

Breastfeeding

Advocacy for health professionals and mothers

G A Mobbs MBBS FRCOG FRANZCOG IBCLC

Elsie J Mobbs* RN RM PhD MAPS IBCLC



mobbsga@gmail.com

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(slide 29 for presentation guide to resource material)- 28/03/2017 update >

*Deceased

What We Will Learn Today and Why

Evolution	Breast milk is important because evolution is determining, and breast milk is an outcome of natural selection for evolutionary success.
Emotion	Foundational behavioral concepts for evolutionary success
Physiology	Understanding breast milk production promotes success
Avoiding hazards	A few to mention. Remember that formula feeding is a worldwide risk to vulnerable infants and their mothers by denying them the safety of fundamental evolutionary benefits
Problems & Solutions	Treatment provides benefits for mother and child and protects evolutionary advantage
Summary	There are no benefits to breastfeeding - breastfeeding is the norm

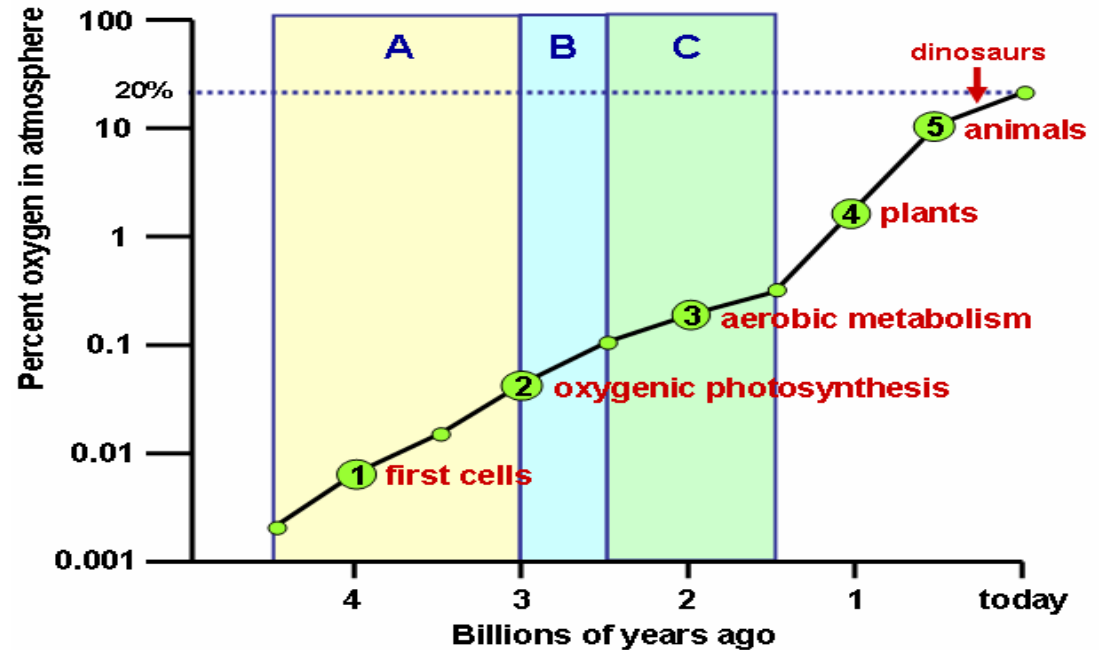
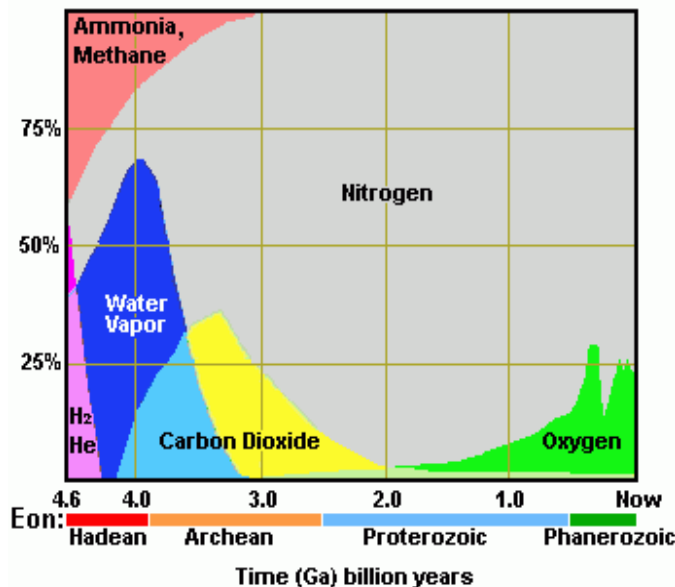


“NOTHING IN BIOLOGY MAKES SENSE EXCEPT IN THE LIGHT OF EVOLUTION”

Theodosius Dobzhansky (1973) FMRS The founder of evolutionary genetics
http://evolution.berkeley.edu/evolibrary/article/history_20

Isotopes decay at different rates:
 Uranium-238 half life of around 4.5 billion years.
 Carbon-14 has a half life of 5,730 years.
 Radiometric dating of meteorites dates earth.
 Evolution evidenced by fossils, rocks, radioactive isotopes, DNA and comparative anatomy.

% of Atmosphere Composition of Earth's atmosphere



Self-replicating molecules more than 3.5 Billion years ago.
 Photosynthetic bacteria 3.5 BYA.
 Eukaryotes with a nucleus and chromosomes 1.5 BYA. Sponges, invertebrates and then the earliest chordate with the appearance of a 30mm long eel 500 to 600 Million years ago - grandparent to all vertebrates & us. Lobe-finned fish (origin of quadruped) 400 MYA. Tiktaalik - between fish and amphibian, left the water 375 MYA and evolved to become a proto-reptile or proto-mammal about 300 MYA.

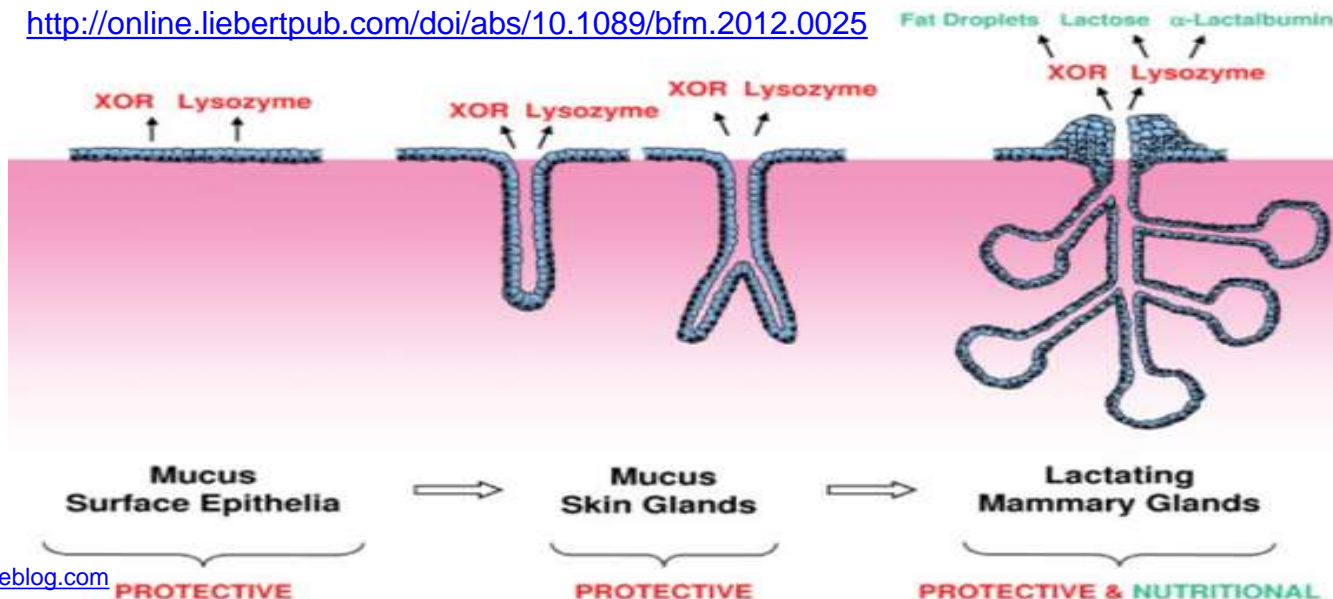


Evolution of Lactation

- Mammalian precursors possessed a skin with apical-like glands providing ancient lysozyme and ancient lactoferrin supplying immune protection and moisture to parchment enclosed eggs dating to over 300 million years ago (compare human colostrum)
- Secondary palate arose 256 MYA (million years ago)
- Earliest eutherians (complete placenta and lactation) appeared around 160 MYA (*Juramaia Sinensis*)
- Diversification 65 MYA following great Cretaceous extinction and end of 100 MY of dinosaur dominance. **Dairy cattle precursor already split from common mammalian ancestor 85 million years ago.** **Primate split 65 MYA. Emergence of social mammal 30 MYA.**
- See [Goldman A S 2012](http://online.liebertpub.com/doi/abs/10.1089/bfm.2012.0025)
<http://online.liebertpub.com/doi/abs/10.1089/bfm.2012.0025>



- Hydration
- Immunofactors

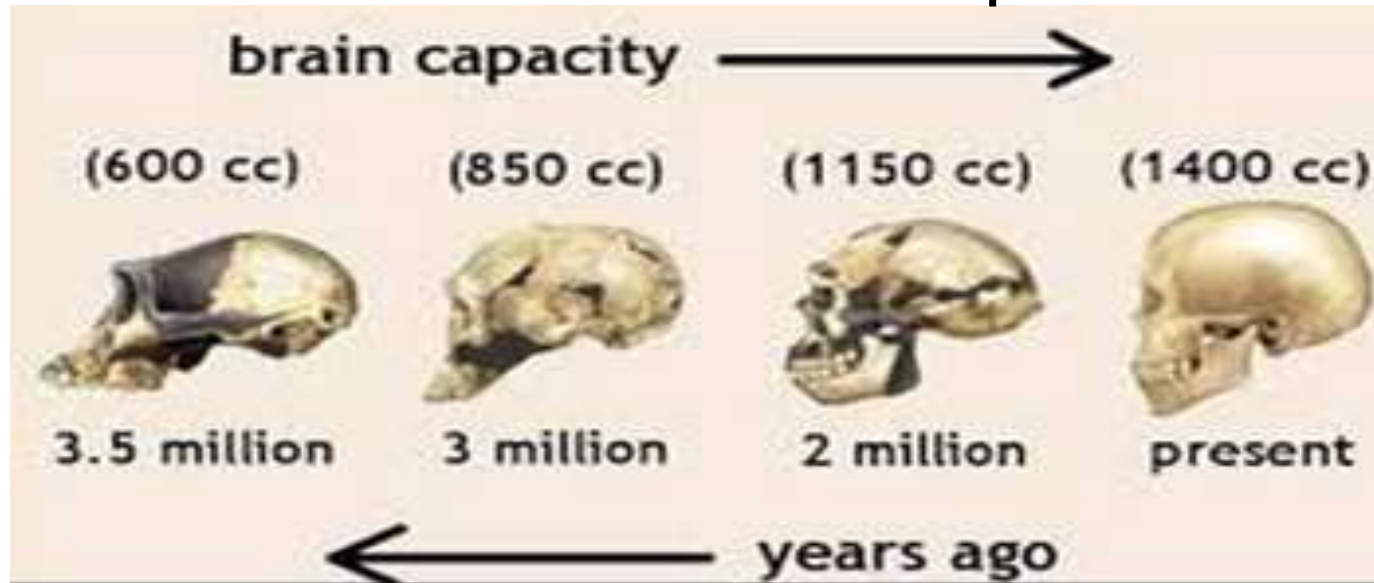


7 million great grandparent of all primates (65 MYA)



85 MYA cattle precursor separated from mammalian common ancestor

Evolution of Homosapiens



Primate evolution commenced 65 MYA

Chimpanzees branched off 7MYA

- 3.5 MYA *A. Afarensis* (Lucy); 3 MYA *A. Africanus* (Taung's Child); *H. Habilus* 2.5 MYA, *H. Erectus* 2.0 MYA, and *H. Sapiens* are probably a single evolutionary lineage dating from 2.5 million years ago (MYA). And see slide 66.
- Cranial capacity has increased throughout human history but not at a constant rate. Swiftest growth in past 800,000 years. No obvious change in past 40,000 years.
- Control of and use of Fire 800,000 years ago
- Modern *Homo sapiens* dates from 200,000 years ago
- Agriculture 11,000 years ago
- Natural selection may continue to drive the evolutionary process with slow replacement of one gene by another and, with helpful mutations, each step would confer a tiny reproductive advantage which includes mother's milk. Unhelpful mutations may lead to reproductive failure.

Neurophysiological Mechanisms

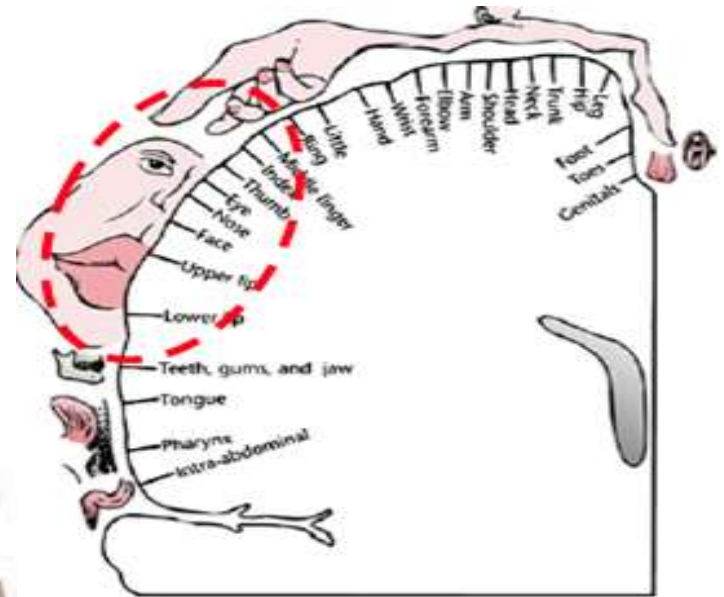


Merkel Cell

Mechano-sensor in buccal mucosa also in finger tips



Latch and oral tactile recognition of suckling (milking) area of breast.



Penfield's Sensory Homunculus

Encoding the neural image for human imprinting. Similar process with Braille script.

Birth Room, Early Life and Foundational Behaviour



Optimal timing for imprinting success:

Around 5 to 20 minutes following birth the baby's eyes will stay widely open. Within the next minute the mouth gapes and the tongue drops downwards and moves forwards, signaling the mother, who is protecting her baby through skin to skin contact, of the nearing readiness to feed.

Images: Widstrom et al *Acta Paediatrica* 2011,100; 79



Innate goal-directed behaviour and proximity for visual accommodation provides response to the stimulus of the pigmented suckling area and baby with the evolved active participation of the mother will draw in the breast for the first immune protective feed of colostrum and learn the experience-dependent oral tactile imprint which will be reinforced through emotion and the first sleep.

Mobbs E *Acta Paediatrica* 2016;105(1) 24-30

<http://onlinelibrary.wiley.com/doi/10.1111/apa.13034/full>

**“Across the mammalian spectrum a one-teat preference is recorded”
(Mobbs E, 1989, *Breastfeeding Review*, 1:39-41)**

In the human mammal this may be a vestigial behavioural remnant and be most evident following maternal nipple deprivation when the baby fixatedly sucks on only one digit out of ten to the exclusion of all others. Also seen is the newborn having a pre-birth fixation on the thumb, finger or wrist, (buccal Merkel cells proliferate from 9th gestational week) resulting in the baby initially rejecting the mother's nipple and suckling area in preference to the already-found and **imprinted** object upon which it has formed an emotional (**latchment**) relationship (see slides 10-20).



Lactation Physiology

1. **Prolactin** stimulates receptor sites on alveolar cells; colostrum present from 16 weeks gestation.
2. **Progesterone** stimulates lobuloalveolar growth while suppressing secretory activity.
3. **Placental expulsion** is followed by abrupt decline in HPL, oestrogen and progesterone.
4. **Prolactin** levels increase without progesterone.
5. **Shared afferent feedback** from nipple to hypothalamus activates both oxytocin and prolactin release.
6. **Autocrine control** takes over with full secretion.
7. **Feedback inhibitors** of lactation, aided by serotonin and dopamine signaling, control production. Keeping the breasts empty accelerates the natural autonomous process.
8. **Oxytocin** permeates mothering areas of brain as well as myoepithelial cells surrounding alveoli.
9. **Serotonin**, the neurotransmitter in every alveolus manages PTHrP control of Ca and P in milk and furthers optimal bone density resetting in the mother.

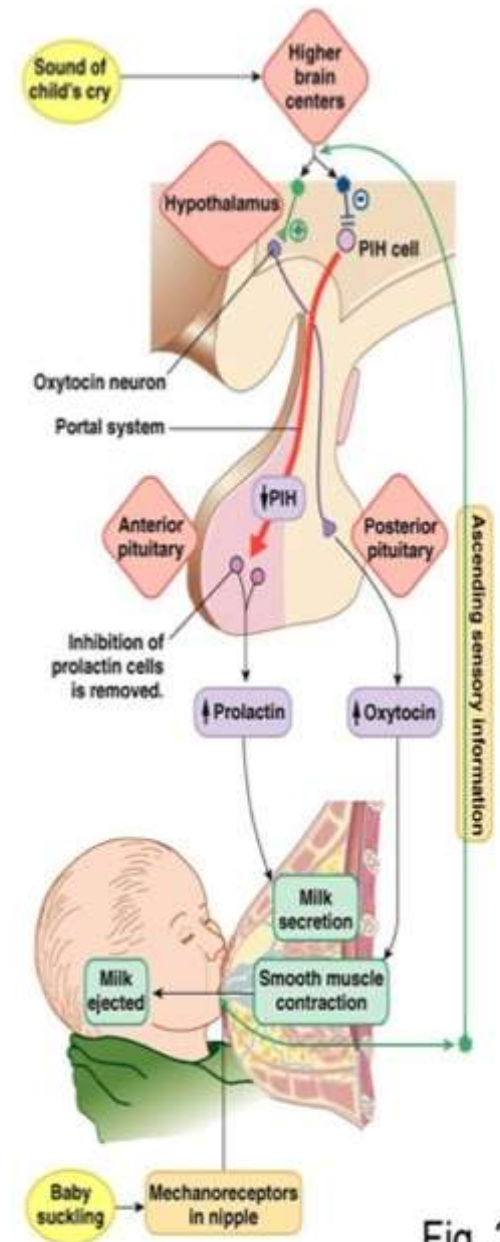


Fig. 26-23

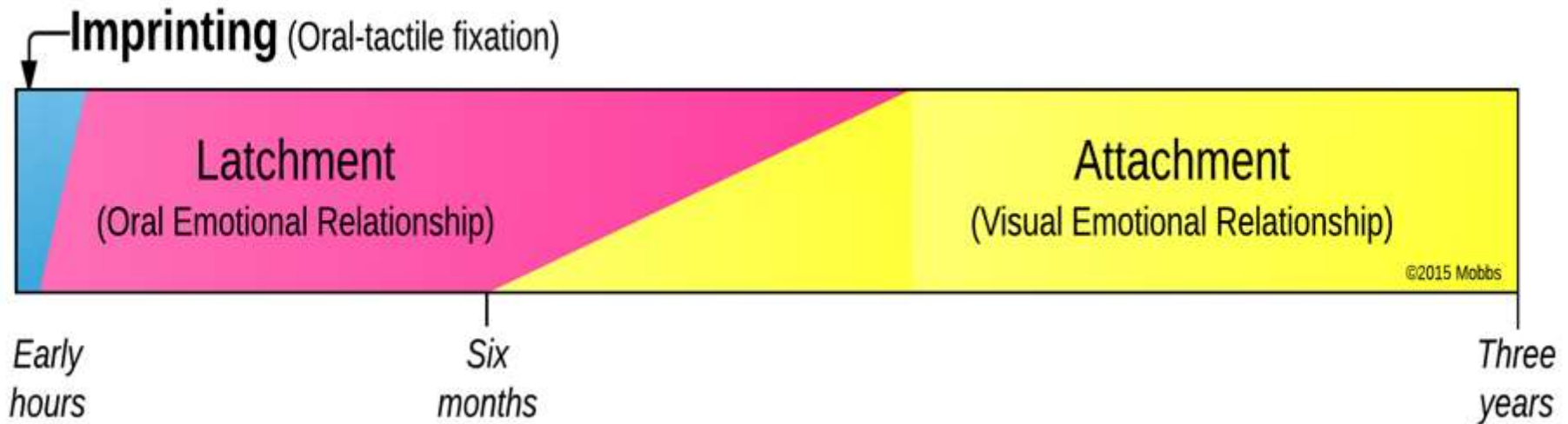
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KEY TERMS IN FOUNDATIONAL BEHAVIOUR AND THE UNDERSTANDING OF EVOLUTIONAL SURVIVAL

Slides 10 - 20

- IMPRINTING
- IMPRINTED OBJECT
- LATCH AND LATCHING
- LATCHMENT
- BONDING
- ATTACHMENT
- MATERNAL NIPPLE DEPRIVATION
- DECOY
- DISPLACEMENT

The Key Stages of Emotional Development - A Time Line



IMPRINTING is the behavioral process that takes place during a sensitive period in the early hours of life during which the baby's evolutionary biology enables it to orally fixate to a stimulus feature (normally the mother's nipple and the surrounding suckling area) and learn its tactile characteristics.

LATCHMENT is the first emotional stage of development during which the baby recognises its mother through the oral tactile perception of the stimulus feature in the mouth for evolutionary survival (**mother in the mouth**).

ATTACHMENT is the second stage of emotional development commencing sometime after 6 months when the baby visually recognises its mother as a whole person (**mother in the eye**). Attachment is a biologically instinctive form of behaviour directed by the infant to the carer who provides a safe haven for evolutionary survival. Attachment characteristic is a predictor of social and emotional outcome.

KEY TERMS

slides 10 - 20

IMPRINTING

The behavioral process that takes place during a sensitive period in the early hours of life during which the baby's evolutionary biology enables it to orally fixate to a stimulus feature (normally the mother's nipple and the surrounding suckling area) and learn its tactile characteristics.

One teat preference is predominant across the mammalian spectrum. This preference is co-evolutionary with the process of imprinting and is a genetically determined strategy for survival (compare displacement leading to fixation on a dummy / thumb / decoy).



KEY TERMS

IMPRINTED OBJECT

The imprinted object is that upon which the baby is emotionally fixated (breast, thumb, dummy, pacifier, bottle teat or other decoy).

The fixation is most evident at sleep time when baby can only be comforted by the imprinted object (**mother in the mouth**).

The most sensitive organ and the one over which a newborn mammal has most control, its mouth, is the organ central to mammalian and human imprinting.



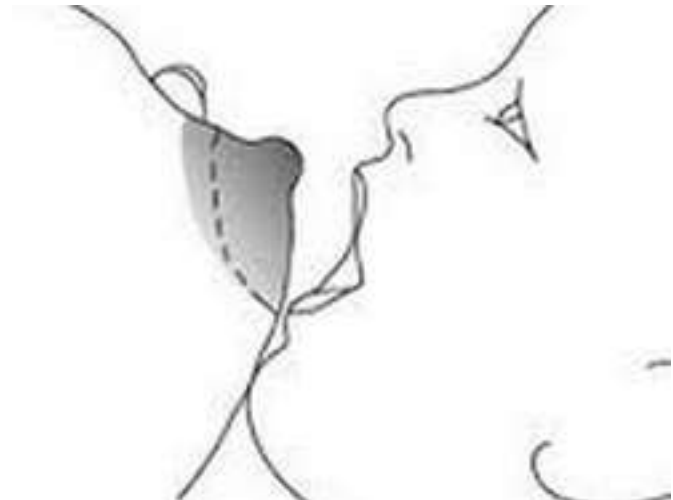
KEY TERMS

LATCH and LATCHING

The physical positioning of the mother's nipple and the suckling area of the breast within the baby's oral cavity



Latch



Latching

KEY TERMS

LATCHMENT

This is the **first** emotional stage of development during which the baby **recognises** its mother through the oral tactile perception of the stimulus feature (nipple and surrounding suckling area). This is an evolutionary survival strategy (**mother in the mouth**).



KEY TERMS

BONDING

The repeated behaviour chosen by the caregiver (attachment figure) to support the infant physically and emotionally and facilitate the release of the infant's instinctive ability to attach to the caregiver for evolutionary advantage.

[Understanding Attachment and Attachment Disorders Prior V, Glaser D 2006](#)

J Can Acad Child Adolesc Psychiatry 2007 Nov; 16(4): 184–185.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2247467/>



KEY TERMS

ATTACHMENT

This is the **second** emotional stage of development commencing sometime after 6 months when the baby visually recognises its mother as a whole person (**Mother in the eye**). During this biologically-instinctive attachment phase the baby will seek close proximity to its mother as a safe haven for evolutionary survival and as a secure base from which to explore and become independent. Attachment is a behaviour directed by the infant to the carer and the characteristic is a predictor of social and emotional outcome. Latchment behaviour is maintained during the attachment phase as baby will seek and continue non-nutritive sucking of the stimulus feature through toddlerhood (compare dummy/decoy fixation).

Understanding attachment 2006 ISBN 978 1 84310 245 8
Prior and Glacier RCP
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2247467/>

Infant Parent Attachment. Benoit D
Paediatr Child Health; 2004;9(8);541-545
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2724160/>



KEY TERMS

MATERNAL NIPPLE DEPRIVATION

The absence of role modeling due to misplaced societal pressures creates a **non-physiological response to a baby**. This may lead to the **displacement** of genetically based behaviour to a non-biological super-stimulus thumb/dummy.



KEY TERMS

DECOY

Any decoy object (pacifier / dummy / thumb, bottle teat / nozzle etc).
that replaces the stimulus feature which evolution designed.

“Pacifier” is a marketing term or branding device with the pretence to
normalise the use of foreign objects.



KEY TERMS

DISPLACEMENT

Sigmund Freud's displacement theory proposed that sucking on a **(displaced)** thumb was for alternate pleasure. The oral tactile imprint is in place to facilitate latchment behaviour and evolutionary survival through the presence of the mother and her milk.



Displacement of genetically determined behaviour



If the biological object determined by evolution is withheld, fragmentation of the mother/baby relationship may result²⁰



ROLE MODELLING

A keystone for evolutionary success (or failure)



When toys are us

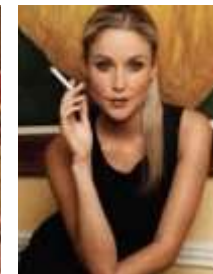


EDUCATION grades K-12

EVOLUTION

AWARENESS

Compare the tobacco role model



When toys are not Us !

RESOURCES PROVIDING HELPFUL ADVICE

If you are uncertain about how to manage a breastfeeding problem seek guidance from a lactation consultant. Keep details of consultants in your practice diary and with your reception staff.

1. Australian Breastfeeding Association has a contact helpline for mothers p. 1800mum2mum p. 1800 686 268 <http://www.breastfeeding.asn.au/> for evidence-based information and group meetings for helpful role modeling. also see <https://www.breastfeeding.asn.au/bfinfo/breastfeeding-fact-or-fiction> for further help.
2. La Leche League International www.llli.org evidence based advice and role modeling group meetings
3. INFACT Canada www.infactcanada.ca and Dr J. Newman www.BreastFeedingInc.ca both very good sites
4. www.Kellymom.com a good evidence-based site for mothers
5. Lactation Consultants of Australia and New Zealand www.lcanz.org to find a lactation consultant and helpful web sites. Similarly www.ilca.org website for International Lactation Consultants Association
6. Academy of Breastfeeding Medicine has helpful protocols for professionals www.bfmed.org
7. Medications in Mothers Milk ISBN 978-0-8261-2858-4 “Most drugs are quite safe in breastfeeding mothers” T. Hale <http://www.medsmilk.com/> , <http://www.infantrisk.com> , www.mothersafe.org.au
8. Sweet Sleep 2014 ISBN 978-0-345-51847-7 La Leche League International. Essential evidence-based sleep <http://www.llli.org/sweetsleepbook>

Your patients may ask you how best to prepare for breastfeeding. They may well know that breastfeeding is important for their baby and therefore worth persevering with and overcoming any problems. Most expectant and new mothers find that helpful role modeling e.g. spending time with breastfeeding mothers enhances their knowledge and confidence.



1. A non smoker
2. Sober and unimpaired
3. An exclusively breastfeeding baby
4. Healthy and term baby
5. Baby on his back
6. Lightly dressed baby
7. On a safe surface



Evidence based infant sleep recommendations

- Breastfeeding Medicine
<http://online.liebertpub.com/doi/full/10.1089/bfm.2014.0113>
- La Leche League International
http://www.lli.org/docs/0000000000001Tear_offs/the_safe_sleep_seven-2.pdf

SIDS and Smothering are Different

SIDS Risk

- Prenatal smoking (5 fold)
- Bed sharing with a smoker, up to 10 fold if both parents smoke
- Any formula feeding (2 fold)
- Respiratory infections
- Baby unattended
- Overheated
- Prone position
- Day care (2 fold risk at least)

Smothering Risk

- Couches, sofas and soft reclining chairs (up to 50 fold risk)
- Alcohol or drug use
- Formula feeding parents
- Pets or siblings
- Non parent
- Overcrowded
- Obese bed partner

EVIDENCE-BASED INFANT SLEEP INFORMATION

Prof. Helen Ball, [Infant Sleep Laboratory, U.Durham UK](#)

Prof. James McKenna, [Mother/Baby Sleep Laboratory UND](#)

SWEET SLEEP Tear sheets – patient resources [La Leche League International](#)

GUIDE FOR EFFECTIVE ADVOCACY

CONTROL GROUP - An exclusively breastfed control as an evolutionary standard (normative practice)

EXPERIMENTAL GROUP - Formula fed or part formula / part breastfed (health risk behaviour)

Diane Wiessinger USA (MSTF) WABA e-newsletter April 2012 page 7, provides a vital message for successful advocacy and scientific integrity in her statement:

“The single most important job we breastfeeding promoters face is not to convince the public of breastfeeding’s superiority. It is to create a united force demanding that researchers and the journals in which they publish focus on the experiment, not on the control group. All the rest - media reports, imagery, perceptions, motivation, will take care of itself.”

[Watch your language! Journal of Human Lactation 1996; 12:1-4 Diane Wiessinger](#)

[The benefits of breastfeeding or the harm of formula feeding Journal of Paediatrics and child Health Cattaneo A 2008,44:1](#)

[Health Professional Knowledge of Breastfeeding: Are the Health Risks of Infant Formula Feeding Accurately Conveyed by the Titles and Abstracts of Journal Articles?](#)

[Julie Smith, Mark Dunstone, M.Elliott-Rudder J Hum Lact 2009 Aug;25\(3\): 350-8 PMID:19369684](#)

[What are the risks associated with formula feeding? Birth 2010, 37:1 McNeil M E, Labbok M H, Abrahams S W](#)

ODDS RATIO - CASE CONTROL STUDY

Formula-feeding vs. breast-feeding: Risk of adverse outcomes.			
INFANT		MOTHER	
Illness	OR	Illness	OR
Diarrhea	2.8	Premenopausal breast cancer	1.4
Otitis media	2.0	Ovarian cancer	1.3
Pneumonia	3.6	Type 2 Diabetes	1.2
SIDS	1.6		
Asthma	1.4		
Leukemia	1.2		

Breastfeeding and Maternal and Infant Health Outcomes in Developed Countries. AHRQ Evidence Report Number 153. April 2007.

<http://archive.ahrq.gov/clinic/tp/brfouttp.htm>

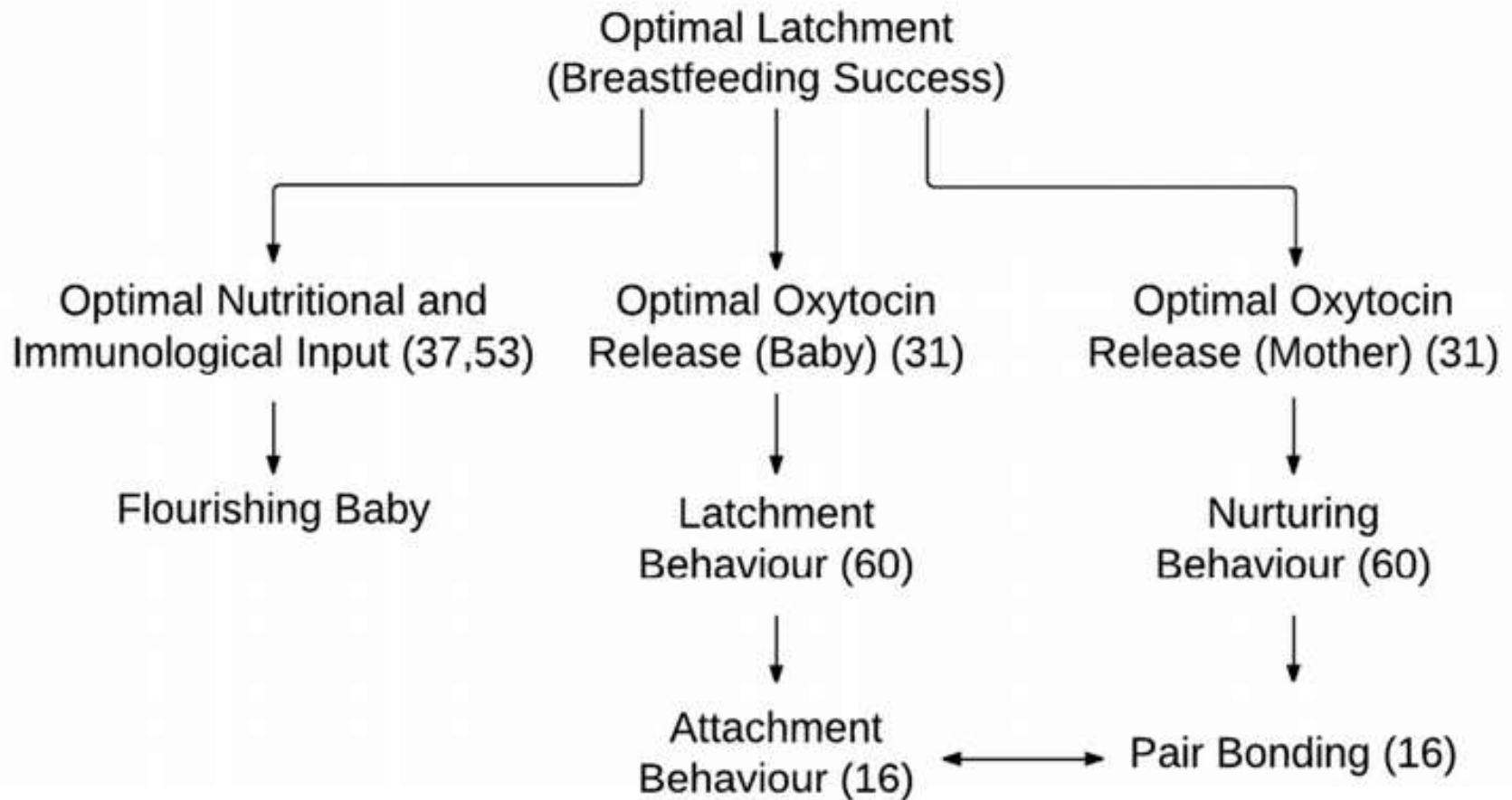
Epidemiologists use studies looking for factors which do harm. Our responsibility is to compare patients who already have a certain condition (cases exclusively formula fed or part formula fed) with patients who do not have this condition (**an exclusively breastfed control as an evolutionary standard developed over 300 Million years**) as a case control study. It is **upside-down science** to report “*advantages of breastfeeding*”. **Mothers need to know “*What are the risks of manufactured formula?*”**

ODDS are calculated by dividing the number of times an event happens by the number of times it does not happen.

ODDS RATIOS are calculated by dividing the odds of having been exposed to a risk factor by the odds in the control group.

We believe it would help resolve the yet unsolved problem of defective breastfeeding advocacy if our scientific journals reported dose-related health deficits of formula as a risk and not the evolutionary norm of breastfeeding as a benefit. Compare the occasional bottle of formula with passive smoking.

Breastfeeding and Normal Expectations

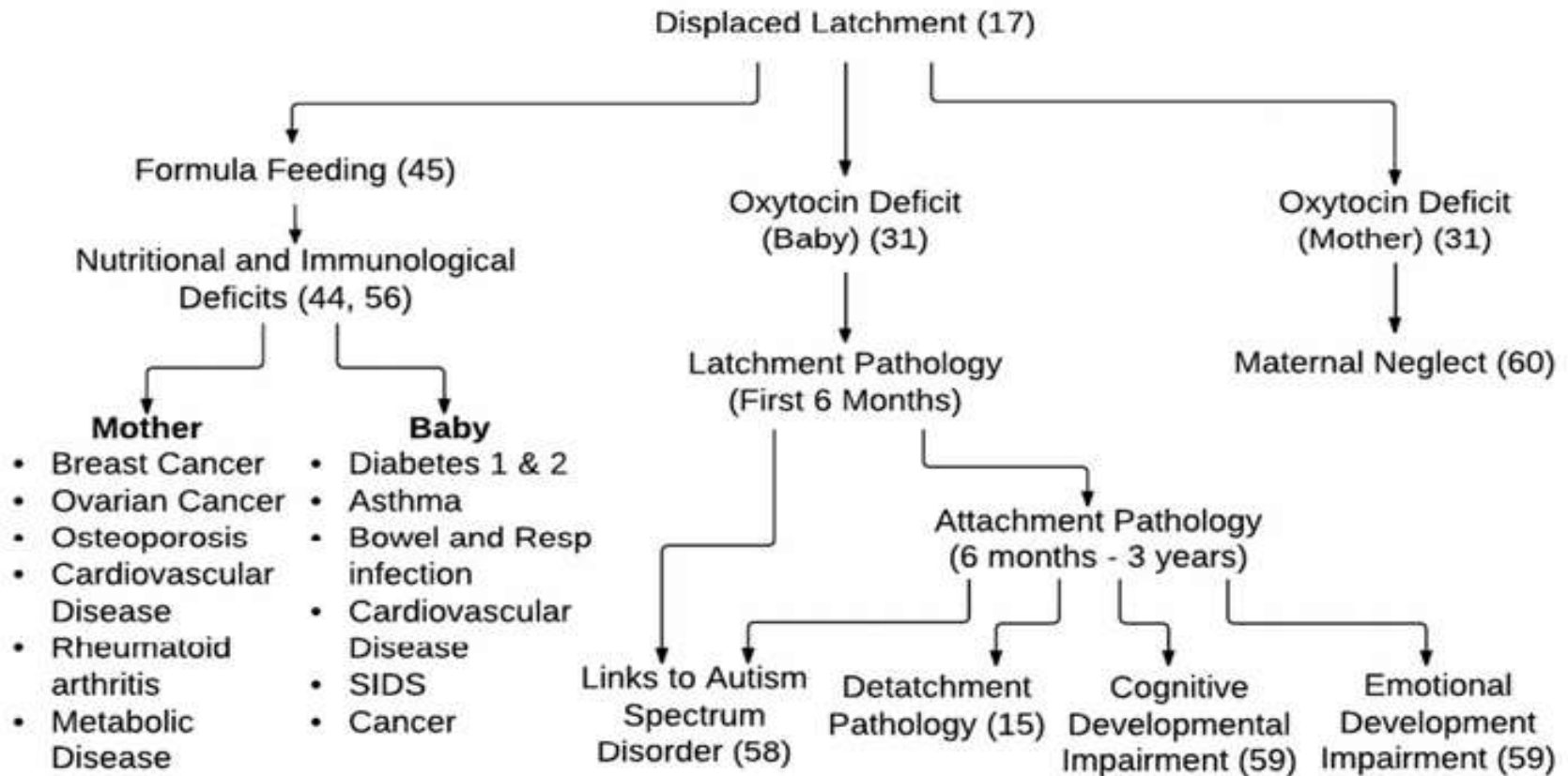


Latchment The first emotional stage of development - oral tactile recognition of stimulus feature (suckling area) “**mother in the mouth**”

Attachment The second emotional stage of development sometime after 6 months - visual recognition of mother “**mother in the eye**”

nb: slide 11

Problems and Pitfalls of Formula Feeding



Latchment The first emotional stage of development - oral tactile recognition of stimulus feature (nipple and surrounding suckling area) - “**mother in the mouth**”

Attachment The second emotional stage of development sometime after 6 months - visual recognition of mother as a whole person – “**mother in the eye**”

Nb: slide 11

[Mobbs E.Acta Paediatrica 2016;105,24, doi/10.1111/apa.13034](https://doi.org/10.1111/apa.13034) for numbered references

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AVOIDING HAZARDS – FORMULA USE MAY DENY NORMAL EVOLUTIONARY POTENTIAL

1. **Formula denies safety of basic evolutionary rights** for baby and mother which are not only nutritional, immunological and infection protective but through oxytocin, maternal responsiveness and relationship benefits provide safer mothering, reduced maternal stress and continuing evolutionary survival - see slides 27, 28
2. **Formula feeding by epileptic mothers** who have used **Valproate** during pregnancy has been associated **with a 12 point IQ loss**. 106 breast vs. 94 for formula ([JAMA Pediatr 2014;168:729](#)) - slide 35
3. **Formula feeding by mothers has been associated with a 20% to 30% reduction in their baby's white matter** at age 2 years on MRI ([NeuroImage 2013;82:77](#)) slide 33 (for grey matter reduction see slide 34)
4. **Formula feeding denies Serotonin neurotransmission** in lactating breast alveoli which provides PTHrP expression and optimal Ca and P metabolism aiding the reset of both pregnancy and lactation physiology at weaning. Menopausal hip fracture increased by 50% resulting from absent reset physiology with formula feeding ([J Bone & Joint Metab 2011;26:2843](#)) - slides 38,39
5. **Formula (probably just one bottle) denies optimal gut colonisation** delaying mucosal host defence and impairing immune homeostasis with increased susceptibility to infection, allergy and autoimmune disease. Deficient sialic acid conjugation may impair ganglioside structure and white matter synaptogenesis - slide 43
6. **Formula denies resetting of visceral fat metabolism**. "[Million Women Study](#)". At every parity level BMI significantly lower with breastfeeding just 6 months. $P = .001$ - slide 42
7. **Formula feeding denies resetting of breast cell histology and increases breast cancer risk** - slide 41
8. **Any feeding by bottle may deny the process of buccal stimulation required for optimal facial development, tongue extrusion and speech** ([Ashley Montagu, Breastfeeding and Food policy in a hungry world](#), ed. Dana Raphael pp 192 ISBN 0-12-580950-6; [Early human development 1995;42:185-93](#) – (slide 65))

Structural growth trajectories and rates of change in the first 3 months of infant brain development MRI

[JAMA Neurology](#) 2014 doi:10.1001/jamaneurol.2014.1638 Holland D et al

- Newborn brain (one third adult size) grows 1% each day immediately following birth but slows to 0.4 % per day by 3 months. Overall growth in the first 90 days was 64% reaching just more than half adult brain volume
- Birth a week premature resulted in a brain 4% smaller than at term. Still 2% smaller at 3 months
- Cerebellum size doubled in 90 days

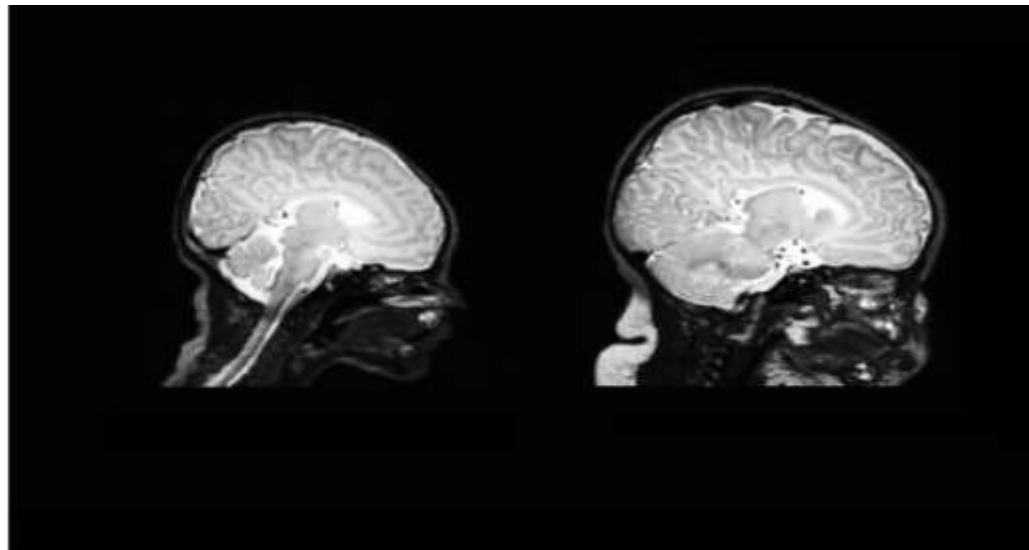
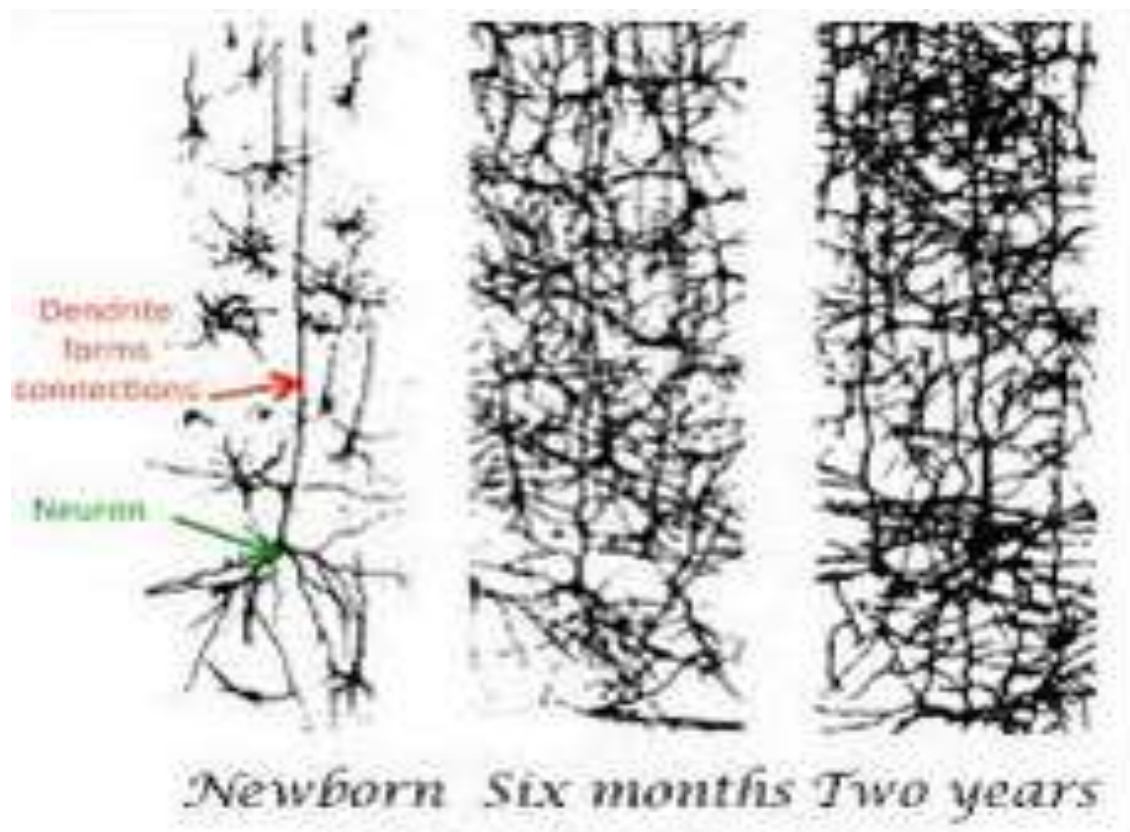


Image: the brain of a newborn and the brain of the same baby at 90 days. Credit: Holland et al.

Dendrite Connections



Formula feeding and early white matter reduction

Neural growth  Information transfer

Quiet MRI imaging of sleeping infants under the age of 4 looked at microstructure of myelin in brain's white matter

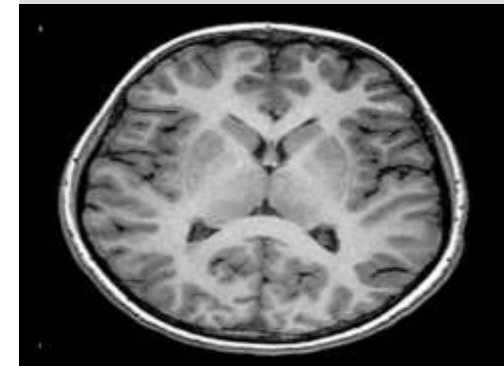
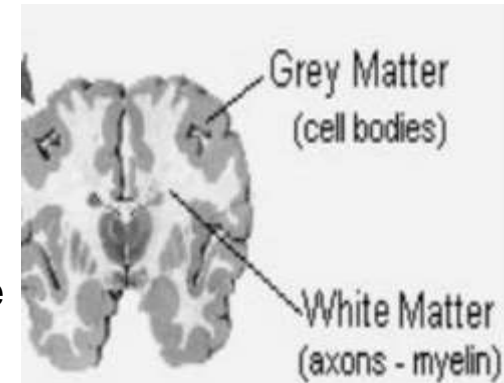
- Babies who had been exclusively or partially formula fed for the first 3 months had reduced development in key parts of the brain white matter at two years compared to the **evolutionary norm** of those exclusively breastfed.
- A 20% to 30% reduction in white matter was found at age 2 years which may indicate that there could be something deficient in formula leading to a mishap that negatively influenced neurological development.

[Deoni S et al NeurolImage 2013,82:77-86](#) (Brown Univ.)

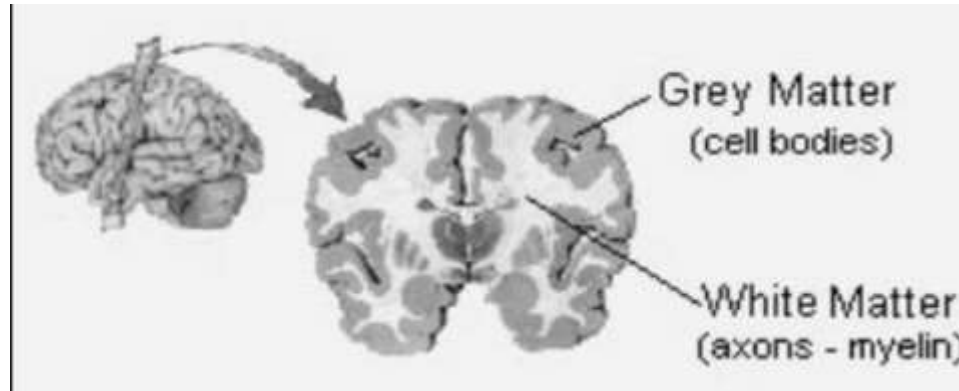
* Highlights

- First investigation of breastfeeding and early infant brain myelination
- Breastfed infants shown improved brain development by two years of age
- Duration of breastfeeding is positively associated with behavioural performance

* These highlights from *NeurolImage* are a thinkable example of upside down interpretation of findings:- **It is health risk findings which should be reported, not the evolutionary norm of breastfeeding stated as a benefit.**



Formula feeding and early grey matter reduction



“ We found that greater breast milk feeding in the first 28 days of life was associated with greater deep nuclear gray matter and hippocampal volume at term equivalent age, and with higher IQ, academic achievement, working memory, and motor scores at 7 years of age in very preterm infants. These results provide support for national⁵³ and international⁵⁴ recommendations to provide breast milk as the primary diet for preterm infants. ■ ”

J Pediatr July 2016. Belfort M B, Anderson P J, Nowak V A, et al
<http://dx.doi.org/10.1016/j.jpeds.2016.06.045>

Would it be more scientifically accurate to report the above stating that “the health risk of formula feeding this group of new-borns leads to a dose-related reduction in depth of deep nuclear grey matter and hippocampal volume with reduction of IQ, academic achievement, working memory and motor scores at 7 years of age?”

Reporting the evolutionary norm of breast milk as a ‘benefit’ disguises the truth.

Pregnancy and Antiepileptic drugs

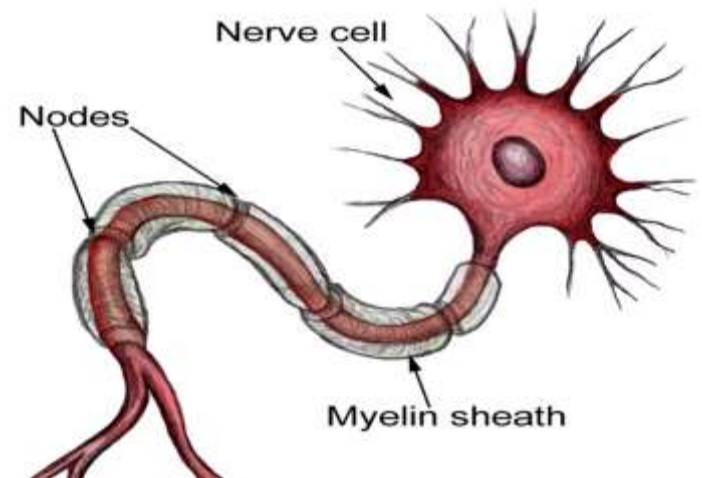
[JAMA Pediatr 2014;168. 729-736 Meador KJ et al.](#)

Overall IQ was higher by 4 points in children who were breastfed than in those receiving formula. Adjustments included periconception folate.

In mothers receiving Valproate (Valproic acid, Epilim) there was a mean difference of 12 IQ points between the breastfed and formula fed groups.

106 for breastfed v. 94 for formula fed $P = .04$

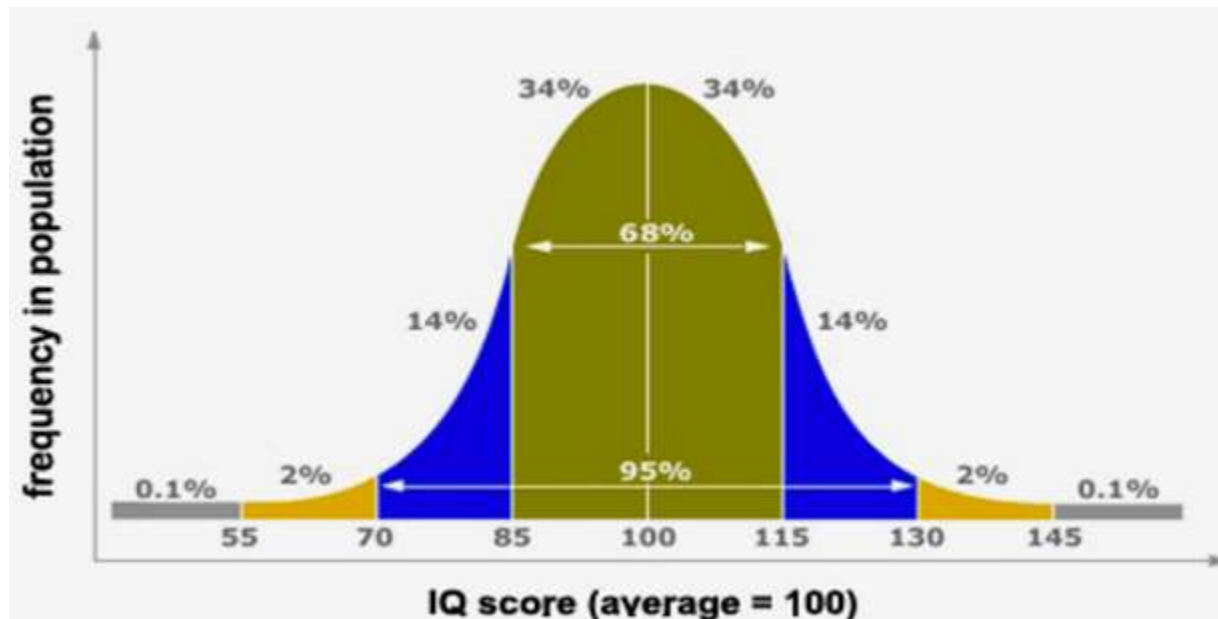
A complex human milk has evolved to prepare a complex human brain



DOES IQ MATTER? The Opportunity Cost of not breast-feeding

[The Lancet Global Health vol 3, no 4, e199-e205, April 2015](#)

“Association between breastfeeding and intelligence”; Victora CG, Horta BL et al, reported a dose-related association with breastfeeding duration for IQ, educational attainment and income in adulthood. In the population studied, breastfeeding was evenly distributed by social class. This suggests that it is a national priority to provide lactation consultants to help mothers breastfeed their precious babies and so reach their evolutionary potential norm. A Bell curve shows how a 4 point IQ advantage may push the IQ beyond 160 and possibly generate an Albert Einstein (breastfed 3 years). On the downside a 4 point IQ deficit may result in the need for a full time carer.



Retinopathy of prematurity and formula feeding

Neural Circuits are Wired in a Bottom-Up Sequence

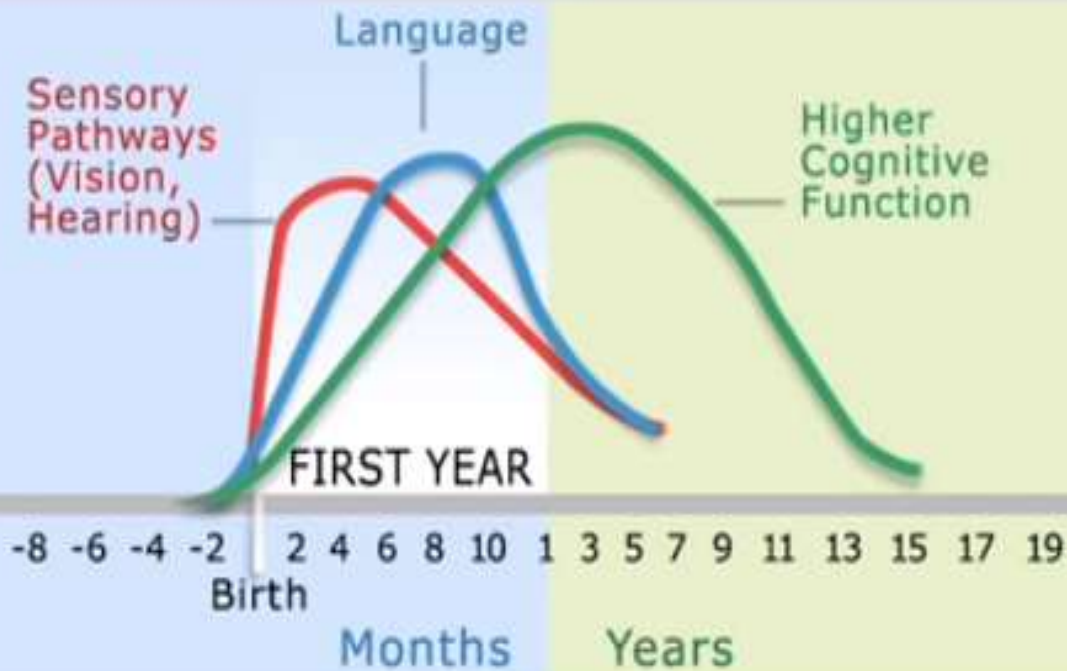


Image: [Nelson 2000 Harvard Uni. - Centre for Developing Child](#)

Retinopathy of prematurity was

significantly lower in infants exclusively fed maternal milk - (11 out of 314)

3.5% compared to formula-fed neonates (29 of 184)

15.8% $p=0.004$.

Same for threshold ROP

$P=0.009$

Early Hum Dev. 2013;89

S64

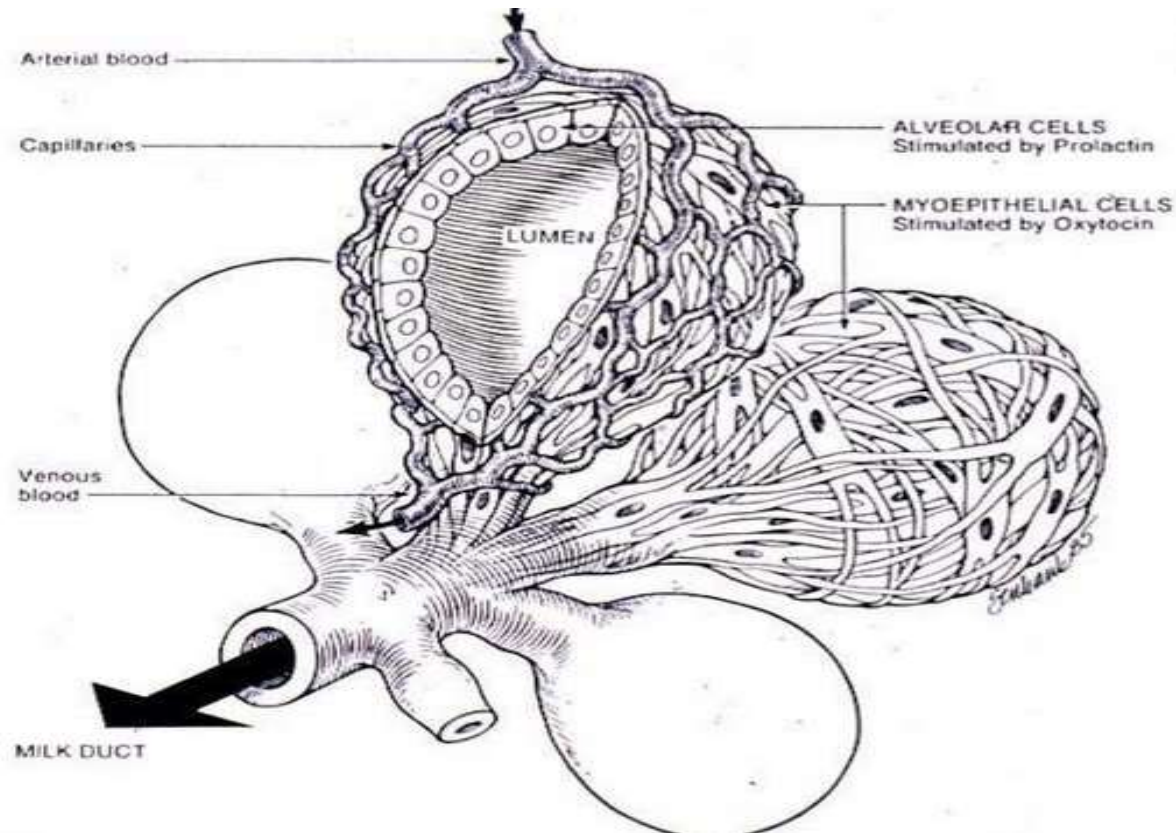
<http://www.ncbi.nlm.nih.gov/pubmed/23809355>

Manzoni P et al



Lactation, Calcium, Bones and Menopausal Hip Fracture

PTHrP expression results from a local serotonin signaling system and is highly induced in response to alveolar dilatation due to milk secretion and provides export of large amounts of calcium and phosphorous. There is a four-fold greater calcium loss during 6 months lactation than whole pregnancy.



[American Journal Physiol Endocrinol Metab](#)
[2012;302 E1009-E1015 Hernandez L et al.](#)

Formula does not provide physiological protection for mother's calcium loss during pregnancy leading to a 50% increased risk of femur neck fracture in post menopausal women who have formula fed.

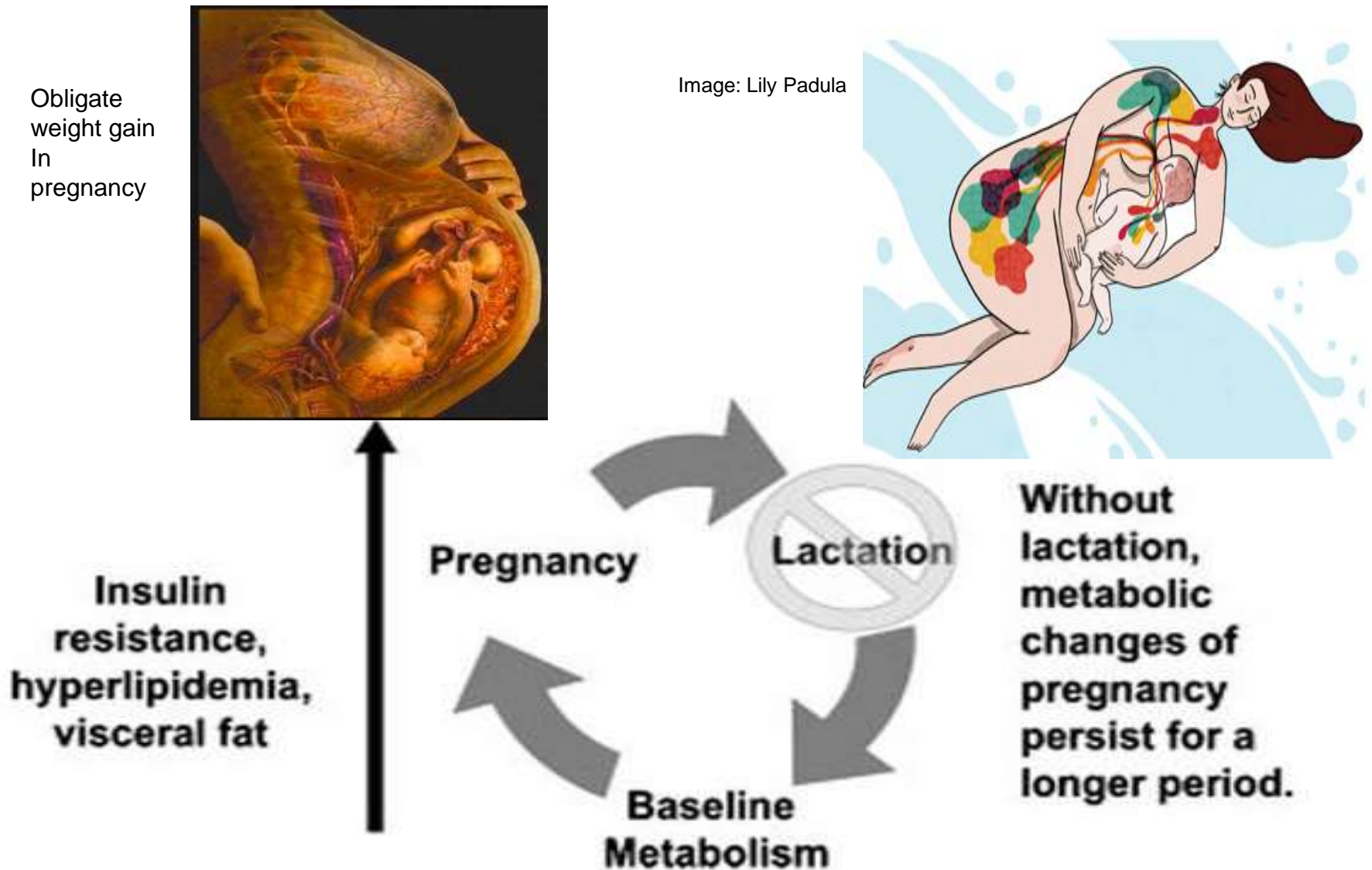
Fragility Fracture and Formula Feeding



[Journal of Bone and Mineral research 2011; 26:2843 Bjornerem A et al](#)

Formula feeding was associated with a 50% higher risk of hip fracture and 27% higher risk of fragility fracture. Wrist fracture was unchanged. Lactation resets calcium metabolism and replaces bone loss of pregnancy for evolutionary survival.

The Reset Hypothesis: Lactation and Maternal Metabolism



[Am.J Perinatology 2009;26:81-88 Stuebe A M, Rich-Edwards JW](#)

Breast cancer and formula feeding: Is there a histology reset with lactation ?

Transformation and maturation of breast tissue has been a signal part of mammalian evolution.

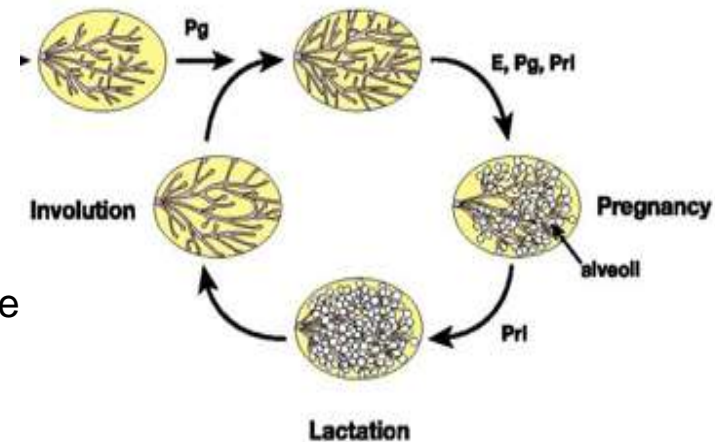
Histological maturity of the breast occurs with lactation. Formula feeding and shorter durations of breastfeeding have been associated with a poorer prognosis and a higher death rate from breast cancer.

The maturation of progenitor cells in the breast requires preferably at least 6 months of lactation for their optimal development with a clear improvement shown in cancer statistics.

Normal maturation of these cells appears to be associated with a lower risk of developing aggressive hormone receptor negative types of breast cancer and, more commonly, luminal A tumours responding well to hormone therapy.

A 30% decrease in risk of breast cancer recurrence with breastfeeding more than 6 months and a 28% death rate reduction has been reported.

[J Nat Cancer Inst Kwan M L et al 2015:107](#)
[Annals of Oncology 2015](#)



Reset of cellular morphology with lactation and weaning sometime after 6 months.

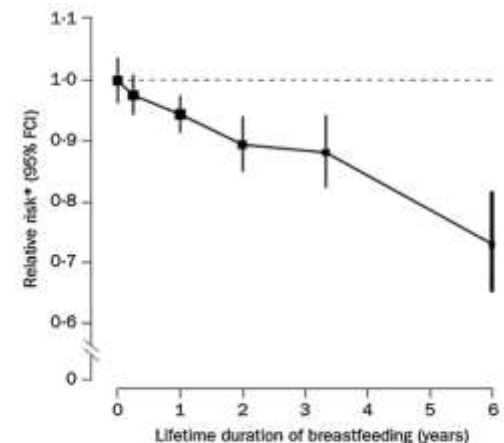
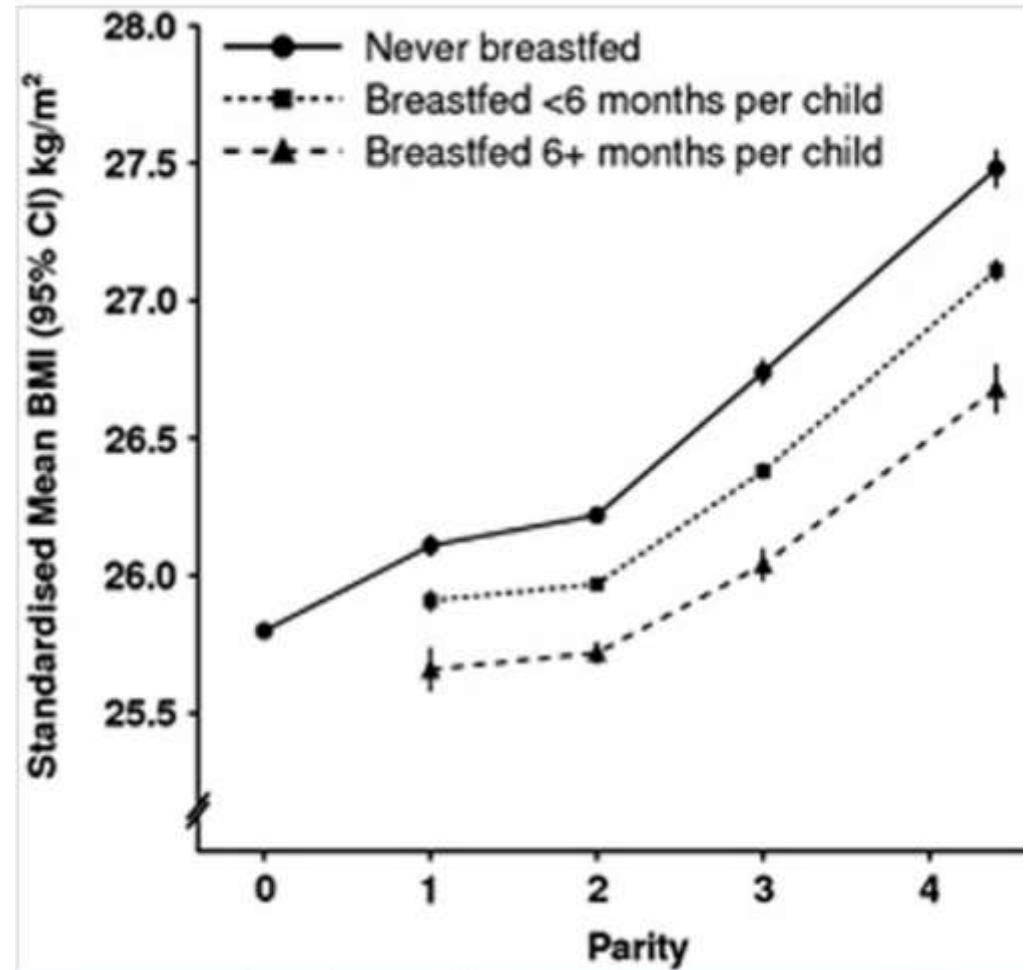


Fig. 3. Risk of breast cancer in relation to lifetime duration of breastfeeding. Relative risk (calculated as floating absolute risk) of breast cancer in parous women adjusted for parity, age, age at first birth, and menopausal status.

The Lancet 2002;360(9328),187-195
Formula feeding and breast cancer.

The Million Women Study

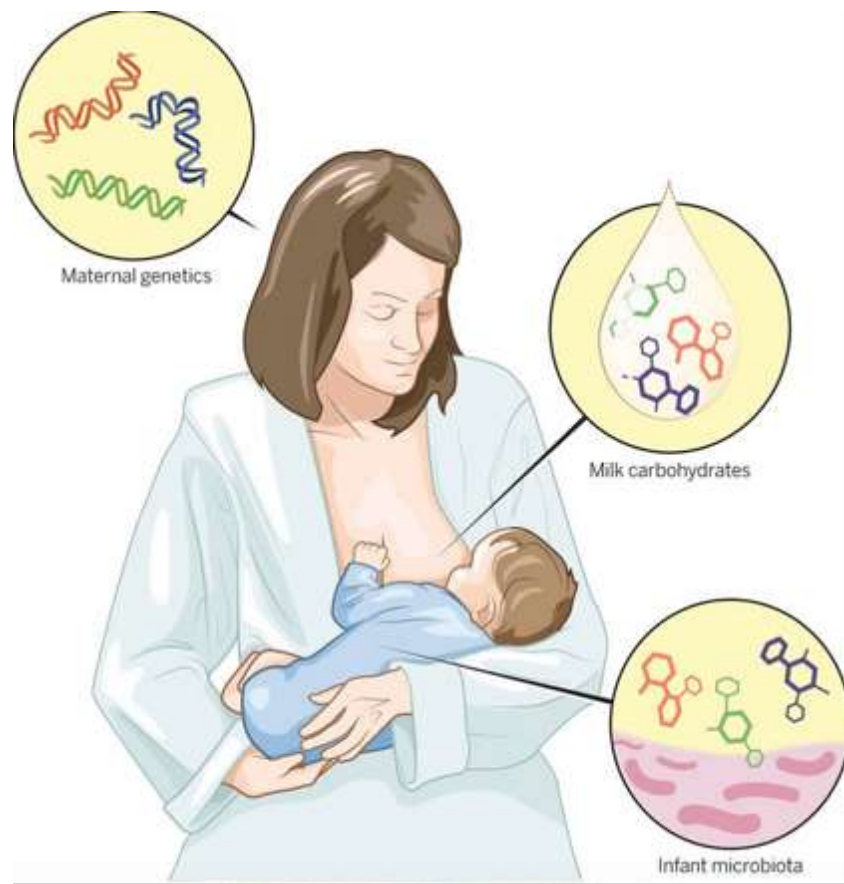
- The reduction in BMI associated with just 6 months breastfeeding in UK women could reduce obesity-related disease with ageing
- At every parity level the standardized mean BMI was significantly lower among women who had breastfed than those who had not
P- 0.0001



[Int J Obes 2013;37:712Bobrow K L](#)

DYSBIOSIS

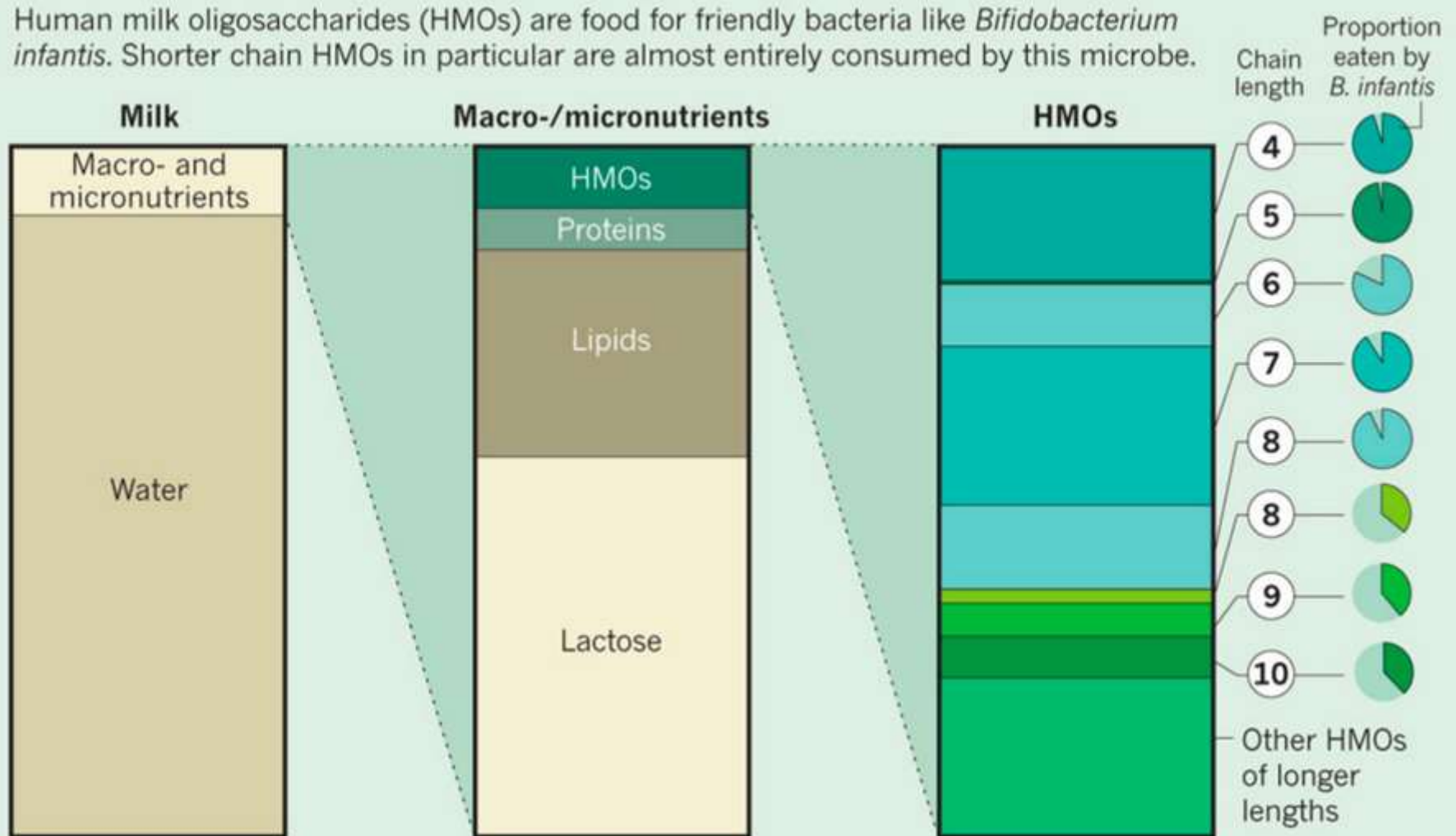
Improper colonization of the infant gut, (altered gut microbiome) resulting when a **substance other than breastmilk** is introduced, delays the process of mucosal host defence provided by prebiotic oligosaccharides and probiotic bifidobacteria evolved over millions of years. This may result in increased susceptibility to newborn and infant infections and altered immune homeostasis leading to the expression of immune-mediated and metabolic diseases with successive generations of manufactured formula use creating this world wide increase (slide 45-50). Human milk sialic acid conjugated oligosaccharides in the colon are essential components in ganglioside structure and are critical for brain development. This may be another link to understanding the IQ reduction seen in the formula fed infant and to concern for how evolution may be influenced.



[Nutrition and Metabolic insights 2015 doi:10.4137/NMI.S29530](#)
[British Medical Journal 2016, Boyle R J, Hydrolysed formula risk](#)
[Pediatric Research 2015, 77,220 Walker W A, Lyengar R](#)
[Glycobiology 2012;22:1147 Lars Bode](#)
[Front.Pediatr 2015 doi:10.3389/fped.2015.00017 Gritz E](#)
[Nutrients 2015,7,2109 Young W et al](#)
[Annu Rev Nutr 2009, 29; 177 Wang B](#)
[Milk Matters 2015, Minchin M](#)
Hinde, K Mind and Microbes [0.1093/emph/eov007](#)
Image: V.Altounian/science/image

WHAT'S IN HUMAN MILK

Human milk oligosaccharides (HMOs) are food for friendly bacteria like *Bifidobacterium infantis*. Shorter chain HMOs in particular are almost entirely consumed by this microbe.



[Anna Petherick Nature 468 Dec.2010](#)

Also see [Lars Bode 10.1016/j.earlhumdev.2015.09.001](#)

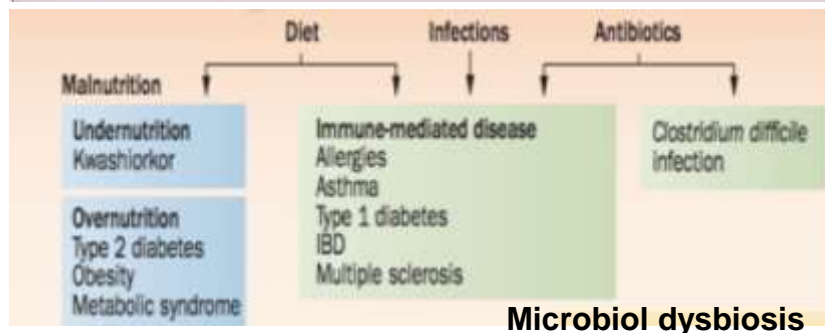
Diet and host—microbial crosstalk in postnatal intestinal immune homeostasis

[N Jain & W Allen Walker Nature Reviews Gastroenterology & Hepatology](#)

Also see: Pediatric research 2015 January vol 77 (1) pp 220, Walker W A and Lyengar R S open access, Harvard University

Key points

- Infant nutrition, including breast-milk, formula milk and solid weaning foods, is a key determinant of early microbial community structure that influences development of protective immunity and seems to affect health throughout life
- Diet-induced dysbiosis changes the species composition of the gut microbiota and leads to immune-mediated inflammatory and metabolic diseases
- Diet influences the postnatal development of innate and adaptive defences at the mucosal barrier surface and affects intestinal barrier function
- A triad of diet, the microbiota and the immune system regulates postnatal intestinal homeostasis and host physiology, which has consequences through to adulthood

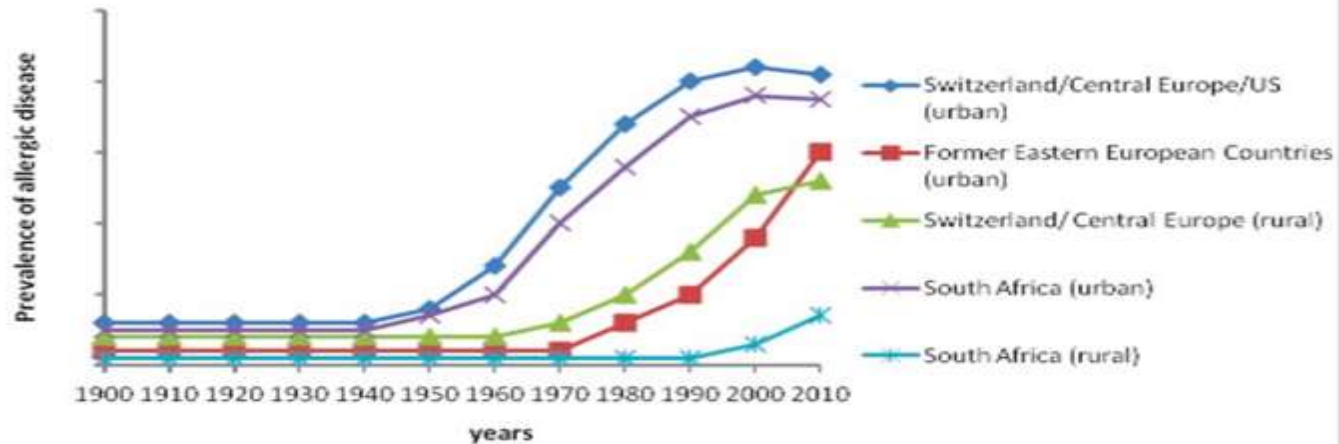


Evolutionary development of the mammary gland has driven mammalian survival. Human milk has a choice of 200 – 250 unique oligosaccharides which form its third largest solid component. These oligosaccharides are partially or not digested by the infant and provide a carbon source for the intestinal flora of Bifobacterium Infantis. Genomic sequence of this strain has revealed 700 unique genes and selective pressures for evolution may be expected to continue.

[German J B, 2008, Dept. Nutrition University of California, Davis](#)

TRANSGENERATIONAL HISTORY

Formula driven dysbiosis may deny protective immunity and lead to immune mediated disease



C A Akdis 2013 [Swiss Institute of Allergy and Asthma](#)

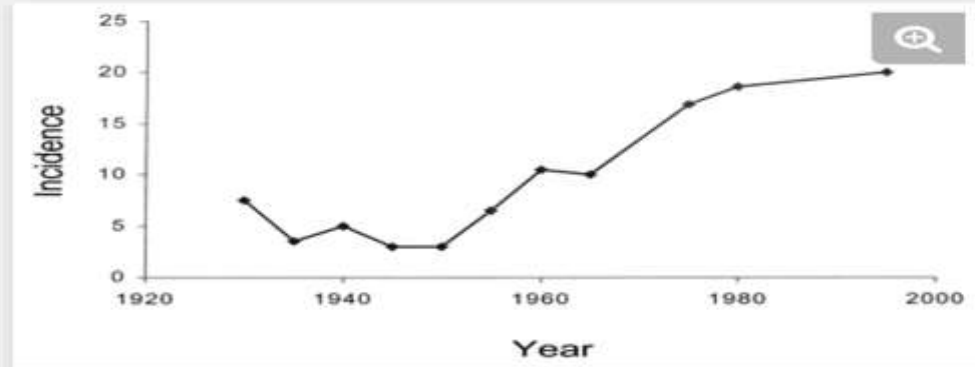


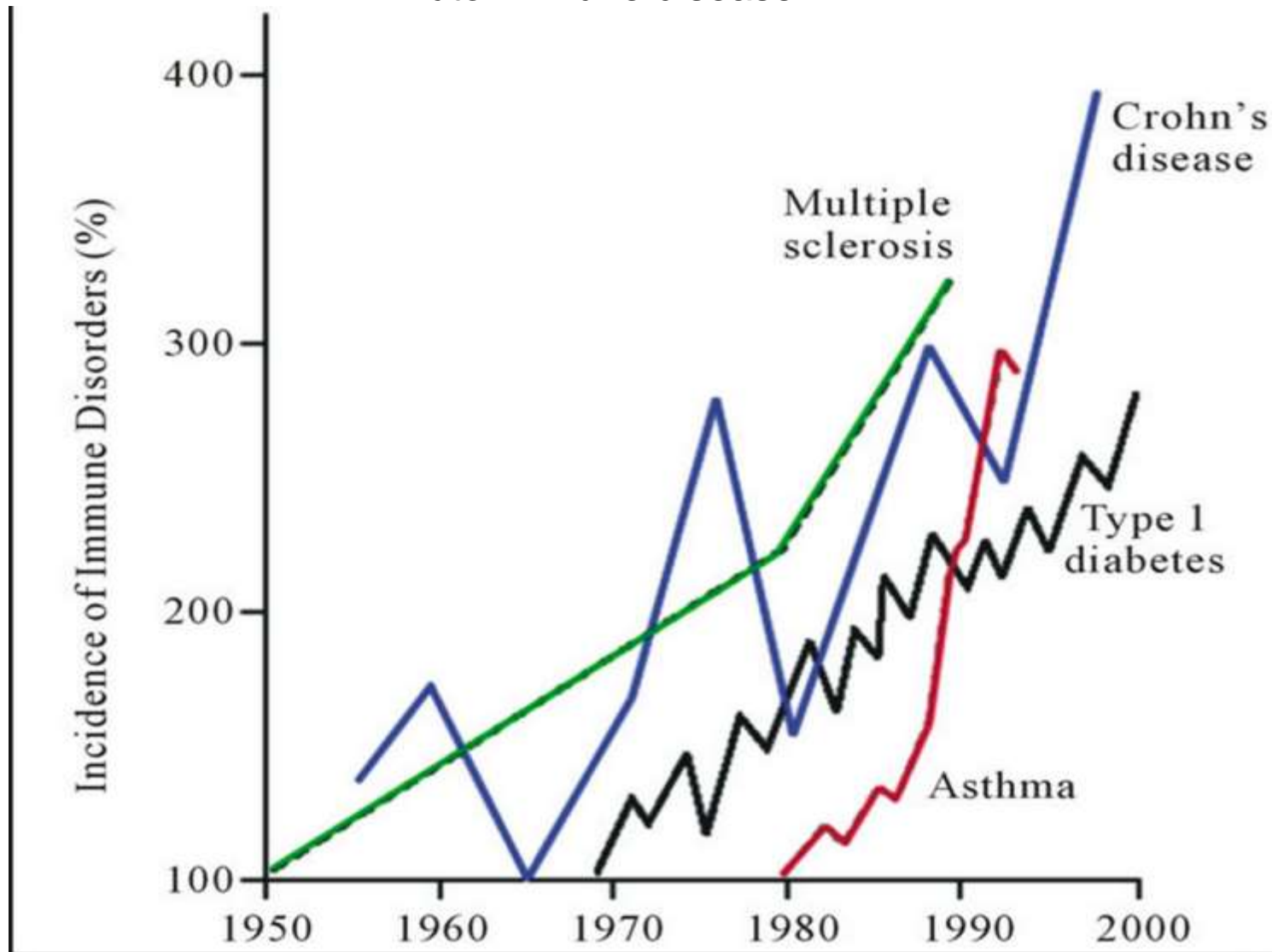
FIG. 2.

[Download figure](#) | [Open in new tab](#) | [Download powerpoint](#)

Incidence of diabetes in children under age 10 years in Norway, 1925–1995. Data from refs. 18,33–36.

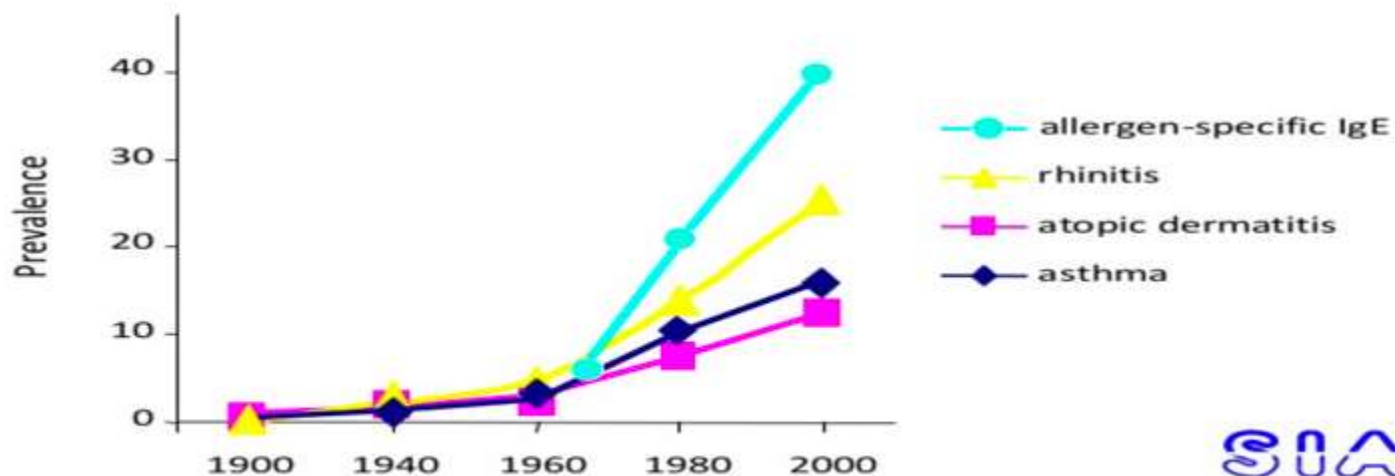
From [American Diabetes Association](#)

Auto-immune disease



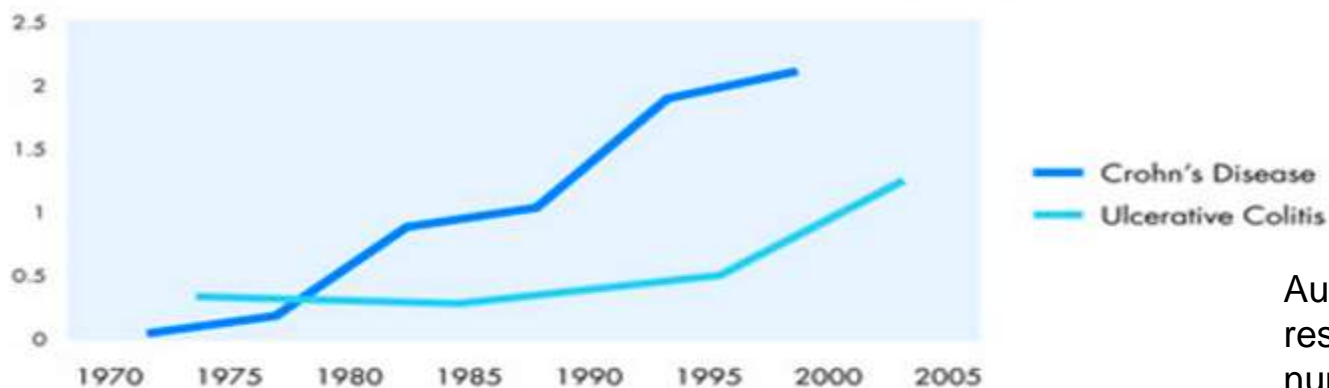
[New England Journal of Medicine, Bach J-F 2002;347\(12\) 911](#)

The Allergy-Epidemic



[From Swiss Institute of Allergy and Asthma Research](#)

Average Incidence of Inflammatory Bowel Disease per 100,000 Victorian children per year



Australian
research
numbers

Gut colonisation and generational progression of allergy and autoimmune disease

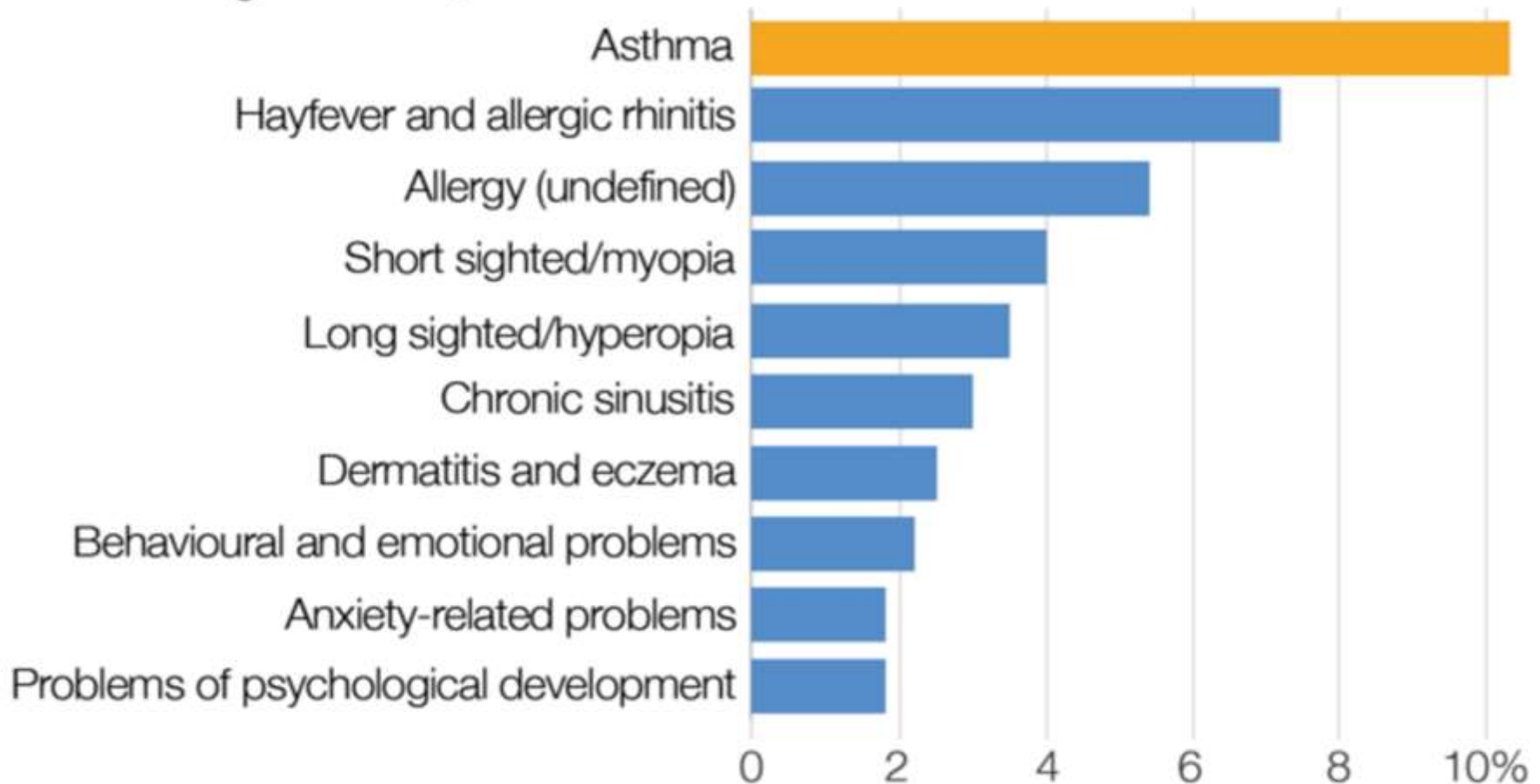
[*Milk matters, infant feeding and immune disorder p 100 M Minchin ISBN:9780959318310*](#)



Australian child health

Most frequently reported long-term conditions

Children aged 0–14, 2007 to 2008



Source: AIHW, A Picture of Australia's Health 2012

Milk banking

- Milk banks save life and improve quality of life of our vulnerable infants
- Massive health \$ save for government and society
- Introduce a tax on manufactured infant formulas to subsidise milk bank management and the cost of the health burden of formula feeding
- Recommend plain packaging and advertising ban legislated for infant formula



Family Courts, visitation, custody, breastfeeding and expert witnesses

A parenting expert, understanding child development and needs and who is also aware of the risks of formula feeding and early weaning, should be sought for advice. Having accurate scientific data available regarding health risks of formula and early weaning is essential. See slides 28,30. The responsibility of ensuring the baby does not suffer from the deficiencies of formula or early-weaning is paramount. The gift of evolutionary advantage should be universal.

Breastfeeding is the standard for normal outcome. It does not have benefits. DO NOT refer to the 'benefits' of breastfeeding as this may lead to its depreciation by a society, often guided by commercial interests, propaganda and personal bias, that downplayed the risks of tobacco 60 years ago. Formula and early weaning are the deficits of concern. The World Health Organisation states that breastfeeding should be exclusive in the first 6 months of life and continue with appropriate complementary foods up to two years of age and beyond. (slides 27 and 28 give overview).

Refer to previous slides (40-42) for guidance in giving weight to the need to ensure the mother's long-term risk of breast, ovarian cancer and metabolic disorder is not increased. See Melissa Bartick <http://onlinelibrary.wiley.com/doi/10.1111/mcn.12366/abstract>

Some helpful sources of information:

1. Australian Breastfeeding Association. <https://www.breastfeeding.asn.au/breastfeeding-and-law>
2. La Leche League <http://www.llli.org/law/lawus.html>
3. Kathryn Dettwyler [Anthropologist and world authority on age of weaning and author of helpful Court letter.](#)
4. American Academy of Pediatrics [Pediatrics vol. 115 no 2, February 2005 pp496-506](#)
5. Leaky Boob blog <http://theleakyboob.com/2011/02/a-journey-through-breastfeeding-and-visitation>
6. Kelly Mom <http://kellymom.com/bf/concerns/legal/bf-law/>

Is this relevant for me?

Will I combine return to work and breastfeed my baby?

How will I plan to do this?

How will I manage my long hours, inflexible schedule and a long commute to work.

Fail to plan – plan to fail

For practical **Return to Work** information

[ABA Return to Work Plans](#)

[Watch ABA 'Breastfeeding and Return to Work' webinar](#)

[La Leche League Return to Work Guide](#)



CLINICAL MANAGEMENT

The following slides, numbered 54 to 63, cover the most common clinical problems that we see. A qualified lactation consultant will be an essential member of every team caring for mothers. An around-the-clock service is mandatory. Mothering is a 24 hour, 7 days a week profession. Breastfeeding mothers provide society a multi-billion \$ “public health-save” which should help cover the costs of government funded paid leave programs and very importantly lactation consultant guidance.



Thanks mum!

Nipple Discomfort – Problems, Prevention and Solutions

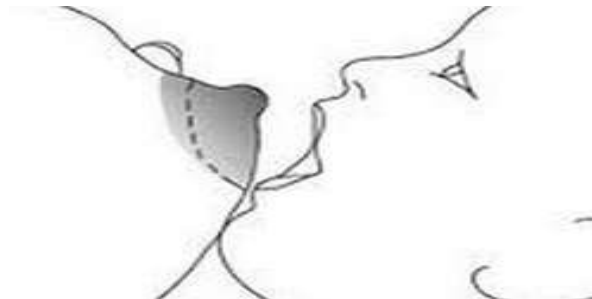
- Primates have evolved as active participants in the latching process from childhood observation within the home and through community role-modelled learning
- Baby's behaviour is innate and with maternal help, aided when necessary by professional expertise, he will latch to perfection at the sensitive time following birth. Good delivery ward management is essential. Latch is best terminated by sleep (re-visit slide 7).
- If insufficient time is allowed for imprinting, with perceptual tactile recognition of the milking (suckling) area, then displacement may occur to a non-nutritive imprint and breastfeeding problems and especially nipple discomfort may follow.



POOR LATCH - LEADS TO NIPPLE DAMAGE



BEST LATCH



Asymmetrical latch for comfort and painless, pleasurable milk delivery



TONGUE
TIE
MAY
IMPAIR
LATCH

Scissor snip
and
finger push

See ABM
protocol
www.bfmed.org



Recognising Breast Fullness and Engorgement

- Redness
- Tight and shiny skin
- Mother states discomfort
- May have mild fever
- May complain that milk not flowing
- Difficult to latch baby on to breast
- Nipple discomfort
- Baby has slept through night and missed feeds
- 48 hours + milk “has come in”



[Academy of Breastfeeding Medicine](http://www.bfmed.org)

Clinical Protocol 20

DOI: 10.1089/bfm.2016.29008.pjb

Engorgement

<http://www.bfmed.org>

Engorgement Treatment

Prevention is the best treatment

- Feed frequently - over 24 hours. Delaying a feed is not physiological. Feed baby when he opens one eye, change nappy when he finishes feeding.
- Sleep without a bra. Cotton singlet or T shirt soaks up milk but topless best
- Ensure decent fitting bra during day time e.g. sports bra

Treatment

- Remove bra before feeding baby
- Hand-expression and feed baby from affected breast first
- Massage and express breast in direction of nipple
- Alternate feeding positions
- Comfort measures including warmth (helps oxytocin let-down), cold packs (reduce oedema)
- Anti-inflammatory medication - Ibuprofen 400 mg qid for pain Reassure mother of safety of this medication
- Bed rest and reassurance - encourage mother to co-sleep as the physiological norm. Give her a **SAFE SLEEP 7 PRINTOUT** (LA LECHE LEAGUE)
- Recommend contact with lactation consultant / ABA / La Leche League.

Recognising a Blocked Duct – a not uncommon problem

- Palpable thickening,?lump
- Localised warmth
- Pain - sore to touch
- Occasional fever

TREATMENT

As for engorgement; clear area between lumpiness and nipple. May take hours or days. Breast massage whilst baby is suckling will help (duct anatomy slide 63).

If baby has a long night sleep (or day)

for no reason OR if baby's cries are neglected in the mistaken belief that sleep training is the done thing, then engorgement, blocked duct, painful lump and/or reduced milk production may result. Baby's cortisol levels stay elevated in spite of trained longer sleep. All mammals have evolved to sleep with their babies for evolutionary survival which includes the optimising of milk production and safety.



Recognising Mastitis

- Red (streaky), swollen, tender area of breast
- Multiple blockages in breast
- Fever, feeling of flu
- Pain
- Chemical or infective
- Patient history - engorgement
blocked duct / missed feed/s
- Blocked duct with ruptured alveoli and milk leakage into connective tissue of breast is common situation leading to chemical inflammation



TREATMENT

As for engorgement. If not treated infection may occur.

[Academy of Breastfeeding Medicine protocols](http://www.bfmed.org/) <http://www.bfmed.org/>

Treatment of Mastitis - Infection?

Follow treatment protocol for chemical mastitis

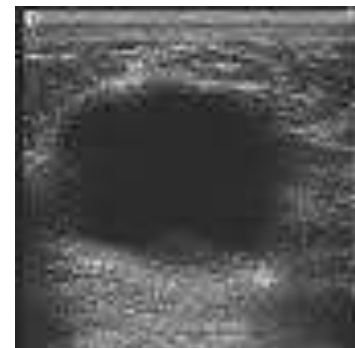
PLUS

- Antibiotics - flucloxacillin or dicloxacillin 500 mg 6th hourly 10 days
- Anti-inflammatory medication - Ibuprofen 400 mg qid
- NB Frequent feeds over 24 hours
- Bed rest for mum - sleep with baby



Recognising Breast Abscess

- An uncommon condition
- If a well-defined area of the breast remains hard, red, and tender and then fluctuant despite appropriate management, then an abscess should be suspected. This occurs in about 3% of women with mastitis.
- A diagnostic breast ultrasound will identify a collection of fluid.



Treatment of breast abscess

Prevention is the best treatment

- Aspirate preferably with ultrasound guidance.
- Local anaesthetic 1% Lignocaine, 14-18 gauge needle, irrigate, culture
- 6 to 8 French pig tail catheter for larger abscesses
- Anti-inflammatory medication - Ibuprofen 400mg qid for pain
- Antibiotics - flucloxacillin or dicloxacillin 500 mg 6th hourly 10 days

Follow protocol for treatment of mastitis including

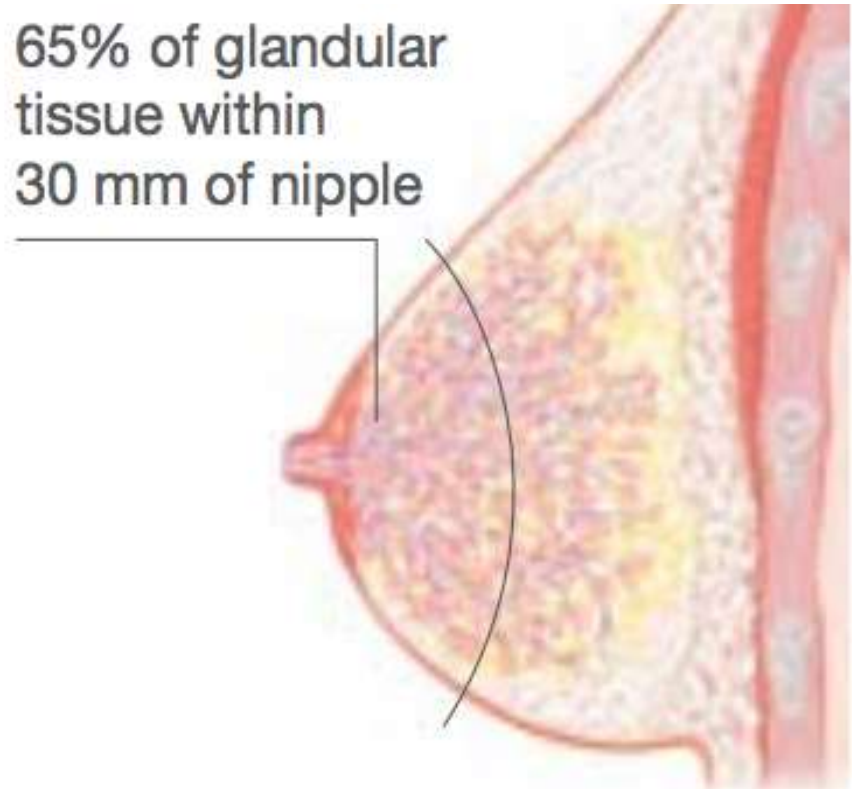
- Frequent breastfeeding - emptying of breast
- Comfort measures including warmth (helps oxytocin let-down), cold packs (reduce oedema)
- Alternate feeding positions
- Bed rest and reassurance - encourage mother to feed baby in bed
- Immune factors in the breast milk help prevent further infection. Be sure to explain this to mother with reassurance to feed from the affected breast

Anatomy of lactating breast

([Peter Hartmann UWA](#) and Medela)

- The number of ductal openings is 4-18
- The ducts branch close to the nipple
- Each breast has 15-25 lobes and each lobe has 10 to 100 alveoli
- Ducts can reside close to the skin surface making them easily compressible
- The majority of glandular tissue is found within 30mm of the nipple

65% of glandular tissue within 30 mm of nipple



See: [Ramsey D T et al. \(2005\) J of Anatomy 206:525 open access](#)

“There was no correlation between milk production and the amount of glandular tissue, the number of ducts or the mean diameter of the milk ducts, nor was there a correlation between the amount of glandular tissue and the storage capacity of the breast”

Lower numbers of alveoli usually provide baby's needs as milk production is controlled by the baby's appetite and the more quickly the breast is emptied the more quickly more milk is made. (Has your natural autonomous process of saliva production ever let you down at a dinner ?)

Exterior Gestation



The lactational phase of human reproduction may also be described as a stage of **exterior gestation** as human babies are born with the least developed brain of any primate. The knowledge that the

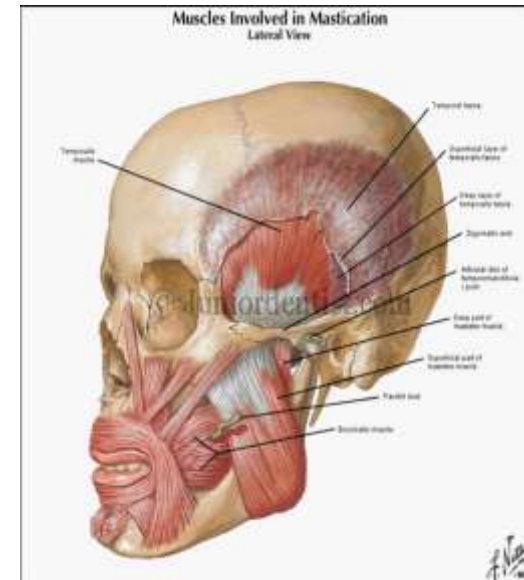
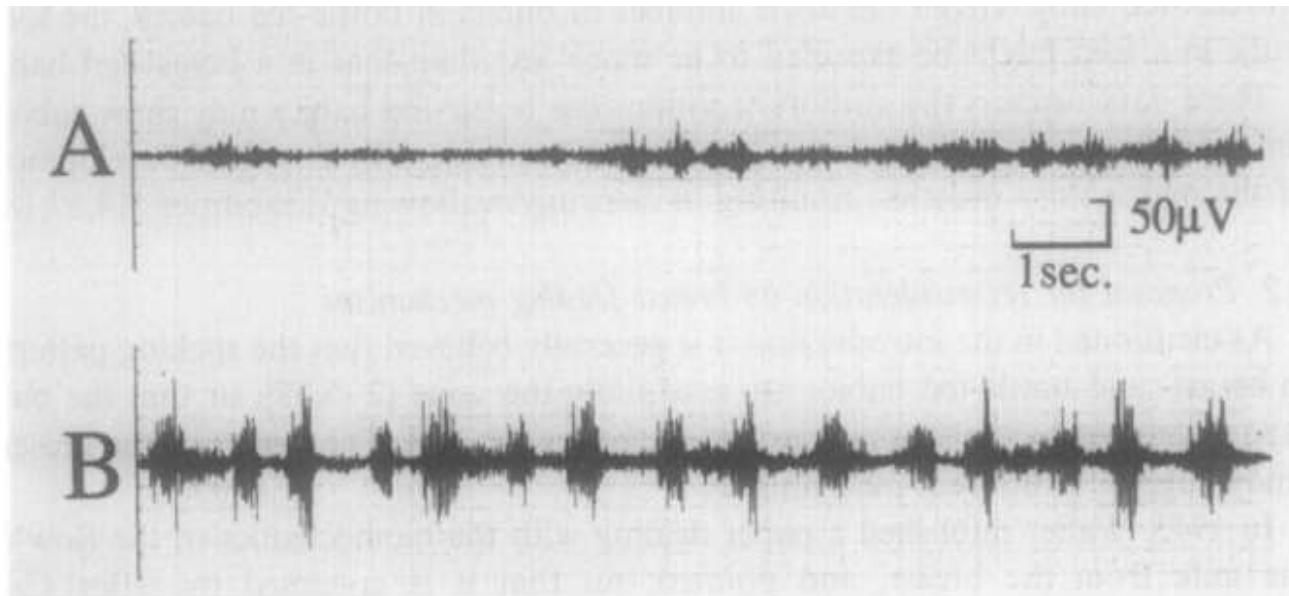
formula feeding of our precious babies has been associated with a measured reduction in brain white matter is significant and alarming and leads our attention to the essential and unique nature of the bioactive factors present **and alive** in mother's milk and to ensuring our babies receive their normal evolutionary accomplishment.

Formula denies our babies the evolutionary advantage of the early nutritional, anti-microbial, immuno-regulatory, anti-inflammatory and behavioural benefits implemented by 65 million years of Darwinian natural selection which has been determining in successful primate evolution and reproduction. The feeding of formulations which have been manufactured from non-living, non-human species milks and soy juices, during the time of maximum brain development deserves concern. There is a measured 64% increase in baby's brain size during the first 90 days of life.

The expression "**The Seduction of Unreason**" is the title of the renowned book written by Richard Wolin; 2004, Princeton University Press: IBN:0-691-11464-1. Not surprisingly, with such a title, the book is about political misdeeds. The term "**seduction of unreason**", we believe, similarly applies to the infant care principle misdeeds popularised by industrial propaganda and fostered by carer ignorance, and then, experimented on many unfortunate babies, some of whom may go on to suffer autoimmune disease which may lead to an unhappy life, or infectious disease which may be life threatening (slides 28 and 30 for formula hazards);

See M. Bartick – <http://onlinelibrary.wiley.com/doi/10.1111/mcn.12366/abstract> for statistics and slide 49 for [Maureen Minchin](#) – transgenerational overview of the increasing health risks of autoimmune disease and allergy from [Milk matters](#) ISBN: 9780959318310 (Also as e-book)

Weakening of masseter muscle activity and reduction of mass in bottle-fed infants –a dysfunctional pathway



Masseter is the main breastfeeding muscle of mastication with help from Mentalis to evert lower lip (Quick look slide 55) Buccinator and Orbicularis oris are muscles of facial expression mainly used by the bottle fed and those sucking on pacifiers and other decoys



Safe solids as early as six months

65

Fig. 1. Examples of EMG from masseter at ingestion of milk. (A) From a bottle-fed female baby 4 months after birth (Case No. A-10). Breast feeding: 0–2 weeks after birth. Bottle feeding: 0–4 months after birth. (B) From a breast-fed female baby 4 months after birth (Case No. B-10). Breast feeding: 0–4 months after birth. Bottle feeding: 0–3 days after birth.

[Early Human Development 1995;42:185-193 Inoue N et al](#)

PROBLEMS:

- Dampening and early extinguishing of the evolutionary safety of the tongue extrusion reflex in the bottle-fed.
- Undoing of evolutionary advantage often leading to premature introduction of solids before six months.
- Unphysiological sucking, chewing, swallowing, palate formation, cranio-facial growth and speech. (quick look slide 55)
- Malocclusions, sleep disordered breathing and otitis media.

[Ashley Montagu, *Breastfeeding and food policy in a hungry world*. Ed, Dana Raphael pp 192, ISBN 0-12-580950-6](#)
[Catherine Watson Genna, *Supporting sucking skills*, 2nd edit, chapter 1, ISBN 978-1-4496-4736-0](#)

Nutrients have evolved along with brain structure, brain function and cognitive development

Natural selection continues to drive the evolutionary process

30% of mother's resting energy output utilised by lactating breasts

Breastmilk contains the highest concentration of miRNA of all body fluids

Lactation provides maternal biochemical signalling guiding normal development

Formula feeding denies and impairs the directional mammalian evolutionary process

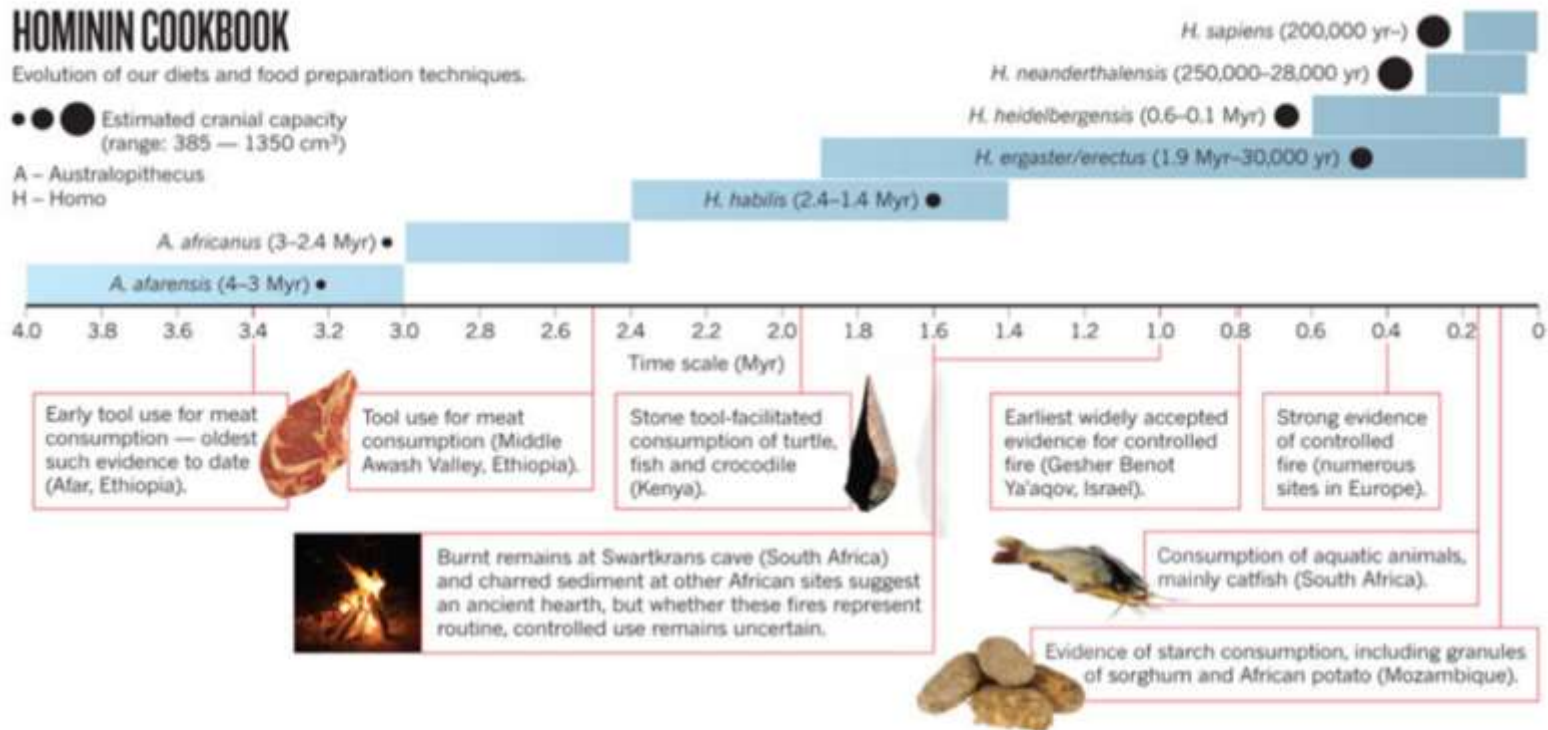
See helpful website humanlactationresearchgroup.com

HOMININ COOKBOOK

Evolution of our diets and food preparation techniques.

●●● Estimated cranial capacity
(range: 385 — 1350 cm³)

A – Australopithecus
H – Homo



COMSTOCK IMAGES; D. STELLER /ISTOCKPHOTO; J. READER/SCIENCE PHOTO LIBRARY; UP THE RESOLUTION; A. DICKOV/ISTOCKPHOTO

[Eisentein M Nature 468 S8-S9 Evolution: The First Supper](#)

Don't debate "feeding choice"



Freedom of choice is a concept frequently raised by makers and users of unhealthy products like manufactured highly flavoured, high fat, high sugar or high salt foods, tobacco and formula. Most women are smart enough to recognise unethical but clever marketing aimed at concealing the facts and undermining women's confidence to breastfeed. Are politicians proponents of baby formula through allowing the marketing of products which deny health benefits to our vulnerable babies?

It is best to avoid describing breastfeeding as "optimal" or "breast is best". Glib expressions such as "breastfeed if you can", oft espoused by formula manufacturers and sadly even some health carers, may lead to a mindset clouded and weakened by doubts and, even worse, a sense of a belief that formula is quite safe to use even though it is associated with acute and chronic illness. Manufactured formula is a product mainly for emergency use. **(Discuss the formula-related deficits outlined in this presentation – slide 30) Mothers deserve to know the facts. Do not debate formula versus breast milk and never shame a woman for not breastfeeding. Breastfeeding is a mammalian evolutionary norm and not a subject for debate; compare evolution of atmospheric air for breathing (slide 3).**

STAND UP FOR MOTHERS AND CHILDREN - remind mothers that poor support and lack of role modeling are the commonest reasons for breastfeeding problems. True low milk production is rare in humans and is usually due to not feeding baby often enough. Government spend on lactation consultants and support of peer organisations such as Australian Breastfeeding Association and La Leche League Int. will lead to much better health outcomes for our precious babies and save \$Billions.

Hold fast exclusively to the known facts about formula in any discussion. (Slide 30)

Latchment (Mobbs) before Attachment (Bowlby)



Attachment styles	% of sample (also generalized to represent U.S. population)	The child's general state of being	Mother's responsiveness to her child's signals and needs	Fulfillment of the child's needs (why the child acts the way it does)
Secure Attachment	65%	Secure, explorative, happy	Quick, sensitive, consistent	Believes and trusts that his/her needs will be met
Avoidant Attachment	20%	Not very explorative, emotionally distant	Distant, disengaged	Subconsciously believes that his/her needs probably won't be met
Ambivalent Attachment	10-15%	Anxious, insecure, angry	Inconsistent; sometimes sensitive, sometimes neglectful	Cannot rely on his/her needs being met
Disorganized Attachment	10-15%	Depressed, angry, completely passive, nonresponsive	Extreme, erratic: Frightened or frightening, passive or intrusive	Severely confused with no strategy to have his/her needs met

Imprinting is the evolutionary behavioural process taking place in the early hours of life when baby learns the tactile characteristics of the suckling area of the breast through oral fixation and the encoding of the neural image. The search for a suitable object on which to imprint is innate.

(Mobbs E J et al. doi: 10.1111/apa.13034)

Displacement to a non-biological super stimulus thumb/dummy/decoy may occur when the biological object determined by evolution is unavailable or withheld.

(Freud S 1955, *The Interpretation of dreams*, Basic books, New York 2010; Mobbs E J et al. doi:10.1111/apa.13034)

Latchment is the **emotional** response to the oral tactile imprint (recognising “**mother in the mouth**”) and it is the first stage of emotional development. It is a biological instinct and has evolved to protect the infant through the presence of its mother and her unique milk.

(Mobbs E J et al. doi: 10.1111/apa.13034)

Attachment is the second stage of emotional development appearing some time after 6 months of age when the baby visually (in distinction to orally) recognises its mother (or carer) as a whole person (“**mother in the eye**”). “Attachment is a biological instinct, evolved to ensure the survival of the vulnerable young” (Bowlby J. 1969/1982 Attachment and Loss. Vol 1, Attachment. Second edition. London)

The Lancet breastfeeding series www.thelancet.com/series/breastfeeding

Released January 2016, **The Lancet Breastfeeding Series** highlights the significant economic and health benefits for both rich and poor countries alike when governments support breastfeeding through meaningful investments and programs. Based on a growing body of evidence, the Series finds the global costs of lower cognitive ability associated with not breastfeeding amount to more than \$300 billion each year, a figure comparable to the entire global pharmaceutical market. Moreover, 820,000 children's lives could be saved annually with increased breastfeeding rates, a nearly 13 percent reduction in all under-5 child deaths.

From *Homepage - 1,000 Days*. (2017). *1,000 Days*. <http://thousanddays.org/>

The Hartmann Human Lactation Research Group also provides helpful information and on-line papers
<http://www.chembiochem.uwa.edu/research/human-lactation>

Questions?



Image: Tumblir

“We should talk about the long term consequences of artificial feeding; not the effects of breastfeeding”
Victoria C G, ABM Conference 2016

OUR CONCLUSION: “ Exclusive breastfeeding is the evolutionary biological norm and needs and deserves the well informed active support of every obstetrician and need we say everyone else on this Planet”

mobbsga@gmail.com
www.elsiemobbs.com.au

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