The Dangers of Insufficient Exclusive Breastfeeding

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I have provided a paid expert opinion on a neonatal hypoglycemia case, 100% proceeds donated to the Fed is Best Foundation.

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All resources at FedisBest.org are free because safe infant feeding is a human right.

Presentation Outline

- Case of newborn starvation from early exclusive breastfeeding
- Basics of feeding, fasting and starvation
- How an infant is underfed - caloric and fluid requirements, weight loss
- Brain- and life-threatening complications of newborn/infant starvation
- Safe limits for newborn weight loss/fasting from exclusive breastfeeding
- Preventing complications, Informed Consent and Safe Breastfeeding

Case Presentation: Landon

Landon was born to a G2P0 mother at 39 weeks 2 days born by c-section due to fetal intolerance of labor. Born with Apgar scores 8 and 9 weighing 3360 g.

Developed grunting and given supplemental O2 and IV bolus

Glucose levels were monitored q1hr x 4 and they remained stable at 109, 107, 103, 85.

Landon was shortly transferred to MBU to exclusively breastfeed

Case Presentation: Landon

Mom’s risk factors for insufficient or delayed lactogenesis II:

Diet-controlled diabetic, small widely-spaced breasts with minimal growth during pregnancy, PCOS, issues with infertility (SAB1), high BMI, primiparity, emergency cesarean.

Landon was born in a Baby-Friendly hospital and mom was supported to exclusively breastfeed with close monitoring of breastfeeding by RNs, LCs and MD support.

Breastfeeding Log

2/25 22:01	---	Time of birth, birth weight 3360 g
2/26 00:07	40 minutes	1st feeding @ 2.5 hrs, LATCH 6, difficulty maintaining latch
2/26 02:24	18 minutes	Per mom, latch improved
2/26 03:15	15 minutes	
2/26 04:22	12 minutes	
2/26 05:00	1.19% weight loss	Weighed @ 7 hours
2/26 07:50	32 minutes	LC: LATCH 10, presence of colostrum confirmed
2/26 10:00	18 minutes	
2/26 10:30	14 minutes	
2/26 11:00	27 minutes	

Breastfeeding Log

2/26 11:35	15 minutes	RN: LATCH 10
2/26 12:00	35 minutes	LC: LATCH 10, mom expressed concern about baby breastfeeding so long, reassured
2/26 13:38	15 minutes	
2/26 14:45	15 minutes	
2/26 17:00	27 minutes	
2/26 20:45	20 minutes	
2/26 21:10	15 minutes	First 24 hrs: 0 wet diapers 4 stools
2/26 22:15	0 minutes	Repeated attempts to hold nipple in mouth

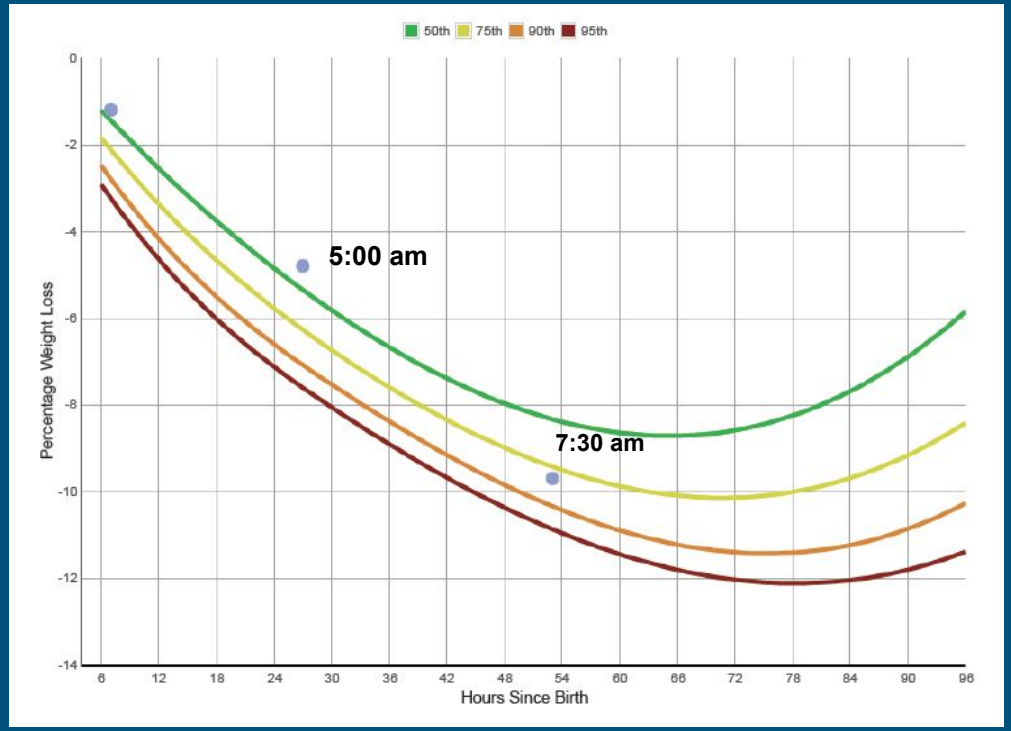
Breastfeeding Log

2/26 23:30	2 minutes	
2/26 23:50	10 minutes	In first 24, baby breastfed 9.3 hours
2/27 01:10	60 minutes	RN: LATCH 7: few audible swallows, 4.76% weight loss @ 27 hours
2/26 02:10	60 minutes	
2/27 03:25	90 minutes	
2/27 05:30	5 minutes	
2/27 07:30	45 minutes	
2/27/10:30	45 minutes	

Breastfeeding Log

2/27 21:15	60 minutes	2nd 24 hours: 13.75 hours of breastfeeding 2nd 24 hrs: 3 wet diapers, 6 dirty diapers
2/28 03:00	60 minutes	According to mom, no more logging occurred b/c Landon fed continuously
2/28 04:00	60 minutes	“Clusterfeeding”
2/28 07:30	60 minutes	9.72% weight loss @ 53 hours
2/28 13:30	60 minutes “Clusterfeeding”	Discharged with next day follow-up, no onset of lactogenesis II, no plan for supplementation with baby exclusively breastfeeding near-continuously for 64 hours, both with little to no sleep

Weight Loss Nomogram



Birth Details

Weight	Date	Time
3360 g	Jan 25	22:01

Delivery Type	Feeding Method
Cesarean	Breast Fed

Measurements

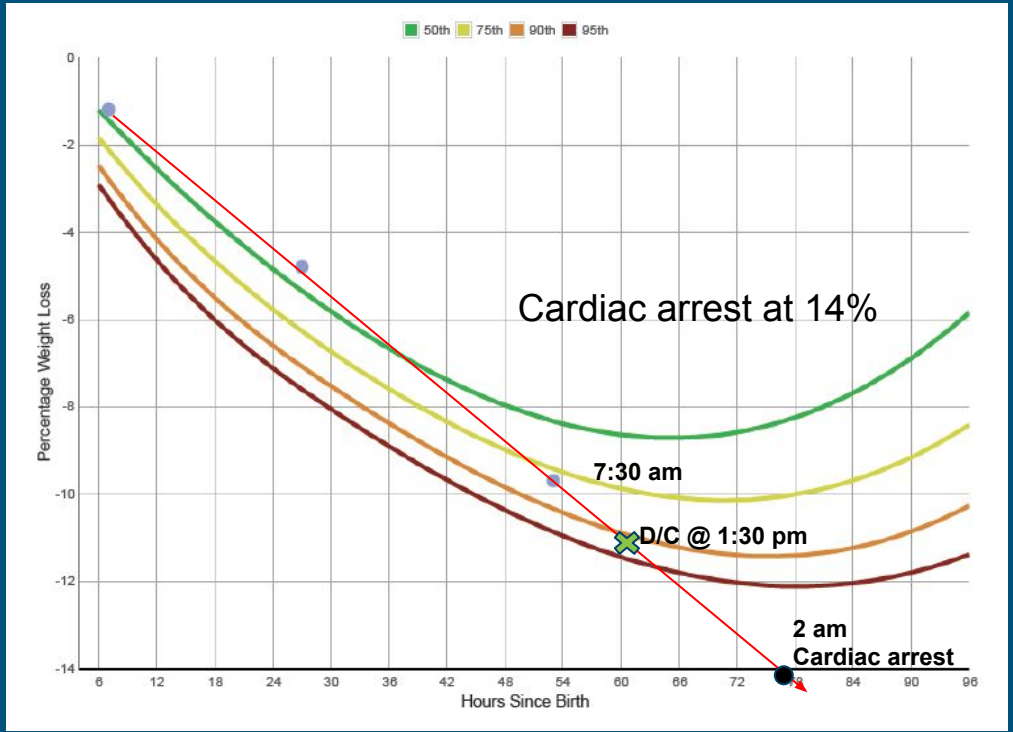
Hour	Weight	Change
Birth	3360 g	—
7	3320 g	-1.2%
27	3200 g	-4.8%
53	3033 g	-9.7%

At Home

Landon continued to “clusterfeed” when they got home.

At 2 am, 12 hours after discharge, Landon “fell asleep” while clusterfeeding.

He was found limp, unresponsive, blue, and EMS was called…



Questions

What was happening to this baby and why did he feed longer and longer until he was continuously on the breast?

If colostrum provides all the nutrients necessary to meet a newborn’s needs, why do EBF newborns develop complications and why would they breastfeed for hours a day with no sleep?

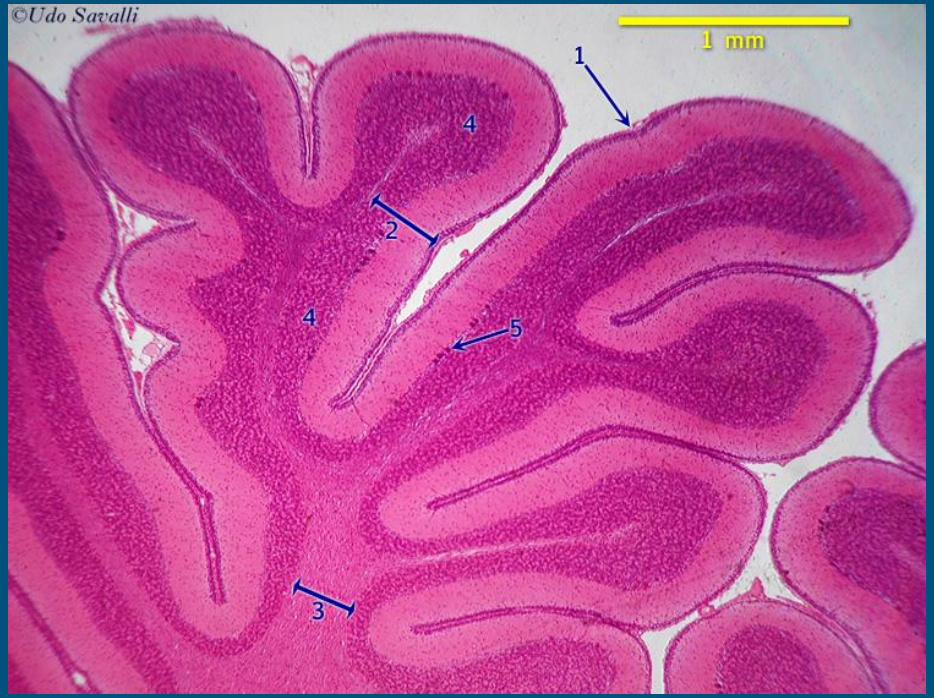
Why are most exclusively breastfed newborns crying? Why do they lose weight?

When does a newborn go from hungry to starving and what are the consequences?

The Basics: Living Cells

Healthy babies are born with all their cells arranged in a way to optimize bodily function and brain development

Every living cell needs calories every second to maintain the basic architecture and function of vital organs.



The Basics: Living Cells

Newborns are born with variable amounts of reserve:

Some are born depleted - small, premature, prolonged, complicated delivery, maternal prolonged fasting

Some are born with high requirement - large, maternal diabetes

The birth weight does not signify a full tank

Fasting and Starvation

If a child does not receive the calories needed to feed their living cells,

Glycogen, protein and fat are depleted → "fasting"

Glucose becomes depleted → ketones from fat become the primary fuel

Ketones are the fuel during fasting and starvation — present in higher levels in EBF newborns[1]

If the caloric reserve is depleted, then living cells die and substrates released are used for fuel → "autophagy" → weight loss

Fasting and Dehydration

Babies receiving minimal fluid experience “antidiuresis” or slowing of urine output (0-2 wet diapers a day)

However, since lack of urine output results in lethal electrolyte abnormalities, we produce urine even with minimal to no fluid intake[2]

Fluid deprivation and continued urination accelerates dehydration → hypotension

Hypotensive dehydration leads to lethargy from poor brain perfusion

→ brain injury → cardiac arrest → death

Brain Injury Occurs within Minutes

Hypotension and hypoglycemia causes widespread brain cell death

- 10 minutes ischemia / loss of circulation from hypotension[3]
- 20 - 30 minutes of hypoglycemia can cause massive brain injury[4]

Brain cell death from 10 minutes of loss of fuel delivery

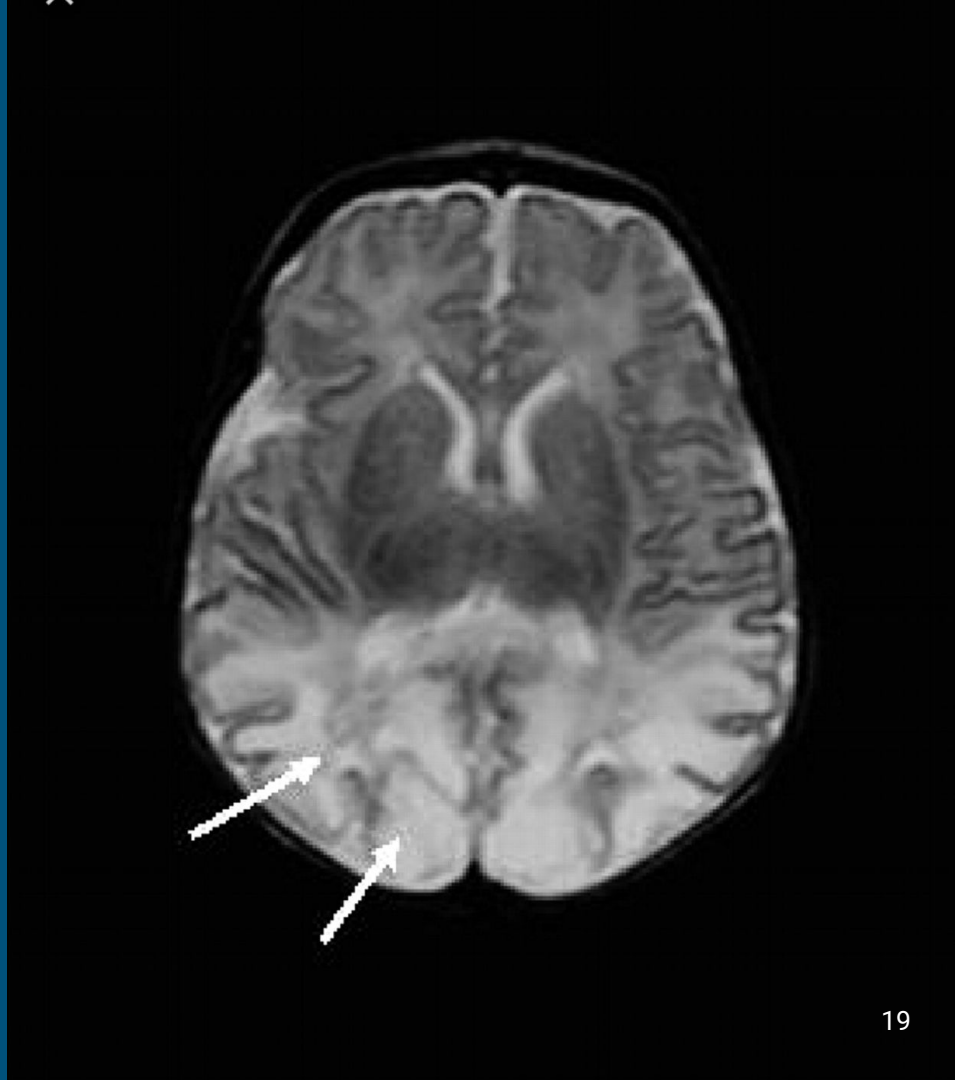
Hypoglycemia

Hypoglycemia - critical state of “running on empty” where necrotic cell death begins to occur

The longer the hypoglycemia, the more brain cells die

Hypoglycemia causes brain cell death and loss of native architecture in dead brain tissue[5]

Brain injury has severe, permanent negative consequences → lifelong disability



Hyperbilirubinemia

Insufficient milk → “breastfeeding jaundice” or starvation jaundice[6]

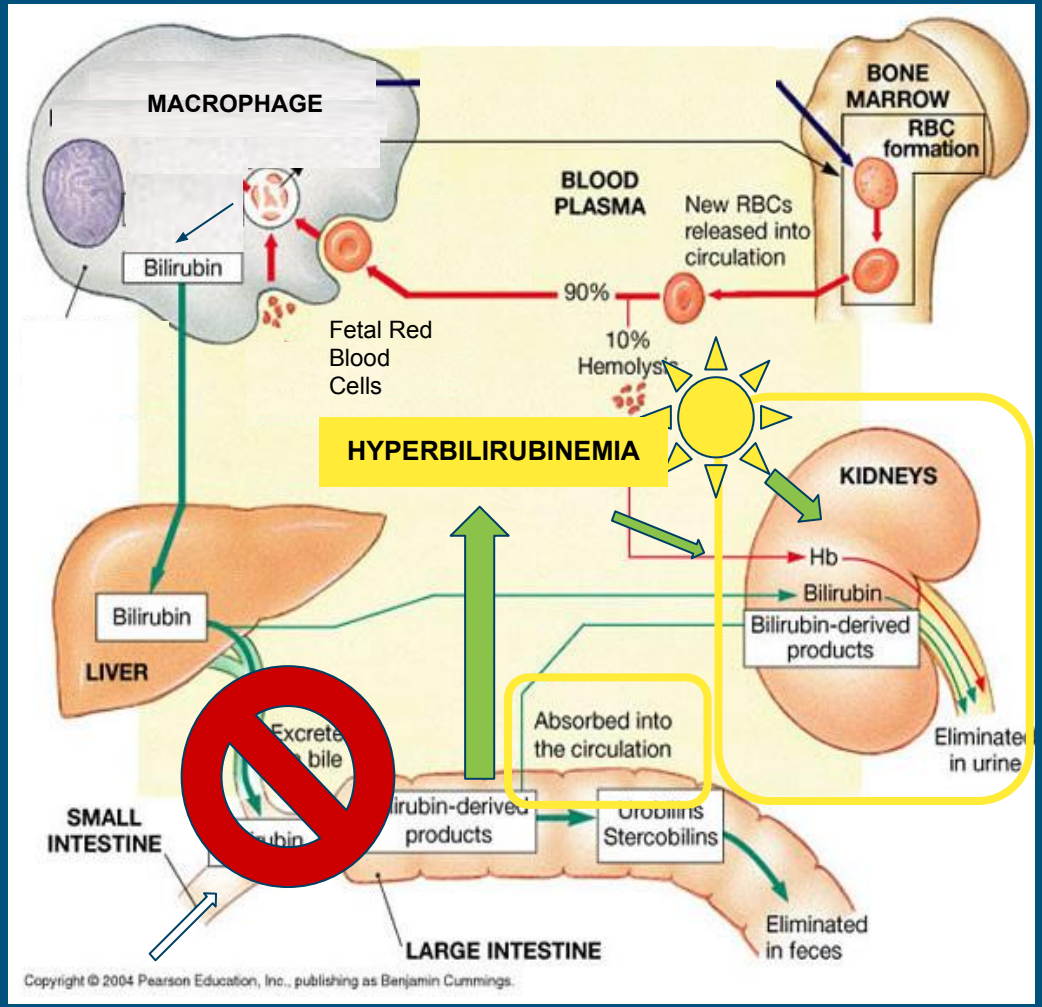
Bilirubin released by liver to digest milk; primary means of bilirubin removal

15% of bilirubin removed via the kidneys, increases w/ phototherapy[7-9]

Low milk volume → bilirubin accumulation.

Excess bilirubin → brain injury, disability

EBF is a risk factor for hyperbilirubinemia[81]



Hyperbilirubinemia

Lower milk volume → bilirubin accumulation

Excess bilirubin → brain injury, disability

EBF is a risk factor for hyperbilirubinemia[81]

TABLE 2.

Risk Factors for Development of Severe Hyperbilirubinemia in Infants of 35 or More Weeks' Gestation (in Approximate Order of Importance)

Major risk factors
Predischarge TSB or TcB level in the high-risk zone (Fig 2)[25,31]
Jaundice observed in the first 24 h[30]
Blood group incompatibility with positive direct antiglobulin test, other known hemolytic disease (eg, G6PD deficiency), elevated $ETCO_c$
Gestational age 35–36 wk[39,40]
Previous sibling received phototherapy[40,41]
Cephalohematoma or significant bruising[39]
Exclusive breastfeeding, particularly if nursing is not going well and weight loss is excessive[39,40]
East Asian race[39]*

AAP Jaundice Guidelines

The primary goal of feeding is to prevent critical starvation that leads to massive body and brain cell death and disability

How many calories do newborns need to not starve and experience brain injury?

Why do EBF newborns lose weight?

Caloric Needs of Newborns to Ensure Cell Survival

Newborn requirement

Daily caloric req't of newborn = 100 Cal/kg/day[10]

Daily fluid requirement of newborn = 100 mL/kg/day

For an average 3 kg baby (6.5 lbs), daily caloric requirement is 300 Cal per day at birth

Minimum fluid requirement is 300 mL per day

Large, small, premature and medically ill babies may have higher caloric requirement

Average mother's colostrum

According to a 2014 study of human milk[11]

Caloric content of colostrum = 54 Cal/100 mL

Mature breast milk = 66-77 Cal/100 mL

Colostrum, in fact, has fewer calories than mature milk

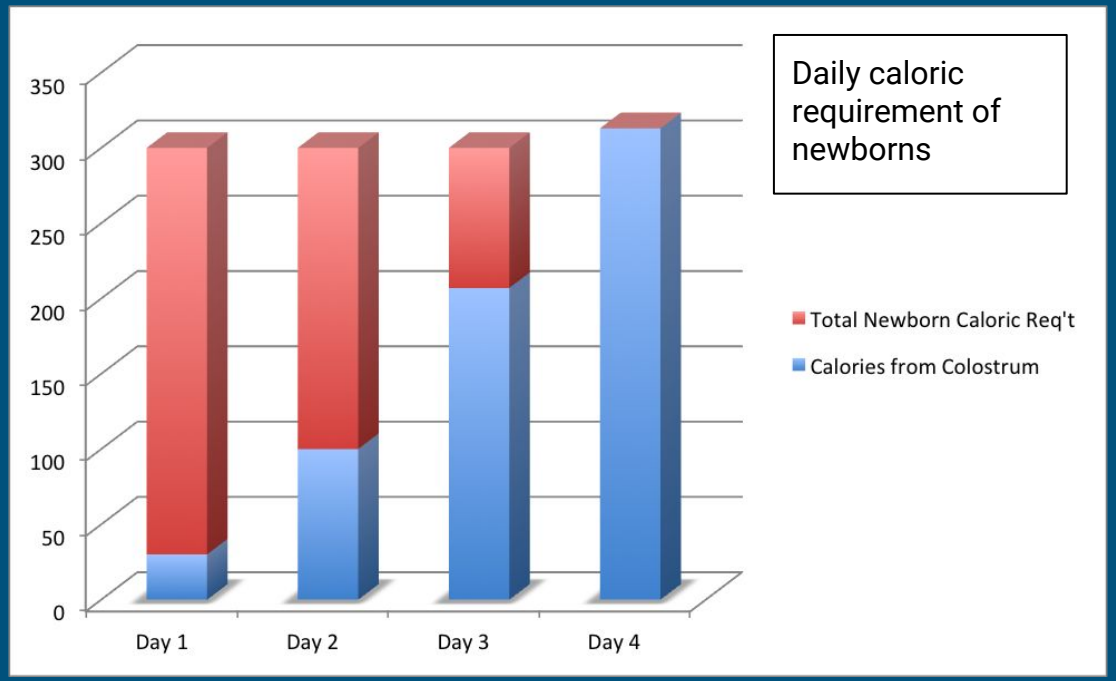
Colostrum is present in small volume and in some women, it is not present at all

Caloric Needs of Newborns to Ensure Cell Survival

Day of life	Average daily colostrum production[12]	Calories provided by colostrum	Daily 3 kg newborn caloric req't
Day 1	56 mL/day	30 Cal	300 Cal
Day 2	185 mL/day	100 Cal	300 Cal
Day 3	383 mL/day	207 Cal	300 Cal
Day 4	580 mL/day	313 Cal	300 Cal

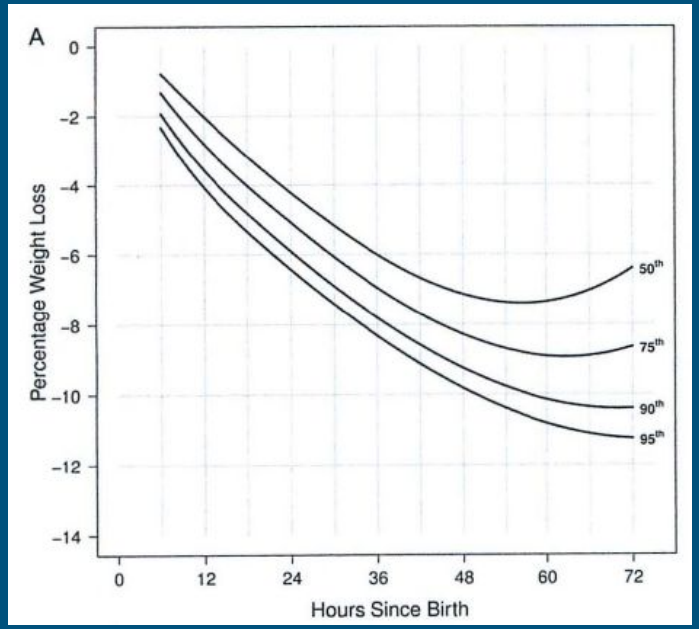
Also the approximate acceptable volumes of colostrum feeding per the BFHI / ABM guidelines[13]

When colostrum/milk meets the newborn caloric need

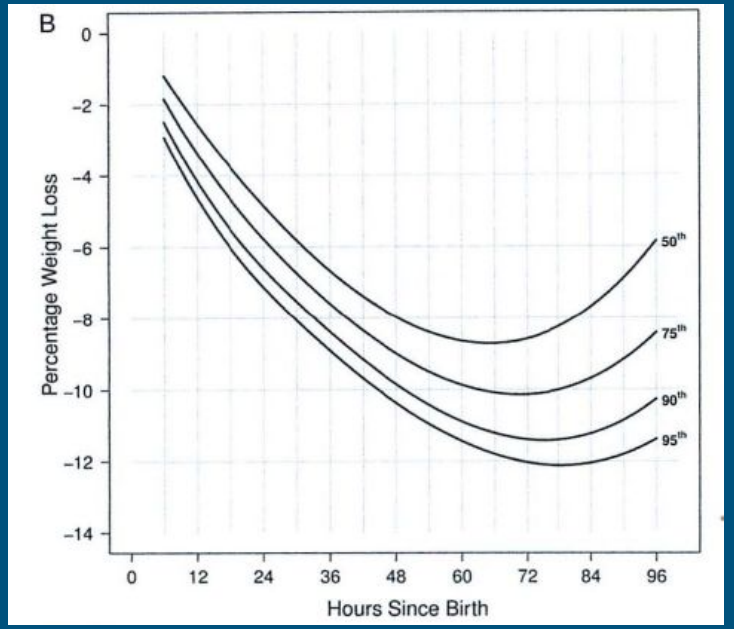


Only on the fourth day does an “average” mother produce sufficient milk to meet the full caloric need of a 3 kg newborn.

How does the newborn respond to this?



Weight loss of vaginally-delivered EBF babies



Weight loss of cesarean-delivered EBF babies[14]

PEDIATRICS , Volume 135, number 1, January 2015 ARTICLE D

So why does an EBF newborn lose weight?

Exclusive breastfed newborns are losing weight because the caloric and fluid content of colostrum does not meet their full metabolic demand.

So why does an EBF newborn lose weight?

Exclusively breastfed newborns are fasting.

How often do EBF newborns have to fast longer?

Study of 280 healthy mothers delivering healthy, term babies[15]

- Close lactation support following the BFHI protocol
- 22% of mothers had delayed lactogenesis II (>72 hrs of life)
- Babies with mothers who had DLII were 7-fold more likely to lose excessive weight of > 10%
- Associated with primiparity* w/ >3.6 kg babies (34% w/ DLII), prolonged labor, BMI >27, flat/inverted nipples, use of labor medication in multips

Pediatrics. 2003 Sep;112(3 Pt 1):607-19.

Primarity is the Highest Risk Factor for DLII

Study of 431 first-time mothers who were exclusively breastfeeding, delivering at term[16]

44% had delayed onset of lactogenesis II (>72 hrs)

Am J Clin Nutr. 2010 Sep;92(3):574-84. doi: 10.3945/ajcn.2010.29192. Epub 2010 Jun 23.

Independent Risk Factors:

- Maternal age > or =30 y
- BMI = overweight or obese
- Birth weight >3600 g
- Absence of nipple discomfort between 0-3 d postpartum
- Infant failing to "breastfeed well" > or =2 times in the first 24 h

Insufficient Exclusive Breastfeeding

The most common complications of early exclusive breastfeeding are caused by fasting:

Hypoglycemia

Excessive Weight loss

Dehydration/Hypernatremia

Hyperbilirubinemia

Starvation

Brain Injury

Vital Organ Injury

Death

Causes of Readmissions, N = 5308 (17.9/1000 WBN Discharges) (Utah)

Cause	N (%)
Feeding problems*	2170 (40.9)
Jaundice*	1873 (35.3)
Respiratory distress	1753 (33)
Rule out sepsis	1193 (22.5)
Infection	1124 (21.2)

Early Readmission of Newborns in a Large Healthcare System. Pediatrics May 2013, Volume 131(5)

*The leading causes of newborn hospitalizations in the U.S. are complications from insufficient feeding due to early exclusive breastfeeding.[17]

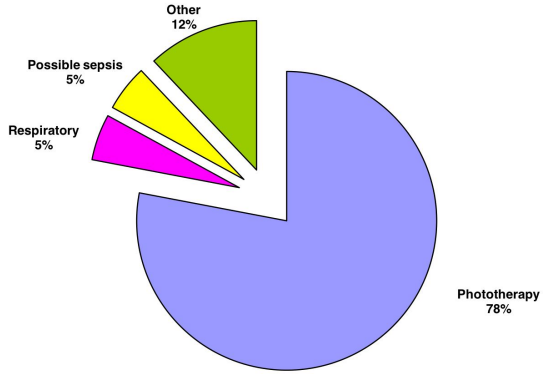
Leading Causes of Neonatal Readmission[18]

13 of 28

Top 8 Principal Dx Codes for Inborn Readmissions (2005- 2009)

DX Code	Percent of total 2005	Percent of total 2009	Percent change 2005-2009
774.xx Jaundice	40.1%	47.7%	17.2%
778.4 Other disturbances of temp. regulation	3.8%	5.3%	39.5%
780.6x Fever	3.3%	.7%	-78.8%
530.81 Esophageal Reflux	3.0%	.7%	-76.7%

Newborn Readmits



NATIONAL PERINATAL INFORMATION CENTER
Quality Analytic Services

American Hospital Association

86% of jaundice admissions result from non-hemolytic or starvation-related jaundice.[19]

Exclusive Breastfeeding Readmissions

- Among healthy term EBF newborns, 10% of vaginally-delivered and 25% of cesarean-delivered newborns developed excessive weight loss of > 10%
- Exclusive breastfeeding at discharge increases the risk of readmission
    - 2-fold increased risk for readmission among discharged healthy, term EBF infants (leading causes were jaundice and dehydration)[20]
    - 11-fold increased risk for dehydration readmission overall[21]
    - 2.3-fold increased risk for hypoglycemia readmission (U.K. NHS data)[22]
    - 98% of hypernatremic dehydration in underfed EBF newborns[23]

Phototherapy Admissions in the U.S.

- ABM estimates that 10-18% of US EBF newborns develop starvation jaundice in the first month of life[6]
- 5.7-10% of newborns at a large BFHI hospital system required phototherapy admissions[83]
- Estimated 228,000 phototherapy admissions in the U.S. annually, majority in dehydrated breastfed newborns[19]
- Cost of U.S. phototherapy admissions = $3.3 billion a year
- Lifetime care of brain-injured newborns costs millions per child

Why do complications occur to EBF newborns if colostrum is “enough” and 10% weight loss is “normal”?

Why do we think that 10% weight loss is normal?

Derived from a 1984 study of 7 vaginally-delivered, healthy term EBF newborns[27]

2 babies lost 10%, one baby failed to thrive, gained minimal weight at 4 wks

No laboratory markers for starvation (glucose, Na, bilirubin levels) were reported.

No long-term data on brain development to compare them to babies who did not lose weight

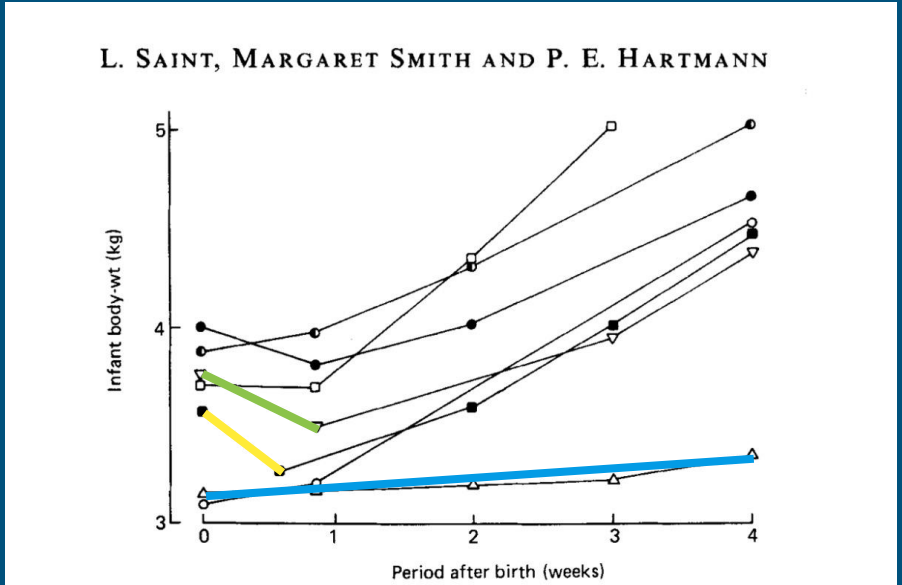


Fig. 4. The body-weight (kg) of the infants of seven mothers (A_1(○), A_2(●), A_4(■), A_6(□), A_8(◐), A_{11}(△), A_{12}(▽)) from birth of infant to 4 weeks post-partum.

How can this be if we survived through EBF?

No historical evidence that we primarily fed babies through *exclusive* breastfeeding from a single mother from birth prior to the WHO BFHI.

Before the WHO BFHI, newborns were near-universally *supplemented* in the first days of life with prelacteal feeding (milk of wet nurses, animal milk or sugar water)

High Breastfeeding Rates Despite Supplementation

Country (Survey date)	*Prelacteal Feeding*	*Median BF Duration*	*BF @ 1 year / 2 year*
Vietnam (1997)	Nearly 100% [28]	16.7 months	80.2% / 23.3%
India (1992-1993)	87.9%, [29], 99%[30]	24.4 months	87.5% / 67.5%
Gambia (2000, earliest)	98% [31]	No data	96.8% / 53.9%
Nigeria (1990)	Nearly 100% [32]	19.5 months	86.4% / 42.9%
S. Africa (1998)	57% mix-fed;47.1% PLF[33]	16 months	66.6% / 30.4%
Bangladesh (1993-94)	90%[34]	>36 months	95.5% / 86.5%
Pakistan (1990-91)	Nearly 100% [35]	19.9 months	78.2% / 51.7%

From the WHO Global Data Bank on Infant and Young Child Feeding

Why was prelacteal feeding common?

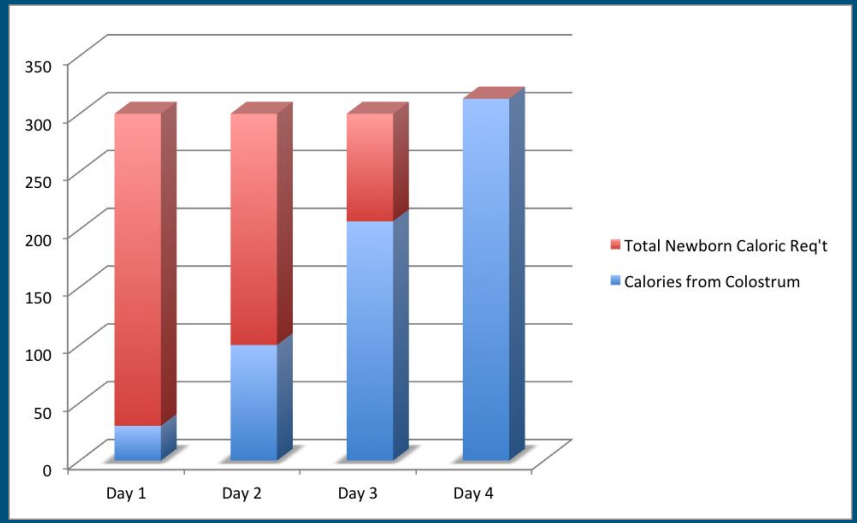
- Most common answer from breastfeeding mothers is “not enough milk”
- 2002 Study of 1100 healthcare workers in Kaduna, Nigeria[36]
  - Nurses gave prelacteal feeds for “perceived” milk insufficiency
  - Doctors gave prelacteal feeds to prevent dehydration, hypoglycemia and jaundice

*Eur J Clin Nutr. 2002 Aug;56(8):729-34.

The Stance of the WHO and the BFHI

Nothing but breast milk is appropriate from birth to 6 months, despite widespread “perceived” inadequacy of breast milk in first days of life

“Colostrum meets the nutritional needs of newborns” without any reference to the caloric content of colostrum or the newborn caloric requirement.



Who’s “perception” of milk adequacy is correct?

But the newborn stomach is so small...

Where do these volumes come from?

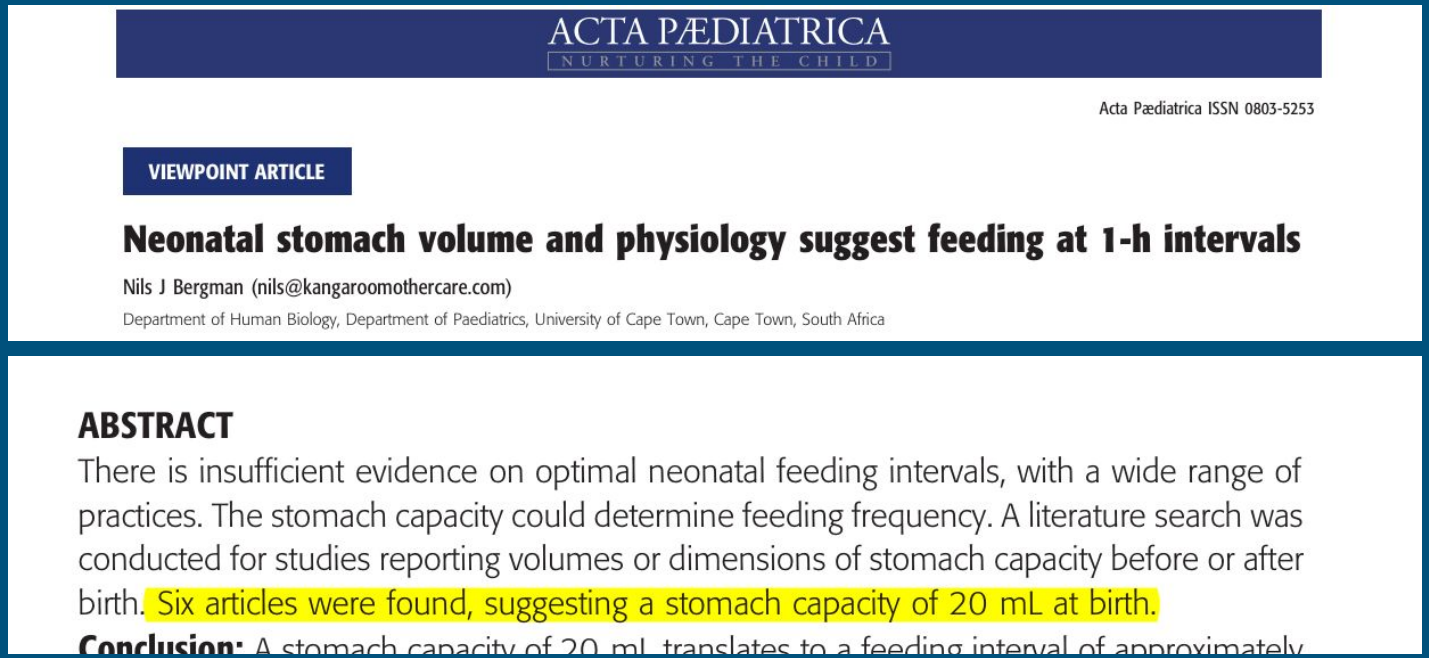
The commonly taught newborn stomach sizes were obtained from the colostrum production of 12 breastfeeding mothers… divided by 10 feeds[37]

NOT the actual size of the newborn stomach

*Am J Clin Nutr 1988;48: 1375

Days postpartum	Corrected milk yield*	Number of subjects
n (range)	*mL/d*	
1	56 ± 65 (−11–155)†	7
2	185 ± 103 (12–379)	10
3	393 ± 158 (226–745)	11
4	580 ± 250 (306–1010)	11
5	563 ± 145 (354–929)	12
6	558 ± 156 (360–888)	10
7	610 ± 187 (421–1008)	8

What is the actual size of the newborn stomach?



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VIEWPOINT ARTICLE

Neonatal stomach volume and physiology suggest feeding at 1-h intervals

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ABSTRACT

There is insufficient evidence on optimal neonatal feeding intervals, with a wide range of practices. The stomach capacity could determine feeding frequency. A literature search was conducted for studies reporting volumes or dimensions of stomach capacity before or after birth. Six articles were found, suggesting a stomach capacity of 20 mL at birth.

Conclusion: A stomach capacity of 20 mL translates to a feeding interval of approximately

38. Acta Paediatrica, May 2013 102:773-777

How often and how soon do healthy, term EBF newborns develop hypoglycemia given their fasting state?

Hypoglycemia in healthy, term EBF babies

- Study of 100 healthy, singleton, full term EBF newborns and incidence of hypoglycemia < 40 mg/dL[39]
- Strictly followed the BFHI protocol and had good sucking reflex and latch
- Glucose by heel-prick monitored at 1, 6, 24 and 48 hours
- 10% of all newborns developed hypoglycemia, all events at 1 and 6 hours
- 23% of the first-born newborns developed hypoglycemia

J Clin Diagn Res. 2015 Sep;9(9):SC07-10.

What does hypoglycemia do to the brain?

- One study of 94 newborns who had brain MRIs to see effect of < 46 mg/dL within first 24 hrs[40]
- Hypoglycemia → 3.72-fold increase in brain injury on MRI
- 12-month follow-up of babies → hypoglycemic babies had 4.82-fold increased chance of lower scores in motor, cognitive and language testing (BSID)

J Pediatr. 2012 July ; 161(1): 88–93

What does transient hypoglycemia do?

1395 asymptomatic newborns universally-screened by 3 hours of life[41]

- Effects of hypoglycemia on ability to pass 4th-grade (10 y.o.) standardized tests in literacy and math
- Tested 3 different cut-offs for hypoglycemia: < 35, < 40, < 45 mg/dL

Hypoglycemia < 45 resulted in 38% reduction in passing literacy test

For newborns with hypoglycemia < 35 and < 40, there were 50% reductions in their ability to pass the test in literacy and math

Study published October 2015, JAMA Pediatr. 2015; 169(10): 913-921

Lower Odds of Passing 4th Grade Proficiency

Adjusted Odds Ratio of Passing 4th Grade Proficiency Test

	< 35 mg/dL	< 40 mg/dL	< 45 mg/dL
Incidence	6.4%	10.3%	19.3%
Literacy	0.49 (0.28-0.83)	0.43 (0.28-0.67)	0.62 (0.45-0.85)
Math	0.49 (0.29-0.82)	0.51 (0.34-0.78)	0.78 (NS)

* Hypoglycemia affected all categories of newborns including healthy, term babies who were appropriately-sized for gestational age

Peripartum Neonatal Hypoglycemia

- “Physiologic nadir” of glucose found in newborns shortly after birth is common but not benign
- Brain cells *do not care* what time you were born when deciding to live or die from hypoglycemia

Effects of Prolonged Hypoglycemia

Newborn lethargy occurs when the brain is no longer supplied with enough calories or circulation to keep the brain awake.

By the time they are lethargic, they may have devastating levels of brain injury visible on MRI

Hypoglycemia from Poor Breastfeeding

- Latest article looking at 11 healthy, term, appropriate-sized exclusively breastfed babies, found lethargic from insufficient feeding, hypoglycemia[42]
  - Occurred between days 2 - 5
  - Lost 0-16% of birth weight; 9 out of 11 lost < 10%
  - Found lethargic, poorly feeding, seizing, hypothermic, apneic
  - 5 out of 6 MRIs had brain injury present affecting extensive areas of several lobes of the brain

Hospital Pediatrics, September 2015, VOLUME 5 / ISSUE 9

Case No.	Mode of Delivery	% Wt Loss	Age (DOL)	Presenting Symptoms	Glucose (mg/dL)	Seizure	MRI Results
1	Vaginal	10.5	4	Lethargy, poor feeding, seizure in trauma bay of ED	20	Yes	Extensive areas of restricted diffusion involving the bilateral parietal and occipital lobes
2	Vaginal	7.3	4	Lethargy, poor feeding, seizures	20	Yes	Extensive severe injury to the posterior one-third of the supratentorial brain
3	Vaginal	6.6	3	Lethargy, poor feeding, no urine ×12 h	36	No	No MRI done
4	Vaginal	9.1	2	Twitching in upper extremities	28	Twitching but EEG normal	No MRI done
5	Vaginal	4.2	3	Poor feeding. shallow breathing, tremors	13	Yes	Restricted diffusion in parietal and bilateral occipital lobes
6	Vaginal	16	3	Lethargy, hypotonia, apnea	<20	Yes	Diffuse brain injury involving frontal, parietal, and occipital
7	Vaginal	0	3	Cyanotic episode at home, lethargy, poor feeding	<20	Yes	Restricted diffusion involving both posterior parietal, temporal, and occipital lobes
8	Vaginal	7	4	Lethargy, poor feeding	23	No	No MRI done
9	Cesarean	7.1	2	Apnea, hypotonia	8	No	Normal
10	Vaginal	5.5	2	Apnea at home	13	No	No MRI done
11	Cesarean	4.5	5	Low temperature at PMD office	35	No	No MRI done

Hypoglycemia from Poor Breastfeeding

- Babies went on to have variable long-term neurological disabilities
  - Epilepsy
  - Diffuse body weakness (hypotonia)
  - Visual impairment
  - Severe feeding difficulties requiring speech therapy

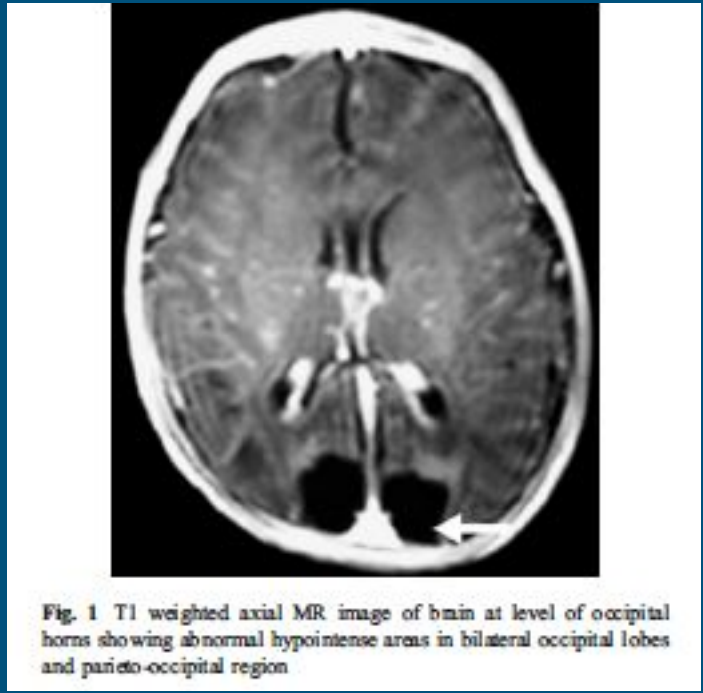


Fig. 1 T1 weighted axial MR image of brain at level of occipital horns showing abnormal hypointense areas in bilateral occipital lobes and parieto-occipital region

Glucose 20 mg/dL in breastfed newborn at 9% wt loss, MRI at 1 month[43]

Neonatal Hypoglycemic Brain Injury

Study of 35 term infants with isolated symptomatic hypoglycemia < 47 mg/dL with brain MRI[5]

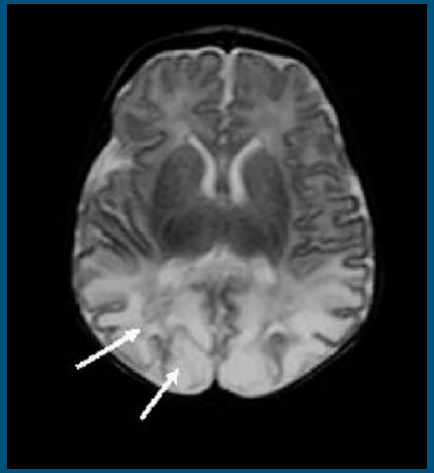
Sx: Poor feeding, hypothermia, jitteriness, limpness, irritability, lethargy, seizures, cyanosis and apnea

33 out of 35 infants had brain injury visible on MRI

Affected every area of the brain, every possible distribution from small to large areas of injury

Burns, C.M., et al. Pediatrics *122*, 65–74.

Hypoglycemia ≤ 47 mg/dl[5]



Size of injury did *not* correlate with

severity of hypoglycemia

whether it was transient or prolonged

presence or absence of seizure*

TABLE 3 Lesions Detected in 35 Infants With Neonatal Hypoglycemia

Lesion Site	No. With Isolated Hypoglycemia (%)
WM abnormalities	33 (94)
Mild	5 (14)
Moderate	13 (37)
Severe	15 (43)
Nature of severe WM lesions	
Focal hemorrhage	2 (13)
Unilateral focal MCA infarction	3 (20)
Widespread infarction	10 (67)
Global	2 (13)
Symmetrical posterior parasagittal	6 (39)
Asymmetrical posterior parasagittal	2 (13)
Location of all WM lesions	
Global	13 (39)
Posterior more than anterior	4 (12)
Anterior more than posterior	2 (6)
Posterior only	6 (18)
Anterior only	0 (0)
Unilateral	2 (6)
Periventricular	12 (36)
Posterior	4 (12)
Basal ganglia or thalami lesion	14 (40)
Normal (score 0)	21 (60)
Mild (score 0)	10 (29)
Moderate/severe (score 1)	4 (11)
PLIC	
Abnormal/absent myelination	4 (11)
Normal myelination	31 (89)
Cerebellum	2 (6)
Abnormal SI	1 (3)
Hemorrhage	1 (3)
Cortex	18 (51)
Highlighting[a]	12 (34)
Loss of markings[a]	9 (26)
Brainstem	2 (6)
Abnormal SI	1 (3)
Hemorrhage	1 (3)
Extracerebral hemorrhage	5 (14)
Intraventricular hemorrhage	3 (9)
Subarachnoid hemorrhage	0 (0)

[a] Not mutually exclusive.

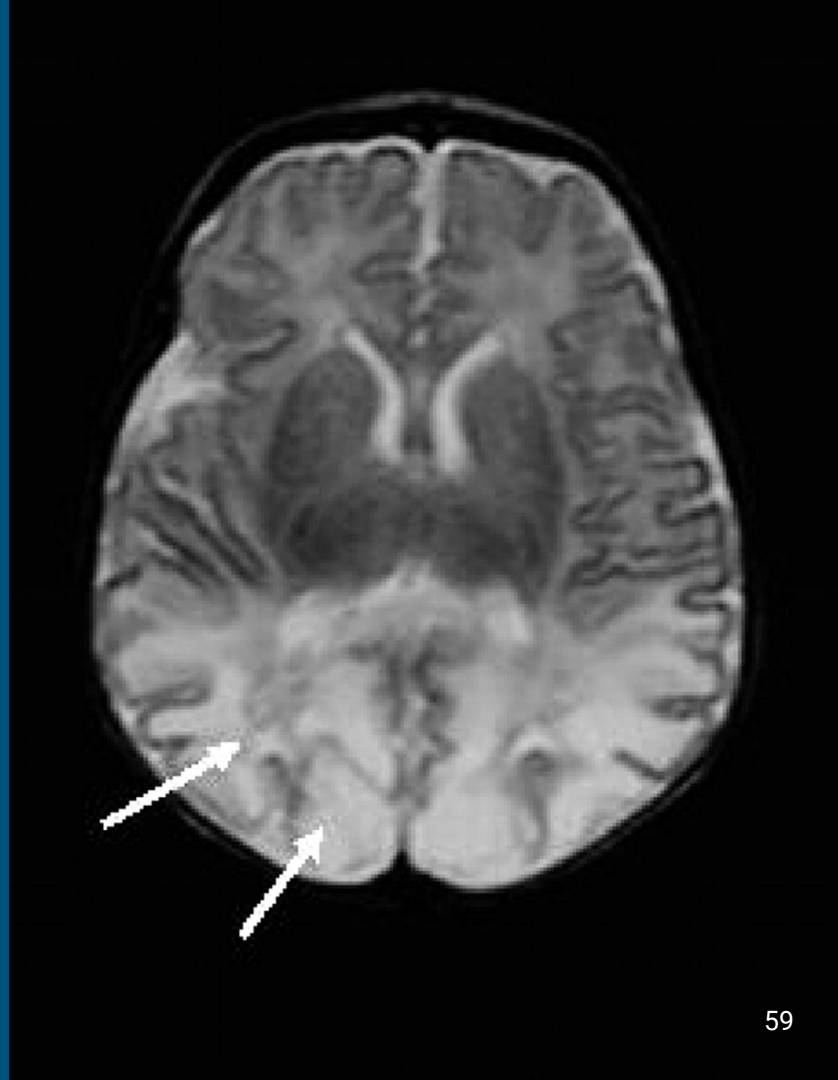
Neurological Outcomes of Hypoglycemia

Variable patterns of neurodevelopmental disabilities[5]

- Cerebral palsy
- Mild to moderate motor deficits
- Mild to moderate cognitive deficits
- Speech and language deficits
- Febrile seizures and epilepsy
- Visual deficits: squint, visual field defects, cortical visual impairment, immature visual attention and tracking, visuospatial difficulties

Hypoglycemic Brain Injury

- Hypoglycemia causes brain injury easily and rapidly
- Hypoglycemia can reduce a child's cognitive potential irreversibly
- Just ONE episode of starvation can disable a child for life
- The best way to protect the newborn brain is by preventing hypoglycemia



Glucose Monitoring of EBF Babies

Latest studies suggest EBF newborns should be monitored for glucose.

Glucose monitoring is the only objective measure of the baby's fuel reserve

Without it…

Only the baby knows when they are close to "empty."

Safe Limits to Prevent Risk of Brain Injury

Lowest glucose level - 47 mg/dL[5,44]

Pediatric Endocrine Society recommends keeping glucose > 50 mg/dL if <48h old then >60 mg/dL[45]

Brain mounts the “neuroendocrine response” at < 50-60 mg/dL

< 47 mg/dL increased risk of brain injury on MRI, lower cognitive scores at 12 months[40] and lower academic proficiency at 10 years of age[41]

Safe Limits to Prevent Risk of Brain Injury

Highest bilirubin level - > 15 mg/dL

Higher risk for disabilities associated with neonatal hyperbilirubinemia (ADHD, cognitive declines, BIND, seizures, cerebral palsy, kernicterus)[46, 68-72]

Markers of brain injury found in blood by 17 mg/dL,[47] accelerates at 19[48]

45% of babies with bilirubin > 19.9 mg/dL have long-term neurobehavioral problems (ADHD, low academic performance, alcoholism) (30 year f/u)[49]

At this time, one BFHI hospital system has reported that 12-20% of their babies develop bilirubins of > 15 mg/dL; and phototherapy rate of 10.1%[50]

Safe Limits to Prevent Risk of Brain Injury

Hypernatremia of > 150 mEq/L

Study of 116 cases of breastfeeding-related neonatal hypernatremia[51]

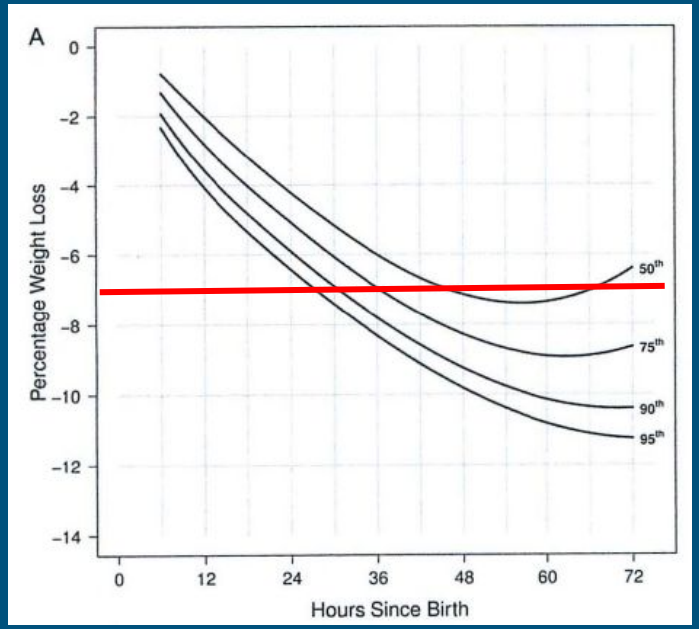
More than 50% of babies exhibited abnormal development by 12 months

When does hypernatremia occur? - 95% of hypernatremic cases begin at

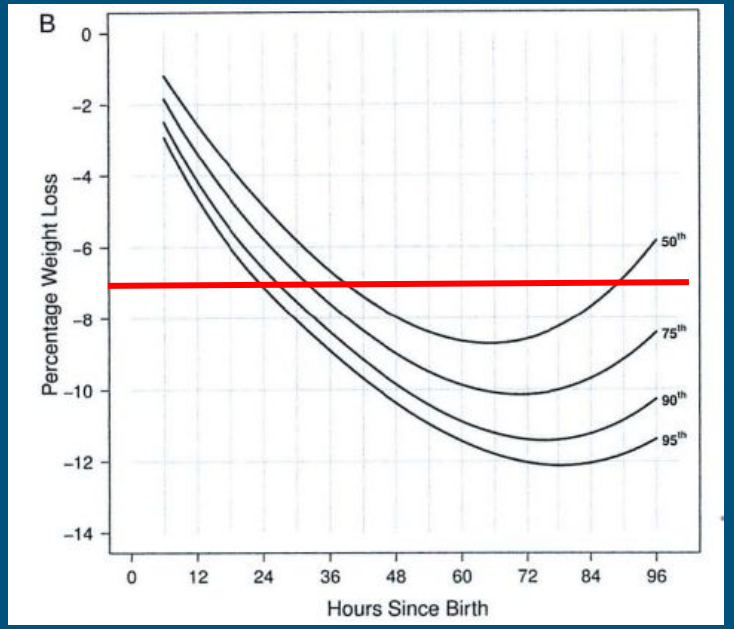
7% weight loss[52, 53]

Greater than half of all EBF newborn babies lose > 7% of their birth weight[14]

Over Half Lose Greater than 7%



Weight loss of vaginally-delivered EBF babies



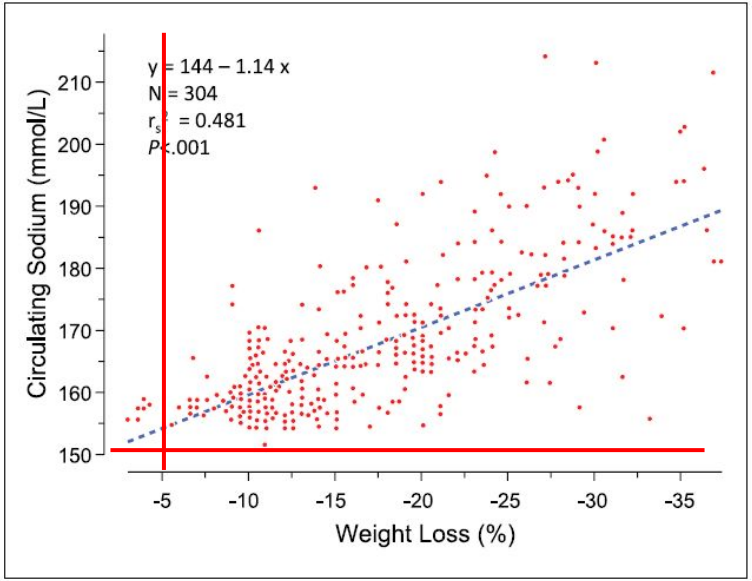
Weight loss of cesarean-delivered EBF babies[14]

PEDIATRICS Volume 135, number 1, January 2015 ARTICLE D

Hypernatremia

- Hypernatremia is considered rare
  - Percent weight loss data suggest hypernatremia is not rare
  - Hypernatremia is “rare” because it is not routinely screened for
- Hypernatremia causes brain injury, renal failure, DIC, intravascular thrombosis, epilepsy, disability and increased risk of death[54]

Figure 2. Relationship between Percentage Weight Loss and Sodium Concentration in 304 Late Preterm or Term Newborn Infants Affected with Breastfeeding-Associated Hypernatremia.



The figure and the regression analysis were built based on data found in references 5-118 concurrently reporting circulating sodium level and percentage weight loss.

53. J Hum Lact. 2016 Feb;32(1):67-74

Mortality Increases with Sodium Level

Neonatal mortality increase to 3.6% by 150 and increases by severity[79]

Sodium level (mEq/L)	Mortality
150-160	3.6%
161-170	17.3%
171-189	66.6%

Safe Limits to Prevent Brain Injury

Weight loss percent > 7% weight loss

(also recommended by AAP, 2012)[55]

- Newborns who lose > 7% weight loss are at higher risk for hypernatremia[52,53] and hyperbilirubinemia > 15 mg/dL[56]
- No neurological data using developmental tests on safety of 10% wt loss
- One study of >12% weight loss with developmental testing at 5 y.o.[57]
    - "Dehydrated" newborns had reduced fine motor score, higher rates of parental concern for language delay, higher rates of parental reports of "shyness," "allergies," and "disability"

What Happens in Real Life

“...my child went through this trauma. He was born healthy and was fed continuously…for the first two days. He was irritable and was always rooting in spite of being fed continuously. 24 hours later he became unresponsive and was taken to the NICU where they stated that his blood sugar dropped to 0. The baby didn't get any milk from me at all. The hospital staff didn't even care to check if I was producing any milk. They blindly suggested to feed the baby continuously and didn't recommend formula. He had brain injury because of this. One third of his brain got affected due to severe dehydration and hypoglycemia..”

— Uma Sista, Irving, TX

“Second Night Syndrome”

Case Conclusion

Landon was pulseless and cyanotic and CPR was started by his father and was continued by EMS en route to the ER.

Required to 2 IOs (due to malfunction) and was intubated in the ER.

VS: Rectal Temp 93.1 F, Pulseless Electrical Activity 130,

Got 7 rounds of epinephrine with no return of circulation. After 45 minutes of CPR, no spontaneous cardiac activity on U/S.

CPR was stopped with parental consent while continuing ventilation and IVF.

Case Conclusion

After 20 minutes of IV saline after CPR termination, he regained his pulse.

Transferred to the nearest Level II NICU for head cooling.

Diagnosed: hypernatremic dehydration from poor feeding and cardiac arrest from hypovolemic shock. Sodium (Na) =155.

Given dextrose infusion, TPN, head cooling protocol

MRI showed injury to the basal ganglia

EEG showed diffuse slowing and seizures c/w widespread brain injury

Case Conclusion

Landon was taken off life support at 19 days of life.

Cause of death according to autopsy:

1. hypernatremic dehydration →
2. cardiac arrest →
3. hypoxic-ischemic encephalopathy

Few hours after birth

12 hours old

2nd day, hungry, constantly crying and nursing

Before discharge, visibly smaller and cluster-feeding

Landon intubated after resuscitation

Jill holding Landon as he took his last breaths

Standard of Care for EBF Mothers & Newborns

- Mothers are not counseled on risk factors for insufficient milk production and breastfeeding complications
- Even if lack of milk or risk factors are confirmed, newborns are commonly allowed to go 24 - 48 hours without supplementation, even if poorly feeding, despite lack of data on its safety.[58] (ABM guidelines)
- Parents and health providers are taught that drops of colostrum is enough.[58]
- EBF newborns not monitored for hypoglycemia despite their fasting state.[59]
- Prolonged crying and nursing, signs of hypoglycemia, are not indications for glucose checks or supplementation[59,60]

Standard of Care for EBF Mothers & Newborns

- The BFHI protocol operates with no awareness of the caloric requirement of a newborn to prevent starvation and brain injury (100 Cal/kg/day or 4 Cal/kg/hr)[9]
- Operates with no awareness of the caloric content of colostrum (54 Cal/dL)[10]
- Believes that 5 mL colostrum can prevent hypoglycemia (3 Calories/5 mL) when it cannot (average requirement for 3 kg newborn is 12 Calories/hr)[9]
- Operates with no knowledge of the calories transferred to a child until starvation-related complications occur[58]

Standard of Care for EBF Mothers & Newborns

- Mothers are told insufficient breast milk is rare when it is not
  - Delayed copious milk is common (44% of primiparous and 22% of all EBF mothers)
  - About 15% of mothers cannot sustain breastfeeding due to insufficient supply
- Mothers are taught there are no risks to exclusive breastfeeding and that there are risks to just one bottle of formula.
- Mothers are not told about the possibility of preventable starvation and brain injury until their babies are affected
- Supplementation is commonly given after they have already developed brain-threatening complications despite hours of newborn distress

Standard of Care for EBF Mothers & Newborns

- Mothers are pressured to withhold supplementation when their babies are crying inconsolably and showing obvious signs of hunger/starvation
- Mothers are sent home before they have adequate milk to sustain their baby's life while being told to not supplement
- They are told crying and continuous/near-continuous nursing are normal when they can be signs of pending hypoglycemia/hypernatremia.
- Starved EBF newborns are commonly found too weak to feed or lethargic from jaundice, hypoglycemia and dehydration shortly after discharge.

Standard of Care for EBF Mothers & Newborns

- For babies who are found lethargic, debilitating levels of brain injury may have already occurred and cannot be reversed
- Per the top WHO breastfeeding guidelines officials, Dr. Nigel Rollins and Dr. Laurence Grummer-Strawn, the BFHI exclusive breastfeeding guidelines have never been tested or monitored for safety
    - Did not have an estimation of the rates of complications from the Ten Steps to Successful Breastfeeding or the BFHI

According to Dr. Rollins

- When asked if the WHO had plans to inform mothers of the risk of brain injury from insufficient breast milk and the role of supplementation to prevent starvation-related brain injury.
- Dr. Rollins:
  - “That specific recommendation, that was not identified by the experts in the guidelines scoping as a top priority. Within the guidelines, there is literature in general on the danger signs, things like convulsions, being lethargic and not being able to feed. Those are clinical signs that are routinely included in materials taught to health care workers and when health workers communicate to mothers. Those signs are identified as ‘alert’ signs.”

Fed is Best Foundation Ethical Stance

- Feeding and being fed are basic patient and human rights.
- A mother cannot be bullied or barred from feeding her inconsolable, hungry child.
- A newborn baby has the right to be fed when persistently crying for milk and showing signs of hunger and thirst
- An inconsolable crying newborn who is losing weight from fasting is crying out of hunger.

Fed is Best Foundation Ethical Stance

- Feeding is more important than exclusive breastfeeding because *the brain will not wait for food*
- Any distressed newborn requires immediate evaluation, a glucose, bilirubin, electrolyte and weight check
- If immediate evaluation is unavailable, supplementation should be offered to prevent the irreversible consequence of starvation-related brain injury

Fed is Best Foundation Ethical Stance

- You cannot ethically gain compliance with early EBF without truthfully informing mothers that their newborns are fasting and are at higher risk for rehospitalization, irreversible brain injury and death from accidental starvation.
- Complications caused by lack of informed consent put health providers/hospitals at risk for litigation.

Hospital Liability for Neonatal Hypoglycemia

Study of 30 claims for neonatal hypoglycemia in the UK between 2002-2011[61]

- Claims > 36 weeks gestation
- Most common sign - abnormal/poor feeding
- Deficits in care were reported, all of which were avoidable
- Damages paid for 25 out of 30 claims
- Total claims £162,166,677
- Average claim award per child - £6.5 million or $10.3 million/child

Breastfed Baby with Kernicterus

Reported in the Arkansas Times, March 10, 2017

Breastfed newborn with ABO-incompatibility

Had high-risk bilirubin at 2 hours of life, sent home with minimal information on jaundice or the possibility of brain injury with follow-up in 10 days, seen at day 8

Mom called doctor due to baby's high-pitched crying with no return of phone calls → bilirubin was 33, MRI showed injury to the basal ganglia c/w kernicturus

Child is now wheelchair bound, cannot talk, feed or care for herself

Family awarded $46.5 million

Fed is Best Guidelines for Safe Early Breastfeeding

Goals:

- No child experiences starvation-related complications
- No child is disabled by starvation

Counseling Before Birth

1. Mother can learn about breastfeeding technique (Stanford Medicine)[63]
2. Mothers can download and fill out a free Feeding Plan - Fedisbest.org[64]
3. Assess the mother's risk factors for insufficient/delayed milk production
4. Review feeding plan with the in-hospital pediatrician and staff *before* birth
5. Provide informed consent of the fasting state of early EBF, risks of jaundice, dehydration, hypoglycemia, brain injury associated with insufficient feeding
6. Provide informed consent of the risk of decreased milk supply if supplementing without adequate time breastfeeding/pumping

Making Sure a Newborn is Fed

- Before every breastfeeding session, mothers can manually express breasts to check for milk (Stanford Hand Expression of Breast Milk)[65]
- Breastfeed within the 1st hour (ideally) with CONFIRMED MILK TRANSFER
  - Assist with correct latch, positioning and hearing of swallows (LATCH)[66]
- Breastfeed for 15-20 minutes per breast every 2-3 hours while hand expressing; feed on-demand (as baby will tolerate)
  - Longer feedings cause greater caloric expenditure than intake, accelerate weight loss

Making Sure a Newborn is Fed

- **If little or no colostrum is present,** a mother may *choose* to supplement 15 mL at time, burp and repeat per hunger cues, to prevent starvation-related complications
  - Depending on a newborn's caloric reserve, they may take 15-30 mL+ of milk per feed
  - Offer mother's expressed breast milk, milk bank donor milk (as available) or formula *per mother's preference*
  - Finger and syringe feeding, SNS feeding, bottle feeding per mother preference
  - Allowing newborns to receive what they need to correct starvation and dehydration protects their brain and vital organs from injury
  - Supplement only AFTER breastfeeding. Offer education on pumping for any missed feedings

Glucose Monitoring for EBF Babies

- EBF newborns are high risk for hypoglycemia due to fasting[39]
  - Monitor glucose per hospital protocol (starting at birth and by 1-hr) and as needed for inconsolable crying despite nursing
  - Babies found hypoglycemic enter hospital's hypoglycemia protocol, IV glucose, *ad-lib* supplementation
- The brain's neuroendocrine response occurs at blood glucose of 50-60 mg/dL to protect its own survival[45]
  - Brain cell tolerance of hypoglycemia does not change according to the time from birth
- The brain's preference should be honored

Hypoglycemic Threshold

- Keeping glucose > 47 mg/dL is the only prospectively validated glucose level that prevent developmental delay[44]
- If blood glucose < 50 mg/dL, the baby is likely depleted of calories
  - PES guidelines: correct glucoses <50 up to 48 hrs old, correct glucoses <60 thereafter[45]
  - Recommend ad lib, unrestricted supplementation after breastfeeding sessions until breastfeeding provides the full caloric requirement of the newborn
  - Restore caloric reserve to stabilize glucose because recurrent hypoglycemia can worsen brain injury

Signs of Hypoglycemia

Supplement if < 50-60 mg/dL for prevention.[45]

- Hypoglycemia < 45 w/o symptoms is also detrimental
- Low body temperature
- Excessive crying even after nursing, prolonged (>45 min) / unsatisfied nursing
- Lethargy, blank staring and poor feeding
- Shakiness or jitteriness
- Seizures - stiffening, jerking, eyes rolling back
- Bradycardia, decreased breathing, blue skin are late signs

Diaper counts do not reflect milk intake[67]

- Wet/dirty diaper counts do not predict adequate milk intake in the first 4 days
- Diapers mostly come from the fluid and meconium they are born with
- Dehydrated babies can produce up to 6 wet diapers on day 4

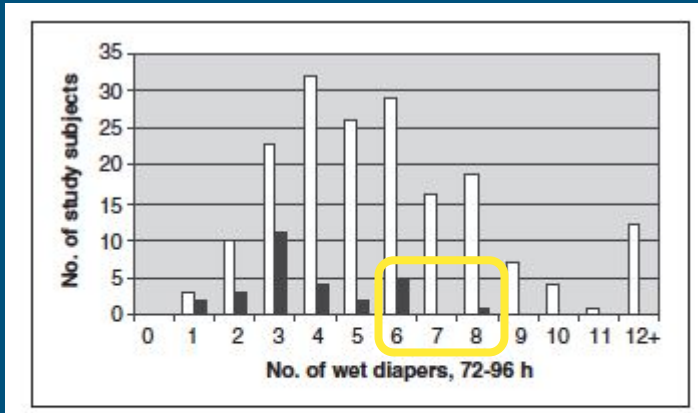


Figure 4. Frequency distribution for wet diaper output on day 4 (72-96 hours) by neonatal weight loss category (white bars = neonatal weight loss < 10% at 72 to 96 hours postpartum, black bars = neonatal weight loss ≥ 10%).

*Newborn Wet and Soiled Diaper Counts and Timing of Onset of Lactation as Indicators of Breastfeeding Inadequacy J Hum Lact 24(1), 2008

Diaper counts do not reflect milk intake[56]

- Dehydrated babies can produce up to 6 dirty diapers on day 4

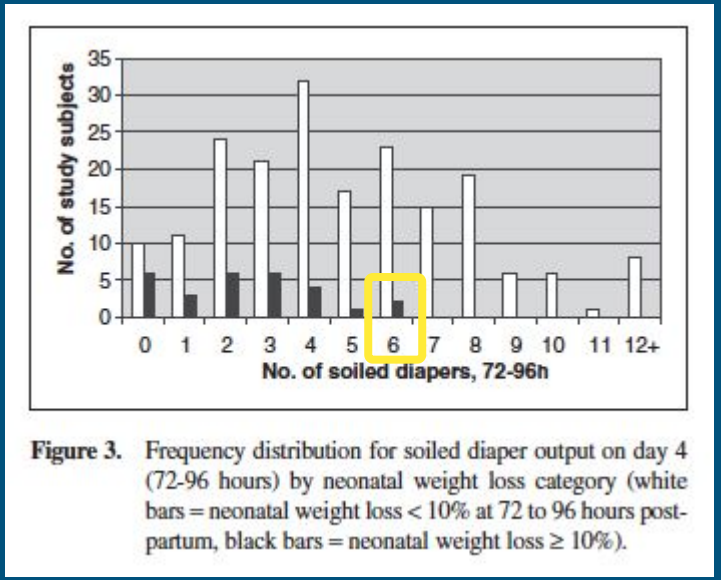


Figure 3. Frequency distribution for soiled diaper output on day 4 (72-96 hours) by neonatal weight loss category (white bars = neonatal weight loss < 10% at 72 to 96 hours post-partum, black bars = neonatal weight loss ≥ 10%).

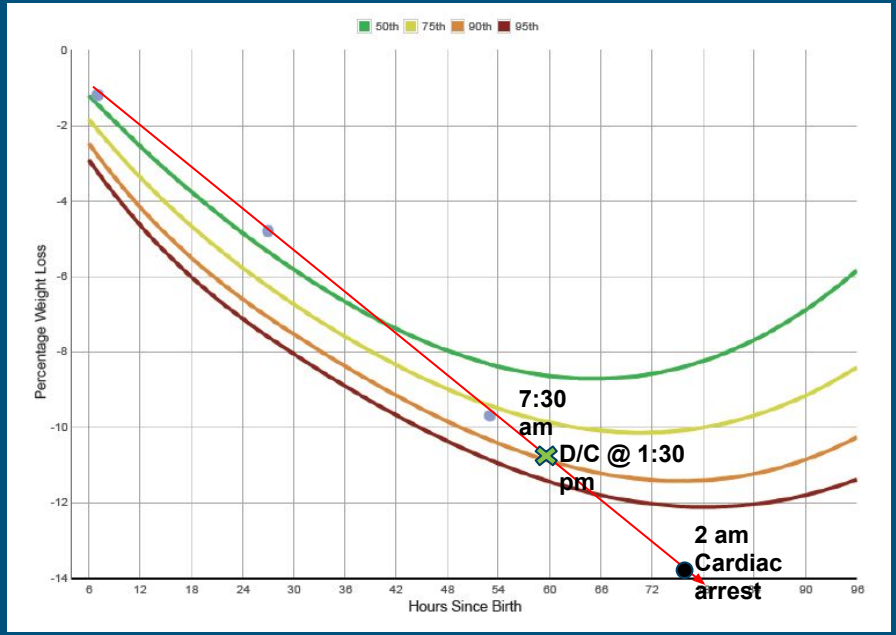
*Newbon Wet and Soiled Diaper Counts and Timing of Onset of Lactation as Indicators of Breastfeeding Inadequacy J Hum Lact24(), 2008

Making Sure a Newborn is Fed

- Obtain weight checks every 12 hours (fastest weight loss 7-8% in 24 hrs)[14]
  - 7% at any time associated with excessive jaundice[8] and hypernatremic dehydration,[52] which increases risk for multiple developmental disabilities[46, 68-72]
  - > 7% Requires evaluation (exam for newborn distress, vital signs, glucose, bilirubin) → recommend ad-lib supplemented breastfeeding if approaching the phototherapy threshold
- Baby should not lose greater than 7% (2012 AAP Guidelines)[55]
  - Consider bilirubin, sodium and glucose screen at 7%

Using the Newborn Weight Loss Tool[62]

- Can justify earlier supplementation
- Does *not* tell you whether a child is safe from brain-threatening complications
  - Excluded hospitalized newborns
  - Data set was not matched with glucose, bilirubin or sodium levels or neurological outcomes
  - Use to predict next day after discharge weight if lactogenesis II does not occur



Bilirubin Monitoring Recommendations

- Daily transcutaneous / serum bilirubin check until lactogenesis II and the onset of newborn weight gain (particularly in newborns with hemolytic jaundice)
    - Both in-hospital and at follow-up (until the feeding plan provides full requirement of 6 oz/kg/day and bilirubin levels are declining in response)
- Bilirubin elimination is dependent on milk volume.
    - Telling parents to expose jaundiced babies to sunlight without ensuring delivery of the full milk requirement of 6 oz/kg/day is insufficient and *unsafe* treatment of jaundice
    - If parents describe newborn is in distress, it is safer to recommend ad-lib supplementation until baby is medically evaluated to prevent irreversible brain injury

Making Sure a Newborn is Fed: Distress

- Newborn distress or a mother worried about newborn distress should signal immediate medical evaluation, laboratory evaluation (sodium, glucose, bilirubin) and likely supplementation
- If the baby is premature, SGA, LGA, IDM or medically fragile, baby will need closer monitoring and likely earlier ad-lib supplementation.
- Chem-7, serum bilirubin, weight check *close to the time of discharge*
    - Do not discharge newborns who are close to abnormal ranges

Reasons for Supplementation

- Hypoglycemia < 50 mg/dL
- Dehydration / Excessive weight loss > 4% in 24 hrs and > 7% at any time
- High sodium (sodium > 145 mEq/L)
- Hyperbilirubinemia or abnormal bilirubin approaching 15 mg/dL or high-risk levels on the bilirubin nomogram
- Lethargy
- Poor latch and feeding despite correction
- Intolerable pain during feedings despite correction
- Mother - baby separation
- Maternal medications that are unsafe to her baby
- Metabolic abnormalities / complications
- Insufficient milk production
- Mother’s preference
- Baby’s persistent crying or hunger signs

Supplemented breastfeeding is a valid and safe feeding choice as no benefit of exclusive breastfeeding justifies the risk of starvation-related brain injury.

Supplemented breastfeeding before lactogenesis II was the norm before the BFHI to prevent starvation/complications.

Pediatrics-trained physicians and NPs are the *only* health professionals qualified to fully evaluate a newborn with labs in order to determine if it is safe to *withhold* supplementation.

No mother can be barred from supplementing her baby if she wishes to do so at any time.

Protecting one's child from hunger and injury is a human right.

EBF newborns being sent home before lactogenesis II are FASTING.

Discharge Instructions for EBF Moms

- Instructions on the signs and symptoms of newborn starvation
- Provide the calculated 7% weight loss threshold.
- Instructions on how to supplement while protecting the supply in the event her milk does not come in or breastfeeding difficulties arise to prevent newborn brain injury
- Need next day after discharge follow-up with universal bilirubin, electrolyte and glucose check and discussion of percent weight loss limits

Majority of Kernicterus is in Breastfed Babies

90% of kernicterus [bilirubin-induced brain injury] occur in breastfed babies, particularly those that lose > 10%

— Dr. Lawrence Gartner, Chief Medical Director of Baby-Friendly USA (citing U.S. Kernicterus database)

Know the signs to look for when your newborn baby is HUNGRY, in the first days of life and watch your baby for:

H Hypoglycemia (low blood sugar) jittery hands, low body temperature, inconsolable and high-pitched crying, turning blue and seizures

U Unsatisfied nursing, lasting longer than 30 minutes and occurring more frequently than every 2 hours, crying despite continuous breastfeeding

N Not waking for feeding every 3 hours, difficult to arouse and very sleepy while attempting to breastfeed, limpness, lethargy

G Growth or weight loss exceeding 4% in the first 24 hours and 7% at any time, which increases risk of hospitalization for jaundice

R Reduced wet and dirty diaper counts (no wet diapers in 6 hours), and/or red brick dust on diapers

Y Yellowing of the skin or eyes, known as jaundice

If you see the signs that your baby is HUNGRY, seek medical assistance from your pediatrician immediately and supplement your baby. Don't wait until it's too late.

For more resources about how to safely breastfeed your newborn baby, click on parent resources at: https://fedisbest.org/resources-for-parents/feeding-plan/

"Perfect latch": Exclusively breastfed, at five days 20% down with hypernatremia and jaundice.

Found on https://fedisbest.org/resources-for-parents/

Excessive Weight Loss and Failure to Thrive

EBF mothers should have a home baby scale

- Before lactogenesis II, weigh baby every 12 hours to prevent weight loss > 7% until baby gaining weight
- Can weigh once weekly to monitor for failure to thrive
  - Gain 5-7 oz per week

How to Supplement and Promote Breastfeeding

1. Supplement only after breastfeeding 15-20 minutes each breast every 2-3 hours or more frequently based on baby hunger cues
2. Manually express breasts to assist milk transfer during breastfeeding
3. Supplement 15 mL (half ounce) at a time until newborn hunger, distress, lethargy and/or medical indications resolve (commonly 15-60 mL)
    a. Finger-feeding
    b. Periodontal syringe feeding at the breast
    c. Supplemental Nursing System to supplement at the breast
4. Burp baby after every 15 mL to prevent regurgitation and gas
5. Pump breasts for 20-30 minutes for any missed feedings

Supplementation Does Not Discourage Breastfeeding

Randomized 40 EBF healthy, term infants 24-48 hours ≥ 5% weight loss (10 mL formula by syringe after BF vs. no supplementation)

At 1 week, 47% supplemented newborns were EBF vs. 10% in unsupplemented group (p = 0.01)

At 3 months, 79% supplemented newborns were EBF vs. 42% of unsupplemented newborns (p=0.02)

Supplementation NEARLY DOUBLED EBF at 3 months

Pediatrics. 2013 Jun;131(6):1059-65.

Randomized 104 healthy, term infants 24-48 hours ≥ 5% weight loss (10 mL formula by syringe after BF vs. no supplementation)

No differences in rates of exclusive and any breastfeeding (p-values for EBF, ABF)

- Discharge (p = 0.2, p>0.99)
- 3 months (p=0.12, 0.10)
- 6 months (p=0.45, 0.34)

PLoS One. 2016 Feb 26;11(2):e0150053.

Supplementation Does Not Discourage Breastfeeding

Randomized trial of 164 EBF newborns given 10 mL of formula after every breastfeeding (ELF) vs. EBF

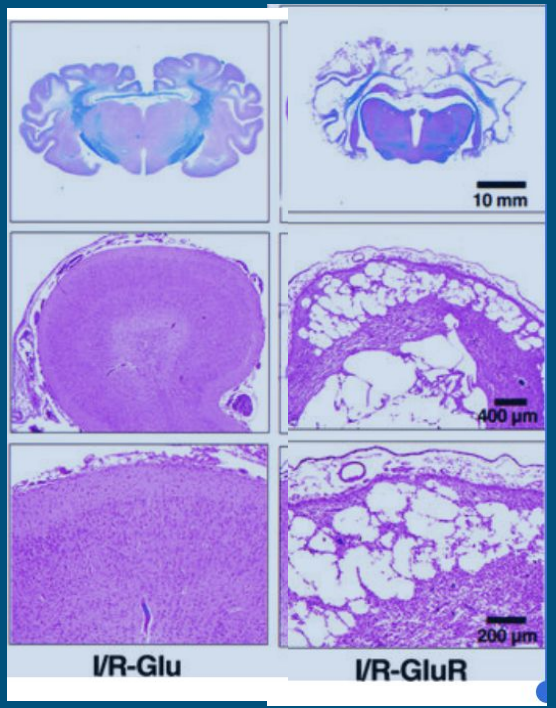
- Inclusion: 24-72 hrs, > 75%ile weight loss, mothers before lactogenesis II

	ELF	EBF	p-values
Still Breastfeeding at 1 week	95.8%	93.5%	p>0.5 (no difference)
Still Breastfeeding at 1 month	86.5%	89.7%	p>0.5 (no difference)
Breastfeeding w/o formula at 1 month	54.6%	65.8%	P =.18 (no difference)
Admission	0	4	p =.06 (no difference, small sample)
Gut microbiome	No differences in microbiome between ELF and EBF		

J Pediatr. 2018 Mar 13. pii: S0022-3476(17)31770-5

Correcting Breastfeeding Complications

- Hypoglycemia
  - Do not overshoot - Hyperglycemia after brain injury causes massive brain cell death
  - Give dextrose bolus to euglycemia (>60) and then give IV infusion and full, ad-lib oral feeds once baby is alert to stabilize glucose[78]
- Hypernatremia
  - Do not correct too quickly: > 0.5 mEq/L/hr correction independently associated with increased risk of seizures and death[79]



Correcting Breastfeeding Complications

- Hyperbilirubinemia
  - Pitfall: sunlight or phototherapy alone without delivery of full milk requirement (6 oz/kg/day) to maintain EBF status is ineffective and potentially dangerous
  - Follow AAP phototherapy guidelines[80]
  - Supplement ad-lib if approaching phototherapy threshold
- Follow-up
  - Parents require honest counseling on the possibility of brain injury and future developmental delay and disability
  - Developmental clinic, monitoring milestones, MRI, EEG, early intervention

Summary

- A newborn who is persistently crying/nursing or lethargic is HUNGRY and is in danger of serious complications if not fed adequately
- EBF newborns need closer glucose, bilirubin, electrolyte, weight monitoring
- Newborns can be supplemented to prevent complications and hospitalizations without compromising long-term breastfeeding success
- No benefit of exclusive breastfeeding justifies the risk of starvation-related brain injury
- Starvation-related brain injury is a mistake that can never be reversed

As parents and health professionals, we have a responsibility to protect *every* newborn from starvation to help ensure that they thrive, grow and reach their full potential.

We achieve this by supporting *every* mother to protect her child with safe and sufficient feeding.

FEDISBEST.ORG

"Unfortunately, the lack of concern about jaundice among health care providers has led to a major [gap] in childbirth education curricula and has added to the burden of jaundice with unmeasured occurrence of [Bilirubin-Induced Neurological Disorder]. The teaching and discussion of jaundice, impact of early discharge, [and] breastfeeding has been minimal or nonexistent. A sound foundation for a safe, family- based global initiative of education, prevention and early treatment is urgently needed to relieve the burden attributed to unsafe management of newborn jaundice."

—– Dr. Vinod Bhutani, Lead Author of AAP Neonatal Jaundice Guidelines

Slideshow available on https://fedisbest.org/resources-for-parents/

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