

A Neurobehavioral Approach to Breastfeeding



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Speaker Disclosure

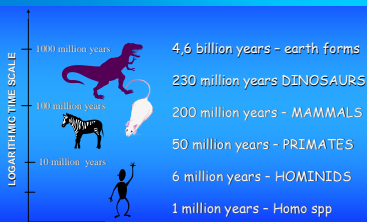
Under ACCMB guidelines:

- I have a financial affiliation with AMEDA : Speakers Bureau
- My wife markets educational materials and shirts related to the talk content Kangaroo Mother Care Promotions

The social science that studies the origins and social relationships of human beings.

EVOLUTION OR INTELLIGENT DESIGN

BIOLOGICAL ORIGINS



BIOLOGICAL ORIGINS



210 mya - MILK first appears MORGANUCODONTIDS (Little known - long extinct)

200 mya - **MONOTREMES (Echidna, platypus)**
Milk from modified sweat glands
Newborn requires some maturity to lap milk!

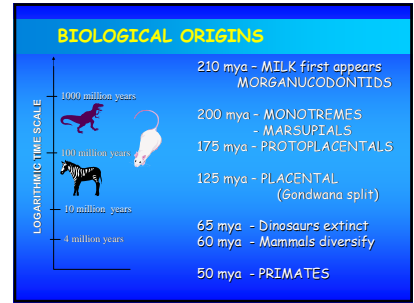
Female duck-billed platypus

- Incubates eggs safely inside a grass-lined burrow;
- Sealed up with their mother, hatchlings feed on milk dripping from hairs surrounding a teatless milk-producing gland

- (J McKenna)

200 mya - **MARSUPIALS (Kangaroo, wombat)**
Invented the NIPPLE (glands concentrated)
?Immunological solution - expel fetus early ...
Fetus is exceptionally immature!
Fetus is exceptionally competent !!!
but depends on nipple and pouch.





175 mya - **PROTOPLACENTALS**
Immunological challenge overcome

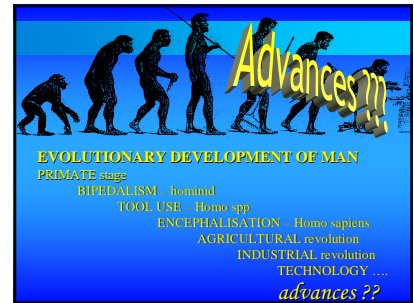
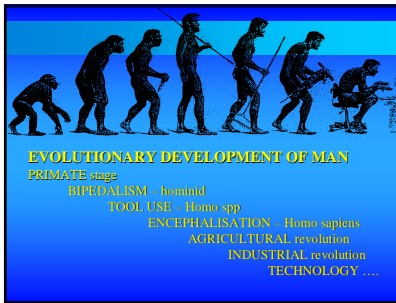
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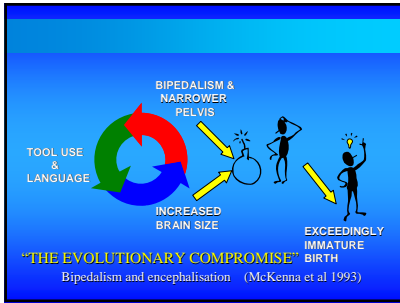
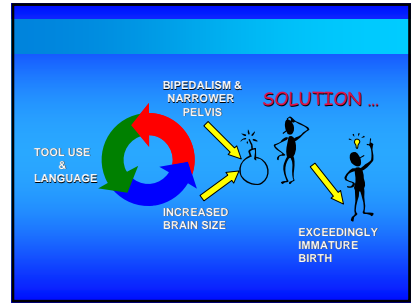
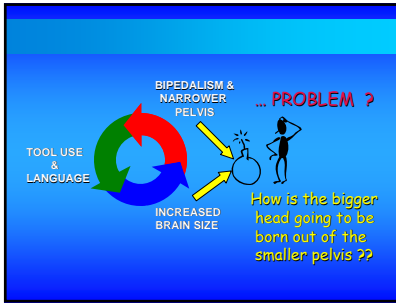
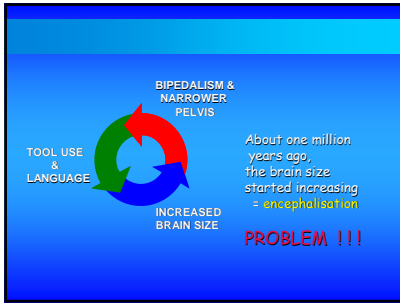
125 mya - **PLACENTAL** (Eomaia - dawn mother)

Placenta allows "force-feeding"
GAIN = more mature young
GAIN = greater diversity (fore-arms)
RISK = greater energy investment

Mammalian care patterns

Different mammals have evolved different newborn care patterns depending on their circumstances



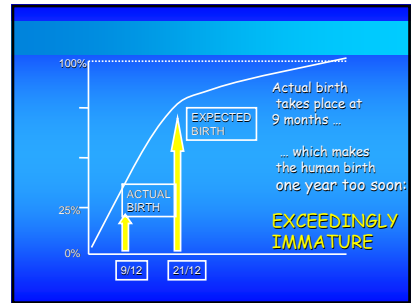
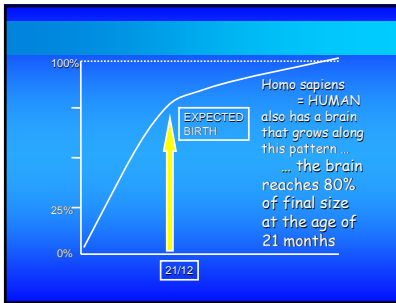
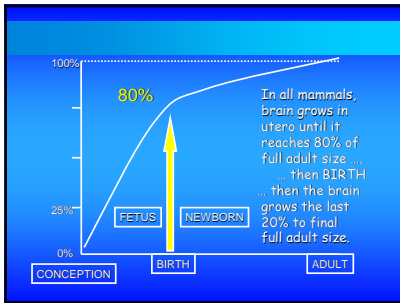


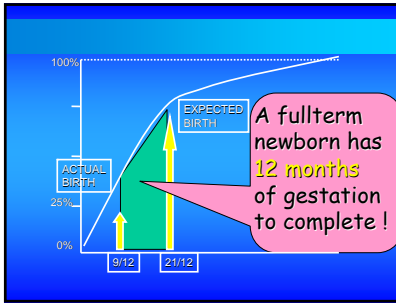
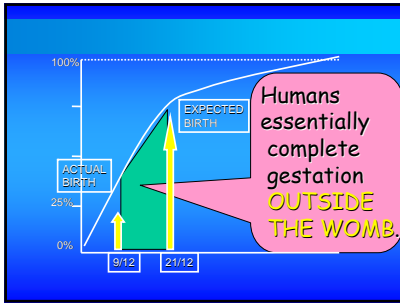
SOLUTION: "the birth of exceedingly neurologically immature infants for whom the majority of brain growth will occur postnatally and not in the womb."
(McKenna 1993)

The human "obstetrical dilemma":

- Human Fetal Head Size Exceeds Outlet Dimensions With Emergence of Bipedalism
- (from J McKenna)

Species	Brain Size (cc)	Pelvic Outlet (cm)
Rhesus Monkey	~40	~4.5
Prothonotary	~50	~5.0
Macaque	~60	~5.5
Orangutan	~70	~6.0
Chimpanzee	~80	~6.5
Gorilla	~90	~7.0
Human	~1300	~10.0





The placenta via the umbilical cord is the means whereby the fetus **CONTINUES ITS GESTATION.**

UTERUS	UMBILICAL CORD	Oxygenation	+++
		Warmth	-
		Nutrition	+++
		Protection	++

In the UTERINE HABITAT, the umbilical cord delivers all the basic biological needs to the fetus.

Human milk is the means whereby the immature infant **CONTINUES ITS GESTATION.**

CHEST	MOTHER'S MILK (BREAST)	Oxygenation	(-)
		Warmth	+
		Nutrition	+++
		Protection	++

In the NEWBORNS HABITAT, the **mother's breast** delivers all the basic biological needs to the fetus.

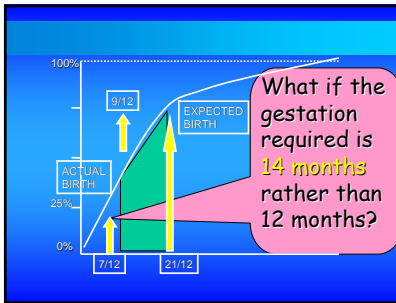
Human milk is the means whereby the immature infant **CONTINUES ITS GESTATION.**

UTERUS	UMBILICAL CORD	Oxygenation	+++
		Warmth	-
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CHEST	MOTHER'S MILK (BREAST)	Oxygenation	(-)
		Warmth	+
		Nutrition	+++
		Protection	++

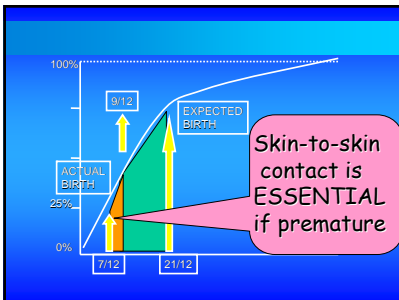
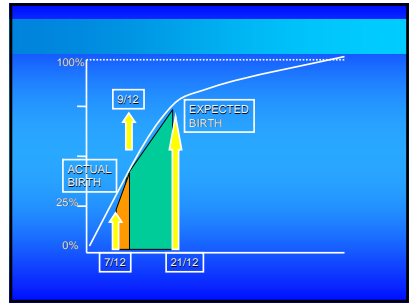
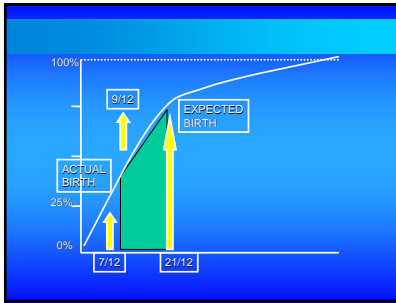
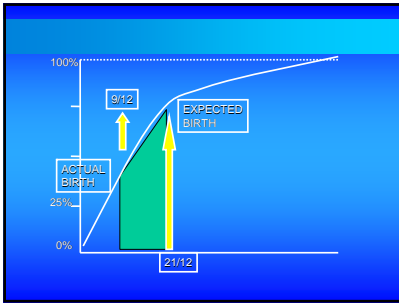
THE CORRECT HABITAT IS MATERNAL-INFANT SKIN-TO-SKIN CONTACT

Skin-to-skin contact, and breastfeeding is the means whereby the immature infant CONTINUES ITS GESTATION.



If skin-to-skin contact is essential for the **the immature newborn,**

IS IT MORE ??
OR LESS ??
essential for **the premature newborn ??**




Skin-to-skin contact, and **breastfeeding** is the means whereby the immature infant **CONTINUES ITS GESTATION.**

Skin-to-skin contact, and **breastfeeding** is the means whereby the **premature** infant **CONTINUES ITS GESTATION.**

THE CORRECT HABITAT IS EVEN MORE ESSENTIAL IN PREMATURITY

BASIC ASSUMPTIONS:
BRAIN GROWS LINEARLY,
BY GENETIC MATURATION
FOUNDATION / PLATFORM / BASE

Survival 

"EEA"
Environment of Evolutionary Adaptedness

"Environment"
is the usual place and
context for which the
genes have adjusted

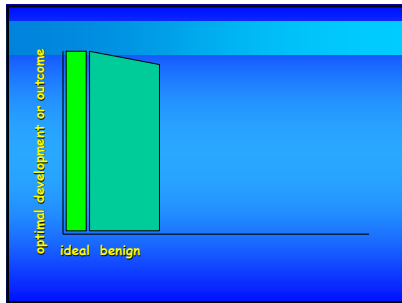
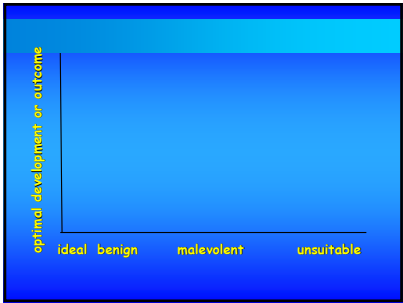
"Evolutionary"
genes are coded to
respond or express
at specific times

"Adaptedness"
the genes have certain
"resilience" and ability
to adjust to changes

"Environment"
can be
BENIGN
MALEVOLENT
UNSUITABLE

GENES HAVE A CERTAIN
EXPECTATION OF THE
ENVIRONMENT "IDEAL"

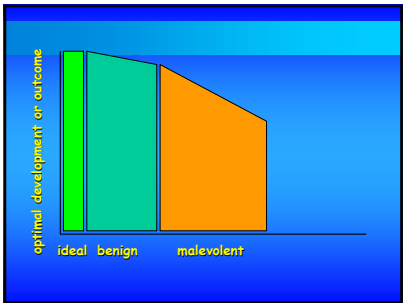
THIS EXPECTATION MATCHES
THE OPTIMAL DEVELOPMENT
OF THE INDIVIDUAL
AND THE SURVIVAL OF SPECIES.

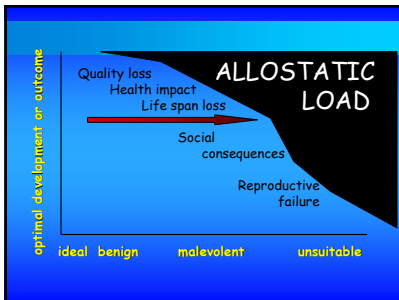
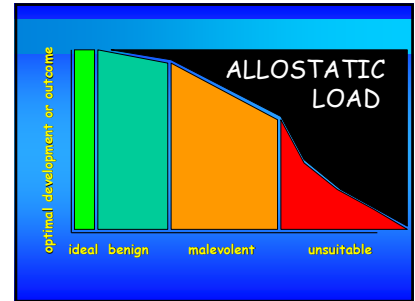
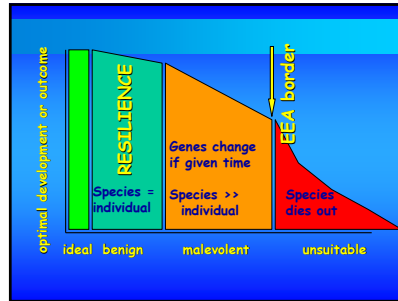
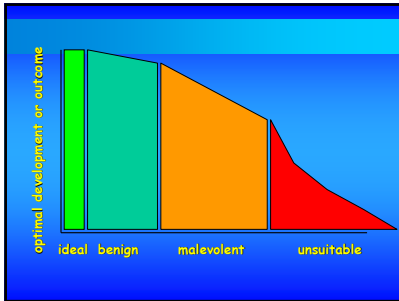


The further the reality
is from the "ideal", the more
RESILIENCE IS REQUIRED

There are limits to resilience ...

when exceeded → consequences !





AN EVOLUTIONARY PERSPECTIVE

- Early stress produces alterations in brain function and disrupts normal brain development.
- The developing brain copes adaptively to early stress.

• Developmental neurobiology of childhood stress and trauma, Martin H. Teicher et al., Psychiatr Clin N Am 25 (2002) 397-426.
• Scars that won't heal: The neurobiology of Child Abuse, Martin H. Teicher, Scientific American March 2002 54-61.

Adaptive Changes to stress

BRAIN CHANGES	CONSEQUENCE
AMYGDALA changes limbic irritability	→ fight-flight response → <u>aggressive</u> defence.
HIPPOCAMPUS	→ <u>dissociation</u> defence.
Left HEMISPHERE diminished maturation less R - L integration.	→ augmented <u>anxiety</u> → more aggression.
Verbal development (CEREBELLUM)	→ limbic irritability, → maintains <u>hyperarousal</u> → sympathetic activation

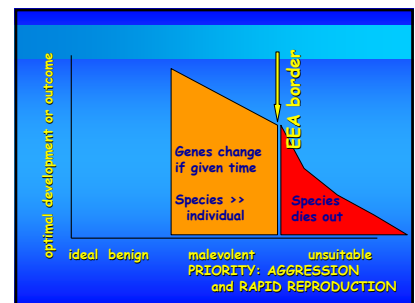
Adaptive Changes to stress

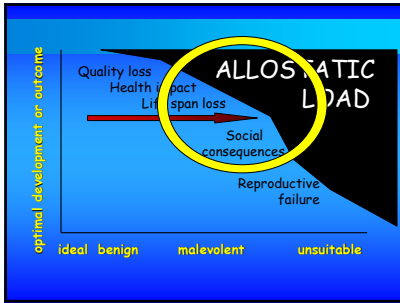
HORMONE CHANGES	CONSEQUENCE
Early stress produces a life-long :	
VASOPRESSIN increase	→ Enhanced sexual arousal
OXYTOCIN reduction	→ Diminished sexual fulfillment
	→ Deficient commitment to a single partner
→ <u>Promiscuity</u> :	
Reproductive success in times of danger	

In a malevolent world...

Important for survival and reproductive success to:

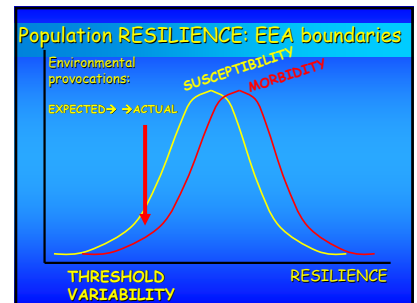
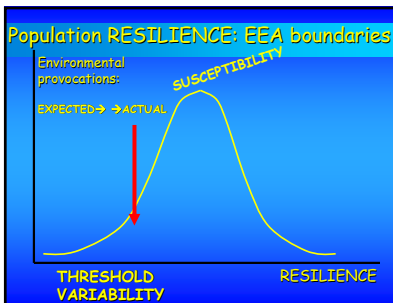
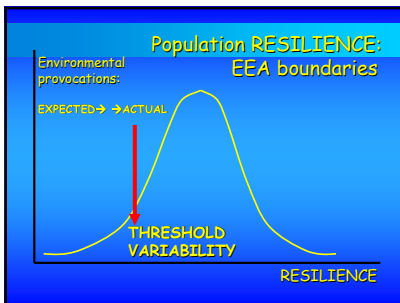
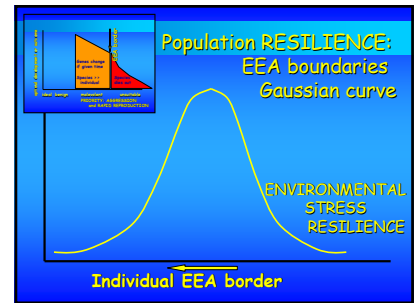
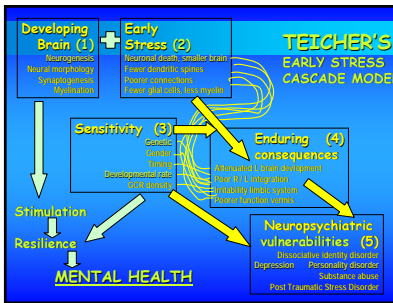
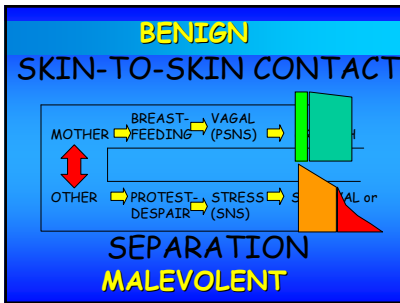
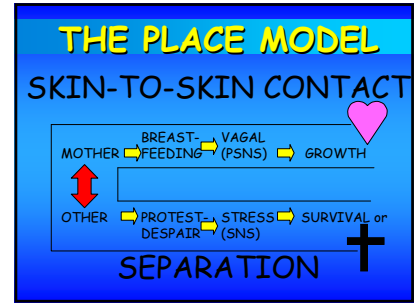
- Maintain a state of vigilance and suspiciousness to detect danger.
- Mobilize an intense fight-flight response.
- React aggressively to challenge without hesitation.

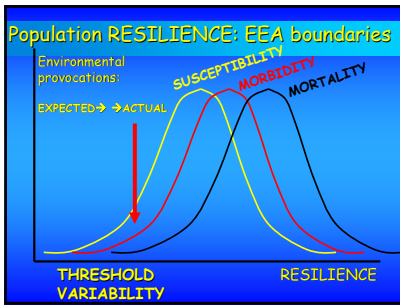




"Evolutionary"
the genes ensure species survival in malevolence ... an alternative program

Belsky et al. Child Development 1991; Vol 62(4): 647-670
Childhood Experience, Interpersonal Development, and Reproductive Strategy: An evolutionary Theory of Socialization.





Effects of EEA violations:
 depend on
 the gene itself
 the timing of expression
 the resilience
 the context (ext support)
 the available alternatives

Infant and Neonatal Mortality for Primary Cesarean and Vaginal Births to Women with "No Indicated Risk," United States, 1998-2001 Birth Cohorts

Marian F. MacDorman, PhD, Eugene Declercq, PhD, Fay Menacker, DPH, CNP, and Alexander H. Hahn, MD, MS

ABSTRACT: Background: The percentage of United States births delivered by cesarean section has increased rapidly in recent years, even for women considered to be at low risk for a cesarean section. The purpose of this paper is to examine infant and neonatal mortality risks associated with primary cesarean section compared with vaginal delivery for women with low (19-41 weeks' gestation) women with no indicated medical risks or complications. Methods: National infant and neonatal death data for 1998-2001 birth cohorts (202,417 live births and 13,597 infant deaths) were analyzed to assess the risk of infant and neonatal mortality for women with no indicated risk by method of delivery and cause of death. Multivariable logistic regression was used to model neonatal survival probabilities as a function of delivery method, and sociodemographic and medical risk factors. Results: Neonatal mortality rates were higher among infants delivered by cesarean section (1.27 per 1,000 live births) than for those delivered vaginally (0.62). The magnitude of this difference was reduced only moderately on statistical adjustment for demographic and medical factors, and when deaths due to congenital malformation and severe risk factor scores for death were excluded. The cesarean/vaginal mortality differential was independent and not confounded by the causes of death. Conclusions: Linking timing to the cause of infant death is important given the rapid growth in the number of primary cesareans without a reported medical indication. (JGIM 2003; 18:3 September 2003)

Caesarean section "social reason"

USA → 1998 to 2001
 Births 5 762 037
 Deaths 11 897 (neonatal)
 adjusted for low risk
 and for sociodemographic
 Neonatal mortality rate 2.14
 (without adjustments 6.99)

Neonatal Mortality Rate (NMR)

	All mothers		
	NVD	C/S	Risk
Early NMR	0.33	1.07	3.2
Late NMR	0.29	0.69	2.4
Post NMR	1.44	1.80	1.3

Neonatal Mortality Rate (NMR)

	All mothers			Multipl
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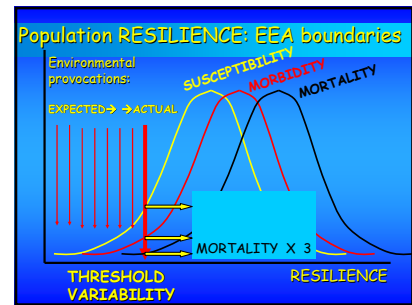
Neonatal Mortality Rate (NMR)

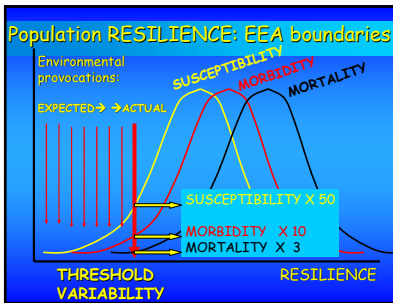
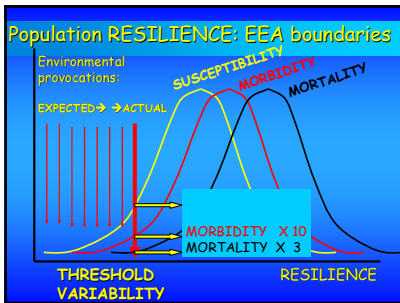
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Hypoxia	2.2	14.7	6.7	

"Differential widespread"

Neonatal Mortality Rate (NMR)

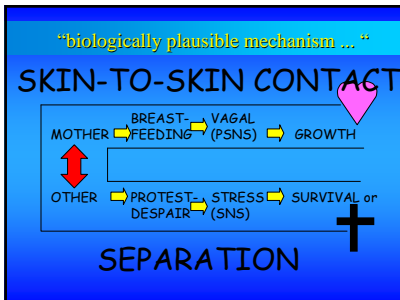
	All mothers			Multipl
	NVD	C/S	Risk	Risk
Hypoxia	2.2	14.7	6.7	
Respiratory distress:				
C/S without labour			35.5	
C/S after labour			12.2	
Normal vaginal			5.3	





of neonates at risk for neonatal mortality for reasons that remain uncertain.

The increased risk of neonatal mortality associated with cesarean section in this low intrapartum-risk group of women cannot be explained by a simple review of the causes of death of their infants. Further research into biologically plausible mechanisms that may put an infant at higher risk for neonatal mortality



"Society reaps what it sows in the way that infants and children are treated. Efforts to reduce exposure to stress and abuse in early life may have far-reaching impacts on medical and psychiatric health and may reduce aggression, suspicion and untoward stress in future generations."

Martin H Teicher

"Society reaps what it sows in the way that infants and children are treated. Efforts to reduce exposure to stress and abuse (**specifically MATERNAL INFANT SEPARATION Bergman**) in early life may have far-reaching impacts on medical and psychiatric health and may reduce aggression, suspicion and untoward stress in future generations."

Martin H Teicher

HARVARD Gazette

April 09, 1998
Children Need Touching and Attention, Harvard Researchers Say

The result, Commons and Miller said, is a nation that doesn't like caring for its own children, a violent nation marked by loose, nonphysical relationships.

<http://www.hns.harvard.edu/gazette/1998/04.09/ChildrenNeedTou.html>

A Neurobehavioural Approach to Breastfeeding

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Cape Town, RSA

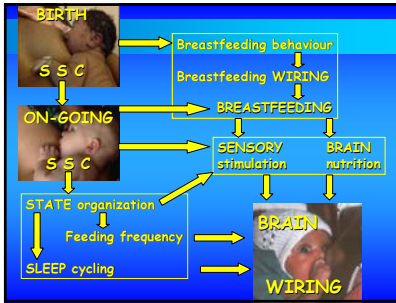
www.kangaroomothercare.com

Presentation objectives

- Birth Skin-to-Skin Contact
- Ongoing SSC
- Breastfeeding behaviour
- Breastfeeding wiring
- BREASTFEEDING
- Sensory stimulation
- State organization
- Sleep cycling
- Feeding frequency
- Brain nutrition
- BRAIN WIRING

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Animal literature does not talk about mammalian lactation, it talks about mammalian birth.

Ruin the birth - and there is no lactation
With a good birth, lactation follows

Diane Weissinger

R Shore

Critical period concept :

"Windows of opportunity in early life when a child's brain is exquisitely primed to receive sensory input in order to develop more advanced neural systems."

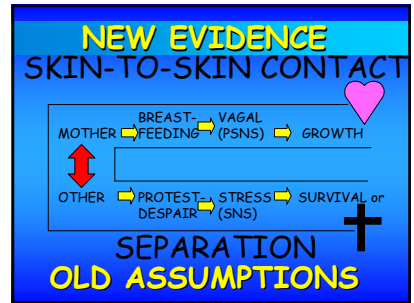
Schore

Critical period :

"Early interpersonal events positively and negatively impact the structural organisation of the brain."

The first hours after birth are a **CRITICAL PERIOD**

mutual psycho-physiological caregivers



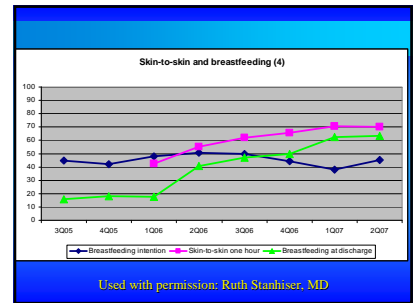
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In partnership with



Used with permission: Ruth Stanhiser, MD

How many mothers in this room have breastfed their babies?

How many mothers in this room had babies that breastfed?

BREASTFEEDING IS A BEHAVIOUR OF THE NEWBORN

BREASTFEEDING IS A BEHAVIOUR OF THE NEWBORN


Not the mother !!

The first hours after birth are a **CRITICAL PERIOD**




mutual psycho-physiological caregivers

WHAT IS BREASTFEEDING ?



BREASTFEEDING =
A place dependent, brain-based behaviour of the newborn.

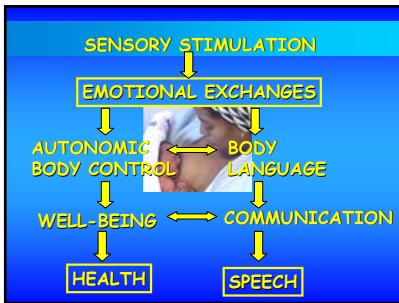
Is breastfeeding IMPORTANT ?



BREASTFEEDING =
Is more than eating: primary purpose is **BRAIN-WIRING !!**

The brain is a

SENSORY ORGAN
BREAST - FEEDING
 =
BRAIN - WIRING
SOCIAL ORGAN



- Presentation objectives
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Edmond et al, Pediatrics 2006

Rural Ghana (developing world)
 Large vitA trial (focus on mothers)
 Separate study (observe initiation time)

10947 babies born in one year
 good followup (from larger trial)

Breastfeeding INITIATION

Breastfeeding start	Mortality	aOR
before one hour	0.7%	1
between 1 & 24 hrs	1.2	1.45

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Exclusive breastfeeding	1.1	1
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d4 or more	4.2	4.4
Exclusive breastfeeding	1.1	1
predominant brf	1.6	1.4
partial breastfeed	5.6	4.5

THE POTENTIAL ...

CONCLUSION: Promotion of early initiation of breastfeeding has the potential to make a major contribution to the achievement of the child survival millennium development goal: 16% of neonatal deaths could be saved if all infants were breastfed from day 1 and 22% if breastfeeding started within the first hour. Breastfeeding-promotion programs should emphasize early initiation as well as exclusive breastfeeding. This has particular relevance for sub-Saharan Africa, where neonatal and infant mortality rates are high but most women already exclusively or predominantly breastfeed their infants.

22% of deaths could be saved
800 000 deaths prevented


The First Hour

"Initiation of breastfeeding within the 1st hour of birth is the first and most vital step towards reducing infant and under-five mortality, by reducing the overwhelmingly high neonatal mortality rate.

"Save ONE million babies – beginning with one action, one hour support and one message: beginning breastfeeding within the 1st hour of birth!"

<http://worldbreastfeedingweek.org/>

Is breastfeeding IMPORTANT ?




BREASTFEEDING =

Is more than eating:
primary purpose is **BRAIN-WIRING !!**

NOTHING CAN BE MORE IMPORTANT !!

NEW EVIDENCE SKIN-TO-SKIN CONTACT



MOTHER BREASTFEEDING → VAGAL (PSNS) → GROWTH

OTHER → PROTEST, DESPAIR → STRESS (SNS) → SURVIVAL or DEATH

SEPARATION OLD ASSUMPTIONS

Frontal alpha EEG asymmetry

= a measure of temperament (i.e. *trait*/emotion).

an index of potential risk for emotion-related psychopathology.

a sizable literature (> 100 studies) embeds this measure in a network of psychological and behavioural constructs. Thus bestowing frontal EEG asymmetry with sizable construct validity as a measure of an underlying approach-related or withdrawal-related motivational style, or as an index of potential risk for emotion-related psychopathology.

Frontal alpha EEG asymmetry

Greater Left-sided EEG asymmetry
→ greater positive affect and
→ greater psychological and
→ greater physiological resilience

Greater Right-sided EEG asymmetry
→ greater negative affect and
→ poorer psychological and
→ poorer physiological resilience

Frontal alpha EEG asymmetry

Greater Right-sided EEG asymmetry
→ greater negative affect and
→ poorer psychological and
→ poorer physiological resilience

Now we know →
Maternal depression causes attachment and developmental problems in baby ... just as above ... what about EEG asymmetry ???

Aaron Jones et al. (2004) conducted a study of four groups of mother - infant dyads: EEG done on baby at 1 month of age

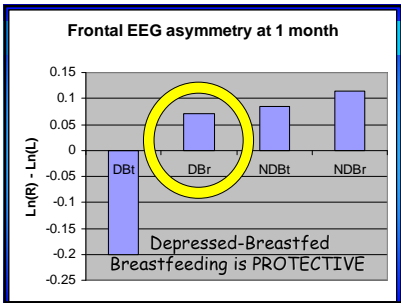
The first group was Depressed-Bottlefed

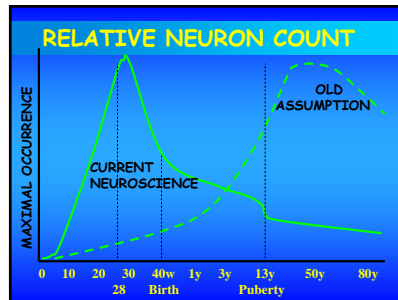
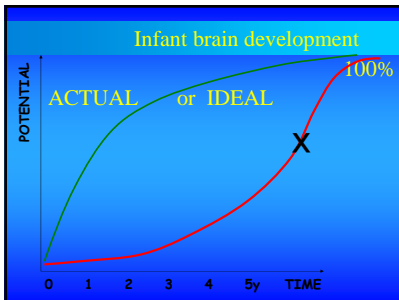
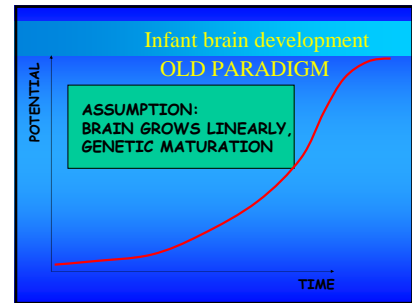
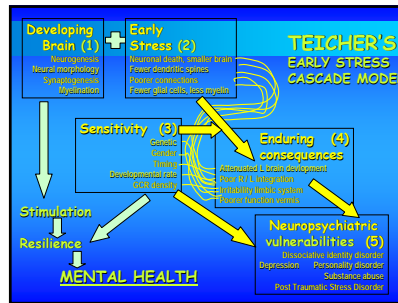
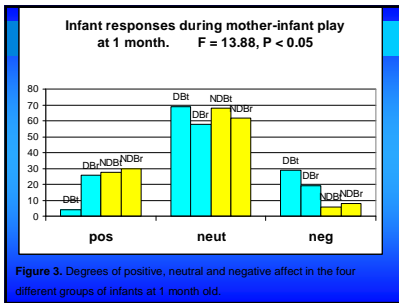
EEG asymmetry correlates as expected ...

Aaron Jones et al. (2004)

The four groups were of mother - infant dyads:

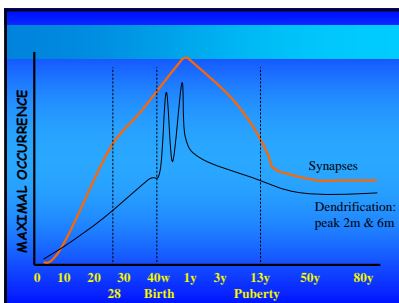
Depressed-Bottlefed	DBt
Non-Depressed-Bottlefed	NDBt
Depressed-Breastfed	DBr
Non-Depressed-Breastfed	NDBr





FETAL BRAIN DEVELOPMENT

At birth, the human being has more synapses in its brain than at any other stage of life.



SYNAPSE DEVELOPMENT

Development is a process of "pruning" some, and developing other synapses - creating "neural pathways".

FIRST COMMANDMENT OF NEUROSCIENCE

Cells that fire together, wire together

(Carla Shatz)

SECOND COMMANDMENT OF NEUROSCIENCE

USE IT,
OR
LOSE IT

The brain is a



SENSORY ORGAN
BREAST - FEEDING
=
BRAIN - WIRING
SOCIAL ORGAN

The brain is a

SENSORY ORGAN
BREAST - FEEDING
=
BRAIN - WIRING
SOCIAL ORGAN

Basic Biological Need

MULTISENSORY
STIMULATION



Presentation objectives



Birth Skin-to-Skin Contact
Ongoing SSC
Breastfeeding behaviour
Breastfeeding wiring
BREASTFEEDING
Sensory stimulation
State organization
Sleep cycling
Feeding frequency
Brain nutrition
BRAIN WIRING

Presentation objectives



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ABILITIES OF NEWBORN DEPEND ON THE HABITAT



720g baby (Kalafong Hospital)

SELF ATTACHMENT.



The newborn should **NOT** be separated at birth, specially if premature !!

Sequence human newborn breast-feeding

Pre-requisite = habitat
 hand to mouth
 tongue moves
 mouth moves
 eye focuses nipple
 crawls to nipple
 latches to nipple
 suckles

(Widstrom et al 1994)

“The newborn may appear helpless, but displays an impressive and purposeful motor activity which, **without maternal assistance**, brings the baby to the nipple.

(Michelson et al 1996)

STATE ORGANISATION.



The ability to appropriately control the level of sleep and arousal.

Sleep

.... brain-wiring !!

In humans, mammals, regular sleep is necessary for survival.

an increased rate of anabolism (the synthesis of cell structures), and a decreased rate of catabolism (the breakdown of cell structures).

STATE ORGANISATION.

Simplified scale -
 HARD CRYING
 CRYING
 FUSSING
 ACTIVE AWAKE
 QUIET AWAKE
 ALERT INACTIVE
 DROWSY
 ACTIVE SLEEP
 IRREGULAR SLEEP
 QUIET SLEEP
 DEEP SLEEP

STATE ORGANISATION.

Simplified scale -
 HARD CRYING
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 QUIET SLEEP
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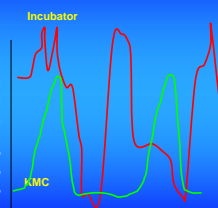
L to R shunting, IVH risk
 Stressful, wastes calories, ... build up to stress
 This is feeding zone!
 Time to connect - stimulation
 ... transition zone
 ... transition zone
 ... activity consumes calories

Good sleep - digestion zone
 Apnoea zone !!

Compared to incubator babies, KMC babies have

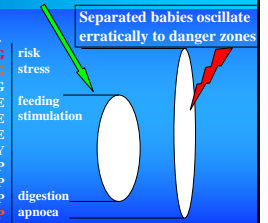
- less deep sleep (when apnoea occurs)
- more quiet sleep (when growth occurs)
- less active sleep (wastes calories)
- more alert periods (promotes bonding)
- much less crying (which is harmful)

Simplified scale -
 HARD CRYING
 CRYING
 FUSSING
 ACTIVE AWAKE
 QUIET AWAKE
 ALERT INACTIVE
 DROWSY
 ACTIVE SLEEP
 IRREGULAR SLEEP
 QUIET SLEEP
 DEEP SLEEP



KMC babies oscillate slowly in safe zones

Simplified scale -
 HARD CRYING
 CRYING
 FUSSING
 ACTIVE AWAKE
 QUIET AWAKE
 ALERT INACTIVE
 DROWSY
 ACTIVE SLEEP
 IRREGULAR SLEEP
 QUIET SLEEP
 DEEP SLEEP



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BREASTFEEDING IS NOT JUST EATING!

Simplified scale -
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 CRYING
 FUSING
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 QUIET AWAKE
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 DROWSY
 ACTIVE SLEEP
 IRREGULAR SLEEP
 QUIET SLEEP
 DEEP SLEEP

feeding stimulation

digestion

The whole cycle of feeding and digesting mother's milk is what is the fully the breastfeeding programme

REM NR1 NR2 NR3 NR4 NR3 NR2 REM
 AS (20 mins) QS (40 mins)

rest-activity cycle is 60-90 minutes long (Ludington 2006)

BREASTFEEDING IS NOT JUST EATING!

feeding stimulation

digestion

The whole cycle of feeding and digesting mother's milk is what is the fully the breastfeeding programme

SKIN-TO-SKIN CONTACT SHOULD BE CONTINUOUS

REM NR1 NR2 NR3 NR4 NR3 NR2 REM
 AS (20 mins) QS (40 mins)

BREASTFEEDING (=BRAINWIRING) should be EVERY HOUR

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BREASTFEEDING THE PREMATURE

The **ABILITY** to breastfeed is **INNATE**.
 The physical **CAPACITY** to breastfeed may however be **insufficient in prematures**.

Full term babies need no help
 Premature babies will need help.



KERSTIN HEDBERG-NYQVIST:
 (Early Human Dev 55 (1999) 247-264)

PIBBS
Preterm Infant Breastfeeding Behaviour Scale

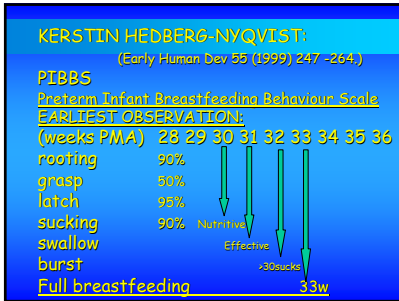
rooting	0 - 2
areolar grasp	0 - 3
latch (and fixation) time	0 - 3
sucking	0 - 4
longest sucking burst	1 - 6
swallowing	0 - 2

KERSTIN HEDBERG-NYQVIST:

PIBBS
Preterm Infant Breastfeeding Behaviour Scale

Nutritive sucking = >5ml swallowed

Full breastfeeding = exclusive Brf



Gut hormones.
 (Uvnas-Moberg 1989)

20 different hormones work in the gut - regulated by the vagal nerve.

Each has a specific function.

Gut hormones.

"Bad guy" - **SOMATOSTATIN:**
 (produced by fetus, rise 10-fold under stress)

inhibits gastrointestinal secretion,
 inhibits motility,
 reduces blood flow to gut and absorption,
 causes gastric retention,
 vomiting, constipation.

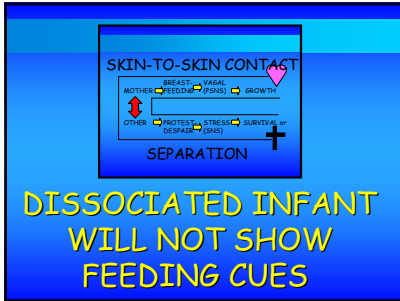
SOMATOSTATIN:

inhibits the good hormones, contributes to slow weight gain.

At high levels also inhibits release of growth hormone.

It takes 30 to 60 minutes to lower somatostatin and other stress hormones

SLEEP !!!

BREASTFEEDING THE PREMATURE

Premature babies will need help.

BERLITH PERSSON has provided that help ...



PERSSON'S WHEEL !

Step 1 SKIN-TO-SKIN

SSC

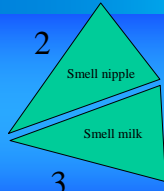
Continuous skin contact

The newborn must be in the right environment for the behaviours that it is capable of to be expressed. It requires protection from stress and provision of warmth.

KMC provides the "maternal nest"

Ideally this should be done on prematures AT BIRTH. However it can be done later, even with nasogastric tube providing expressed breast milk in the meantime

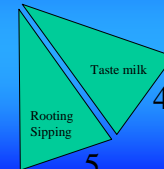
Step 2 and 3 Olfactory



The first steps in sequence require smell of the nipple which may take longer in the premature, and then the smelling of milk. Babies can identify smells and tastes from their time in the uterus in the mother's milk!

Step 4 Taste

This is re-inforcing the smell. Fullterm seems to skip this!




Step 5 Rooting


These are mouth movements the normal sequence described in the full-terms. Here the premature requires help, with position and "sipping" = feeling milk in mouth

Step 6 First suckling.

Key step, builds on steps 1 to 5. Must be awake and alert. Alert period is maximal at birth, and lasts 45 - 90 minutes. If missed then, will require feeding, and several hours delay.



Step 6 First suckling.



Note difference suckling vs sucking! "... myographically distinct"

For late premature lactation, allow suckling to develop in successive alert periods, while feeding by tube.


Breastfeeding & Suckling

From 16 or 20 weeks gestation, the fetus is swallowing.
 From 26 or 28 weeks gestation the fetus can SUCKLE
 From 36 weeks gestation the fetus is able to SUCK

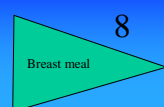
SUCKING and SUCKLING sound same, but VERY different

Step 7 Latching & swallowing

Premature is too physically weak to crawl to nipple, but if held to nipple will at this stage latch on. Once latched, suckling follows. Suckling squirts a controlled dose of milk to the back of throat, which is safely swallowed without any interference of breathing. This is INNATE.

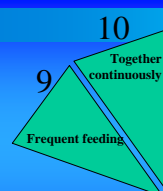


Step 8 First breast milk meal.



Steps 1 to 7 and on take place rapidly in the fullterm. They can occur in the first alert period after birth in a premature if allowed to, but may require a longer period of defined steps in successive alert periods. For late prem lactation, step 8 is the first time milk is swallowed Enough to feed the baby.

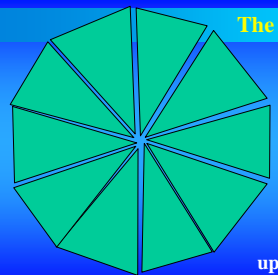
Step 9 Frequent feeding



In utero, baby is feeding Continuously. Demand feeding is NOT SUITABLE f or pretermatures. Feeds should be at most 2 hours apart.

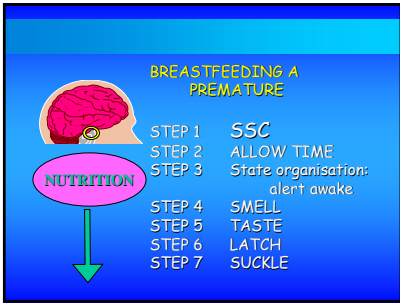
Step 10 Together continuously

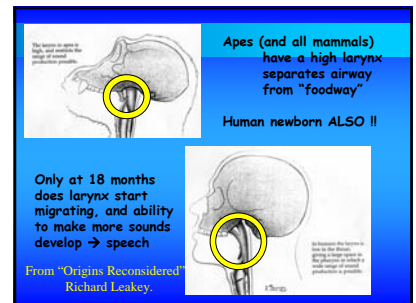
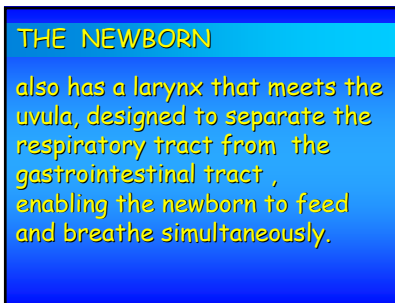
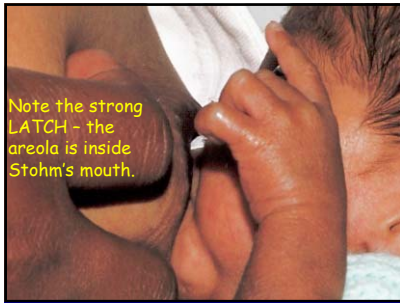
The wheel

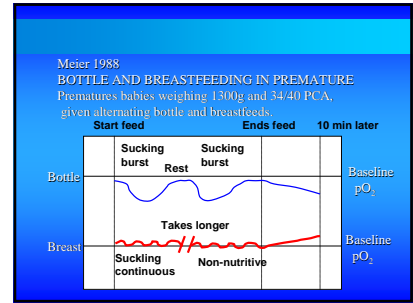
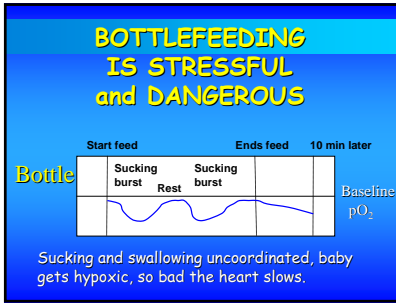
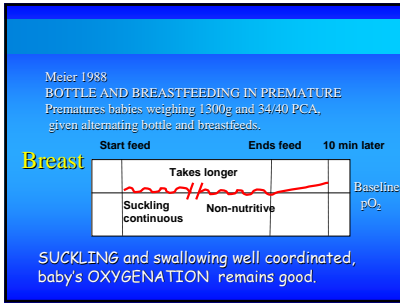


is not round
 Turns slow at first
 but then picks up speed!

SKIN-TO-SKIN & BREASTFEEDING : THEN ADD TECHNOLOGY







SUCKLING uses the largest muscle in the baby's head, making the smallest movement

SUCKING requires lots of tiny and weak muscles, making maximum effort,
... also causes hypoxia,
... and is STRESSFUL !

Bottle feeding requires SUCKING, which requires completely different muscles, and does NOT allow co-ordination between swallowing and breathing. Bottle feeding causes STRESS in prematures, and relative post-prandial hypoxaemia.

SUCKLING - in and of itself, apart from nutrition intake - has beneficial effects on both mother and baby.
SENSORY STIMULATION

Suckling induces simultaneous endocrine effects in the gut of both mother and child

there is a physiological symbiosis between them.

Breast feeding also has psychic effects; CCK is produced, which induces sedation and sleep.

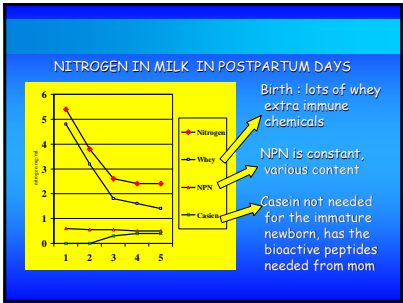
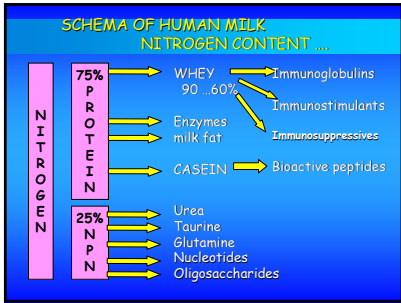
Sucking a pacifier while fed by nasogastric tube:

feed enters stomach faster, stomach empties sooner, somatostatin levels lowered.

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"It's not what we know that gets us into trouble.... it's what we know... that just ain't so!
From: Everybody's Friend (1874)
 By Josh Billings

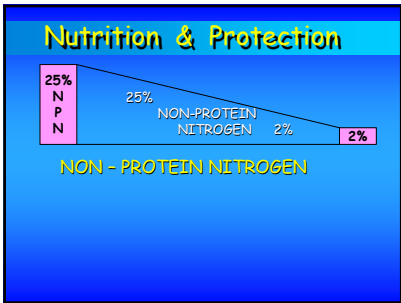
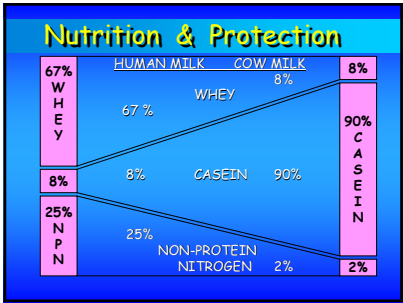


NON - PROTEIN NITROGEN

Urea conditionally essential nutrient
 Taurine aminoacid required neonatal brain, eyes, kidney
 Glutamine for stress and sepsis
 Nucleotides repair of injury, specially gut, immunological processes
 improve cellular immunity
 Oligosaccharides bacteria-specific interactions
 anti-inflammatory effects

CASEINS → BIOACTIVE PEPTIDES
 unique and essential effects:

Phosphopeptides absorbing calcium and zinc
 Opioid peptides regulate gastric and intestinal motility
 Milk mucins against all pathogenic bacteria
 Glycoproteins against specific bacteria
 Secretory IgA against pathogenic bacteria
 Cell adhesion molecules prevent necrotising enterocolitis
 Lactoferrin growth factor, iron absorption
 anti-inflammatory factor
 immuno-modulating factor



Nutrition & Protection

NON - PROTEIN NITROGEN

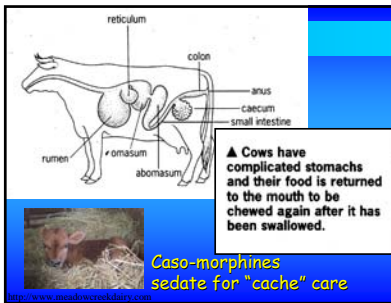
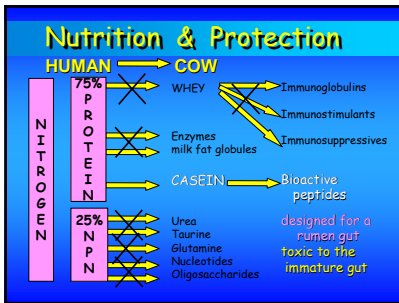
In cows this is 2 - 4%
 In humans 20 - 25%

Nutrition & Protection

NON - PROTEIN NITROGEN

In cows this is 2 - 4%
 In humans 20 - 25%

This is a critical component for the baby !!
 Over 200 irreplaceable chemicals ...



TRIGLYCERIDE

Left: glycerol, Right: palmitic acid, oleic acid, alpha-linolenic acid

In phosphoglycerides, glycerol molecule same: two fatty acids esterified

Phospholipids are a major component of all biological membranes,

Sphingomyelin particularly concentrated in BRAIN major part of MYELIN.

TRIGLYCERIDE

MYELIN

FATTY ACIDS ARE SPECIES SPECIFIC

Dendritification and myelinisation peaks occur at 2 and 6 months is maximal at one year ...

At one year: human milk has less protein, but MORE TRIGLYCERIDE !!!

Be sure the wet nurse has plenty of milk ... because if she lacks it she may give the baby milk of a goat or sheep or some other animal, because the child ... nourished on animal milk does not have perfect wits like one fed on woman's milk and always looks stupid and vacant and not right in the head.

14th century Tuscan text

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POST - TEST

Georgetown University, Washington D.C.
212 babies 4500g, prospectively followed:

Infection rate for formula fed	47.2%
Infection rate for human milk fed	29.3%

Conclusion:

" being human milk fed decreased the odds of infection by 57%."

OR

" being cow fed increased the odds of infection by 61%."

POST - TEST Example of paradigm

Conclusion:

" being human milk fed decreased the odds of infection by 57%."

OR

" being cow fed increased the odds of infection by 61%."

The first statement assumes that being cow fed is the normal.

POST - TEST Example of paradigm

Conclusion:

" being human milk fed
decreased the odds of infection by 57%."

OR

" being cow fed
increased the odds of infection by 61%."

The first statement assumes that
being cow fed is the normal
Would you introduce a new feed
which increases odds of infection?

A Neurobehavioural
Approach to
Breastfeeding



... CONTINUES ...