70	73
	C x Mean	+ 19.65	- 20.05	- 20.4	+ 20.4
	Sum of C x Mean	- .4			
Numerator	(Sum of C x Mean)^2	.16			
	$\frac{C^2}{n}$	.0139	.0135	.0143	.0137
	Sum of $\frac{C^2}{n}$	.0554			
	MS_w (from MANOVA)	3.42			
Denominator	MS_w x Sum of $\frac{C^2}{n}$	.1895			
F Ratio	F (obs)	.8443			
	Square Root of F (obs)	.9189			
t (crit)	- for 2 comparisons	df= 333	alpha = .05	2.265	

t (obs) < t (crit), therefore nonsignificant

Notes: C = contrast; obs = observed; crit = critical.

MS_w = value from MANOVA run with no covariates.

Summary of the 3-Way Repeated Measures Analyes of Joint Angle Data and 2-Way Analyses of Joint Laxity Scores (continued)

Post-hoc Analyses using the Dunn Method of Multiple Comparisons

Popliteal Angle

Comparison 1. Presentation Groups: Birth to 6 Weeks

		Breech (birth)	**Cephalic (birth)**	**Breech (6 weeks)**	**Cephalic (6 weeks)**
	Mean	5.1	4.5	5.3	5.05
	Contrast (C)	+ 1	- 1	- 1	+ 1
	n	88	90	82	77
	C x Mean	+ 5.1	- 4.5	- 5.3	+ 5.05
	Sum of C x Mean	.35			
Numerator	(Sum of C x Mean)^2	.1225			
	$\frac{C^2}{n}$	.0114	.0111	.0122	.0130
	Sum of $\frac{C^2}{n}$	.0477			
	MS_w (from MANOVA)	.29			
Denominator	MS_w x Sum of $\frac{C^2}{n}$	.0138			
F Ratio	F (obs)	8.8768			
	Square Root of F (obs)	2.98			
t (crit)	- for 3 comparisons	df= 333	alpha = .05	2.422	

t (obs) > t (crit), therefore statistically significant

Notes: C = contrast; obs = observed; crit = critical.

MS_w = value from MANOVA run with no covariates.

Summary of the 3-Way Repeated Measures Analyes of Joint Angle Data and 2-Way Analyses of Joint Laxity Scores (continued)

Post-hoc Analyses using the Dunn Method of Multiple Comparisons

Popliteal Angle

Comparison 2. Presentation Groups: 3 to 5 Months

		Breech (3 months)	**Cephalic (3 months)**	**Breech (5 months)**	**Cephalic (5 months)**
	Mean	5.7	5.5	5.95	5.85
	Contrast (C)	+ 1	- 1	- 1	+ 1
	n	74	78	75	78
	C x Mean	+ 5.7	- 5.5	- 5.95	+ 5.85
	Sum of C x Mean	.1			
Numerator	(Sum of C x Mean)^2	.01			
	$\frac{C^2}{n}$	.0135	.0128	.0133	.0128
	Sum of $\frac{C^2}{n}$	.0524			
	MS_w (from MANOVA)	.29			
Denominator	MS_w x Sum of $\frac{C^2}{n}$	.0152			
F Ratio	F (obs)	.6579			
	Square Root of F (obs)	.8111			
t (crit)	- for 3 comparisons	df= 301	alpha = .05	2.422	

t (obs) < t (crit), therefore nonsignificant

Notes: C = contrast; obs = observed; crit = critical.

MS_w = value from MANOVA run with no covariates.

Summary of the 3-Way Repeated Measures Analyes of Joint Angle Data and 2-Way Analyses of Joint Laxity Scores (continued)

Item and Source	df	MS	F	p
Joint Laxity Scores				
Elbow Extension				
Presentation	1	.03	.34	
Delivery	1	.25	3.00	
Presentation by Delivery	1	.03	.33	
Subjects within Pr x D	138	.08		
Knee Extension				
Presentation	1	.32	.97	
Delivery	1	.81	2.40	
Presentation by Delivery	1	.55	1.66	
Subjects within Pr x D	138	.34		
Thumb to Wrist				
Presentation	1	.11	.14	
Delivery	1	.43	.54	
Presentation by Delivery	1	.11	.14	
Subjects within Pr x D	138	.80		
Fifth MCP Extension				
Presentation	1	.02	.02	
Delivery	1	1.31	1.36	
Presentation by Delivery	1	.43	.45	
Subjects within Pr x D	138	.96		
Total Laxity Score				
Presentation	1	1.19	.37	
Delivery	1	.06	.02	
Presentation by Delivery	1	.33	.10	
Subjects within Pr x D	138	3.22		

Notes: Alpha level (Bonferroni's Correction) = .013 for individual items or .05 for Total Laxity Score. Nonsignificant p values left blank. Pr x D = interaction of Presentation and Delivery.

Appendix 4Y: Summary of the 3-Way Repeated Measures Analyses of the AIMS and 2-Way Analyses of the Peabody Developmental Motor Scales Scores and Age Walked

Subsection and Source	df	MS	F	p
AIMS Subsections (to 10 Months)				
Prone				
Between Subjects				
Presentation	1	12.48	1.37	
Delivery	1	10.47	1.15	
Presentation by Delivery	1	1.58	.17	
Subjects within Pr x D	137	9.10		
Within Subjects				
Time	4	6650.66	1761.65	< .001
Time by Presentation	4	.54	.14	
Time by Delivery	4	2.83	.75	
Time by Pr x D	4	.25	.07	
Time x Subjects within Pr x D	548	3.78		
Supine				
Between Subjects				
Presentation	1	1.92	1.63	
Delivery	1	3.16	2.68	
Presentation by Delivery	1	3.51	2.98	
Subjects within Pr x D	137	1.18		
Within Subjects				
Time	4	1060.50	1749.11	< .001
Time by Presentation	4	.80	1.32	
Time by Delivery	4	.28	.46	
Time by Pr x D	4	.75	1.24	
Time x Subjects within Pr x D	548	.61		
Sitting				
Between Subjects				
Presentation	1	.03	.01	
Delivery	1	.07	.03	
Presentation by Delivery	1	.04	.02	
Subjects within Pr x D	137	2.32		
Within Subjects				
Time	4	2601.46	2554.96	< .001
Time by Presentation	4	.97	.95	
Time by Delivery	4	1.37	1.35	
Time by Pr x D	4	.80	.79	
Time x Subjects within Pr x D	548	1.02		

Notes: Alpha levels significant by Bonferroni's Correction (.013) for sub-section scores. Nonsignificant p values left blank. Pr x D = interaction of Presentation and Delivery.

Summary of the 3-Way Repeated Measures Analyses of the AIMS and 2-Way Analyses of the Peabody Developmental Motor Scales Scores and Age Walked (continued)

Subsection and Source	df	MS	F	p
AIMS Subsections (to 10 Months)				
Standing				
Between Subjects				
Presentation	1	2.58	.86	
Delivery	1	.08	.03	
Presentation by Delivery	1	1.32	.44	
Subjects within Pr x D	137	2.99		
Within Subjects				
Time	4	1282.76	678.84	< .001
Time by Presentation	4	.98	.52	
Time by Delivery	4	.20	.11	
Time by Pr x D	4	1.32	.70	
Time x Subjects within Pr x D	548	1.89		
AIMS Total Score (to 15 Months)				
Between Subjects				
Presentation	1	49.00	1.43	
Delivery	1	10.32	.30	
Presentation by Delivery	1	3.62	.11	
Subjects within Pr x D	134	34.33		
Within Subjects				
Time	5	56701.96	5318.71	< .001
Time by Presentation	5	3.85	.36	
Time by Delivery	5	4.76	.45	
Time by Pr x D	5	6.61	.62	
Time x Subjects within Pr x D	670	10.66		

Notes: Alpha levels significant by Bonferroni's Correction (.013) for sub-section scores or .05 for Total AIMS Score. Nonsignificant p values left blank. Pr x D = interaction of Presentation and Delivery.

Summary of the 3-Way Repeated Measures Analyses of the AIMS and 2-Way Analyses of the Peabody Developmental Motor Scales Scores and Age Walked (continued)

z-tests between Group AIMS Scores and the Normative Sample (Piper and Darrah, 1994)

6 Weeks: Mean = 7.3; sd = 1.96

Group	n	sem	z	p
Cesarean-Breech	45	.29	$z = \frac{6.1 - 7.3}{.29} = -4.14$	< .001
Cesarean-Cephalic	38	.32	$z = \frac{6.9 - 7.3}{.32} = -1.25$	.21
Vaginal-Breech	37	.32	$z = \frac{6.2 - 7.3}{.32} = -3.44$	< .001
Vaginal-Cephalic	39	.32	$z = \frac{7.0 - 7.3}{.32} = -0.94$	.35

3 Months: Mean = 11.2; sd = 2.86

Group	n	sem	z	p
Cesarean-Breech	38	.46	$z = \frac{11.6 - 11.2}{.46} = 0.87$	.38
Cesarean-Cephalic	39	.46	$z = \frac{12.1 - 11.2}{.46} = 1.96$	.05
Vaginal-Breech	36	.48	$z = \frac{11.2 - 11.2}{.48} = 0$	1.00
Vaginal-Cephalic	39	.46	$z = \frac{11.2 - 11.2}{.46} = 0$	1.00

5 Months: Mean = 20.6; sd = 4.45

Group	n	sem	z	p
Cesarean-Breech	39	.72	$z = \frac{20.7 - 20.6}{.72} = 0.14$	.89
Cesarean-Cephalic	39	.72	$z = \frac{21.2 - 20.6}{.72} = 0.83$	.41
Vaginal-Breech	36	.74	$z = \frac{19.6 - 20.6}{.63} = -1.35$	.18
Vaginal-Cephalic	39	.72	$z = \frac{20.7 - 20.6}{.72} = .14$	.89

Summary of the 3-Way Repeated Measures Analyses of the AIMS and 2-Way Analyses of the Peabody Developmental Motor Scales Scores and Age Walked (continued)

z-tests between Group AIMS Scores and the Normative Sample (Piper and Darrah, 1994) (continued)

7 Months: Mean = 30.3; sd = 6.18

Group	n	sem	z	p
Cesarean-Breech	36	1.03	$z = \frac{30.8 - 30.3}{1.03} = 0.49$	.62
Cesarean-Cephalic	38	1.00	$z = \frac{32.1 - 30.3}{1.00} = 1.80$	.07
Vaginal-Breech	36	1.03	$z = \frac{31.1 - 30.3}{1.03} = 0.78$	.44
Vaginal-Cephalic	38	1.00	$z = \frac{31.6 - 30.3}{1.00} = 1.30$	.19

10 Months: Mean = 47.4; sd = 6.70

Group	n	sem	z	p
Cesarean-Breech	37	1.10	$z = \frac{48.2 - 47.4}{1.10} = 0.73$	.47
Cesarean-Cephalic	37	1.10	$z = \frac{47.9 - 47.4}{1.10} = 0.45$	.65
Vaginal-Breech	35	1.14	$z = \frac{46.7 - 47.4}{1.14} = -0.61$	.54
Vaginal-Cephalic	37	1.10	$z = \frac{47.6 - 47.4}{1.10} = 0.18$	.86

15 Months: Mean = 57.4; sd = 1.21

Group	n	sem	z	p
Cesarean-Breech	36	.20	$z = \frac{57.9 - 57.4}{.20} = 2.50$	.01
Cesarean-Cephalic	37	.20	$z = \frac{57.6 - 57.4}{.20} = 1.00$	.32
Vaginal-Breech	34	.21	$z = \frac{57.7 - 57.4}{.21} = 1.43$	.15
Vaginal-Cephalic	36	.20	$z = \frac{58 - 57.4}{.20} = 3.00$	.003

Summary of the 3-Way Repeated Measures Analyses of the AIMS and 2-Way Analyses of the Peabody Developmental Motor Scales Scores and Age Walked (continued)

Subscale and Source	df	MS	F	p
PDMS Gross Motor Subscale				
Balance				
Presentation	1	.08	.04	
Delivery	1	.78	.42	
Presentation by Delivery	1	3.28	1.77	
Subjects within Pr x D	139	1.86		
Non-locomotor				
Presentation	1	.91	1.41	
Delivery	1	.04	.07	
Presentation by Delivery	1	.61	.94	
Subjects within Pr x D	139	.65		
Locomotor				
Presentation	1	34.37	2.17	
Delivery	1	16.61	1.06	
Presentation by Delivery	1	6.05	.38	
Subjects within Pr x D	139	15.85		
Receipt / Propulsion				
Presentation	1	5.94	1.29	
Delivery	1	11.39	2.48	
Presentation by Delivery	1	1.20	.26	
Subjects within Pr x D	139	4.60		
Total Gross Motor				
Presentation	1	56.84	1.29	
Delivery	1	67.82	1.54	
Presentation by Delivery	1	1.10	.03	
Subjects within Pr x D	139	44.12		

Notes: Alpha level (Bonferroni's Correction) = .013 for individual skill areas or .05 for Total Sub-scale Score. Nonsignificant p values left blank. PDMS = Peabody Developmental Motor Scales. Pr x D = interaction of Presentation and Delivery.

Summary of the 3-Way Repeated Measures Analyses of the AIMS and 2-Way Analyses of the Peabody Developmental Motor Scales Scores and Age Walked (continued)

Subscale and Source	df	MS	F	p
PDMS Fine Motor Subscale				
Grasping				
Presentation	1	.12	.12	
Delivery	1	.26	.26	
Presentation by Delivery	1	.01	.01	
Subjects within Pr x D	139	1.00		
Hand Use				
Presentation	1	.00	.00	
Delivery	1	.00	.00	
Presentation by Delivery	1	.05	.02	
Subjects within Pr x D	139	2.27		
Eye-Hand Coordination				
Presentation	1	6.99	.82	
Delivery	1	15.78	1.84	
Presentation by Delivery	1	46.96	5.48	
Subjects within Pr x D	139	8.57		
Manual Dexterity				
Presentation	1	.56	.35	
Delivery	1	.007	.004	
Presentation by Delivery	1	.04	.03	
Subjects within Pr x D	139	1.61		
Total Fine Motor				
Presentation	1	9.33	.40	
Delivery	1	11.47	.49	
Presentation by Delivery	1	40.04	1.72	
Subjects within Pr x D	139	23.34		

Notes: Alpha level (Bonferroni's Correction) = .013 for individual skill areas or .05 for Total Sub-scale Score. Nonsignificant p values left blank. PDMS = Peabody Developmental Motor Scales. Pr x D = interaction of Presentation and Delivery.

Summary of the 3-Way Repeated Measures Analyses of the AIMS and 2-Way Analyses of the Peabody Developmental Motor Scales Scores and Age Walked (continued)

Source	df	MS	F	p
Age Walked				
Presentation	1	.88	.41	
Delivery	1	.88	.41	
Presentation by Delivery	1	1.78	.83	
Subjects within Pr x D	137	2.14		

Notes: Nonsignificant p values left blank. Pr x D = interaction of Presentation and Delivery.