Importance of Breastfeeding Preterm and LBW Infants, and KMC

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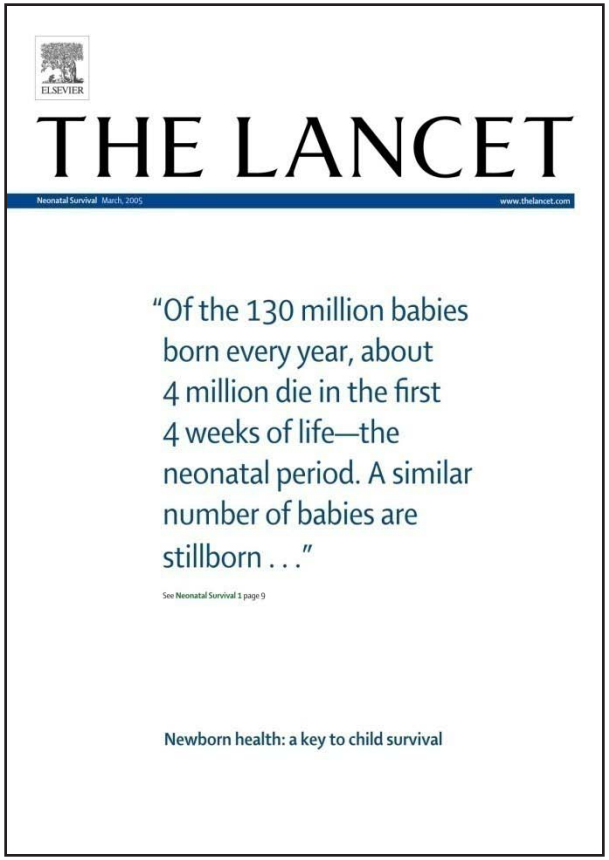
Inherent handicaps in Preterms

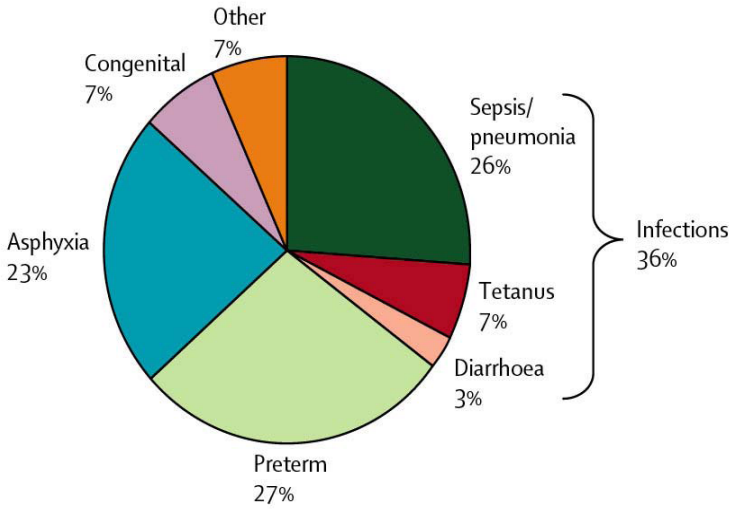
- Relatively high caloric requirements; low energy reserve; small gastric capacity.
- Excessive evaporative fluid loss.
- Poor suckle and swallow coordination
- Poor Gag reflex – aspiration.
- Immature incomplete esophageal sphincter.
- Decreased enzymes, hormones, bile acids
- Immature gut; decreased bowel motility

Goals of Nutrition

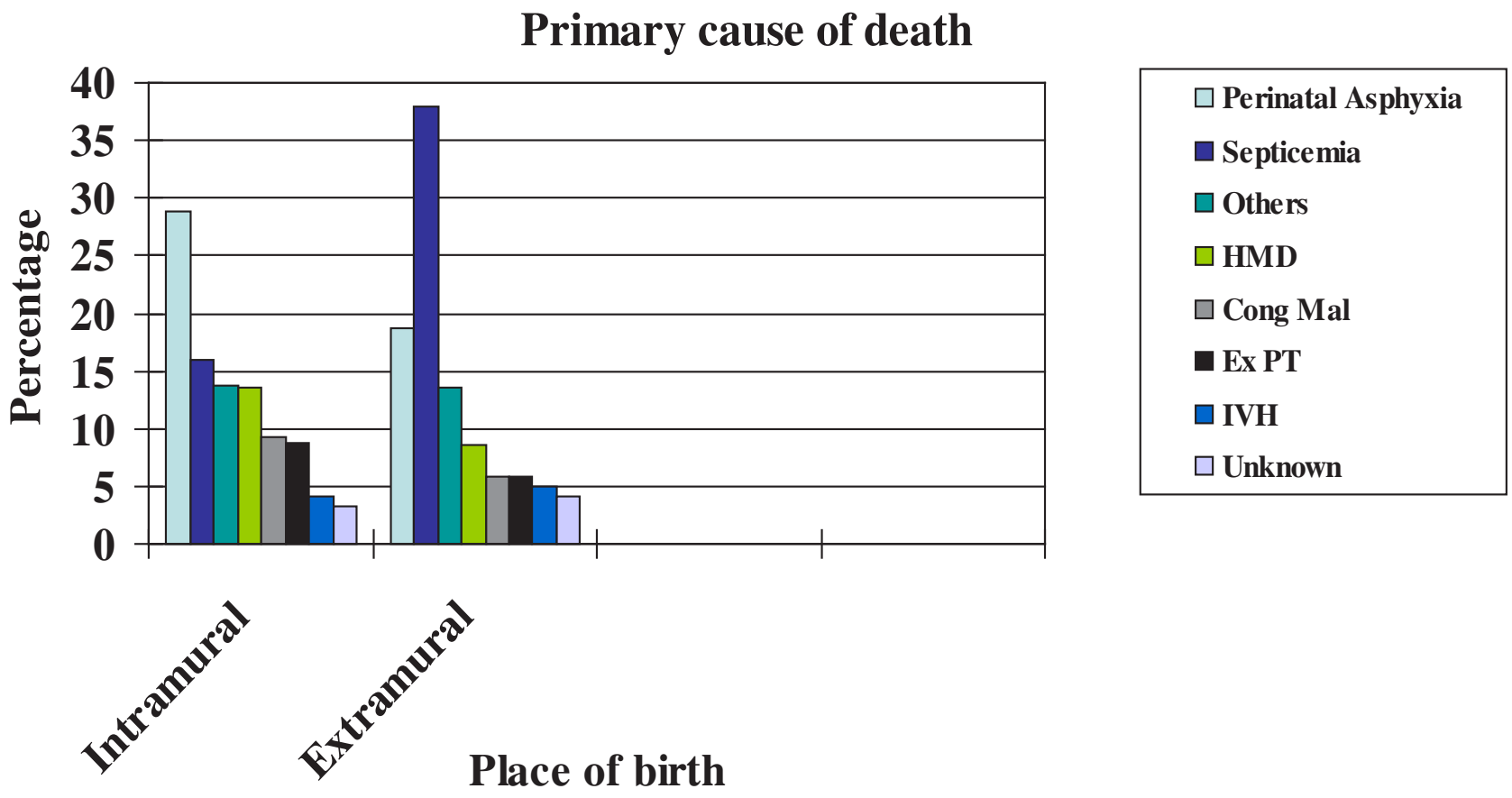
ESPGHAN Committee on Nutrition (2010) holds that goal of caring for preterm infants is achieving functional outcome comparable to babies born at term

Goals of Nutrition
1. Neonatal Survival

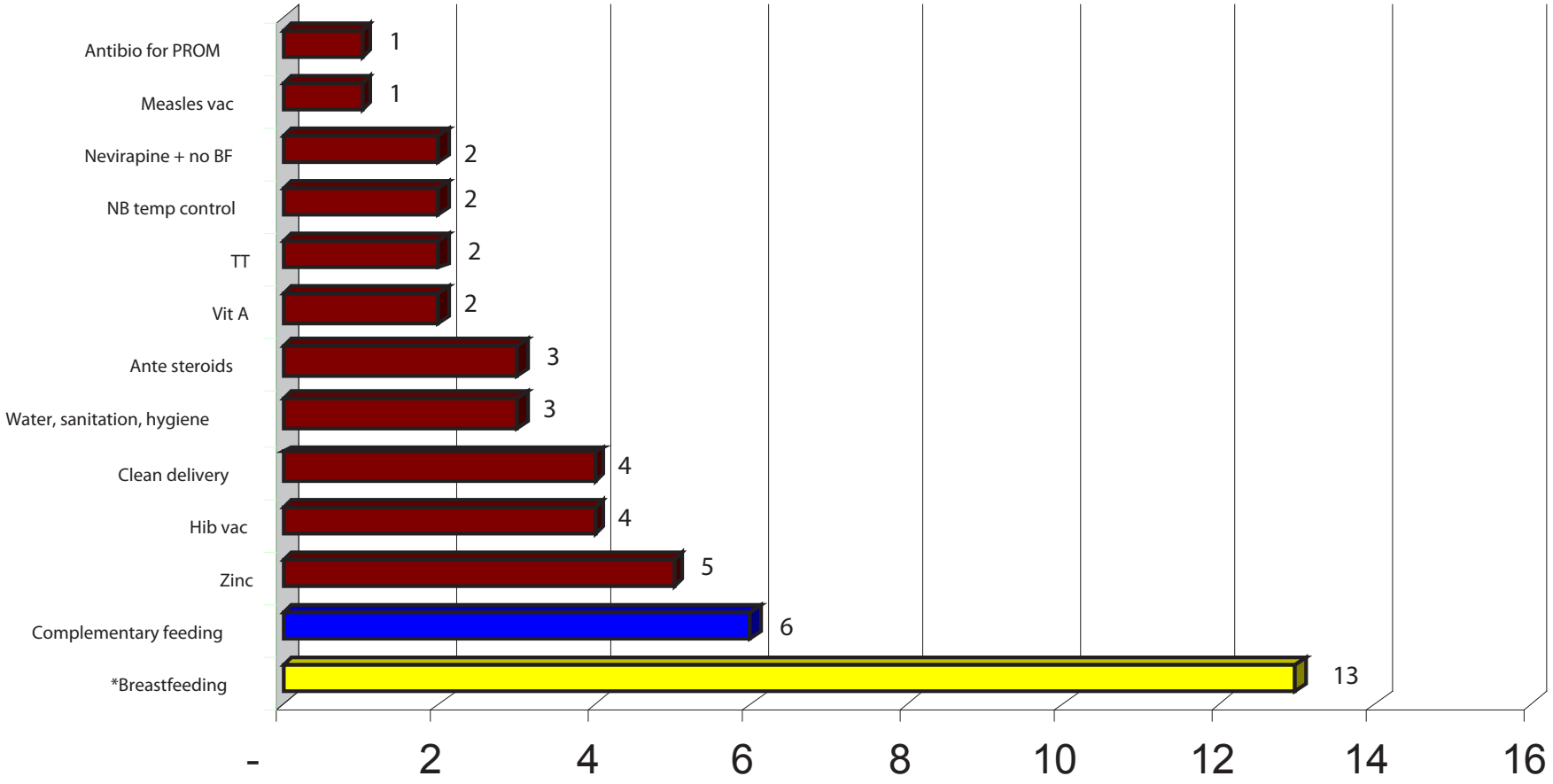




NNPD 2002-2003 (NNF)



U-5 Child Deaths (%) Saved with Preventive Interventions



Breastfeeding is defined as exclusive breastfeeding for first 6 months and continued breastfeeding during 6-11 months

Source: Jones et al. LANCET 2003; 632:65-71

Interventions: neonatal infections

Prevention

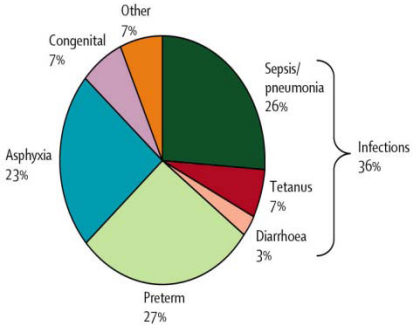
Treatment

Clean delivery -1

Antibiotics for premature rupture of membranes -2

Breastfeeding -1

Exposure to infections



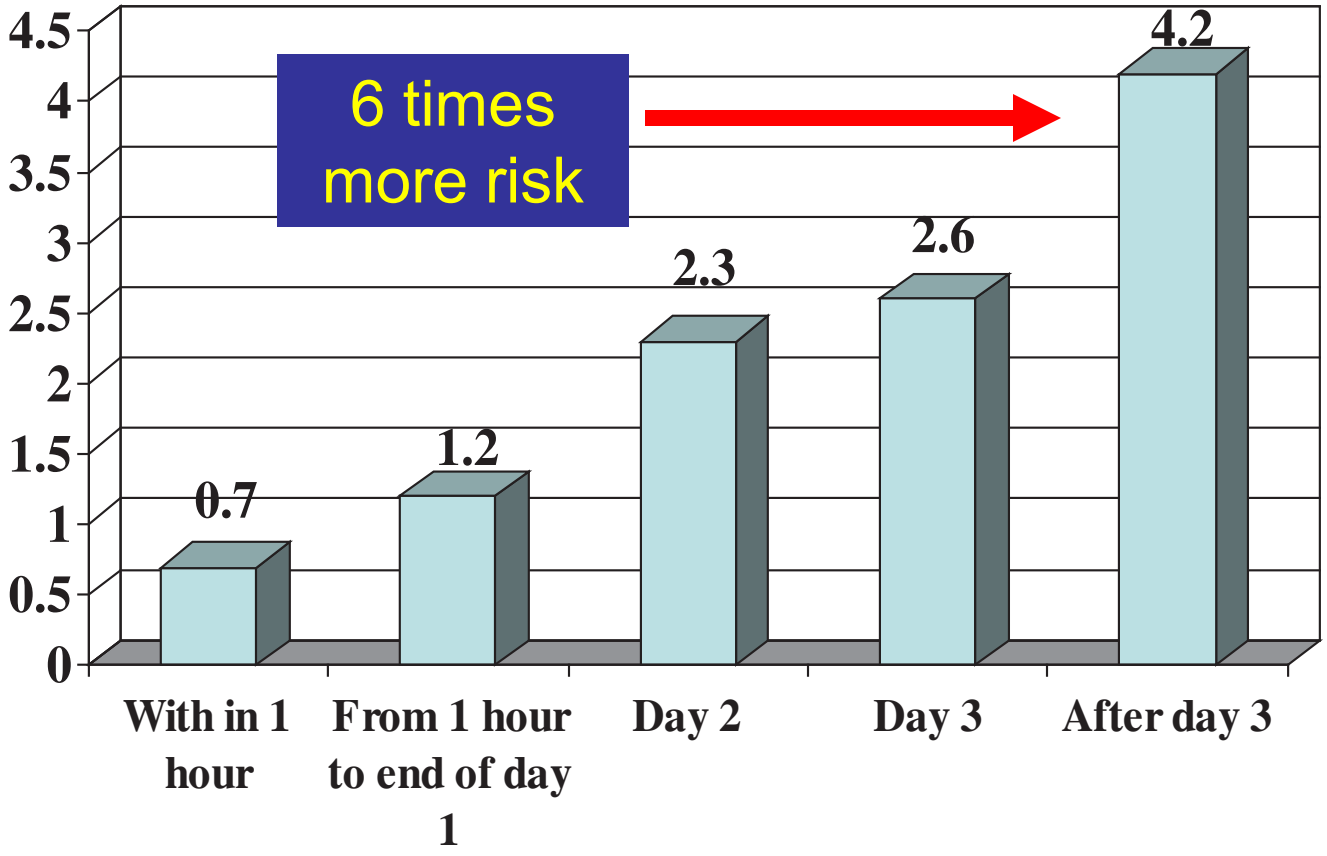
Severe bacterial infection

Antibiotics for sepsis -1

Die

Survive

Risk of neonatal mortality & time of initiation of breastfeeding



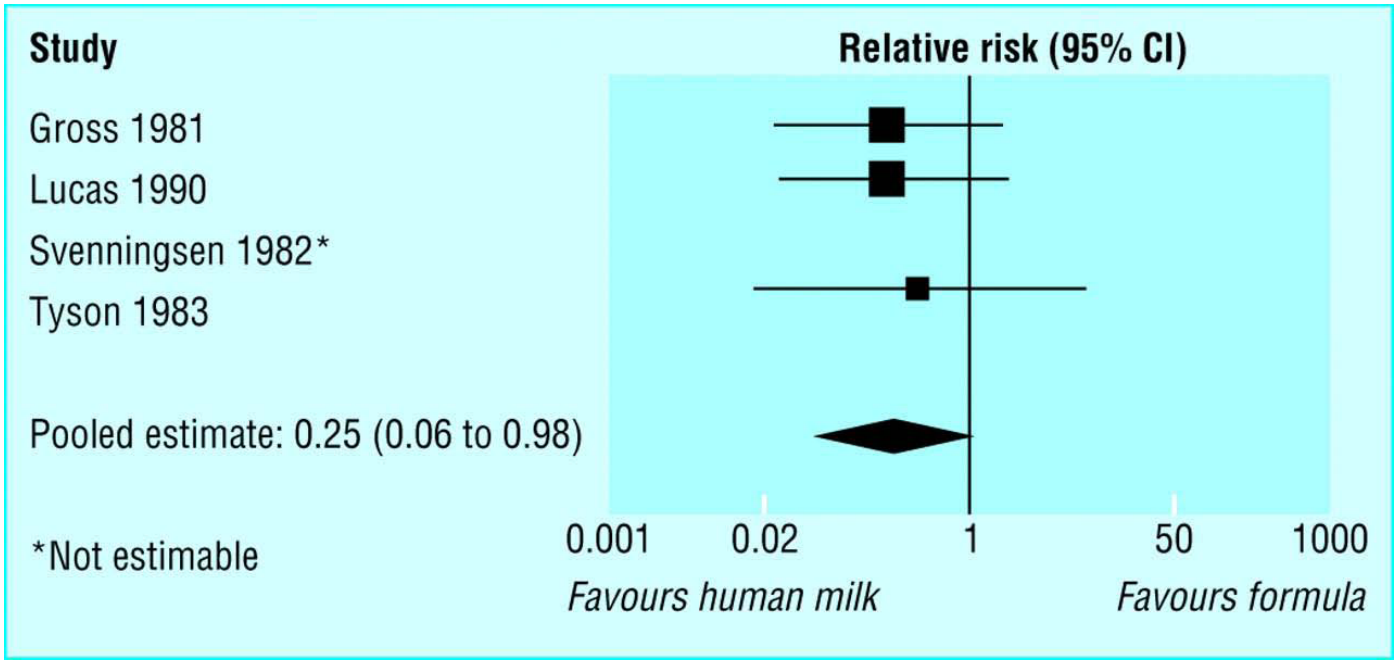
Pediatrics 2006;117:380-386

Incidence of Neonatal Infections Based on Feeding Patterns in LBW

Narayanan I, Lancet 1984

Infections	BM N=45	BM+F N=83	CM+F N=73	F N=46
GIT	0	4	4	10
Sepsis	0	5	9	15
Superficial	5	10	11	16
Episodes	5/45	19/83	24/73	41/46
% infected	11	17	21	48

Relative risk of NEC with human milk versus formula



Mc Guire, W. et al. BMJ 2004;329:1227-1230

NEC protection by breast milk

- *Oligosaccharides and glycoconjugates, natural components in human milk, prevent intestinal attachment of enteropathogens by acting as receptor homologues*
  - Breast-fed infants have bifidobacteria
  - Formula-fed infants: coliforms, enterococci and bacteroides predominate

SURVIVAL

- *1998 Hylander et al*. USA, N=212 VLBW, BM V Formula, infection BM 29% formula 47%, sepsis/ meningitis 19.5% vs 32.6%
- *1984 Butz et al.* Malaysia N=5471, 6 mos EBF, significant survival than mixed feeding (sanitation irrelevant)
- *1993 Ford et al.* New Zealand N=485, EBF at discharge or in last 2 days: reduced SIDS by ½
- *2001 Arifeen et al*. Bangladesh N=1677, prospective, san EBF, other patterns had risk of death, 2.4 fold= ARI; 3.94= diarrhoea
- *2001 Bertran et al.* 15 national surveys, EBF prevented 55% diarrhea/ ARI deaths for at least 3 months with continued BF

Goals of Nutrition 2

Achieve well-defined short - term growth and nutrient retention :

- Mimic intrauterine growth curves
- Post natal growth grids
- Growth velocity
- Mimic reference fetal composition

IT'S LIKE TAKING MOON IN HANDS?

Goals of Nutrition-3

Optimize long term outcomes

- Achieving physical growth
- Optimize neuro-developmental outcome
- Reduce allergy and atopic diseases
- Impact adult onset metabolic syndrome

Breast Milk Macronutrients

- **BMM** beyond energy and tissue building
- ***Fatty acids*** ω-6/ω-3 perform inter/intra cellular communication; gene expression for lipogenic, lipolytic, glycolytic enzymes. LA & ALA [arachdonic acid, DHA]
- ***Proteins*** stimulate intestinal maturation, aid nutrient absorption, prevent infection
- ***-CHO*** maintains pH, favorable flora, health

Breast Milk

- **Proteins**
  - Suitable protein content
  - Ratio of whey: casein (70:30)
  - Lactalbumin early digested, helps in lact.abs.
  - Lactoferin, lysozymes, S-IgA

Breast Milk

- Human milk carb
  - Lactose (90% absorbed even by LBW unabsorbed makes soft stool & mineral abs
  - Oligosaccharides – prevent bacterial colonization & NEC
- Lipids
  - Suitable fatty acids
  - Salt stimulated lipase
  - LCFA 20 :4n-6 (Arachidonic acid)
  - DHA

Ideal Infant Nutrition:

Breastmilk

E= Expressed [Evidence]

B= Breast [Based]

M= Milk [Medicine]

It has been proved that EBM feeding in NICU ensures quality survival

Method of enteral feeding

- MEN-minimal enteral feeding
- Gavage feeding-bolus/continuous
- ***Cup/palade feeding***
- Spoon feeding
- Bottle feeding

EBM Gavage Feeding-NICU

EBM Gavage Feeding-Twins

EBM Katori Feeding

Weight Gain in Exclusively Breastfed Preterm Infants (CMC Vellore,n = 355)

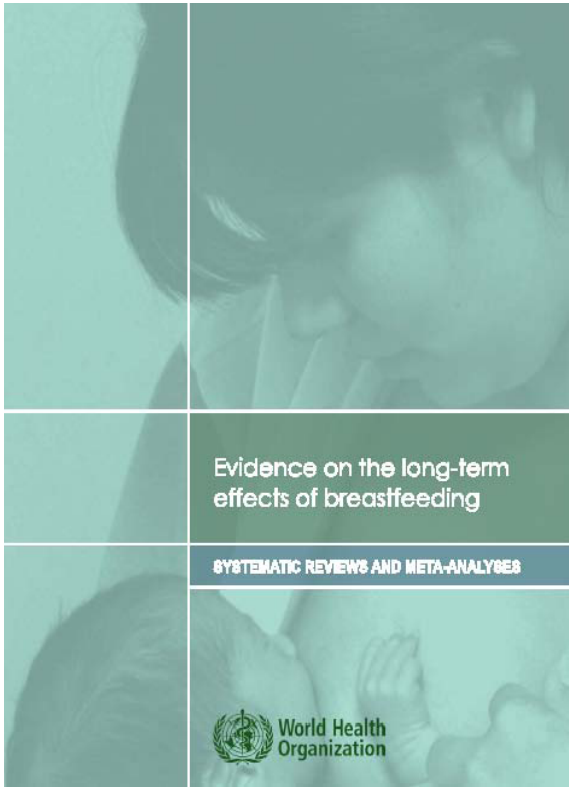
The weights attained were comparable to infra-uterine growth rates

Weight/Gestation	BW Double at	BW Triple at	Growth velocity
1000–1500 g	10 weeks	18 weeks	20–30 g/day
1501–2000 g	12 weeks	16 weeks	20 – 30 g/day

Ramasethu J et al. Journal of Tropical Pediatrics 1993 39(3):152-159

Evidence on the long-term effects of breastfeeding

Systemic Reviews and Meta - Analyses



World Health Organization 2007

Beneficial role in :

- blood pressure
- blood cholesterol
- the risk of overweight and obesity
- the risk of type-2 diabetes
- school achievement/ intelligence levels

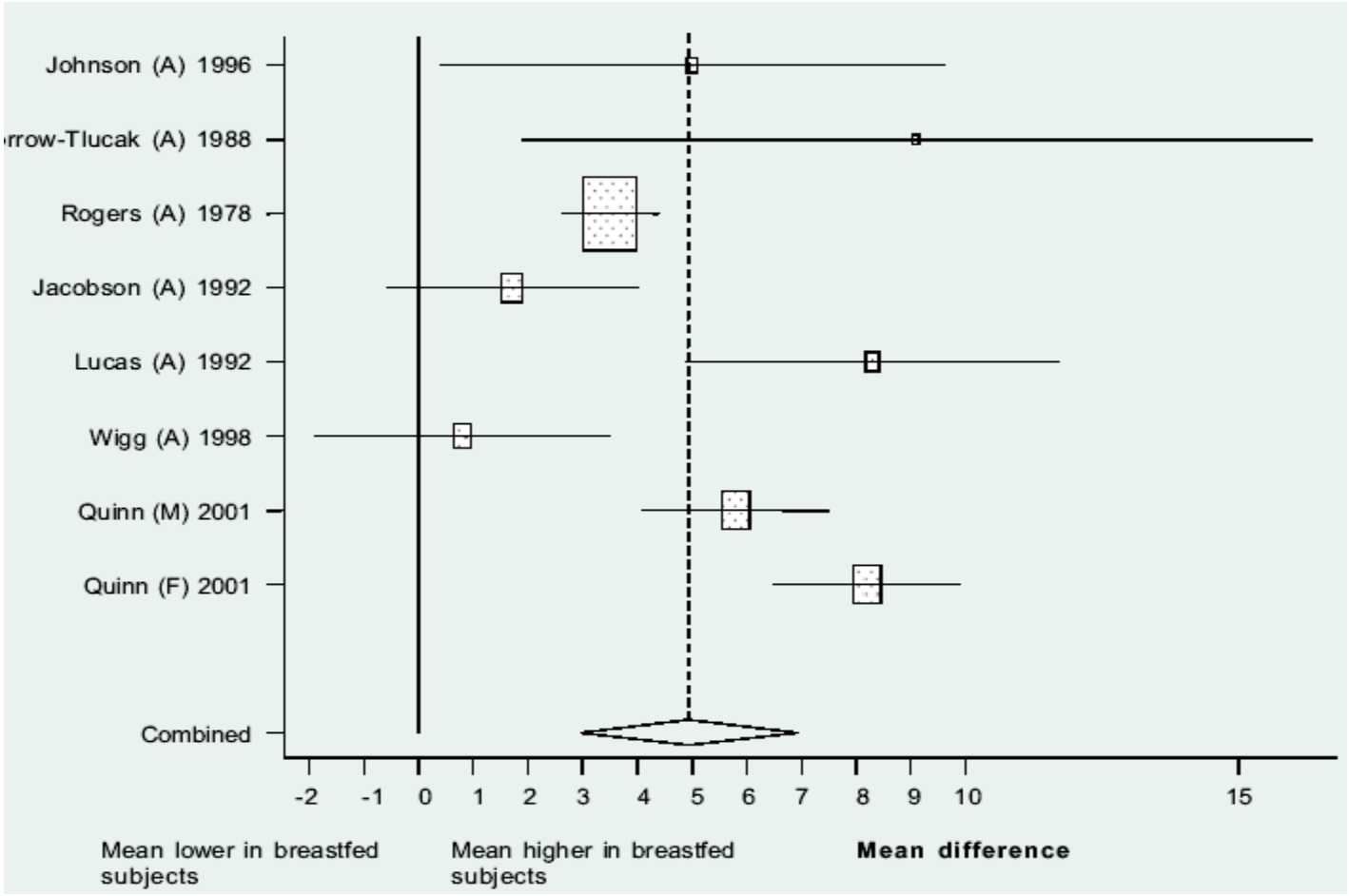
Beneficial effects of breast milk in the NICU on the developmental outcome of ELBW infants at 18 months of age n=1035

- Multivariate analyses, a significant independent association of breast milk on all 4 primary outcomes:
  - Mental Development Index
  - Psychomotor Development Index
  - Behavior Rating Scale
  - incidence of re-hospitalization

- For every 10-mL/kg per day increase in breast milk ingestion, the Mental Development Index increased by 0.53 points, the Psychomotor Development Index increased by 0.63 points, the Behavior Rating Scale percentile score increased by 0.82 points, and the likelihood of rehospitalization decreased by 6%

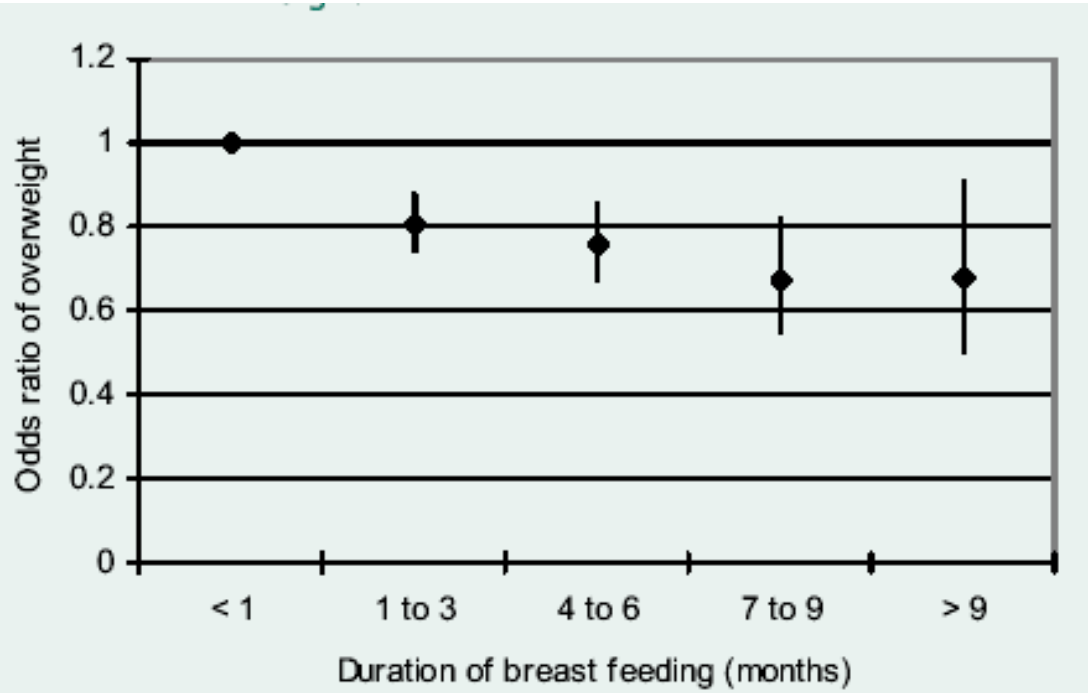
Vohr BR et al.Pediatrics. 2006 Jul;118(1):e115-23. Center for Research for Mothers and Children, National Institute of Child Health and Human Development, Maryland

Cognitive development scores between breastfed and non-breastfed subjects



World Health Organization 2007

Breastfeeding duration and odds ratio of overweight



Harder T et al. American Journal of Epidemiology, 2005, 162(5):397-403.

Early feeding in PT and later blood pressure

- N=926 PT, two parallel randomized trials in 5 NICU in UK
- Follow up 13-16 yrs

  Result = mean arterial BP lower in BM gp than formula feed gp

Lancet 2001;357:413-9

Feeding Practices in NICUs

- 1372 surviving neonates, admitted to 13 tertiary-level NICU in Lombardy (Italy) with birth weight <=1500 g
- Neonates discharged on maternal milk and formula ranged between 4.6 to 52.3% and 12.5 to 85.4% respectively among centers

BELLU' R et al. Pediatric Research:2005; 58: 359

Kangaroo Mother Care

- **K=** knowledge
  skills
  communication
- **M=** material
  management
  monitoring
- **C=** care for feeding
  comfort
  confidence

Fetus & Newborn as individual

- **Intrauterine habitat**
  - O2] Placenta
  - Nutrition] Placenta
  - Warmth
  - Protection: infection, injury, noise, pollution
  - Security
- **Extrauterine habitat**
  - Needs remain same
  - Pulmonary/enteral
  - S2S; breastfeeding
  - Bedding-in
  - Touch/eye/verbal/ olfactory contact

Breastfeeding & KMC

- ***Acta Pediatr 2012***.doi:10.1111/apa.12023

  Indian Study [Hyderabad]

  KMC in KMC ward as effective as CNC; morbo-mortality same; 11.5 d care saved

- ***J Obstet Gynecol Neonatal Nurs*** 2011;40:190-7 Swedish study

  KMC time ά duration of EBF

Kangaroo Mother Care

- **Extrauterine habitat**
  - Needs remain same
  - Pulmonary/enteral
  - S2S; breastfeeding
  - Bedding-in
  - Touch/eye/verbal/ olfactory contact

Kangaroo Mother Care

- **Extrauterine habitat**
  - RR, HR, SpO2 stable
  - EBF/EBMF success
  - Normothermia
  - Better wt gain, cry
  - Better neurodevelopment
  - LOS/ infection

Conclusion

Breast milk

- Perfect nutrition
- Prevents infections
- Prevents morbidities
- Promotes neurodevelopment
- Prevents adult onset diseases
- *Preserves SE status*


BE
A
LEADER