

Neurobehavioural approach to breastfeeding premature infants



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**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 !!

BRAIN GROWTH

(Rojas et al)

"Somatic growth or preterm infants SSV vs traditional holding ..."

J Dev & Behav Ped 2003; 24(3):163-168

<1500g, same caloric intake,

< 2 hours per day of SSC vs TH

→ Increased head circumference

BRAIN GROWTH

(Rojas et al)

"Somatic growth or preterm infants SSV vs traditional holding ..."

J Dev & Behav Ped 2003; 24(3):163-168

<1500g, same caloric intake,

< 2 hours per day of SSC vs TH

→ Breastfeeding rate 83% vs 33%

BRAIN FUNCTION

(Ohgi et al)

NBAS, Bayley, ITQ

"Comparison of KC and SC ... behavioural organisation and development at 1 year .."

J of Perinatology 2002; 22:374-379

< 2 hours per day of SSC vs SC

→ at 12 m mental and psychomotor development significantly higher in KC

BREASTFEEDING

with an emphasis on
premature babies



**HOW TO
DO IT !**

Overview

Implementation framework

Skin-to-skin technique

KangaCarrier

Self-attachment

State Organisation

Breastfeeding steps (Persson)

Breastfeeding anatomy

Feeding frequency

Maternal neurobehaviour

SEPARATING

MOTHERS

FROM

BABIES

IS

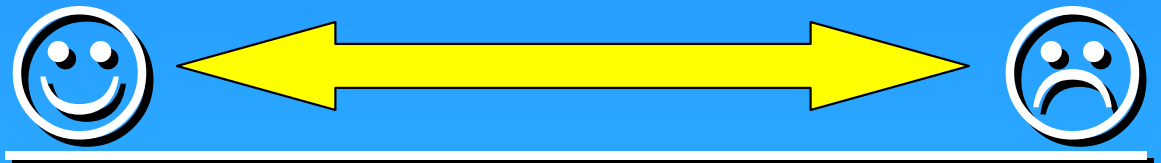
BAD

NEWS

Newborns
should never
be separated !!

K M C FRAMEWORK

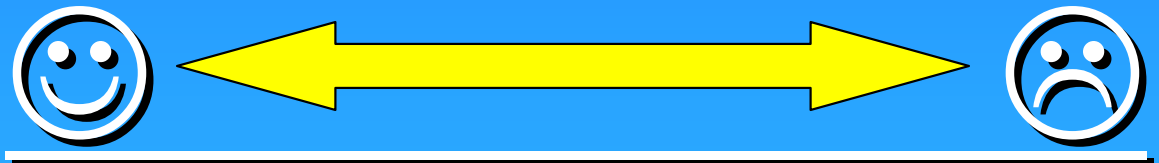
CARE VARIABLE



INITIATION	Birth	<90'	<7h	<7d	>7d
CONTINUUM	>20h	>12h	>4h	>1h	<1h
FOOD	BM	EBM	IV	Mix	Cow
METHOD	Breast	Cup	line	NGT	Bottle
Resp' Support	Vent'	CPAP		O ₂	No

K M C FRAMEWORK

CARE VARIABLE



INITIATION

The EARLIER the BETTER

CONTINUUM

The MORE the BETTER

FOOD

MUST BE MOTHER'S MILK

METHOD

BREAST - FEEDING !!!

Resp' Support

ADD available technology

SELF ATTACHMENT.

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

“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.

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

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 !!

KMC babies oscillate slowly in safe zones

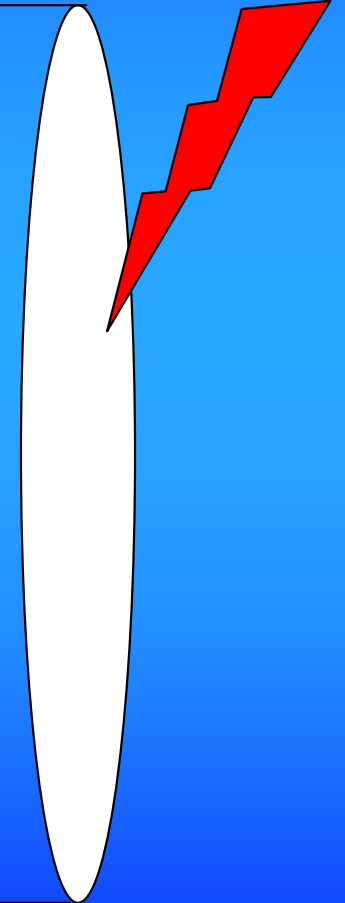
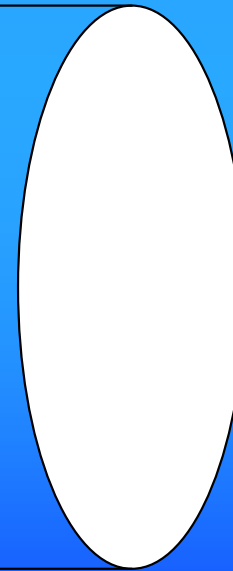
Separated babies oscillate erratically to danger zones

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

risk
stress

feeding
stimulation

digestion
apnoea

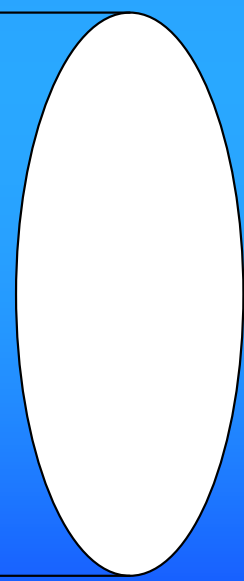
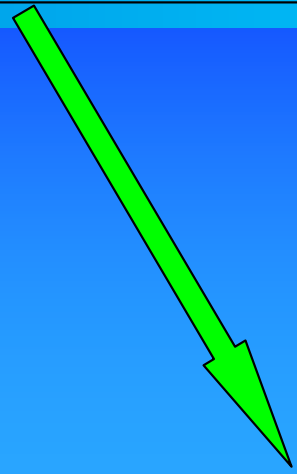


BREASTFEEDING IS NOT JUST EATING!

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

feeding
stimulation

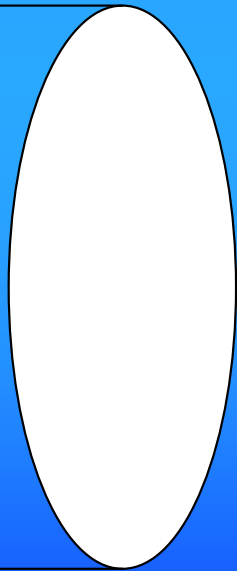
digestion



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

BREASTFEEDING IS NOT JUST EATING!

feeding
stimulation



digestion

The whole
cycle of
feeding and
digesting
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is what is the
fully the
breastfeeding
programme

SKIN-TO-SKIN
CONTACT
SHOULD BE
CONTINUOUS

KMC AND SLEEP STUDY

The basic

rest-activity cycle

for pretermatures and neonates

(44-52 weeks post conceptional age)

is 60-90 minutes long

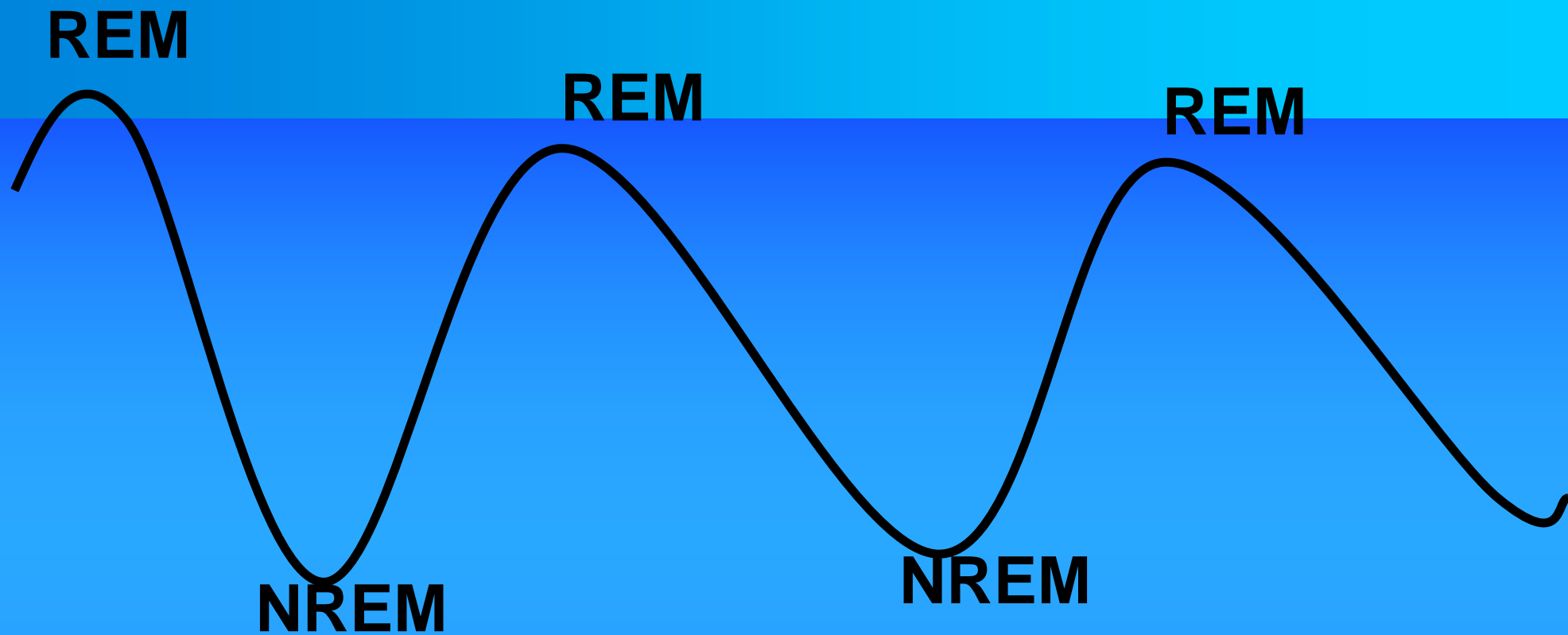
Ludington 2003

Not so much duration,
or density of any sleep stage,
or number of sleep stage episodes, but,

cycling between quiet sleep

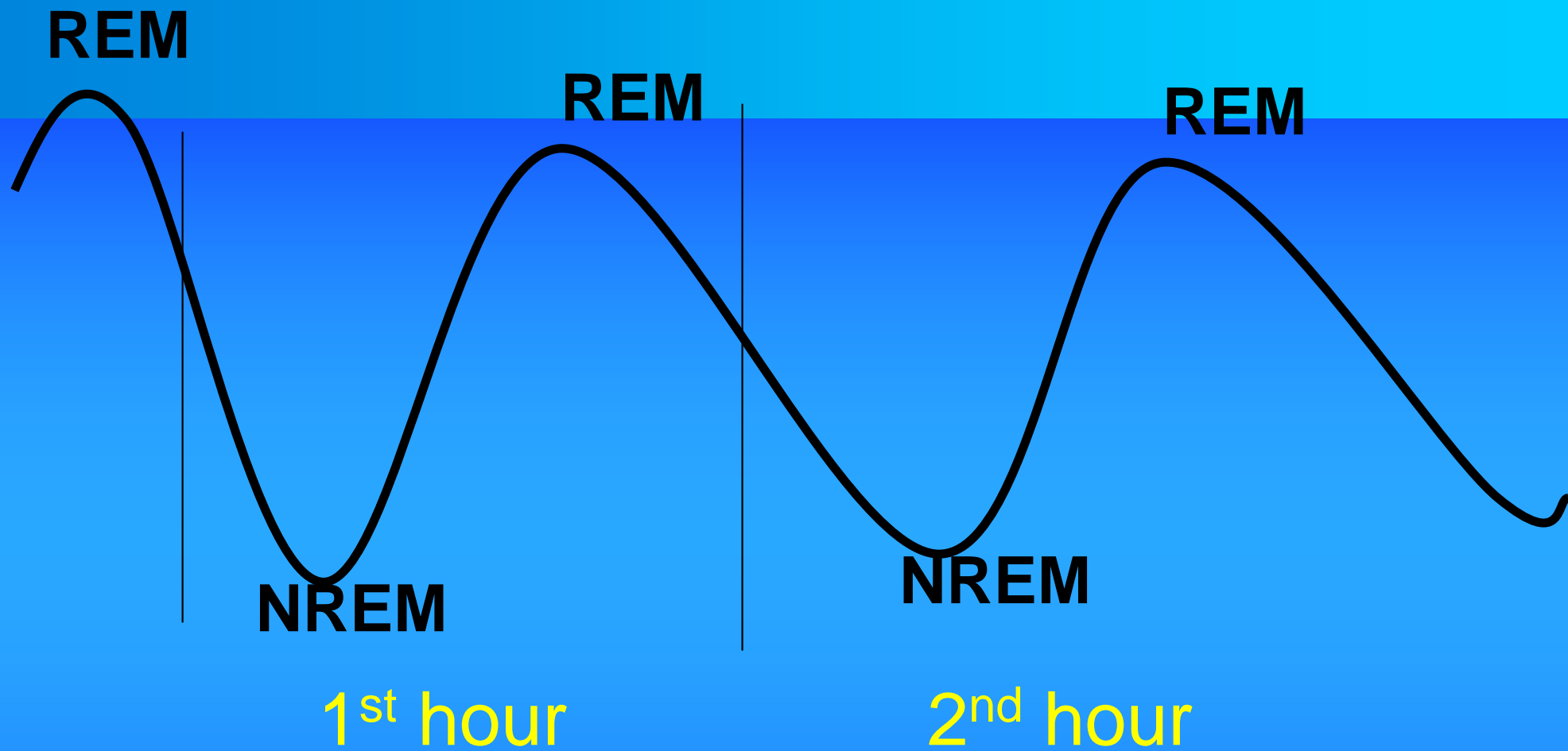
and active sleep

is what is important

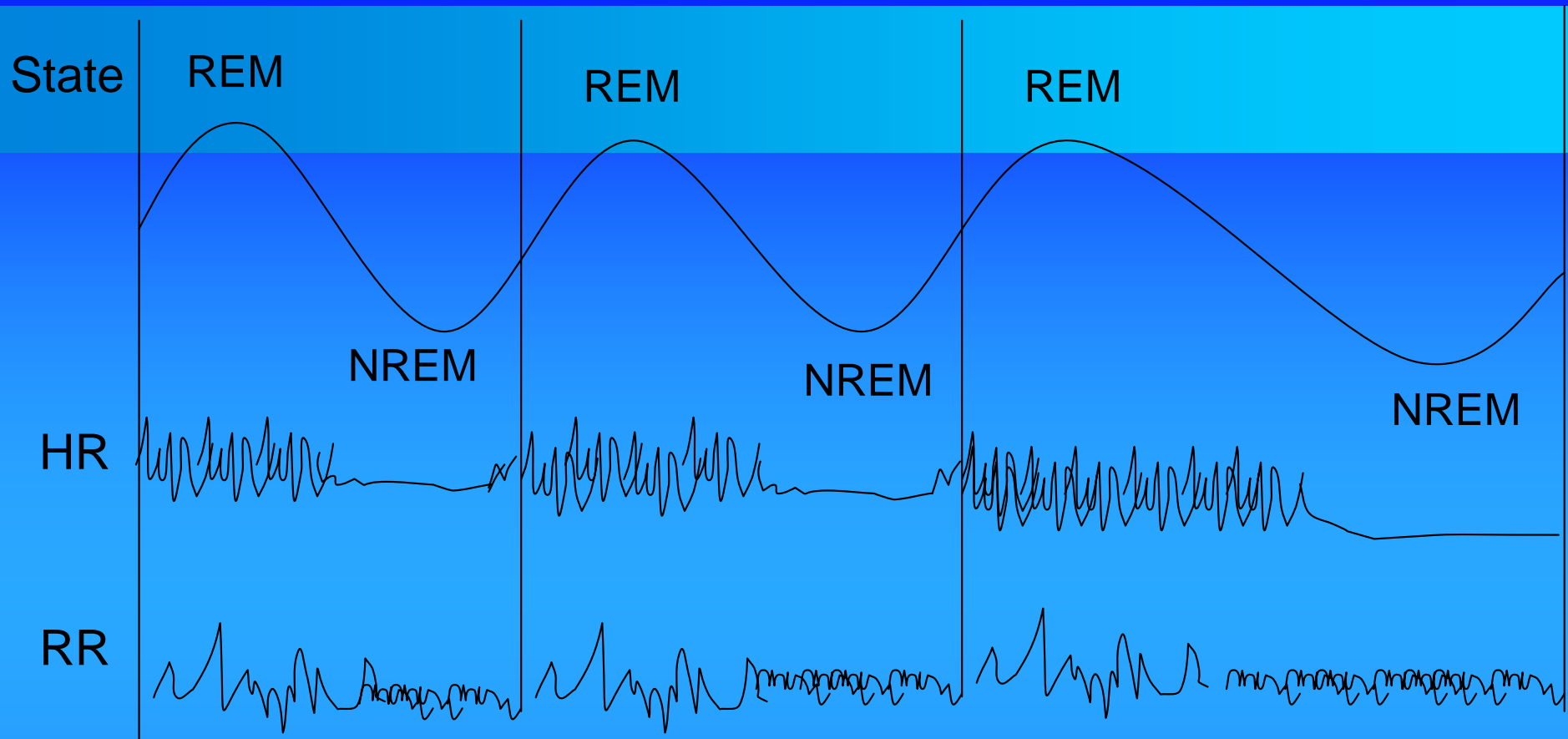


This is a healthy sleep pattern
This is a very good cycling pattern

(thanks to Susan Ludington-Hoe)

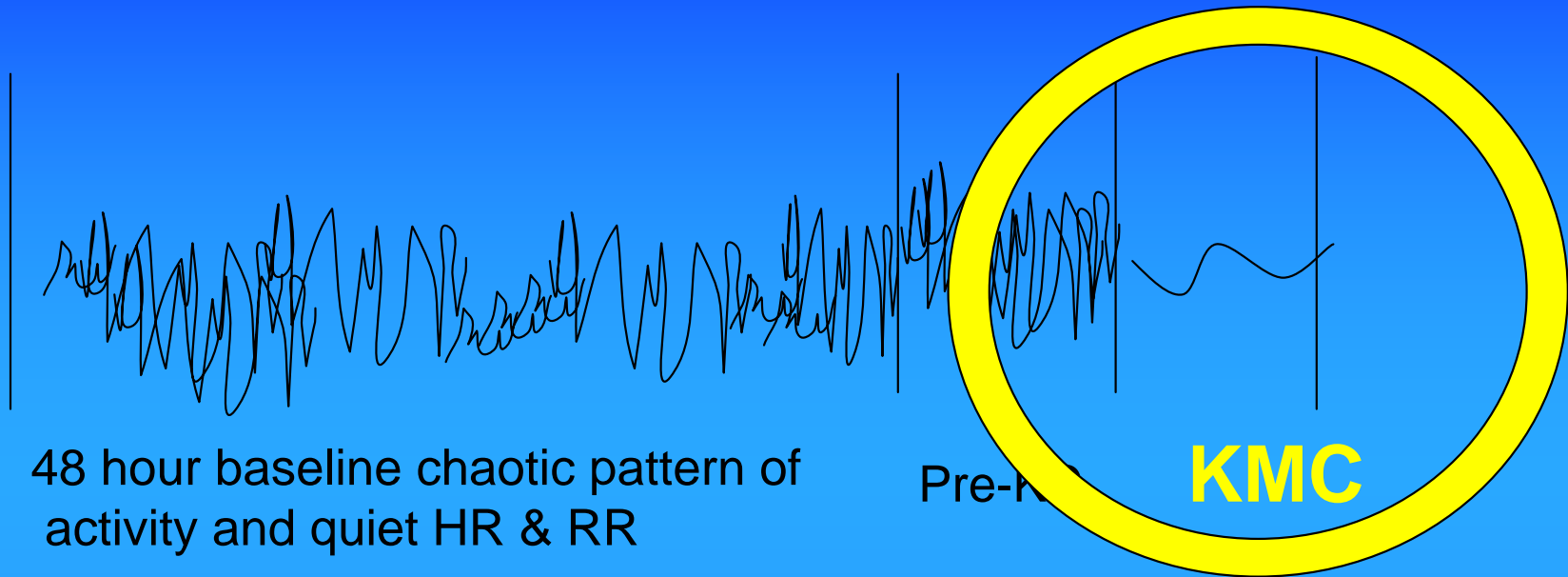


So in every hour, you would like to see an EEG pattern that shows this



REM Sleep is supposed to be somewhat active, so HR increases and RR is irregular

What do we see during KMC?



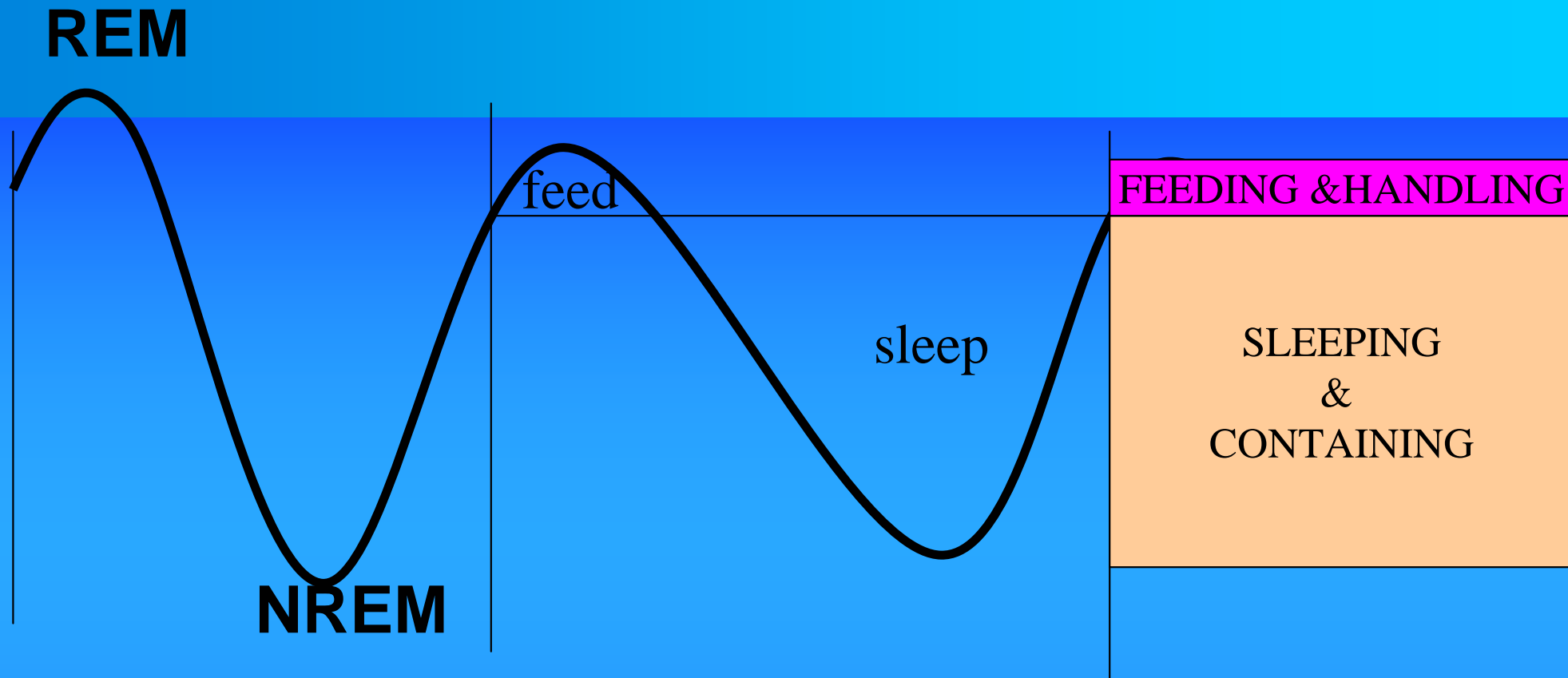
48 hour baseline chaotic pattern of activity and quiet HR & RR

Pre-KMC

KMC

In KMC:

- Normal cycling
- Non-chaotic pattern



During sleep time - the newborn should NOT BE HANDLED !!

K MC and neurobehavioural state organisation

State organisation is the ability to appropriately control the level of sleep or arousal.

Compared to incubator babies, KMC babies have

less deep sleep (which is when apnoea occurs)

more quiet sleep (which is when growth occurs)

less active sleep (which wastes calories)

more alert periods (which promotes bonding)

much less crying (which is harmful)

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
described

“The development of
preterm infants’
breastfeeding behaviour”

Nyqvist KH, Sjoden PO, Ewald U.
Early Human Development 55 (1999): 247-264

BREASTFEEDING THE PREMATURE

Premature babies will need help.

BERLITH PERSSON

has provided that help ...

PERSSON'S WHEEL !

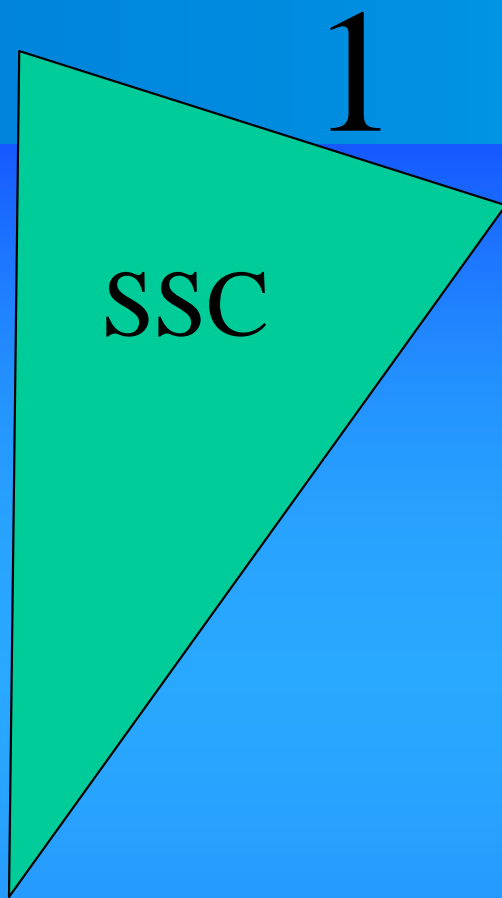
Breastfeeding & Suckling

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 1

SKIN-TO-SKIN

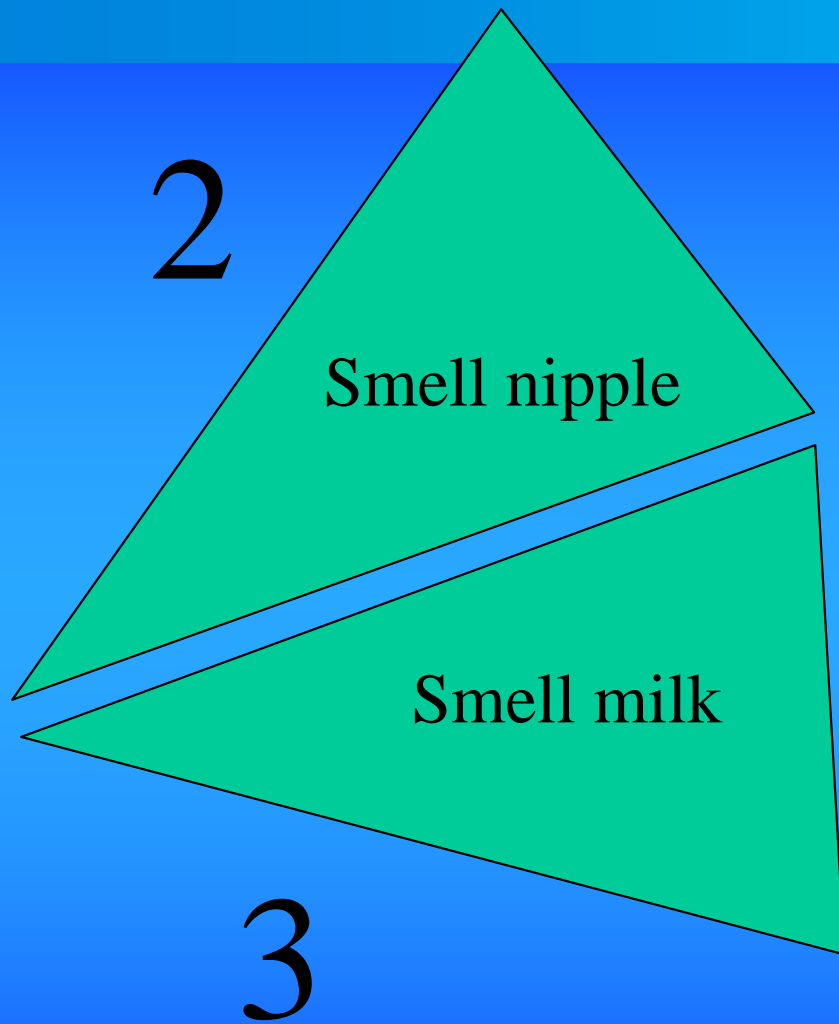
Continuous skin contact

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 preterm infants AT BIRTH. However it can be done later, even with nasogastric tube providing expressed breast milk in the meantime

Step 2 and 3 Olfactory

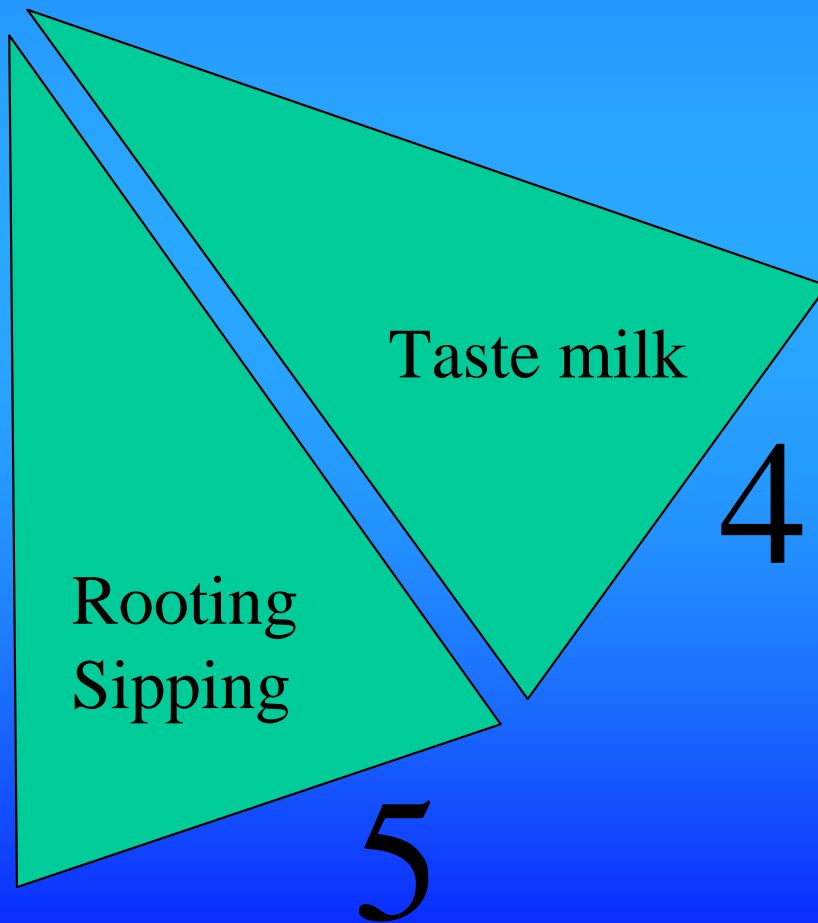


The first steps in sequence require smell of the nipple which may take longer in the premature, and then the smelling of milk.

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**

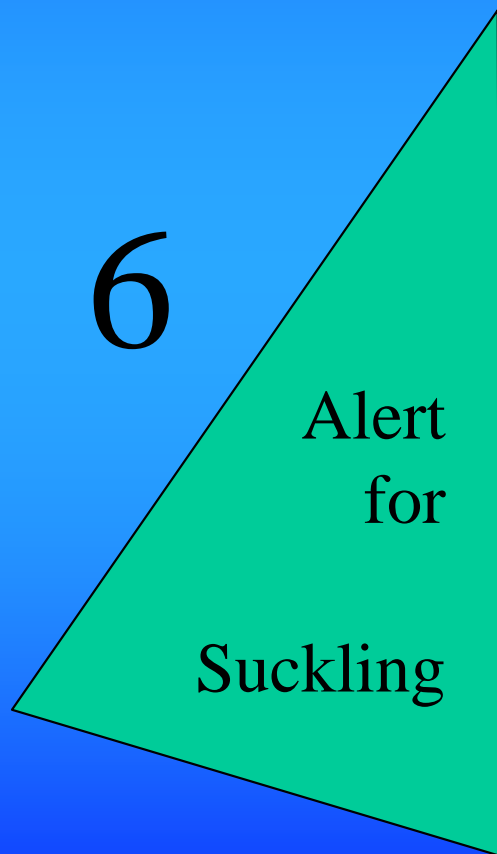
Step 6 First suckling.

Key step, builds on steps 1 to 5.

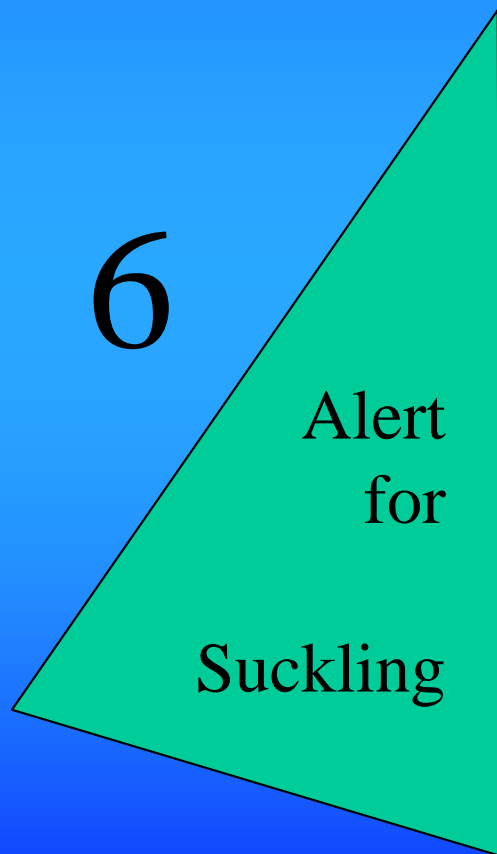
Must be awake and alert.

**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.



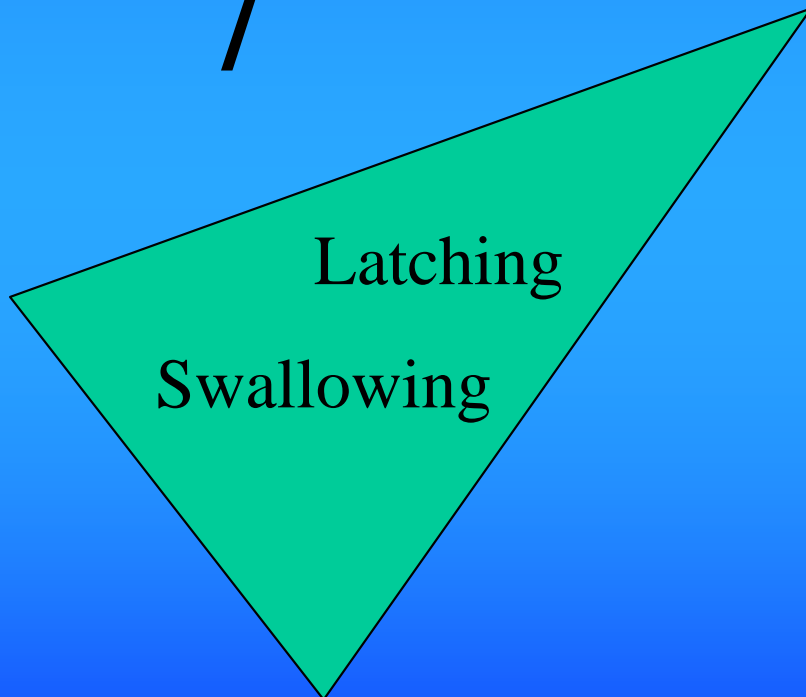
Note difference suckling vs sucking!

“... myographically distinct”

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

Step 7 Latching & swallowing

7



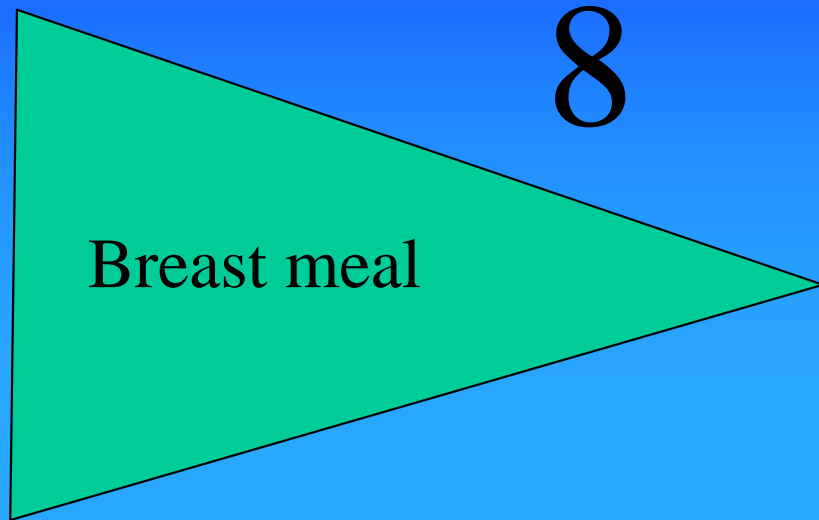
Premature is too physically weak to crawl to nipple, but if held to nipple will at this stage latch on.

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

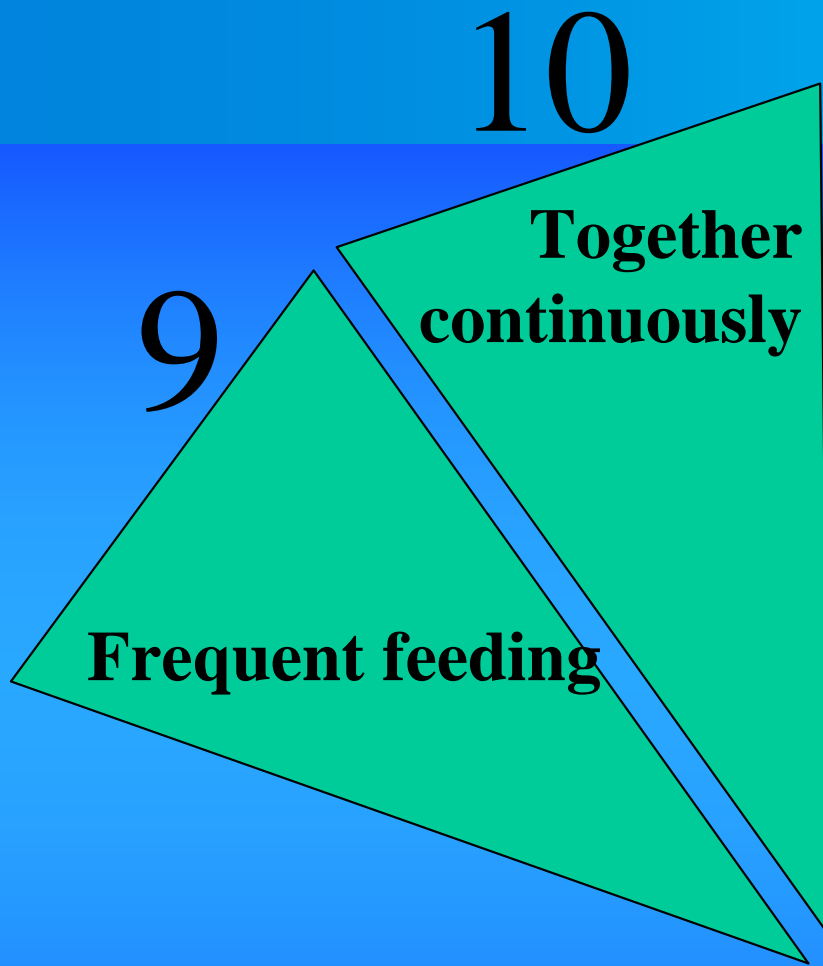
This is INNATE.

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.

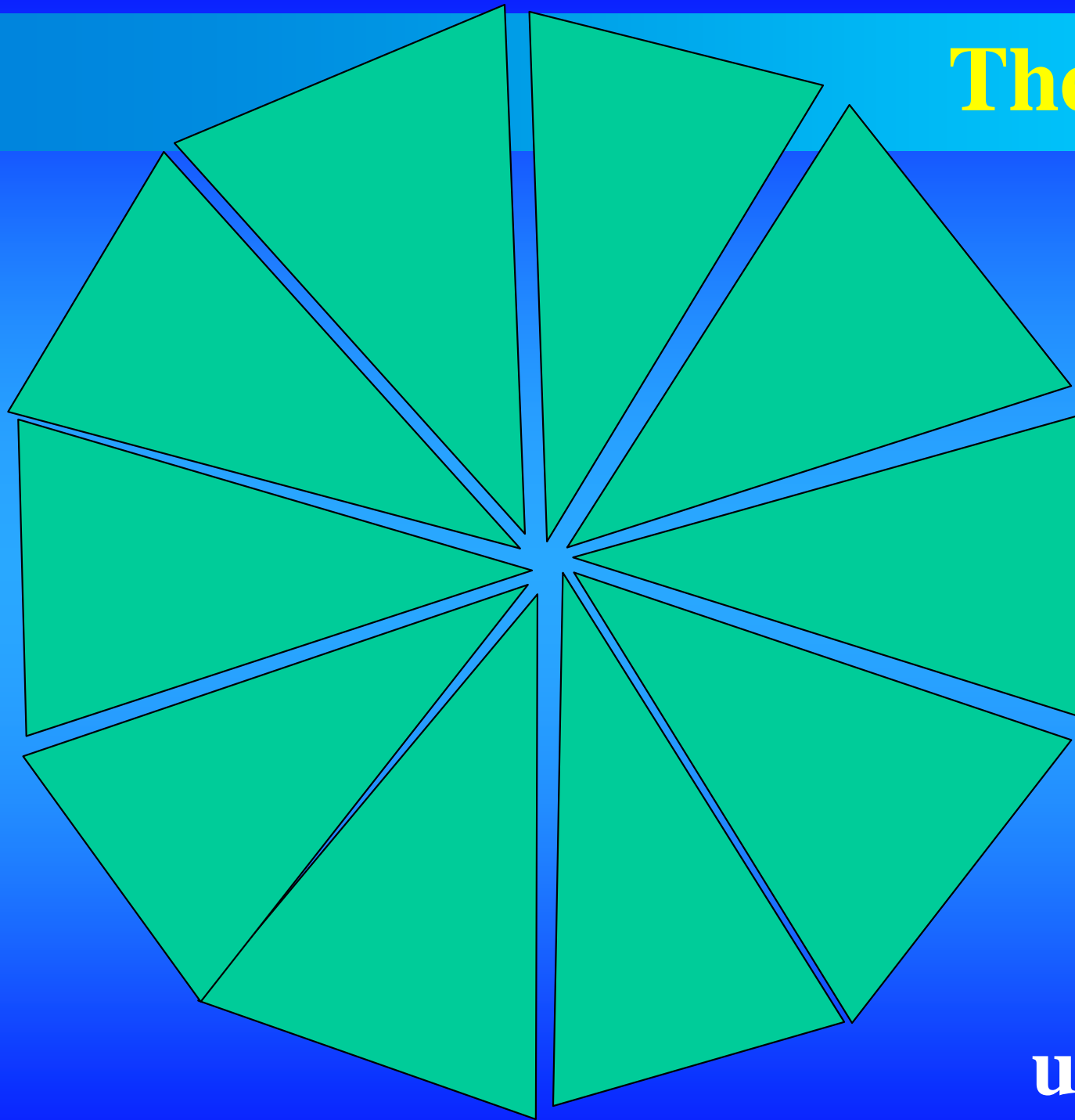
Demand feeding
is **NOT SUITABLE** for
or pretermatures.

Feeds should be at
most 2 hours apart.

Step 10

Together continuously

The wheel

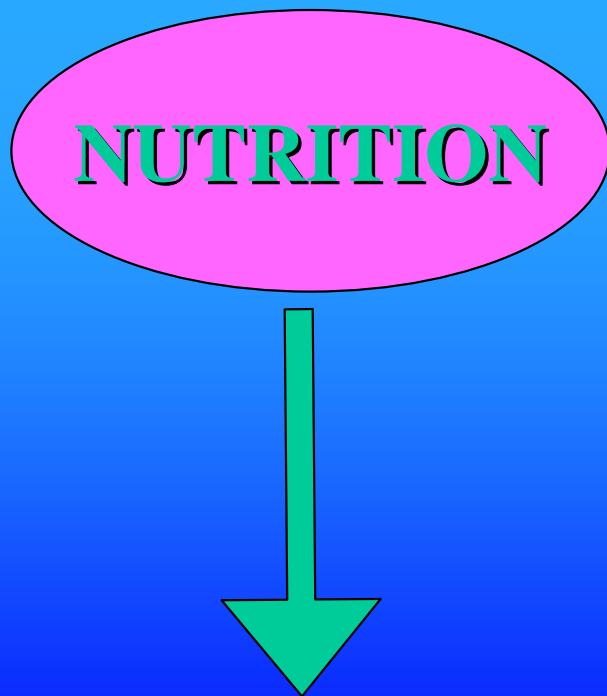


is not
round

Turns
slow at
first

but
then
picks
up speed!

BREASTFEEDING A PREMATURE



- | | |
|--------|------------------------------------|
| STEP 1 | SSC |
| STEP 2 | ALLOW TIME |
| STEP 3 | State organisation:
alert awake |
| STEP 4 | SMELL |
| STEP 5 | TASTE |
| STEP 6 | LATCH |
| STEP 7 | SUCKLE |

Breast-feeding of Premature babies.

A fullterm baby **NEEDS NO HELP** to breastfeed
(Does perhaps need help not to be hindered!)

A premature baby **DOES NEED HELP !!**

The constant sequence is however constant, but some minor changes will help:

Place the baby on mother's chest, not abdomen

Allow longer for each step

Recognise the steps, and assist where needed

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:
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

Babies need to have had a good sleep first.
They will only have a good sleep if given
continuous skin-to-skin contact.

Baby should be allowed to get to a state
of **AWAKE** and **ALERT** by itself.

ALLOW TIME → ...

Position baby for eye to eye contact,
and close the nipple for SMELLING ...

"Feeding cues" are any movements that make
up the global behaviour of breastfeeding.

Ziggy

... is able to

eat and purr

(and breathe) at
the same time !

Emma's cat :
"Zig-Zag Thomas"

Larynx meets uvula,
separate
airway & foodway

THE NEWBORN

also has a larynx that meets the uvula, designed to separate the respiratory tract from the gastrointestinal tract , enabling the newborn to feed and breathe simultaneously.

Apes (and all mammals)
have a high larynx
separates airway
from "foodway"

Human newborn ALSO !!

Only at 18 months
does larynx start
migrating, and ability
to make more sounds
develop → speech

From "Origins Reconsidered"
Richard Leakey.

Sensitive Midwife - PREMATURE

SUCKLING

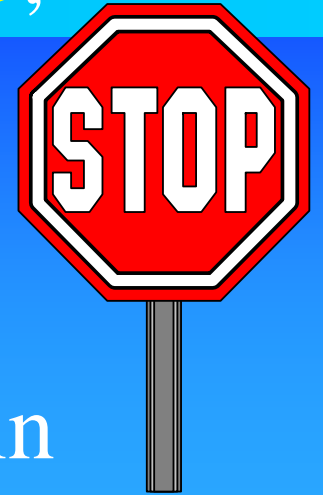
uses the largest muscle in the baby's head, making the smallest movement

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.

A normal
sleep cycle for
a premature is
60 - 90 minutes

A babies stomach
empties in
60 - 90 minutes.

The volume of
a single letdown
reflex is

30 - 35 ml

The volume of a
week old baby's
stomach is

30 - 35 ml.

Peter Hartmann

has measured the volume of milk
in a single let down reflex.

Quite regardless
of breast-size ...
amazingly constant:

a let down of milk is 30 - 35 ml.

One feed every 90 minutes
= 16 feeds/ day

16 feeds of 30 mls each
= 480 mls

480 mls per day for 3 kg baby
= 160 ml/kg/d

= requirement of baby.

FREQUENT FEEDS !!!!

The volume of a
week old baby's
stomach is

30 - 35 ml.

- | | | |
|----|--------|------------------|
| D7 | 30ml | = pinpong ball |
| D3 | 15ml | = shooter marble |
| D1 | 3-5 ml | = small marble |

The volume of a
week old **PREM's**
stomach is ???

10 - 15 ml.

D7 10 ml ? =

D3 5 ml ? =

D1 1-2 ml ? =

Overfilling ????

FREQUENT FEEDS !!!!

In anthropological studies, where infants are carried constantly, and have free access to the breast, they will breastfeed every hour.

Surmise - Cholecystokinin, oxytocin
- Behavioural synchrony.

*In the Muslim faith
context of divorce ...*

*“The mother shall give
suck to their offspring,
for two complete years”*

- Quran Surah II (Baqarah) verse 233

*suckling rights of the infant over ride
father's rights to child.*

BRAIN GROWTH & BREASTFEEDING

“suckling rights of the infant over ride father’s rights to child.”

**NEWBORN’S CHOICE, or
FUNDAMENTAL RIGHT:**

Exclusive breastfeeding 6 months

Ongoing breastfeeding 2 years

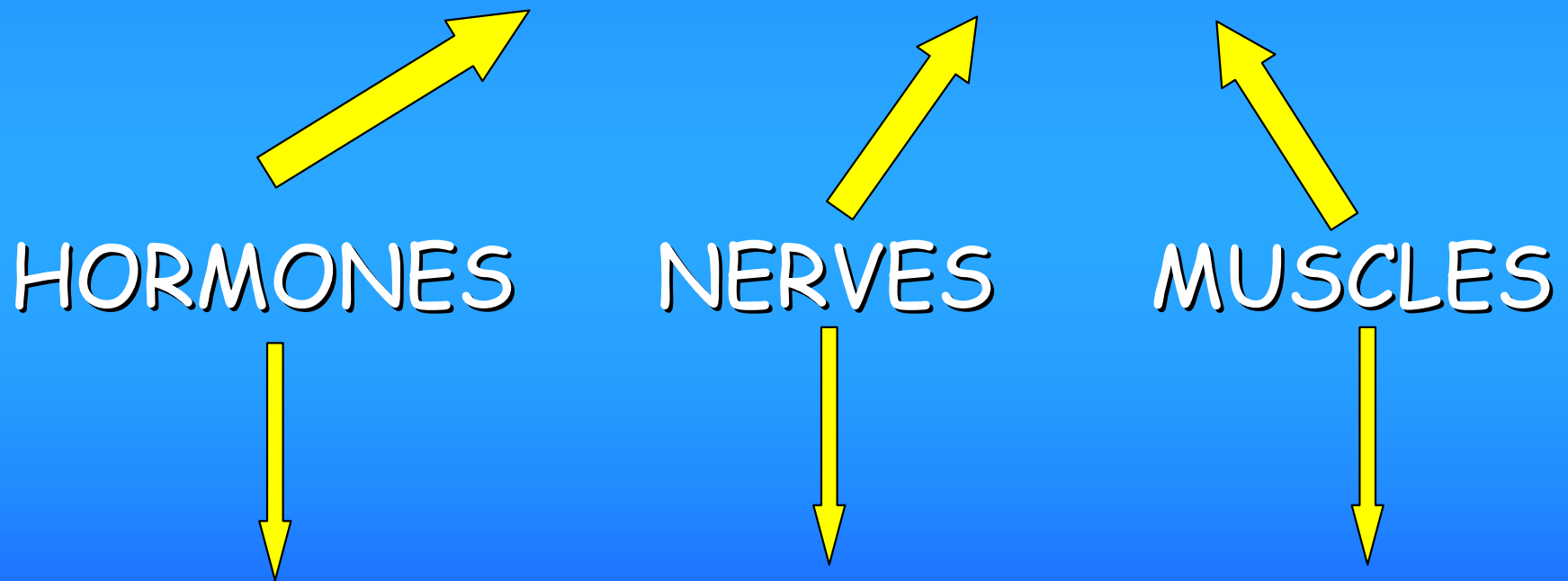
Personal testimony of a mother
at International KMC Workshop

“The instinct of a
mother to hold and
care for her baby
is primordial and
primitive, and an
overwhelmingly
powerful feeling.”

Jane Davis, Bogota, Dec 1998

Mother's have an innate, inborn

BEHAVIOUR



HORMONES

NERVES

MUSCLES

HOLD & CARE

MOTHER
is the
Only

Appropriate
ENVIRONMENT

MOTHER'S

MILK is

the only

Appropriate

FOOD

FETAL BRAIN DEVELOPMENT

The first 10 – 14 weeks, fetal brain growth is determined by genes (the DNA)

Thereafter, brain growth is an active process.

The neurons extend their axons, and make synapses

Each axon make thousands of synapses, again by “firing”, which is stimulated by sensations.

Brain growth depends on experiences !!

AND ON MOTHER’S MILK.



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