

## 5<sup>th</sup> ISRHML bibliography

Human milk and lactation publications from 1 April to 31 May 2005 (Entrez dates)

### List of topics

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2. Long term effects on infant health
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#### 1. Infectious diseases

None.

#### 2. Long term effects on infant health

*Diabetes Care. 2005 Jun;28(6):1457-62.*

Long-Term Impact of Breast-Feeding on Body Weight and Glucose Tolerance in Children of Diabetic Mothers: Role of the late neonatal period and early infancy.

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**OBJECTIVE:** Offspring of diabetic mothers (ODM) are at increased risk of developing overweight and impaired glucose tolerance (IGT). Recently, we observed that early neonatal ingestion of breast milk from diabetic mothers (DBM) may dose-dependently increase the risk of overweight in childhood. Here, we investigate whether DBM intake during the late neonatal period and early infancy also influences later adipogenic and diabetogenic risk in ODM. **RESEARCH DESIGN AND METHODS:** A total of 112 ODM were evaluated for influence of DBM ingestion during the late neonatal period (2nd-4th neonatal week) and early infancy on relative body weight (RBW) and glucose tolerance in early childhood. **RESULTS:** Exclusive breast-feeding was associated with increased childhood RBW ( $P = 0.011$ ). Breast-fed ODM had an increased risk of overweight (odds ratio 1.98 [95% CI 1.12-3.50]). Breast-feeding duration was also positively related to childhood RBW ( $P = 0.004$ ) and 120-min blood glucose during an oral glucose tolerance test ( $P = 0.022$ ). However, adjustment for the DBM volume ingested during the early neonatal period, i.e., 1st week of life, eliminated all these relations with late neonatal breast-feeding and its duration. Interestingly, no relationship was observed between maternal blood glucose in the middle of the third trimester and the outcome. **CONCLUSIONS:** Neither late neonatal DBM intake nor the duration of breast-feeding has an independent influence on childhood risk of overweight or IGT in ODM. Therefore, the 1st week of life appears to be the critical window for nutritional programming in ODM by ingestion of maternal "diabetic" breast milk.

*Arch Dis Child.* 2005 Jun;90(6):582-8.

Infant feeding and components of the metabolic syndrome: findings from the European Youth Heart Study.

Lawlor DA, Riddoch CJ, Page AS, Andersen LB, Wedderkopp N, Harro M, Stansbie D, Smith GD.

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**AIMS:** To assess the associations of type and duration of infant feeding with components of the metabolic syndrome in children aged 9 and 15. **METHODS:** A total of 2192 randomly selected schoolchildren aged 9 and 15 years from Estonia ( $n = 1174$ ) and Denmark ( $n = 1018$ ) were studied. Insulin resistance (homoeostasis model assessment), triglyceride levels, high density lipoprotein cholesterol, and systolic blood pressure were measured. **RESULTS:** Children who had ever been exclusively breast fed had lower systolic blood pressures than those who were not. With full adjustment for age, sex, country, birth weight, pubertal stage, body mass index, height, maternal and paternal education, income, smoking, and body mass index the mean systolic blood pressure of children who had ever been breast fed was 1.7 mm Hg (95% CI -3.0 to -0.5) lower than those who had never been exclusively breast fed. There was a dose-response in this association with decreasing mean systolic blood pressure across categories from never exclusively breast fed to breast fed for more than six months. Exclusive breast feeding was not associated with other components of the metabolic syndrome. Results were similar when examined separately in each country. **CONCLUSIONS:** The magnitude of the association, its independence of important confounding factors, and the dose-response suggest that exclusive breast feeding is causally associated with

reduced systolic blood pressure. The magnitude of the effect we found with blood pressure is comparable to the published effects of salt restriction and physical activity on blood pressure in adult populations, suggesting that it is of public health importance.

*Arterioscler Thromb Vasc Biol.* 2005 May 12; [Epub ahead of print]

Breastfeeding and Atherosclerosis. Intima-Media Thickness and Plaques at 65-Year Follow-Up of the Boyd Orr Cohort.

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**OBJECTIVE:** The impact of breastfeeding in infancy on cardiovascular disease risk is uncertain. We related breastfeeding in infancy to atherosclerosis in adulthood. **METHODS AND RESULTS:** A historic cohort study based on a 65-year follow-up of the Carnegie (Boyd Orr) survey of diet and health in prewar Britain, 1937 to 1939. A total of 732 eligible cohort members living in or around Aberdeen, Bristol, Dundee, Wisbech, and London were invited for follow-up examinations in 2002, and 405 (55%) participated. In models controlling for age and sex, breastfeeding was inversely associated with common carotid intima-media thickness (IMT; difference -0.03 mm; 95% CI, -0.07 to 0.01), bifurcation IMT (difference -0.19 mm; 95% CI, -0.37 to -0.01), carotid plaque (odds ratio [OR], 0.52; 95% CI, 0.29 to 0.92), and femoral plaque (OR, 0.54; 95% CI, 0.26 to 1.12), compared with bottle-feeding. Controlling for socioeconomic variables in childhood and adulthood, smoking and alcohol made little difference to effect estimates. Controlling for factors potentially on the causal pathway (blood pressure, adiposity, cholesterol, insulin resistance, and C-reactive protein) made little difference to observed associations. **CONCLUSIONS:** Breastfeeding may be associated with a reduced risk of atherosclerosis in later life. Measurement error and power considerations limit the extent to which conclusions about the mechanisms underlying this relationship can be made.

*Pediatrics.* 2005 May;115(5):1367-77.

Effect of infant feeding on the risk of obesity across the life course: a quantitative review of published evidence.

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**OBJECTIVE:** To examine the influence of initial infant feeding on obesity in later life. **METHODS:** A systematic review of published studies investigating the association between infant feeding and a measure of obesity was performed with Medline (1966 onward) and Embase (1980 onward) databases, supplemented with manual searches. Data extraction was conducted by 2 authors. Analyses were based on odds ratios of obesity among initially breastfed subjects, compared with formula-fed subjects, pooled with fixed-effects models. **RESULTS:** Sixty-one studies reported on the relationship of infant feeding to a measure of obesity

in later life; of these, 28 (298900 subjects) provided odds ratio estimates. In these studies, breastfeeding was associated with a reduced risk of obesity, compared with formula feeding (odds ratio: 0.87; 95% confidence interval [CI]: 0.85-0.89). The inverse association between breastfeeding and obesity was particularly strong in 11 small studies of <500 subjects (odds ratio: 0.43; 95% CI: 0.33-0.55) but was still apparent in larger studies of > or =500 subjects (odds ratio: 0.88; 95% CI: 0.85-0.90). In 6 studies that adjusted for all 3 major potential confounding factors (parental obesity, maternal smoking, and social class), the inverse association was reduced markedly (from an odds ratio of 0.86 to 0.93) but not abolished. A sensitivity analysis examining the potential impact of the results of 33 published studies (12505 subjects) that did not provide odds ratios (mostly reporting no relationship between breastfeeding and obesity) showed little effect on the results. **CONCLUSIONS:** Initial breastfeeding protects against obesity in later life. However, a further review including large unpublished studies exploring the effect of confounding factors in more detail is needed.

*Curr Opin Nephrol Hypertens. 2005 May;14(3):259-64.*

Early life determinants of adult blood pressure.

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**PURPOSE OF REVIEW:** While treating high blood pressure in middle age is beneficial in terms of reducing the occurrence of cardiovascular disease, treated and well controlled hypertensive adults still have a substantial excess mortality and reduced survival compared with normotensives. Therefore, identification of the means of preventing hypertension in earlier life is an important objective. There is increasing evidence that adult blood pressure is determined by a range of characteristics from the intrauterine period, through infancy and childhood. The purpose of this review is to provide a summary of the current evidence concerning the early life determinants of adult blood pressure. **RECENT FINDINGS:** Children from poorer socioeconomic positions, those whose mothers experience pregnancy-induced hypertension, those whose mothers smoke throughout pregnancy, those with low birthweight, who are not breast-fed, who have high sodium diets in infancy and who are obese in childhood or adolescence tend to have higher blood pressure in adulthood. However, the mechanisms linking these early life factors to later blood pressure and the most appropriate means of preventing adult hypertension by intervening in early life are unclear. **SUMMARY:** There is clear evidence that early life factors are important determinants of adult blood pressure. However, there is a need for randomized trials with sufficient resources for long-term follow-up to assess the effects that interventions such as preventing pregnancy-induced hypertension, reducing maternal smoking, increasing breast-feeding, reducing salt consumption in infancy and preventing childhood obesity have on adult blood pressure and cardiovascular disease.

*Nutrition. 2005 Apr;21(4):474-9.*

Early infant diet and risk of type 1 diabetes mellitus in Belgrade children.

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**OBJECTIVES:** This study investigated whether an infant diet is associated with the development of type 1 diabetes. **METHODS:** A case-control study was conducted in Belgrade from 1994 to 1997. A total of 105 patients with recent onset diabetes (< or = 16 y old) were compared with 210 controls chosen among children with skin disease (first control group). Cases and controls were individually matched by age (+/-1 y), sex, and place of residence. Eighty-six children with diabetes were also compared with their siblings (second control group). **RESULTS:** According to univariate logistic regression analysis, when cases were compared with the first control group, the risk of type 1 diabetes was greater for children who were breast fed less than 4 mo (odds ratio = 2.09, 95% confidence interval = 1.30 to 3.36) and who received cow's milk at younger than 5 mo (odds ratio = 3.39, 95% confidence interval = 2.04 to 5.66). According to univariate analysis, when cases were compared with their relatives, only early introduction of supplementary milk was associated with a higher risk for diabetes (odds ratio = 5.75, 95% confidence interval = 2.91 to 11.36). After adjusting for different confounding variables, infant diet was not independently associated with diabetes. **CONCLUSIONS:** The results obtained do not support the hypothesis that infant diet is related to the occurrence of type 1 diabetes.

*Obes Res. 2005 Feb;13(2):362-71.*

Additive interactions of maternal prepregnancy BMI and breast-feeding on childhood overweight.

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**OBJECTIVE:** To examine the interactions of maternal prepregnancy BMI and breast-feeding on the risk of overweight among children 2 to 14 years of age. **RESEARCH METHODS AND PROCEDURES:** The 1996 National Longitudinal Survey of Youth, Child and Young Adult data in the United States were analyzed (n = 2636). The weighted sample represented 51.3% boys, 78.0% whites, 15.0% blacks, and 7.0% Hispanics. Childhood overweight was defined as BMI  $\geq$ 95th percentile for age and sex. Maternal prepregnancy obesity was determined as BMI  $\geq$ 30 kg/m<sup>2</sup>. The duration of breast-feeding was measured as the weeks of age from birth when breast-feeding ended. **RESULTS:** After adjusting for potential confounders, children whose mothers were obese before pregnancy were at a greater risk of becoming overweight [adjusted odds ratio (OR), 4.1; 95% confidence interval (CI), 2.6, 6.4] than children whose mothers had normal BMI (<25 kg/m<sup>2</sup>); p < 0.001 for linear trend). Breast-feeding for  $\geq$ 4 months was associated with a lower risk of childhood overweight (OR, 0.6; 95% CI, 0.4, 1.0; p = 0.06 for linear trend). The additive interaction between maternal prepregnancy obesity and lack of breast-feeding was detected (p < 0.05), such that children whose mothers were obese and who were never breast-fed had the greatest risk of becoming overweight (OR, 6.1; 95% CI, 2.9, 13.1). **DISCUSSION:** The combination of maternal prepregnancy obesity and lack of breast-feeding may be associated with a greater risk of childhood overweight. Special attention may be needed for children with obese mothers and lack of breast-feeding in developing childhood obesity intervention programs.

### 3. Immune factors and allergy

*Pediatr Pulmonol. 2005 May 4;40(1):81-87 [Epub ahead of print]*

Risk factors of bronchial hyperresponsiveness in children with wheezing-associated respiratory infection.

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The objectives of this study were to identify possible risk factors of bronchial hyperresponsiveness (BHR) in children up to 5 years of age with wheezing-associated respiratory infection (WARI), and to study the prevalence of BHR. Children up to 5 years of age with WARI were enrolled in the study. The parents or caregivers of children were asked about their demographic data and clinical histories. Physical examination and clinical score assessment were performed. Pulmonary function tests, i.e., tidal breathing flow volume (TBFV), were performed to measure tidal breathing parameters before and after salbutamol nebulization. If volume at peak tidal expiratory flow/inspiratory tidal volume and time to peak expiratory flow/total expiratory time increased  $\geq 20\%$ , or tidal expiratory flow at 25% of tidal volume/peak tidal expiratory flow increased  $\geq 20\%$  after nebulization therapy, BHR was diagnosed. The number in the positive BHR group was used to calculate the prevalence of BHR, and clinical features were compared with those of the negative BHR group. Categorical data were analyzed for statistical significance ( $P < 0.05$ ) by chi-square test or Fisher's exact test, or Student's t-test, as appropriate. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated for those with statistical significance. One hundred and six wheezing children underwent pulmonary function tests before and after salbutamol nebulization. With the aforementioned criteria, 41 cases (38.7%) were diagnosed with BHR. History of reactive airway disease, (OR, 6.31; 95% CI, 1.68-25), maternal history of asthma (OR, 3.45; 95% CI, 1.34-9), breastfeeding less than 3 months (OR, 3.18; 95% CI, 1.26-8.12), and passive smoking (OR, 3; 95% CI, 1.15-7.62) were significant risk factors of BHR. The eosinophil count was significantly higher in the BHR (+) group particularly, in children 1-5 years of age ( $P \leq 0.01$ ). Patchy infiltrates were more commonly found in patients with negative BHR but not statistically significant. In conclusion, a history of reactive airway disease, maternal history, breastfeeding less than 3 months, and passive smoking were significant risk factors for BHR. *Pediatr Pulmonol.* (c) 2005 Wiley-Liss, Inc.

*Annu Rev Nutr.* 2004 May 21; [Epub ahead of print]

Human Milk Glycans Protect Infants Against Enteric Pathogens.

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Breastfed infants have lower morbidity and mortality due to diarrhea than those fed artificially. This had been attributed primarily to the secretory antibodies and prebiotic factors in human milk. Oligosaccharides are the third largest component of human milk. They were initially considered to be functionless by-products of glycoprotein and glycolipid synthesis during milk production. However, in the past few decades it has become apparent that the human milk oligosaccharides are composed of thousands of components, at least some of which protect against pathogens. Oligosaccharide protection against infectious agents may result in part from their prebiotic characteristics, but is thought to be primarily due to their inhibition of pathogen binding to host cell ligands. Most

human milk oligosaccharides are fucosylated, and their production depends on enzymes encoded by the genes associated with expression of the Lewis blood group system. The expression of specific fucosylated oligosaccharides in milk thus varies in relation to maternal Lewis blood group type, and is significantly associated with the risk of infectious disease in breastfed infants. Specific fucosylated moieties of oligosaccharides and related glycoconjugates (glycans) are able to inhibit binding and disease by specific pathogens. This review presents the argument that specific glycans, especially the oligosaccharides, are the major constituent of an innate immune system of human milk whereby the mother protects her infant from enteric and other pathogens through breastfeeding. The large input of energy expended by the mother in the synthesis of milk oligosaccharides is consistent with the human reproductive strategy of large parental input into rearing relatively few offspring through a prolonged period of maturation. These protective glycans may prove useful as a basis for the development of novel prophylactic and therapeutic agents that inhibit diseases caused by mucosal pathogens. Expected online publication date for the Annual Review of Nutrition Volume 25 is July 17, 2005. Please see [http://www.annualreviews.org/catalog/pub\\_dates.asp](http://www.annualreviews.org/catalog/pub_dates.asp) for revised estimates.

*J Nutr.* 2005 May;135(5):1308-12.

Innate immunity and human milk.

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Human neonates are born with an immature and naive acquired immune system, and many of the innate components of mucosal immunity are not fully developed. Thus, the innate immune system of human milk is an important complement to the mucosal barrier of the developing gut. The nursing mother provides her infant many protective agents through milk, a growing number of which have been identified as isolates of milk in laboratory models of infection. The number, the potency, and the importance of these protective agents are probably greater than previously thought. For example, many potent protective agents are not found in milk until digestion releases antimicrobial agents such as fatty acids and peptides. An alternate conformer of alpha-lactalbumin forms from milk in the stomach and inhibits cancer cells. Many of the protective constituents of human milk inhibit different aspects of a pathogenic process, creating a synergy, where much lower concentrations of each component become protective. Some components have a temporal and a spatial specificity that would cause their protective role to go unrecognized by most laboratory models of infection. Some protective components had remained underappreciated because of technical challenges in their isolation and testing. Recent reports suggest that human milk contains a highly potent mixture of protective agents that constitute an innate immune system, whereby the mother protects her infant from enteric and other diseases. These human-milk components may represent a rich source of novel classes of therapeutic agents against human pathogens.

*J Nutr.* 2005 May;135(5):1304-7.

Human-Milk Glycans That Inhibit Pathogen Binding Protect Breast-feeding Infants against Infectious Diarrhea.

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Breast-feeding is a highly effective strategy for preventing morbidity and mortality in infancy. The human-milk glycans, which include oligosaccharides in their free and conjugated forms, constitute a major and an innate immunologic mechanism by which human milk protects breast-fed infants against infections. The glycans found in human milk function as soluble receptors that inhibit pathogens from adhering to their target receptors on the mucosal surface of the host gastrointestinal tract. The alpha1,2-linked fucosylated glycans, which require the secretor gene for expression in human milk, are the dominant glycan structure found in the milk of secretor mothers, who constitute the majority (approximately 80%) of mothers worldwide. In vitro and in vivo binding studies have demonstrated that alpha1,2-linked fucosylated glycans inhibit binding by campylobacter, stable toxin of enterotoxigenic *Escherichia coli*, and major strains of caliciviruses to their target host cell receptors. Consistent with these findings, recently published epidemiologic data demonstrate that higher relative concentrations of alpha1,2-linked fucosylated glycans in human milk are associated with protection of breast-fed infants against diarrhea caused by campylobacter, caliciviruses, and stable toxin of enterotoxigenic *E. coli*, and moderate-to-severe diarrhea of all causes. These novel data open the potential for translational research to develop the human-milk glycans as a new class of antimicrobial agents that prevent infection by acting as pathogen anti-adhesion agents.

*J Nutr.* 2005 May;135(5):1289-1293.

Antimicrobial Peptides in Mucosal Secretions: The Importance of Local Secretions in Mitigating Infection\*

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The antimicrobial activity of the collective molecules comprising human milk reflects an evolutionarily successful paradigm for preventing and limiting microbial infection. Understanding the molecules that participate in this process and how they work can yield insight into potentially new antimicrobial therapies. Upon proteolytic processing, antimicrobial peptides can be derived from milk proteins, such as lactoferrin, casein, and lysozyme. Similarly, using the HIV-1 gp41 protein template, we have demonstrated that the 28-residue C-terminus, when produced as an independent peptide, exhibits selective toxicity for bacteria over eukaryotic cells. Upon optimizing this sequence for cationic charge and hydrophobic character presented as an alpha-helical structure, we show improved capability of the parent LLP1 sequence to selectively kill bacteria in the host environment and that this activity is increased by the inclusion of Trp residues on the hydrophobic face. We report that it is possible to (i) design de novo antimicrobial peptides that demonstrate optimal antimicrobial activity with minimal inflammatory activity and (ii) design antimicrobial peptides to function in a defined environment. In the end, we describe a de novo designed antimicrobial peptide, WLBU2, which is selectively toxic to microbial pathogens in complex environments and does not stimulate a significant immunomodulatory response. In spite of these properties, WLBU2 activity against *Pseudomonas aeruginosa* in human milk is inferior to the host peptide LL37 with regard to antimicrobial potency. These studies demonstrate that antimicrobial peptides can be engineered for greater potency in one medium but may not be optimal for

working in a different medium such as human milk.

*J Nutr. 2005 May;135(5):1286-8.*

Human milk inactivates pathogens individually, additively, and synergistically.

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Breast-feeding can reduce the incidence and the severity of gastrointestinal and respiratory infections in the suckling neonate by providing additional protective factors to the infant's mucosal surfaces. Human milk provides protection against a broad array of infectious agents through redundancy. Protective factors in milk can target multiple early steps in pathogen replication and target each step with more than one antimicrobial compound. The antimicrobial activity in human milk results from protective factors working not only individually but also additively and synergistically. Lipid-dependent antimicrobial activity in milk results from the additive activity of all antimicrobial lipids and not necessarily the concentration of one particular lipid. Antimicrobial milk lipids and peptides can work synergistically to decrease both the concentrations of individual compounds required for protection and, as importantly, greatly reduce the time needed for pathogen inactivation. The more rapidly pathogens are inactivated the less likely they are to establish an infection. The total antimicrobial protection provided by human milk appears to be far more than can be elucidated by examining protective factors individually.

*Med J Aust. 2005 May 2;182(9):464-7.*

The Australasian Society of Clinical Immunology and Allergy position statement: summary of allergy prevention in children.

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A family history of allergy and asthma identifies children at high risk of allergic disease. Dietary restrictions in pregnancy are not recommended. Avoiding inhalant allergens during pregnancy has not been shown to reduce allergic disease, and is not recommended. Breastfeeding should be recommended because of other beneficial effects, but if breast feeding is not possible, a hydrolysed formula is recommended (rather than conventional cow's milk formulas) in high-risk infants only. Maternal dietary restrictions during breastfeeding are not recommended. Soy formulas and other formulas (eg, goat's milk) are not recommended for reducing food allergy risk. Complementary foods (including normal cow's milk formulas) should be delayed until a child is aged at least 4-6 months, but a preventive effect from this measure has only been demonstrated in high-risk infants. There is no evidence that an elimination diet after age 4-6 months has a protective effect, although this needs additional investigation. Further research is needed to determine the relationship between house dust mite exposure at an early age and the development of sensitisation and disease; no recommendation can yet be made about avoidance measures for preventing allergic

disease. No recommendations can be made about exposure to pets in early life and the development of allergic disease. If a family already has pets it is not necessary to remove them, unless the child develops evidence of pet allergy (as assessed by an allergy specialist). Women should be advised not to smoke while pregnant, and parents should be advised not to smoke. No recommendations can be made on the use of probiotic supplements (or other microbial agents) for preventing allergic disease at this time. Immunotherapy may be considered as a treatment option for children with allergic rhinitis, and may prevent the subsequent development of asthma.

*Curr Opin Allergy Clin Immunol. 2005 Jun;5(3):255-9.*

Primary prevention of food allergy in infants who are at risk.

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**PURPOSE OF REVIEW:** Allergic diseases represent a major burden of health problems in industrialized countries. Though several studies have focused on possible preventive measure and strategies much controversy still exists on this topic. The aim of this review is to discuss the recent literature on primary prevention of food allergy. **RECENT FINDINGS:** In prospective observational controlled studies of high quality of birth cohorts, exclusive breastfeeding for at least 4 months combined with introduction of solid foods after 4 months of age is associated with a reduced risk of food allergy and atopic dermatitis, particularly in high-risk infants. When breastfeeding for 4-6 months is not possible or insufficient, randomized controlled trials have shown a significant reduction in food allergy and atopic dermatitis in high-risk infants fed a documented hypoallergenic hydrolysed formula. **SUMMARY:** Breastfeeding should be encouraged for 4-6 months. In high-risk infants a documented hypoallergenic hydrolysed formula is recommended if exclusively breastfeeding is not possible for the first 4 months. As regards primary prevention of food allergy there is no evidence for preventive dietary intervention during neither pregnancy nor lactation. Likewise, preventive dietary restrictions after the age of 4-6 months are not scientifically documented.

*Pediatr Allergy Immunol. 2005 May;16(3):201-8.*

Exclusive breastfeeding and risk of atopic dermatitis in some 8300 infants.

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Earlier studies on breastfeeding and atopy in infants have yielded contradictory results. We examined the relationship between exclusive breastfeeding and atopic dermatitis (AD) in a cohort of infants born between 1 October 1997 and 1 October 1999 in south-east Sweden. We evaluated the risk of AD 'at least once' or 'at least three times' during the first year of life in relation to duration of exclusive breastfeeding: <4 months (short exclusive breastfeeding; SEBF) vs. > or = 4 months. All data were obtained through questionnaires. Of 8346 infants with breastfeeding data, 1943 (23.3%) had suffered from AD during the first year of life. Duration of exclusive breastfeeding was not associated with lower risk of AD (p = 0.868). SEBF did not influence the risk of any AD (OR = 1.03; 95% CI OR = 0.91-1.17; p = 0.614) or AD at least three times (OR = 0.97; 95% CI OR =

0.81-1.16;  $p = 0.755$ ) during the first year of life. Adjustment for confounders did not change these point estimates. Neither was there any link between SEBF and risk of AD among infants with a family history of atopy [adjusted odds ratio (AOR) = 1.16; 95% CI AOR = 0.90-1.48;  $p = 0.254$ ]. Furred pets at home were linked to a lower risk of AD both among infants with a family history of atopy (AOR = 0.76; 95% CI AOR = 0.60-0.96;  $p = 0.021$ ) and among infants with no such history (AOR = 0.79; 95% CI AOR = 0.69-0.90;  $p < 0.001$ ). Infants with no family history of atopy were less prone to develop AD if parents smoked (AOR = 0.76; 95% CI AOR = 0.61-0.95;  $p = 0.016$ ). This study indicates that exclusive breastfeeding does not influence the risk of AD during the first year of life, while presence of furred pets at home seems to be negatively associated with AD. Copyright 2005 Blackwell Munksgaard

*Clin Chem Lab Med.* 2005;43(2):198-201.

Chitotriosidase activity in colostrum from African and Caucasian women.

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Chitotriosidase (ChT), a protein produced by activated macrophages, belongs to the chitinases, a group of enzymes able to hydrolyze chitin, a structural component of fungi and nematodes. A codominant inherited deficiency in ChT activity is frequently reported in plasma of Caucasian subjects, whereas in the African population this deficiency is rare. This study compares ChT activity in colostrum of 53 African women and 50 Caucasian women. Samples were collected at 24-48 and 72 h after delivery. We found elevated ChT in colostrum of African women on the first day after delivery (1230 $\pm$ 662 nmol/mL/h) which decreased to 275 $\pm$ 235 nmol/mL/h on the third day. The ChT activity on the first day after delivery in the colostrum of Caucasian women, however, was significantly lower (293 $\pm$ 74 nmol/mL/h) and decreased to 25 $\pm$ 20 and 22 $\pm$ 19 nmol/mL/h on the 2nd and 3rd day, respectively. The ChT activity in plasma of African women was also higher (101 $\pm$ 80 nmol/mL/h) than that of Caucasian women (46 $\pm$ 16 nmol/mL/h), but no correlation was found between plasma and colostrum ChT activity. The elevated ChT activity in colostrum of African women suggests the presence of activated macrophages in human milk, consistent with the genetic characteristics of the African population.

*Br J Dermatol.* 2005 Apr;152(4):742-9.

Risk factors for atopic dermatitis in New Zealand children at 3.5 years of age.

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**BACKGROUND:** The prevalence of atopic dermatitis (AD) is increasing in Western societies. The hygiene hypothesis proposes that this is due to reduced exposure to environmental allergens and infections during early life. **OBJECTIVES:** To examine factors associated with a diagnosis of AD at 3.5 years of age, especially those factors implicated by the hygiene hypothesis. **METHODS:** The Auckland Birthweight Collaborative study is a case-control study of risk factors for small for gestational age babies. Cases were born at term with birthweight  $<$  or = 10th centile; controls were appropriate for gestational age, with

birthweight > 10th centile. The infants were assessed at birth, 1 year and 3.5 years of age. Data were collected by parental interview and examination of the child. AD was defined as the presence of an itchy rash in the past 12 months with three or more of the following: history of flexural involvement; history of generally dry skin; history of atopic disease in parents or siblings; and visible flexural dermatitis as per photographic protocol. Statistical analyses took into account the disproportionate sampling of the study population. RESULTS: Analysis was restricted to European subjects. Eight hundred and seventy-one children were enrolled at birth, 744 (85.4%) participated at 1 year, and 550 (63.2%) at 3.5 years. AD was diagnosed in 87 (15.8%) children seen at 3.5 years. The prevalence of AD did not differ by birthweight. AD at 3.5 years was associated with raised serum IgE > 200 kU L(-1), and wheezing, asthma, rash or eczema at 1 year. In multivariate analysis, adjusted for parental atopy and breastfeeding, AD at 3.5 years was associated with atopic disease in the parents: maternal atopy only, adjusted odds ratio (OR) 3.83, 95% confidence interval (CI) 1.20-12.23; paternal atopy only, adjusted OR 3.59, 95% CI 1.09-11.75; both parents atopic, adjusted OR 6.12, 95% CI 2.02-18.50. There was a higher risk of AD with longer duration of breastfeeding: < 6 months, adjusted OR 6.13, 95% CI 1.45-25.86; > or = 6 months, adjusted OR 9.70, 95% CI 2.47-38.15 compared with never breastfed. These findings remained significant after adjusting for environmental factors and a personal history of atopy. AD at 3.5 years was associated with owning a cat at 3.5 years (adjusted OR 0.45, 95% CI 0.21-0.97) but not with owning a dog at 3.5 years, pets at 1 year, nor with older siblings. Furthermore, AD at 3.5 years was not associated with gender, socioeconomic status, maternal smoking, parity, damp, mould, immunizations, body mass index or antibiotic use in first year of life. CONCLUSIONS: A personal and a parental history of atopic disease are risk factors for AD at 3.5 years. Duration of breastfeeding was associated with an increased risk of AD. No association was found with those factors implicated by the hygiene hypothesis. This study suggests that breastfeeding should not be recommended for the prevention of AD.

*Clin Rev Allergy Immunol. 2005 Feb;28(1):5-16.*

Primary prevention of allergy and asthma is possible.

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Allergic diseases, such as asthma, are the result of complex gene-environment interactions. The focus for prevention of allergic disease has been on environmental control. Environmental exposures begin during the intrauterine period, during which a T-helper-2 immune phenotype is promoted. Food allergy frequently occurs during the first year of life, and avoidance of exposure must begin in early pregnancy and must be complete to be effective. Partial avoidance strategies have not been successful. Current data do not allow us to specifically recommend breastfeeding for the prevention of allergy and allergic diseases, but for other important reasons, breastfeeding (particularly exclusive breastfeeding) should be encouraged for at least the first 4 mo of life. Sensitization to allergens is one of the strongest determinants for subsequent development of asthma. There is a strong relationship between exposure to house dust mites, allergen sensitization, and asthma. However, exposure to pets and animals in a farming environment early in life may actually be protective for the development of allergy and asthma. Specific recommendations relating to

these exposures requires additional research, but genetics clearly plays an important role in that process. To date, only a multifaceted intervention program has been successful as a primary prevention strategy for the development of asthma in young children. The specific components of the multifaceted intervention and the duration of protection have not yet been defined. It is increasingly clear that gene-directed environmental manipulation undertaken in a multifaceted manner during a "window of opportunity" is critical in the primary prevention of allergy and allergic diseases like asthma.

*Saudi Med J. 2005 Mar;26(3):460-6.*

Risk factors for asthma among primary school children in Baghdad, Iraq.

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**OBJECTIVE:** Asthma is one of the most common chronic diseases of children. To fill the gap in data concerning this disease in Iraq, we investigated the socio-demographic and other risk factors related to asthma occurrence among primary school children. **METHODS:** A case control study was conducted in Baghdad, Iraq among primary school children aged 6-12 years, for the period between October 2000 and June 2002. Six hundred and forty-four children with asthma were investigated with a control group of 1618 children without asthma. Well-constructed standardized modified questionnaires of International Study of Asthma and Allergies in Childhood were completed by the parents of the chosen children. **RESULTS:** From the studied risk factors, the following were found as significant risk factors for asthma development: crowding rate of  $\geq 5$  (odds ratio [OR]=1.65, 95% confidence interval [CI]=1.1 - 2.4), lower educational level of parents, prematurity (OR=1.61, 95% CI=1.003-2.59), low birth weight (OR=2.41, 95% CI=1.87-3.09), family history of asthma whether father (OR=3.86, 95% CI=2.54-5.87), or mother (OR=8.27, 95% CI=5.21-13.15) or sibling (OR=4.33, 95% CI=3.24-5.8) and environmental exposure to tobacco smoking during pregnancy or currently from both parents. On the contrary, our study failed to detect significant association for the following factors: gender, residency, type of birth, breast feeding and duration. **CONCLUSION:** Crowding, low parental education, prematurity, low birth weight, family history of asthma and smoking are significant risk factors for asthma development among our primary school children. Efforts must be concentrated for hygienic environment, good antenatal care and quitting smoking habits in order to overcome this health problem.

#### **4. LCPUFA and cognitive development**

*Annu Rev Nutr. 2004 May 21; [Epub ahead of print]*

The Role of Essential Fatty Acids in Development.

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The presence of (DHA) and arachidonic acid (ARA) in human milk but not in infant formula, coupled with lower plasma and brain lipid contents of DHA in formula-fed than in breast-fed infants and reports of higher IQ in individuals who were breast-fed versus formula-fed as infants, suggest that exogenous DHA

(and ARA) may be essential for optimal development. Thus, since 1990, several studies have examined the impact of formulas containing DHA or DHA plus ARA on visual function and neurodevelopmental outcome. Some of these studies have shown benefits but others have not. These results leave largely unanswered the question of whether these fatty acids are beneficial for either the term or preterm infant. However, evidence that preterm infants might benefit is somewhat more convincing than that for term infants. Despite the limited evidence for efficacy, formulas supplemented with DHA and ARA are now available and appear to be safe. Expected online publication date for the Annual Review of Nutrition Volume 25 is July 17, 2005. Please see [http://www.annualreviews.org/catalog/pub\\_dates.asp](http://www.annualreviews.org/catalog/pub_dates.asp) for revised estimates.

*Early Hum Dev. 2005 Mar;81(3):303-11.*

Influences of maternal dietary intake and suckling on breast milk lipid and fatty acid composition in low-income women from Brasilia, Brazil.

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Diet has a strong effect, while suckling stimulus is believed not to influence breast milk fatty acids. The effect of dietary pattern and suckling on the fatty acid composition of Brazilian women's breast milk was studied. A cross-sectional study was conducted with low-income women living in the central region of Brazil, where dietary DHA is not readily available. Fore and hind milk fatty acids were collected from 77 women on day 15 $\pm$ 1 postpartum, and information on maternal characteristics and dietary habit was taken. The effect of suckling stimulus was measured by the changes between fore and hind milk. The mean body mass index (BMI) of volunteers was 23.7 $\pm$ 3.2 kg/m<sup>2</sup>, and the milk lipid concentration was 4.8 $\pm$ 1.2 g/dl. A mixture of traditional and western type of dietary habit, high in fat and sugar was observed. The fatty acids of the subject's milk were 41.93 $\pm$ 1.42% saturated, 33.31 $\pm$ 1.67% monounsaturated and 25.03 $\pm$ 5.23% polyunsaturated (wt/wt). The DHA level in the milk was 0.34 $\pm$ 0.19%, similar to the values found in milk of many western societies. DHA and 18:3n-3 levels increased from fore to hind milk ( $p$ <0.05). Correlation existed mostly between dietary components and milk 16:0 and oleic acid (18:0). An analysis of classes of fatty acids in milk showed oleic acid (18:0) to present a negative correlation with all milk fatty acid classes. The results suggest that breast milk fatty acids of Brazilian women reflect a western maternal dietary pattern and are influenced by the suckling.

*Nutrition. 2005 Apr;21(4):467-73.*

Lipid composition in human breast milk from Granada (Spain): changes during lactation.

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OBJECTIVE: To determine possible differences of composition in the course of lactation, phospholipid (PL) classes (phosphatidylethanolamine, phosphatidylinositol, phosphatidylserine, phosphatidylcholine, and

sphingomyelin) and fatty acid composition of PL and triacylglycerol (TGs) fractions of milk fat were analyzed in 66 samples from mothers from Granada (Spain) who gave birth to full-term infants. Analyses included colostrum, transitional milk, and mature milk. METHODS: After milk fat extraction, PLs and TGs were separated by thin-layer chromatography and fatty acids of each fraction were converted into their methyl esters, which were analyzed by gas chromatography. PL classes were determined by high-performance liquid chromatography using an evaporative light-scattering detector. RESULTS: Mature human milk showed a lower content ( $P = 0.020$ ) of PLs than did the other milks. Percentage of sphingomyelin was constant for all stages of lactation, whereas the percentage of phosphatidylcholine in mature milk was significantly lower ( $P < 0.05$ ) than in colostrum and transitional milk. TGs in mature human milk contained lower percentages ( $P < 0.001$ ) of arachidonic acid, docosahexaenoic acid, and nervonic acid. Docosahexaenoic acid and nervonic acid also showed a significant decrease ( $P < 0.001$ ) in total PLs from colostrum and mature milk. CONCLUSIONS: The composition of PL classes and fatty acids in PLs and TGs in milk of mothers in Granada (Southern Europe) is different from that in milk from mothers in other parts of the world. In addition, the ratio of long-chain polyunsaturated fatty acids delivered in the form of PLs to long-chain polyunsaturated fatty acids delivered in the form of triacylglycerols diminishes as lactation proceeds.

*Pediatr Res. 2005 Jun;57(6):921.*

Polyunsaturated Fatty acids in argentinian human milk: is there a relative deficiency in N-3 Fatty acids?: 5.

Marin MC, Sanjurjo A, Rodrigo MA, Alaniz MJ.

(no abstract)

## **5. Growth and nutrient status**

*J Am Diet Assoc. 2005 May;105(5):709-15.*

Predictors of Improvement in Hemoglobin Concentration among Toddlers Enrolled in the Massachusetts WIC Program.

Altucher K, Rasmussen KM, Barden EM, Habicht JP.

Abstract Objective Nutrition supplementation programs are generally targeted to those members of the population who are thought to be at risk of an undesirable outcome, but not all who participate in such programs respond to them. We sought to identify determinants of improvement in hemoglobin concentration among young children in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). Design We conducted an observational study using data from 9,930 children who were enrolled in the Massachusetts WIC program and had data available on their hemoglobin values at both 1 and 2 years of age. Predictors of change in hemoglobin concentration between these ages were studied using multivariate statistical modeling. Results Overall, hemoglobin concentrations increased from age 1 to 2 years in those who had been breastfed 25 or more weeks ( $P < .0001$ ) and were female ( $P < .01$ ), and decreased with increasing weight at 1 year of age ( $P < .001$ ). The determinants of change in hemoglobin concentration differed from the determinants of hemoglobin concentration at age 1 year. Conclusions The analytical approach used here could be extended to identify subgroups of WIC participants likely to improve in other outcomes. If current efforts to increase the duration of breastfeeding among WIC participants are

successful, the importance of WIC in improving hemoglobin concentration among young children also will increase.

*Arch Pediatr Adolesc Med.* 2005 Apr;159(4):335-41.

Reemerging nutritional rickets: a historical perspective.

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Recent case reports highlight the resurgence of rickets in certain groups of breastfed infants. Infants residing in the North, irrespective of skin color, and dark-skinned African American infants residing anywhere in the United States are most vulnerable to nutritional rickets if they are exclusively breastfed past age 6 months without vitamin D supplementation. At the turn of the 20th century, rickets was nearly universal among African American infants living in the North. The discovery of vitamin D, the initiation of public health campaigns to fortify infant foods with vitamin D, and the supplementation of vitamin D to breastfed infants were responsible for overcoming the rickets scourge. We review a classic nutritional study by Alfred F. Hess, one of the greatest clinical nutritional researchers of the early 20th century, in the context of the resurgence of rickets, especially among dark-skinned infants. The Columbus Hill district, a black community of New York, NY, served as the setting for the study. Sixty-five infants (aged 1-17 months) entered a 6-month open-label trial of daily cod liver oil therapy. Participants were assessed for signs of rickets at recruitment and at 2, 4, and 6 months. Cod liver oil prevented the development of rickets in 34 (92%) of 37 infants treated for 6 months and in 7 (58%) of 12 treated for 4 months. Of the 16 infants who did not take the prescribed treatment, rickets progressed unremittingly in 15. Hess translated his success into a public health campaign leading to the development of the first rickets clinic in 1917. This was the first step in the conquest of the rickets epidemic of the early 20th century.

*Arch Dis Child Fetal Neonatal Ed.* 2005 May;90(3):F281-2.

Nutritional infantile vitamin B12 deficiency: pathobiochemical considerations in seven patients.

Roschitz B, Plecko B, Huemer M, Biebl A, Foerster H, Sperl W.

(no abstract)

## **6. Nutrients and other components in human milk**

*J Dairy Sci.* 2005 Jun;88(6):1927-40.

Size distribution of fat globules in human colostrum, breast milk, and infant formula.

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Only a few results are available on the size of human milk fat globules (MFG), despite its significance regarding fat digestion in the infant, and no data are available at <24 h postpartum (PP). We measured the MFG size distribution in colostrum and transitional human milk in comparison with fat globules of mature milk and infant formula. Colostrum and transitional milk samples from 18 mothers were collected regularly during 4 d PP and compared with mature milk samples of 17 different mothers and 4 infant formulas. The size distribution was measured by laser light scattering. For further characterization, the zeta-potential of some mature MFG was measured by laser Doppler electrophoresis. The MFG diameter decreased sigmoidally in the first days. At <12 h PP, the mode diameter was 8.9 +/- 1.0 microm vs 2.8 +/- 0.3 microm at 96 h PP. Thus, the surface area of MFG increased from 1.1 +/- 0.3 to 5.4 +/- 0.7 m<sup>2</sup>/g between colostrum and transitional milk. In mature milk, the MFG diameter was 4 microm on average and increased with advancing lactation, whereas the droplets in infant formula measured 0.4 microm. The zeta potential of mature MFG was -7.8 +/- 0.1 mV. The fat globules are larger in early colostrum than in transitional and mature human milk and in contrast with the small-sized fat droplets in infant formula. Human MFG also have a low negative surface charge compared with bovine globules. These structural differences can be of nutritional significance for the infant.

*J Obstet Gynecol Neonatal Nurs.* 2005 May-Jun;34(3):367-72.

Vitamin d and the breastfed infant.

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For infants and children, vitamin D deficiency causes a bone-deforming disease known as rickets. As breastfeeding rates have increased, so have the incidences of rickets. The current recommendation from the American Academy of Pediatrics, to supplement all breastfed infants with vitamin D, is controversial. The role of the nurse is to understand the vitamin D dilemma, promote breastfeeding, and prevent vitamin D deficiency rickets.

*J Hum Lact.* 2005 May;21(2):138-50.

Primary and secondary mediators' influence on milk output in lactating mothers of preterm and term infants.

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This study examined potential primary mediators, such as intended length to breastfeed, maternal education, income, and infant gestation, and secondary mediators, such as early frequency of breast stimulation, early milk output, and supplementation with artificial milks that may influence milk output in mothers of preterm and term infants the first 6 weeks postpartum. Analysis suggested that for mothers of a preterm infant (n = 95), the primary mediators, income and infant gestation, and the secondary mediators, early milk output/d and early frequency/d, accounted for 53.5% of the variance in milk output/d at week 6. For mothers of a term infant (n = 98), the primary mediator, income, and secondary

mediators, early milk output/d and supplementation, accounted for 48.4% of the variance in milk output/d at week 6. Further research is needed to determine what early interventions may improve milk output in mothers at risk for lactation failure. *Journal of Human Lactation*. 21(2):138-150.

*Am J Clin Nutr*. 2005 May;81(5):1088-93.

Ascorbic acid supplementation and regular consumption of fresh orange juice increase the ascorbic acid content of human milk: studies in European and African lactating women.

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**BACKGROUND:** Little is known about the influence of an increased intake of ascorbic acid (AA) on human milk AA output. **OBJECTIVE:** We aimed to compare human milk AA content in European and African women and to evaluate the influence of increased AA intake on human milk AA output. **DESIGN:** Apparently healthy lactating women were recruited. AA was analyzed by titration with 2,6-dichlorophenol-indophenol. **RESULTS:** Mean human milk AA was approximately 50% lower ( $P < 0.001$ ) in the African women (31 mg/kg;  $n = 171$ ) than in the European women (63 mg/kg;  $n = 142$ ). AA supplementation (1000 mg/d for 10 d) increased mean human milk AA from 19 to 60 mg/kg ( $P < 0.001$ ) and from 60 to 70 mg/kg ( $P = 0.03$ ) in 18 African and 10 European women, respectively. In 11 African women, mean human milk AA increased from 17 to 36 mg/kg ( $P < 0.001$ ) after intake of 100 mg AA/d for 10 d. In African women, intake of 1 serving of orange juice per week had no significant effect, whereas 3 or 5 servings/wk (approximately 100 mg AA/serving) for 6 wk increased mean human milk AA from 16 to 32 mg/kg ( $n = 13$ ) and from 21 to 46 mg/kg ( $n = 13$ ), respectively ( $P < 0.001$ ). **CONCLUSIONS:** Human milk AA can be doubled or tripled by increased intake of AA in women with low human milk AA content at baseline. The response to a relatively high dose of AA was modest in European women in contrast with the 3-fold increase in mean human milk AA content in African women. These data indicate that human milk AA content is regulated.

*J Nutr Biochem*. 2005 May;16(5):272-8.

Detection of a single nucleotide polymorphism in the human alpha-lactalbumin gene: implications for human milk proteins.

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Variability in the protein composition of breast milk has been observed in many women and is believed to be due to natural variation of the human population. Single nucleotide polymorphisms (SNPs) are present throughout the entire human genome, but the impact of this variation on human milk composition and biological activity and infant nutrition and health is unclear. The goals of this study were to characterize a variant of human alpha-lactalbumin observed in milk from a Filipino population by determining the location of the polymorphism in the amino acid and genomic sequences of alpha-lactalbumin. Milk and blood

samples were collected from 20 Filipino women, and milk samples were collected from an additional 450 women from nine different countries. alpha-Lactalbumin concentration was measured by high-performance liquid chromatography (HPLC), and milk samples containing the variant form of the protein were identified with both HPLC and mass spectrometry (MS). The molecular weight of the variant form was measured by MS, and the location of the polymorphism was narrowed down by protein reduction, alkylation and trypsin digestion. Genomic DNA was isolated from whole blood, and the polymorphism location and subject genotype were determined by amplifying the entire coding sequence of human alpha-lactalbumin by PCR, followed by DNA sequencing. A variant form of alpha-lactalbumin was observed in HPLC chromatograms, and the difference in molecular weight was determined by MS (wild type=14,070 Da, variant=14,056 Da). Protein reduction and digestion narrowed the polymorphism between the 33rd and 77th amino acid of the protein. The genetic polymorphism was identified as adenine to guanine, which translates to a substitution from isoleucine to valine at amino acid 46. The frequency of variation was higher in milk from China, Japan and Philippines, which suggests that this polymorphism is most prevalent in Asia. There are SNPs in the genome for human milk proteins and their implications for protein bioactivity and infant nutrition need to be considered.

*Acta Paediatr. 2004 Dec;93(12):1569-74.*

Determination of oxidative status in breast and formula milk.

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**AIM:** To investigate to what extent formula milk and stored breast milk, commonly used in hospitals, could be pro-oxidant sources for newborn babies. **Methods:** We determined total antioxidant capacity and lipid peroxidation products, such as lipid peroxides, TBARS and conjugated dienes, in fresh and stored (at -20 degrees C) samples of breast milk and in different brands of formula milk. **Results:** There were notable differences in the oxidation parameters in several brands of formula milk, particularly concerning the levels of lipid peroxides and total antioxidant capacity. No difference was found in the mean total antioxidant capacity between formula and breast milk, even if the vitamin content is much higher in formula milk than in breast milk. On the contrary, all the considered lipid peroxidation products were higher in human milk (HM) than formula milk (FM), and lipid peroxides were much higher in HM stored at -20 degrees C. Many differences were found between different formula milks. **CONCLUSION:** There was a conspicuous formation of lipid peroxides in HM stored at -20 degrees C, which was probably caused by an increased presence of free fatty acids due to lipoprotein lipase activity during storage. Unexpectedly, even fresh HM had a higher concentration of lipid peroxidation products when compared to FM. This could be ascribed to the higher susceptibility of HM to degradation during analysis because of manipulation and light exposure. However, it is also interesting that the high content of lipid peroxides did not correspond to a low total antioxidant capacity in either breast or formula milk. This could signify that such levels of lipid peroxidation products might be present naturally in milk and HM after expression is subject to a strong peroxidation either at room temperature or at -20 degrees C.

*Am J Clin Nutr. 2005 Apr;81(4):851-8.*

Elevated serum concentrations of beta-glucuronide metabolites and 4-oxoretinol in lactating sows after treatment with vitamin A: a model for evaluating supplementation in lactating women.

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**BACKGROUND:** The effects of large doses of preformed vitamin A, such as those provided in supplementation programs for the prevention of deficiency, on total serum vitamin A have been inadequately investigated. **OBJECTIVE:** This study characterized the time course of serum vitamin A metabolites in lactating sows after single high doses of retinyl ester. **DESIGN:** Lactating sows were fitted with jugular catheters and subsequently fed either 1.05 or 2.1 mmol retinyl ester (n = 6/group) or a corn oil vehicle (n = 3). Blood was collected at baseline and at intervals to 48 h and analyzed by gradient HPLC for retinol, retinyl esters, and metabolites. **RESULTS:** The mean ( $\pm$ SD) total serum vitamin A concentration peaked at 1 h (3.69  $\pm$  4.0  $\mu$ mol/L) and 2 h (7.70  $\pm$  6.8  $\mu$ mol/L) in the low- and high-dose groups, respectively (P < 0.05). Retinyl esters accounted for most of the serum vitamin A in both groups at peak time points. Mean serum retinol concentrations changed little and accounted for most of the serum vitamin A at baseline (94% and 97% for the low- and high-dose groups, respectively) but for only 22% and 14% at peak times for the low- and high-dose groups, respectively. Postdosage increases were observed for total vitamin A and retinyl esters, 4-oxoretinol, retinoyl beta-glucuronide, and retinyl beta-glucuronide but not for retinoic acid. **CONCLUSIONS:** Serum retinol concentration remains relatively static after a large dose of preformed vitamin A and therefore is not an appropriate measure of intervention efficacy. The increases in beta-glucuronide metabolites and 4-oxoretinol suggest a preventive role against a rise in retinoic acid and retinol.

## 7. Transmission of HIV, other viral infections and mastitis

*J Acquir Immune Defic Syndr.* 2005 Jun 1;39(2):138-142.

alpha-Defensins in the Prevention of HIV Transmission Among Breastfed Infants.

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alpha-Defensins have been observed to have anti-HIV activity but have not been investigated in relation to mother-to-child HIV transmission. We measured the concentration of alpha-defensins in breast milk of HIV-positive mothers and tested whether the concentrations were associated with HIV transmission. A nested case-control study of 32 HIV-positive women who transmitted HIV to their infants and 52 randomly selected HIV-positive women who did not transmit HIV to their infants was conducted in Lusaka, Zambia. alpha-Defensins were detected in

most (79%) of the milk samples tested. Concentrations of alpha-defensins increased as breast milk HIV RNA quantity increased, and breast milk HIV RNA quantity was, in turn, a strong and significant predictor of HIV transmission. After adjustment for milk HIV RNA quantity, however, alpha-defensin concentration was significantly associated with a decreased risk of intrapartum and postnatal HIV transmission (odds ratio = 0.3, 95% confidence interval: 0.09-0.93). Our data suggest that there may be a role for alpha-defensins in prevention of HIV transmission to breastfed infants.

*J Immunol.* 2005 Jun 1;174(11):7202-7209.

Natural Antibodies to CCR5 from Breast Milk Block Infection of Macrophages and Dendritic Cells with Primary R5-Tropic HIV-1.

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In the present study, we demonstrate that breast milk of 66% and 83% of HIV-seronegative and seropositive women, respectively, contains natural Abs of the secretory IgA and IgG isotypes directed against the CCR5 coreceptor for R5-tropic strains of HIV-1. Abs to CCR5 were affinity purified on a matrix to which a synthetic peptide corresponding to the second extracellular loop of CCR5 had been coupled. The purified Abs bound to the CCR5 peptide in a dose-dependent fashion and to both native CCR5 expressed by Chinese hamster ovary cells transfected with CCR5 gene, macrophages, and immature dendritic cells. Although the avidity differed, the amount of anti-CCR5 Abs did not significantly differ between breast milk of HIV-seropositive and -seronegative women. Purified anti-CCR5 Abs inhibited up to 75% infection of macrophages and dendritic cells with HIV(BaL) and HIV(JR-CSF). Our observations provide evidence for a role of natural Abs to CCR5 in breast milk in controlling transmissibility of HIV through breastfeeding.

*Retrovirology.* 2005 Apr 29;2(1):28.

Inactivation of HIV-1 in breast milk by treatment with the alkyl sulfate microbicide sodium dodecyl sulfate (SDS).

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**BACKGROUND:** Reducing transmission of HIV-1 through breast milk is needed to help decrease the burden of pediatric HIV/AIDS in society. We have previously reported that alkyl sulfates (i.e., sodium dodecyl sulfate, SDS) are microbicidal against HIV-1 at low concentrations, are biodegradable, have little/no toxicity and are inexpensive. Therefore, they may be used for treatment of HIV-1 infected breast milk. In this report, human milk was artificially infected by adding to it HIV-1 (cell-free or cell-associated) and treated with  $\leq 1\%$  SDS ( $\leq 10$  mg/ml). Microbicidal treatment was at 37 degrees C

or room temperature for 10 min. SDS removal was performed with a commercially available resin. Infectivity of HIV-1 and HIV-1 load in breast milk were determined after treatment. RESULTS: SDS ( $\geq 0.1\%$ ) was virucidal against cell-free and cell-associated HIV-1 in breast milk. SDS could be substantially removed from breast milk, without recovery of viral infectivity. Viral load in artificially infected milk was reduced to undetectable levels after treatment with 0.1% SDS. SDS was virucidal against HIV-1 in human milk and could be removed from breast milk if necessary. Milk was not infectious after SDS removal. CONCLUSION: The proposed treatment concentrations are within reported safe limits for ingestion of SDS by children of 1 g/kg/day. Therefore, use of alkyl sulfate microbicides, such as SDS, to treat HIV-1-infected breast milk may be a novel alternative to help prevent/reduce transmission of HIV-1 through breastfeeding.

*J Nutr.* 2005 May;135(5):1113-9.

Use of Population-Specific Infant Mortality Rates to Inform Policy Decisions Regarding HIV and Infant Feeding.

Piwoz EG, Ross JS.

Mother-to-child transmission of HIV occurs during pregnancy, at the time of delivery, and through breastfeeding (BF). WHO recommends avoidance of all BF when replacement feeding (RF) is affordable, feasible, acceptable, sustainable, and safe. Otherwise, exclusive breastfeeding (EBF) followed by early BF cessation is recommended. Governments are currently scaling up programs to prevent infant HIV infection. Few data exist to guide policy decisions about the allocation of resources to prevent postnatal HIV transmission while minimizing the non-HIV-related risks of these policies. This paper presents an analysis of the impact of WHO infant feeding recommendations in different settings characterized by infant mortality rate (IMR). Mathematical simulation modeling is used to estimate the effects on HFS (HFS) through 24 mo of 3 intervention scenarios: RF from birth by HIV-positive mothers (RF24), EBF up to 6 mo followed by early BF cessation (EBF6), and the default scenario where there is no postnatal intervention (BF24). This analysis differs from earlier reports in that it uses the most recent data on risks of postnatal HIV transmission for mixed and exclusive BF. These simulations suggest that in settings where IMR is  $< 25/1000$  live births, RF24 results in the greatest HFS to 24 mo; EBF6 produces the best outcome where IMR  $> 25/1000$  live births. RF24 results in lower HFS than no postnatal intervention where IMR  $\geq 101/1000$ . IMR-based analyses can help to guide government policy decisions about which infant feeding strategies to invest in and emphasize for HIV-positive mothers in different settings.

*Int J STD AIDS.* 2005 Mar;16(3):227-32.

Epidemiology and microbiology of subclinical mastitis among HIV-infected women in Malawi.

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The epidemiology and microbiology of subclinical mastitis, a risk factor for perinatal HIV transmission, have not been well characterized. In all, 250 HIV-infected women were followed from two weeks to 12 months postpartum in Blantyre, Malawi, and subclinical mastitis was assessed by breast milk leukocyte

counts. The point prevalence of subclinical mastitis at 2, 4, 6, 10, and 14 weeks, and 6, 9, and 12 months was 12.2%, 7.8%, 6.8%, 3.7%, 10.6%, 5.1%, 4.9%, and 1.9%, respectively ( $P = 0.002$ ), and 27.2% of women had at least one episode of subclinical mastitis. There was no significant relationship between maternal plasma HIV load or parity and subclinical mastitis. *Staphylococcus aureus* was isolated in 30% of women with subclinical mastitis, and the proportion of women with positive cultures decreased during follow-up ( $P = 0.02$ ). Subclinical mastitis is prevalent among breastfeeding mothers and further studies are needed to characterize the differences between infectious and non-infectious subclinical mastitis.

*AIDS. 2005 Apr 29;19(7):699-708.*

Early exclusive breastfeeding reduces the risk of postnatal HIV-1 transmission and increases HIV-free survival.

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**OBJECTIVES:** The promotion of exclusive breastfeeding (EBF) to reduce the postnatal transmission (PNT) of HIV is based on limited data. In the context of a trial of postpartum vitamin A supplementation, we provided education and counseling about infant feeding and HIV, prospectively collected information on infant feeding practices, and measured associated infant infections and deaths. **DESIGN AND METHODS:** A total of 14 110 mother-newborn pairs were enrolled, randomly assigned to vitamin A treatment group after delivery, and followed for 2 years. At baseline, 6 weeks and 3 months, mothers were asked whether they were still breastfeeding, and whether any of 22 liquids or foods had been given to the infant. Breastfed infants were classified as exclusive, predominant, or mixed breastfed. **RESULTS:** A total of 4495 mothers tested HIV positive at baseline; 2060 of their babies were alive, polymerase chain reaction negative at 6 weeks, and provided complete feeding information. All infants initiated breastfeeding. Overall PNT (defined by a positive HIV test after the 6-week negative test) was 12.1%, 68.2% of which occurred after 6 months. Compared with EBF, early mixed breastfeeding was associated with a 4.03 (95% CI 0.98, 16.61), 3.79 (95% CI 1.40-10.29), and 2.60 (95% CI 1.21-5.55) greater risk of PNT at 6, 12, and 18 months, respectively. Predominant breastfeeding was associated with a 2.63 (95% CI 0.59-11.67), 2.69 (95% CI 0.95-7.63) and 1.61 (95% CI 0.72-3.64) trend towards greater PNT risk at 6, 12, and 18 months, compared with EBF. **CONCLUSION:** EBF may substantially reduce breastfeeding-associated HIV transmission.

*Indian J Med Res. 2005 Apr;121(4):489-501.*

Prevention of mother-to-child transmission of HIV--an overview.

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With the human immunodeficiency virus (HIV) epidemic showing a shift towards women and young people, the increasing seroprevalence among women will result in an increase in the mother-to-child transmission of HIV. The vast majority of

HIV-positive children worldwide acquire the infection through vertical transmission. The discovery of successful interventions that interrupt this transmission has been one of the greatest successes in AIDS research. The transmission of HIV from an infected mother to her child can be reduced to less than 2 per cent by intensive interventions in the antenatal, intranatal and postnatal periods. To achieve this low rate, primary prevention of HIV infection in parents-to-be, early identification of seropositivity in pregnant women, prevention of unwanted pregnancies, prevention of mother-to-child transmission of HIV by appropriate antiretroviral therapy, special interventions in maternal management during labour, appropriate care and follow up of the newborn, all play an important role. However, these approaches are not always possible in developing countries wherein currently 95 per cent of vertical transmission occurs. Several questions and challenges remain. These include choice, availability, affordability, duration, long-term safety of optimal antiretroviral agents to be used during pregnancy and early neonatal life and the issue of transmission via breastfeeds in situations where alternatives to breastfeeding are not available. The challenge is to find the most cost-effective and feasible intervention to achieve zero per cent transmission of HIV from an infected mother to her child.

*Am J Clin Nutr.* 2005 Apr;81(4):880-8.

Vitamin supplementation of HIV-infected women improves postnatal child growth.

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**BACKGROUND:** Linear growth retardation and wasting are common in children born to HIV-infected women. Inexpensive interventions that could improve the postnatal growth pattern of such children are needed. **OBJECTIVE:** The objective was to examine the effect of supplementing HIV-infected women with multivitamins or vitamin A and beta-carotene, during and after pregnancy, on the growth of their children during the first 2 y of life. **DESIGN:** We conducted a randomized placebo-controlled trial in 886 mother-infant pairs in Tanzania. At the first prenatal visit, HIV-infected women were randomly assigned to 1 of 4 daily oral regimens in a 2 x 2 factorial fashion: multivitamins (MV: thiamine, riboflavin, vitamin B-6, niacin, vitamin B-12, vitamin C, vitamin E, and folic acid), preformed vitamin A + beta-carotene (VA/BC), MV including VA/BC, or placebo. Supplementation continued during the first 2 y postpartum and thereafter. Children were weighed and measured monthly, and all received vitamin A supplements after 6 mo of age per the standard of care. **RESULTS:** Multivitamins had a significant positive effect on attained weight (459 g; 95% CI: 35, 882; P = 0.03) and on weight-for-age (0.42; 95% CI: 0.07, 0.77; P = 0.02) and weight-for-length (0.38; 95% CI: 0.07, 0.68; P = 0.01) z scores at 24 mo. VA/BC seemed to reduce the benefits of MV on these outcomes. No significant effects were observed on length, midupper arm circumference, or head circumference. **CONCLUSION:** Supplementation of HIV-infected women with multivitamins (vitamin B complex, vitamin C, and vitamin E) during pregnancy and lactation is an effective intervention for improving ponderal growth in children.

*Forum Nutr.* 2003;56:162-4.

Breastfeeding and risk of HIV transmission: an update.

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(no abstract)

*J Infect Dis.* 2005 May 15;191(10):1780.

Comments on the Brief Report "Provirus Load in Breast Milk and Risk of Mother-to-Child Transmission of Human T Lymphotropic Virus Type I".

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(no abstract)

*BMJ.* 2005 Apr 16;330(7496):862.

Wet nursing increases risk of HIV infection among babies.

Sidley P.

(no abstract)

## **8. Preterm infants**

*Acta Paediatr.* 2005 Jan;94(1):53-8.

Cytomegalovirus transmission to extremely low-birthweight infants through breast milk.

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**AIM:** To determine the incidence, timing and clinical significance of acquired postnatal cytomegalovirus (CMV) in extremely low-birthweight (ELBW) infants. **METHODS:** Prospective, longitudinal surveillance study. ELBW infants were recruited in the first week of life. Maternal blood was tested for CMV-specific IgG antibodies. Weekly urine samples were obtained from infants for CMV culture and rapid antigen testing. Data were collected regarding clinical course and breast milk intake. **RESULTS:** Of 181 eligible infants, 119 infants, born to 101 mothers, were enrolled. Eighty of the 101 mothers had their serum checked for CMV status. Seventy percent of those tested were seropositive for CMV. Of the 65 infants born to seropositive mothers, 94% received breast milk during their hospital stay. Complete urine collection was obtained in 92 infants. CMV was cultured from the urine of only four infants, all of whom were born to seropositive mothers. Only one of these four infants was symptomatic. The range at which CMV was first detected was between 48 and 72 postnatal days of age.

**CONCLUSIONS:** Despite a very high CMV seropositivity rate in mothers of ELBW infants, and the previously reported high rate of CMV excretion into breast milk, the incidence of postnatal CMV transmission was extremely low in our study.

*Cochrane Database Syst Rev. 2005 Apr 18;(2):CD004591.*

Lactase treated feeds to promote growth and feeding tolerance in preterm infants.

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**BACKGROUND:** Successful transition from parenteral nutrition to full enteral feedings during the immediate neonatal period is associated with improved growth in preterm infants. Lactase is the last of the major intestinal disaccharidases to develop in preterm infants. Because of inadequate lactase activity, preterm infants are unable to digest lactose. Lactase preparations could potentially be used to hydrolyze lactose in formulas and breast milk to minimize lactose malabsorption in preterm infants. **OBJECTIVES:** To assess the effectiveness and safety of the addition of lactase to milk compared to placebo or no intervention for the promotion of growth and feeding tolerance in preterm infants. **Primary outcomes:** Weight gain expressed as g/kg/day, growth expressed as weight, length and head circumference percentile for gestational age, assessed at birth and at 40 weeks post-menstrual age, days to achieve full enteral feeds. **Secondary outcomes:** Several common outcomes associated with preterm birth, and adverse effects. **SEARCH STRATEGY:** Electronic and manual searches were conducted in January 2005 of Cochrane Central Register of Controlled Trials (CENTRAL, The Cochrane Library, Issue 4, 2004), MEDLINE (1966-Jan 2005), EMBASE (1980-Jan 2005) and CINAHL (1982-Jan 2005), personal files, bibliographies of identified trials and abstracts by the Pediatric Academic Societies' and the European Society of Pediatric Research Meetings published in Pediatric Research. **SELECTION CRITERIA:** Types of studies: Randomized or quasi-randomized controlled trials. Participants: Preterm infants < 37 weeks gestational age. Intervention: Addition of lactase to milk versus placebo or no intervention. **DATA COLLECTION AND ANALYSIS:** The standard methods of the Cochrane Neonatal Review Group were followed independently by the reviewers to assess study quality and report outcomes. Treatment effects, calculated using RevMan 4.2, included relative risk (RR), risk difference (RD) and mean difference (MD), all with 95% confidence intervals (CI). A fixed effect model was used for meta-analyses. Heterogeneity tests were not performed as only one study was identified. **MAIN RESULTS:** One study enrolling 130 infants of 26 - 34 weeks postconceptual age (mean postnatal age at entry 11 days) was identified and no identified study was excluded. The study was a double blind randomized controlled trial of high quality. Lactase treated feeds were initiated when enteral feedings provided > 75% of daily intake. None of the primary outcomes outlined in the protocol for this review and only one of the secondary outcomes, necrotizing enterocolitis (NEC), were reported on. The RR for NEC was 0.32 (95% CI 0.32 (0.01, 7.79); the RD was -0.02 (95% CI -0.06, 0.03) (a reduction which was not statistically significant). There was a statistically significant increase in weight gain at study day 10 in the lactase treated feeds group but not at any other time points. Overall, there was not a statistically significant effect on weight gain. No adverse effects were noted. **AUTHORS' CONCLUSIONS:** The only randomized trial to date provides no evidence of significant benefit to preterm infants from adding lactase to their feeds. Further research regarding effectiveness and safety are required before

practice recommendations can be made. Randomized controlled trials comparing lactase vs placebo treated feeds and enrolling infants when enteral feeds are introduced are recommended. The primary and secondary outcomes for effectiveness and safety should include those identified in this review.

*Pediatr Infect Dis J. 2005 Apr;24(4):381-2.*

Breast milk as a source of late onset neonatal sepsis.

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Neonatal sepsis can be a life-threatening complication in preterm neonates. We present the clinical course of 3 preterm neonates, 1 with recurrent sepsis and 2 with late onset sepsis attributed to ingestion of breast milk containing pathogenic organisms. Breast milk should be considered as a potential source of infection in neonates with recurrent infections or when infections occur simultaneously in siblings.

*Adv Neonatal Care. 2005 Apr;5(2):93-103.*

Qualitative analysis of barriers to breastfeeding in very-low-birthweight infants in the hospital and postdischarge.

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**PURPOSE:** To determine barriers to the successful establishment and maintenance of breastfeeding in very-low-birthweight (VLBW) infants, both in the hospital and after discharge, and changes in barriers over time. **SUBJECTS:** Sixty-four mothers of infants <1500 g birth weight who planned to breastfeed and were in the supplementary structured breastfeeding counseling intervention group. **DESIGN:** This qualitative, longitudinal study is a secondary analysis of a previously reported randomized controlled trial of a breastfeeding support intervention that examined infants weighing <1500 g at birth. **METHODS:** A qualitative technique, content analysis, was used to review, analyze, interpret, and categorize data for the current study. Data were extracted from the research records of the research lactation consultant that addressed all aspects of mothers' reported breastfeeding experiences. The principal investigator identified the main issues of the conversations, entered these into a summary chart, and then assigned appropriate categories. All categories are a reflection of maternal perception. Categorical data were analyzed descriptively using the crosstabs function. **MAIN OUTCOME MEASURES:** Barriers to the successful establishment and maintenance of breastfeeding during discharge from the neonatal intensive care unit (NICU), at discharge home, and at 1, 3, 6, and 12 months corrected age, or until weaning from breastfeeding. Changes in breastfeeding barriers across the 6 time periods were also determined. **PRINCIPAL RESULTS:** At NICU discharge, low milk volume was the greatest breastfeeding barrier. During the period from discharge home and at 1 month and 3 months, the infants' compromised physical status was the largest barrier to breastfeeding. Data from the 6- and 12-month time periods indicated that the provision of complementary feeding was the greatest barrier to breastfeeding; it was most prevalent in the period following NICU discharge and before discharge home. Across all time periods, nipple and breast problems were most prevalent at NICU

discharge, whereas poor technique was a barrier at 1 month. Mothers' compromised emotional status was greatest at discharge from the NICU and diminished thereafter. CONCLUSIONS: Results from this study indicate the need to address time-period-specific barriers encountered during the breastfeeding experience of mothers of VLBW infants.

*Adv Neonatal Care. 2005 Apr;5(2):72-88; quiz 89-92.*

A review of the literature examining the benefits and challenges, incidence and duration, and barriers to breastfeeding in preterm infants.

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Breastfeeding benefits preterm infants from a nutritional, gastrointestinal, immunological, developmental, and psychological perspective. Despite the benefits, the incidence and duration of breastfeeding preterm infants continues to be less than that of full-term infants. The lower incidence is probably related to breastfeeding challenges that preterm infants and parents face, including establishing and maintaining a milk supply and transitioning from gavage feeding to breastfeeding. In order to increase the incidence and duration of breastfeeding preterm infants, researchers must examine breastfeeding experiences longitudinally. This way, researchers and clinicians can begin to understand the barriers to breastfeeding at various time periods in the breastfeeding experience and begin implementing strategies to remove these barriers.

*J Perinatol. 2005 May;25(5):297-8.*

CMV acquisition in premature infants fed human milk: reason to worry?

Schanler RJ.

(no abstract)

*Adv Neonatal Care. 2005 Apr;5(2):89-92.*

A review of the literature examining the benefits and challenges, incidence and duration, and barriers to breastfeeding in preterm infants.

[No authors listed]

(no abstract)

## **9. Maternal aspects**

*Prev Med. 2005 Aug;41(2):433-438.*

Does long-term lactation protect premenopausal women against hypertension risk? a Korean women's cohort study.

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**BACKGROUND:** Little is known about the long-term effect of lactation on maternal cardiovascular health except for a few animal or human experimental studies. The objective of this study was to examine the effects of lactation on the incidence of hypertension in premenopausal women. **METHODS:** The data were derived from a cohort study with 6 years follow-up (1995-2000). The cohort was composed of 177,749 Korean premenopausal women, aged 20-59, who had medical evaluations in 1992 and 1994. During the follow-up, blood pressure was measured as part of the 1996, 1998, and 2000 periodic examinations. **RESULTS:** In multivariate Cox proportional hazard models, lactation decreased the risk of hypertension (risk ratio, 0.92; 95% confidence interval, 0.90-0.96). Compared with women who with no history of lactation, 1-6 months of lactation decreased the risk of hypertension (RR, 0.90; 95% CI, 0.87-0.93), as did 7-12 months (RR, 0.92; 95% CI, 0.87-0.98) or 13-18 months (RR, 0.93; 95% CI, 0.86-0.99). In particular, the coexistence of obesity and no lactation increased the risk of hypertension (P for interaction = 0.028). **CONCLUSION:** This finding suggests that lactation may be a protective factor against hypertension among premenopausal women.

*Eur J Clin Nutr. 2005 May 25; [Epub ahead of print]*

Bone mineral density and calcium metabolism of Hong Kong Chinese postpartum women-a 1-y longitudinal study.

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**Objective:** This paper reports longitudinal changes in bone mineral density (BMD), calcium homeostasis and dietary calcium intake in a group of Hong Kong breastfeeding women during the first year postpartum. **Design and subjects:** Nine mothers who breastfed exclusively or almost exclusively for at least 3 months and 14 formula feeding mothers aged 20-40 y were interviewed after delivery, 2 and 6 weeks, 3, 6 and 12 months postpartum. BMD at L2-L4 lumbar spine (LS), trochanter (Tro) and femoral neck (FN), serum intact parathyroid hormone (iPTH), serum bone-specific alkaline phosphatase (b-ALP), urinary deoxypyridinoline (Dpd), serum and urinary calcium (Ca) and phosphorus (P) and dietary intake of macronutrients were assessed. **Results:** Compared to the formula feeding group, BMD assessed at LS, Tro and FN decreased significantly in the breastfeeding group over the first 6 months, with rebound to approximate baseline values at 12 months for the latter two sites. Serum iPTH increased in both groups, whereas serum b-ALP was consistently higher in the breastfeeders. Urinary Ca and P excretion decreased early postpartum in both groups, but the breastfeeders had higher excretion at 3 and 6 months. Breastfeeding mothers consumed significantly more Ca than the formula feeding mothers in the early postpartum. **Conclusions:** Increased calcium requirement during early lactation is affected through mobilisation of bone and renal calcium conservation. Bone mineral loss during lactation is temporary. Further studies are warranted to investigate the effects of diet and other hormonal factors on the calcium homeostasis during lactation. **Sponsorship:** CSM was supported by a research studentship from the Research Grants Council, Hong Kong. *European Journal of Clinical Nutrition* advance online publication, 25 May 2005; doi:10.1038/sj.ejcn.1602148.

*Am J Clin Nutr.* 2005 May;81(5):1206S-12S.

Multiple micronutrients in pregnancy and lactation: an overview.

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This overview of multiple micronutrients during pregnancy and lactation emphasizes 2 relatively neglected issues. The first is that maternal micronutrient status in the periconceptional period, and throughout pregnancy and lactation, should be viewed as a continuum; too often these 3 stages are treated and discussed separately from both a scientific and a public health perspective. Iron and vitamin B-12 are included as examples to stress how status at conception affects maternal, fetal, and infant status and health until the child is weaned. The second issue is that while most attention has been focused on a few micronutrients, for example iron and folate as discussed elsewhere in this Supplement, multiple micronutrient deficiencies occur simultaneously when diets are poor. Some of these deserve more attention as causes of poor pregnancy outcome, including other B vitamin deficiencies that result in homocysteinemia, antioxidants, vitamin D, and iodine. In lactation, maternal status or intake of the B vitamins (except folate), vitamin A, selenium and iodine strongly affect the amount of these nutrients secreted in breast milk. This can result in the infant consuming substantially less than the recommended amounts and further depleting stores that were low at birth. While the optimal mode of meeting recommended micronutrient intakes is an adequate diet, in some situations supplementation is also important. Unfortunately, information is lacking on the optimal formulation of micronutrient supplements for pregnant women, and the need to continue these supplements during lactation is not recognized in many situations where maternal and infant health could benefit.

*Dev Dyn.* 2005 May 5; [Epub ahead of print]

Reduced expression of the PTH/PTHrP receptor during development of the mammary gland influences the function of the nipple during lactation.

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Signaling by the parathyroid hormone/parathyroid hormone-related protein receptor (Ppr) is necessary for mammary gland development beyond the early induction stage in mice. We used a series of murine models of reduced Ppr expression to determine how diminished receptor signaling influences mammary development. Reduction of Ppr expression to very low levels prevented mammary gland development. A less-severe reduction in Ppr expression permitted progression of mammary gland development beyond the induction stage, but the nipples of these mice were dramatically smaller than those of controls, with altered epidermis and connective tissue. Mothers with reduced expression of Ppr could not successfully nurse pups; however, the lactating glands did produce milk but could not efficiently deliver it. This finding was associated with reduced levels of matrix metalloproteinase-2 and an absence of pregnancy-associated remodeling of connective tissue matrix in the nipple. Reduced smooth muscle appears to underlie the majority of nipple deficiencies in mice with lower levels of the Ppr expression. *Developmental Dynamics*, 2005. (c) 2005 Wiley-Liss, Inc.

*J Steroid Biochem Mol Biol. 2005 Apr;94(5):421-9. Epub 2005 Mar 28.*

Attainment of peak bone mass and bone turnover rate in relation to estrous cycle, pregnancy and lactation in colony-bred Sprague-Dawley rats: Suitability for studies on pathophysiology of bone and therapeutic measures for its management.

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Alteration in biochemical markers of bone turnover and bone mineral density (BMD) of whole body and isolated femur and tibia in relation to age, estrous cycle, pregnancy and lactation and suitability of use of rat as model for studies on pathophysiology of bone and therapeutic measures for its management were investigated. Immature rats (1, 1.5 and 2 month of age; weighing, respectively, 39.3±1.0, 67.8±2.4 and 87.2±5.2g) exhibited high rate of bone turnover, as evidenced by high serum osteocalcin and alkaline phosphatase and urine calcium/creatinine ratio. However, their BMD (whole body or of isolated long bones) was below measurable levels. Marked increase in body weight at 3 months (185.5±5.2g) was associated with low serum osteocalcin and alkaline phosphatase and urine calcium/creatinine ratio. Biochemical markers and BMD attained at puberty at 3 months were maintained until 36 month of age. No significant change in serum calcium was observed with increasing age or on any of the biomarkers during estrous cycle, and BMD of femur and tibia isolated during proestrus and diestrus stages was almost similar. Onset of pregnancy was associated with significant increase in serum total alkaline phosphatase and osteocalcin levels, but serum calcium, urine calcium/creatinine ratio or BMD of whole body or isolated long bones were not significantly different from that at proestrus stage. No marked change, except increase in body weight ( $P<0.05$ ), was also evident in these parameters between days 5 and 19 of pregnancy, irrespective of number of implantations in the uterus. A significant decrease in BMD of isolated femur (neck and mid-shaft regions) was observed on days 5 and 21 of lactation as compared to that during pregnancy or diestrus/proestrus stages of estrous cycle; the decrease being almost similar in females lactating two or six young ones. BMD of isolated tibia (global and region proximal to tibio-fibular separation point), though generally lower than that during cycle and pregnancy, was statistically non-significant. However, clear evidence of occurrence of osteoporosis during lactation, with decrease in BMD of  $>2.5 \times S.D.$  in isolated femur (global, neck and mid-shaft) as well as tibia (global) was observed only when BMD data was analysed on T-/Z-score basis. Serum biochemical markers of bone turnover, too, were significantly increased in comparison to cyclic rats. Findings demonstrate marked increase in body weight and bone turnover during first 3 months of age, direct correlation between peak bone mass and onset of puberty at 3 months of age and increase in bone resorption rate during lactation. Finding of the study while might suggests possible use of rat as useful model for studies on bone turnover rate during lactation and post-weaning periods and extrapolation of the result to the human situation, but not in relation to ageing.

*Eur J Clin Nutr. 2005 May;59(5):632-8.*

Total energy expenditure (H218O), physical activity level and milk output of lactating rural Bangladeshi tea workers and nontea workers.

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**OBJECTIVE:** To assess the total daily energy expenditure (TDEE), milk output and physical activity level (PAL) of chronically malnourished lactating women using the doubly labelled water method (DLW). **DESIGN:** Prospective, longitudinal study designed to assess the extent of malnutrition and energetics of lactating tea workers and nontea workers. **SETTING:** North-east Bangladesh on women working and living in the same tea estates. **SUBJECTS:** Of an original cohort of 150 lactating women, 30 were selected to participate in this study when they were at about 12 months postpartum. One mother subsequently dropped out. **INTERVENTIONS:** On day 1 each women provided a urine sample, was administered a dose of DLW and 6 h later provided another sample. Further urine samples were collected for 21 subsequent days. In addition, every 5 days the mother provided a milk sample and at the same time her baby provided a urine sample. **RESULTS:** Mean (s.d.) BMI was 17.4 (1.63). Mean TDEE and PAL were significantly higher in workers than nonworkers (8.42 (1.38) and 6.83 (2.09) MJ/day,  $P = 0.02$  and  $1.92 (0.34)$  and  $1.59 (0.44)$ ,  $P = 0.03$ , respectively). Mean milk output was similar in the two groups (672 (180) ml and 749 (189) ml in workers and nonworkers, respectively). **CONCLUSIONS:** Based on international BMI cutoffs, 79% of mothers were suffering from some degree of chronic energy deficiency. A total of 35% of workers and 17% of nonworkers were engaged in strenuous physical activity. The mean milk output of both workers and nonworkers was not different and was high especially as most of the mothers were about 12 months postpartum. No relationship was found between menses return and any of the variables studied. **SPONSORSHIP:** World Health Organization, Nestle Foundation, UNICEF.

*Fertil Steril.* 2005 Apr;83(4):988-94.

Serum leptin and lactational amenorrhea in well-nourished and undernourished lactating women.

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**OBJECTIVE:** To ascertain the possible role of leptin in the resumption of postpartum menstruation in lactating women with differing nutritional statuses. **DESIGN:** Analysis of data and blood samples collected during a previous prospective study. **SETTING:** Healthy volunteers in an academic research environment. **PATIENT(S):** Undernourished (body mass index [BMI] < or = 19 kg/m<sup>2</sup>) and well-nourished (BMI > or = 26 kg/m<sup>2</sup>) lactating women who resumed regular menstruation before 24 weeks and at or after 24 weeks postpartum. **INTERVENTION(S):** Venous blood samples at four-weekly intervals and other clinical data collected until resumption of regular menstruation. **MAIN OUTCOME MEASURE(S):** Serum leptin concentrations. **RESULT(S):** Leptin concentrations were significantly higher in the well-nourished than in the undernourished women, irrespective of the time of resumption of menstruation. Time of resumption of menstruation did not significantly affect leptin levels within well-nourished and undernourished groups. Leptin significantly correlated with BMI ( $r = 0.78$ ). The BMI ( $r = -0.53$ ), but not leptin, was significantly and negatively correlated with the duration of lactational amenorrhea. **CONCLUSION(S):** Leptin is unlikely to be a major determinant of early resumption of regular menstruation in well-nourished women.

*Ann Nutr Metab.* 2005 Mar-Apr;49(2):110-7. Epub 2005 Mar 29.

Assessment of body composition and breast milk volume in lactating mothers in pastoral communities in pokot, kenya, using deuterium oxide.

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**Background:** In sub-Saharan Africa, the practice of breast-feeding infants is common. Records documenting the intake of breast milk amongst infants are limited. This study evaluated the association between maternal body composition and the intake of breast milk in infants from the pastoral communities within Pokot, Kenya. **Methods:** The study was conducted in 10 lactating mothers who were participating in a longitudinal study aimed at determining maternal body composition, iron stores and vitamin A status during the third trimester pregnancy and four months after they had given birth. Maternal and infant anthropometric measurements were made, and maternal blood samples were taken to determine serum retinol and ferritin levels. Infant milk intake and maternal fat-free mass (FFM) and percent body fat (% BF) were measured using 'the dose to the mother method'. A measured deuterium oxide ( $(^2\text{H})_2\text{O}$ ) dose was given to the mother. Urine and breast milk from the mother, and saliva samples from the infant, were collected on days 1, 8 and 14 after dosing. **Results:** The mean (+/- SD) maternal mid upper arm circumference (MUAC) and body mass index (BMI) were 21.8 (0.9) cm and 18.6 (1.0) kg/height (m<sup>2</sup>), respectively. Infant weight and weight/age Z score were 4.956 (0.874) kg and -1.750 (0.77), respectively. Throughout the study, the infants gained 20 (4) g/day in body weight and had a milk intake of 555 (22) ml/day. The energy intake of the infant was 1,602 (148) kJ/day and was lower ( $p < 0.05$ ) than the 2,404 (423) kJ/day estimated requirement by the FAO/WHO/UNU. The maternal FFM, %BF, Hb, Hct, ferritin and retinol were 32.8 (3.1) kg, 17.24 (7.0), 11.5 (1.3) g/dl, 33.9 (4.9), 16.2 (0.1) mug/l and 0.894 (0.16) mumol/l, respectively. Infant milk intake was significantly and positively correlated to maternal pregnancy triceps ( $r = 0.679$ )  $p < 0.05$  and pregnancy MUAC ( $r = 0.725$ )  $p < 0.05$ . Maternal pregnancy MUAC was an important predictor of infant breast milk intake. **Conclusion:** Data on volume of breast milk consumed by the infants suggests, at least for this group of infants, that adequate growth may not be achieved. There is a possibility that lactating mothers practicing exclusive breast-feeding and living under harsh conditions may experience periods of low breast milk volume. Body composition and biochemical findings among this group of Pokot mothers indicate dietary inadequacies that require nutritional intervention. Copyright (c) 2005 S. Karger AG, Basel.

*Psychoneuroendocrinology.* 2005 Sep;30(8):791-806.

Effects of psycho-social stress during pregnancy on neuroendocrine and behavioural parameters in lactation depend on the genetically determined stress vulnerability.

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The neuroendocrine consequences of repeated exposure of the pregnant mother to relevant stressors have been studied in the offspring, but not in the mothers. As these stress effects might depend on the genetically determined stress susceptibility of the dams, here, we investigated the effects of daily exposure to psycho-social stressors (maternal defeat by an aggressive lactating resident and restraint) between pregnancy days 4 and 18 in female rats selectively and bidirectionally bred for high (HAB) or low (LAB) anxiety-related behaviour. ACTH and corticosterone secretory responses to a mild stressor were found to be low in unstressed lactating HAB and LAB dams (day 8 of lactation) indicating an intact physiological attenuation of the HPA axis at this time. Pregnancy stress significantly increased the reactivity of the hypothalamo-pituitary-adrenal (HPA) axis in lactating HAB, but not LAB rats, reflecting impaired attenuation of the HPA axis selectively in pregnancy-stressed HAB dams. The high and low anxiety phenotypes were consistent in lactation and not significantly altered by pregnancy stress, despite an elevated level of arousal in pregnancy-stressed HAB dams. In general, HAB dams showed signs of a more protective maternal behaviour compared to LAB dams: (i) in the home cage, HAB dams spent more time in direct pup contact (day 1 of lactation), (ii) during two forms of the pup retrieval test, differing in the level of challenging the dam, HAB dams retrieved the pups faster, and (iii) during the maternal defence test, they were more aggressive towards a virgin intruder compared to LAB and NAB dams. Pregnancy stress did not alter any of these behavioural measures, except an increase in the speed of pup collection in a novel environment in HAB dams and increased maternal aggression in LAB dams. The results indicate a robust behavioural phenotype of HAB and LAB dams with respect to anxiety and maternal behaviour which was found to be almost unchanged by exposure to pregnancy stress. However, the finding of differential effects of pregnancy stress on the attenuation of the reactivity of the HPA axis in lactation makes HAB and LAB rats a potential animal model for studying genetically determined differences in stress vulnerability and stress-induced maladaptation of the HPA axis post-partum.

*Forum Nutr. 2003;56:231-3.*

Nutrition of pregnant and lactating women.

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(no abstract)

## **10. Prevalence, management and support of BF**

*Birth. 2005 Jun;32(2):115-21.*

Newborn Temperature During Skin-to-Skin Breastfeeding in Couples Having Breastfeeding Difficulties.

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Background: Kangaroo (skin-to-skin contact) care facilitates the maintenance of safe temperatures in newborn infants. Concern persists that infants will become cold while breastfeeding, however, especially if in skin-to-skin contact with the mother. This concern might be especially realistic for infants experiencing breastfeeding difficulties. The objective was to measure temperature during a

study of mothers and infants who were having breastfeeding difficulties during early postpartum and were given opportunities to experience skin-to-skin contact during breastfeeding. Method:Forty-eight full-term infants were investigated using a pretest-test-posttest study design. Temporal artery temperature was measured before, after, and once during 3 consecutive skin-to-skin breastfeeding interventions and 1 intervention 24 hours after the first intervention. Results:During skin-to-skin contact, most infants reached and maintained temperatures between 36.5 and 37.6 degrees C, the thermoneutral range, with only rare exceptions. Conclusions:The temperatures of study infants reached and remained at the thermoneutral range during breastfeeding in skin-to-skin contact. The data suggest that mothers may have the ability to modulate their infant's temperature during skin-to-skin contact if given the opportunity. Hospital staff and parents can be reassured that, with respect to their temperature, healthy newborn infants, with or without breastfeeding difficulties, may safely breastfeed in skin-to-skin contact with their mothers. (BIRTH 32:2 June 2005).

*Birth. 2005 Jun;32(2):99-106.*

Night Rooming-in: Who Decides? An Example of Staff Influence on Mother's Attitude.

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Background: In 1989 the World Health Organization and UNICEF introduced the "Ten Steps" for successful breastfeeding. One step suggests that a mother and her newborn baby should remain together day and night during the hospital stay. The purpose of this study was to investigate, first, whether or not mothers in our hospital roomed-in with their babies at night, second, the attitudes of mothers toward night rooming-in and their feelings of closeness to their babies, and third, how mothers perceived hospital staff attitudes toward night rooming-in. Methods: All mothers ( n = 132) of Nordic ancestry and with good knowledge of the Swedish language, who were admitted to the maternity wards during a 2-week period at Karolinska University Hospital, Stockholm, Sweden, answered a questionnaire on demographic background data and their current night rooming-in practices, including an attitude scale. Results: Most study mothers were positive toward night rooming-in, regardless of whether they had roomed in with their babies at night (93% positive) or not (73% positive). Mothers who had not roomed-in with their babies were more likely to perceive that the staff believed their babies should stay in the nursery compared with those mothers who practiced night rooming-in ( $z = -2.733$ ,  $p = 0.006$ ). Mothers not rooming-in with their babies scored closeness to their babies as less important than those mothers who roomed-in with their babies ( $z = -3.780$ ,  $p = 0.0002$ ); they also were more worried about their own and their babies' sleep ( $z = -2.321$ ,  $p = 0.02$ ) and disturbing noises ( $z = -3.487$ ,  $p = 0.0005$ ). Conclusions: Mothers who left their babies in the nursery at night more often perceived that the staff believed their babies should stay in the nursery, rating closeness between mother and infant lower. Hence, negative staff attitudes toward night rooming-in may implicitly suggest to mothers that closeness between mothers and babies is not important.

*Birth. 2005 Jun;32(2):93-8.*

Prevalence of Breastfeeding and Acculturation in Hispanics: Results from NHANES 1999-2000 Study.

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Background: A more current estimate to evaluate ethnic and acculturation differences in breastfeeding is warranted, given the rapid growth of the Hispanic population in the United States and the proliferation of breastfeeding promotion programs. The study objective was to describe current national estimates of the prevalence of breastfeeding and evaluate differences in reasons not to breastfeed by acculturation status. Methods: Secondary data analysis of the National Health and Nutrition Examination Survey (NHANES) 1999-2000 was performed on a nationally representative sample of non-Hispanic white women born in the U.S. and Hispanic women with at least one live birth. Acculturation status among Hispanics was assessed using a validated language scale, and prevalence of breastfeeding was based on maternal self-report. Results: Prevalence of breastfeeding was higher in less acculturated Hispanic women (59.2%) than high acculturated Hispanic women (33.1%) and white women (45.1%). Less acculturated Hispanic women were more likely to cite their child's physical/medical condition as a reason not to breastfeed (53.1%), whereas whites and more acculturated Hispanics were more likely to cite their child preferred the bottle (57.5% and 49.8%, respectively). A logistic regression analysis revealed no significant differences in likelihood to breastfeed between non-Hispanic whites and Hispanics after controlling for education, age, and income. Higher acculturated women were less likely to breastfeed their children than low acculturated women (95% CI: 0.14-0.40) even after education, age, and income were taken into account. Conclusions: Acculturation differences in prevalence of breastfeeding and reasons not to breastfeed may be the result of attitudinal changes that occur due to acculturation. Further research into the acculturation process and its impact on breastfeeding may help to prevent the decline in breastfeeding that occurs as mothers become more acculturated. Meanwhile, patient education that addresses women's perceptions of the child's health condition and benefits of breastfeeding would be helpful. (BIRTH 32:2 June 2005).

*Birth. 2005 Jun;32(2):86-92.*

Learning needs of postpartum women: does socioeconomic status matter?

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Background: Little is known about how information needs change over time in the early postpartum period or about how these needs might differ given socioeconomic circumstances. This study's aim was to examine women's concerns at the time of hospital discharge and unmet learning needs as self-identified at 4 weeks after discharge. Methods: Data were collected as part of a cross-sectional survey of postpartum health outcomes, service use, and costs of care in the first 4 weeks after postpartum hospital discharge. Recruitment of 250 women was conducted from each of 5 hospitals in Ontario, Canada (n = 1,250). Women who had given vaginal birth to a single live infant, and who were being discharged at the same time as their infant, assuming care of their infant, competent to give

consent, and able to communicate in one of the study languages were eligible. Participants completed a self-report questionnaire in hospital; 890 (71.2%) took part in a structured telephone interview 4 weeks after hospital discharge. Results: Approximately 17 percent of participants were of low socioeconomic status. Breastfeeding and signs of infant illness were the most frequently identified concerns by women, regardless of their socioeconomic status. Signs of infant illness and infant care/behavior were the main unmet learning needs. Although few differences in identified concerns were evident, women of low socioeconomic status were significantly more likely to report unmet learning needs related to 9 of 10 topics compared with women of higher socioeconomic status. For most topics, significantly more women of both groups identified learning needs 4 weeks after discharge compared with the number who identified corresponding concerns while in hospital. Conclusions: It is important to ensure that new mothers are adequately informed about topics important to them while in hospital. The findings highlight the need for accessible and appropriate community-based information resources for women in the postpartum period, especially for those of low socioeconomic status. (BIRTH 32:2 June 2005).

*Birth. 2005 Jun 1;32(2):81-85.*

Comparing Sociodemographic and Hospital Influences on Breastfeeding Initiation.

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Background: Healthy breastfeeding practice in the United States depends decisively on high rates of initiation at the delivery hospital. We sought to estimate the component of hospital variation in rates of exclusive breastfeeding at discharge that was dependent on demographic composition. Isolating that component can help to illuminate the potential independent contribution of hospital policies, practices, and staff behaviors. Methods: Electronic birth certificate data in New Jersey from 1996 to 2001 (n = 545,837) were used to measure variations in hospital-level rates of breastfeeding initiation. The method of infant feeding within 24 hours before hospital discharge was reported as exclusive breastfeeding, formula feeding, combination feedings, other methods, and unknown. Rates of exclusive breastfeeding by hospital were standardized to remove sociodemographic differences in hospitals' service populations that influence initiation rates. Results: Sociodemographic variables predicted about 60 percent of the variation in hospital-specific rates of exclusive breastfeeding at discharge. Hospitals that were designated intensive or regional perinatal centers, delivered higher volumes of infants, and served more breastfeeding-prone populations were only slightly more likely to have higher adjusted rates compared with other hospitals; considerable unexplained variation remained. Conclusions: Standardized exclusive breastfeeding rates pointed to the contribution of population demographics to breastfeeding initiation, and other contributions, including hospital practices, are also important. To protect, promote, and support breastfeeding, a more detailed evidence base on hospital policies and practices should be developed, and hospitals should review their policies and practices in light of documented best breastfeeding practice. (BIRTH 32:2 June 2005).

*Aust N Z J Public Health. 2005 Apr;29(2):171-5.*

Breastfeeding and the introduction of solids in Australian infants: data from the 2001 National Health Survey.

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**OBJECTIVE:** To present estimates on rates of breastfeeding and timing of introduction of solid foods to Australian children, 1998-2001. **METHODS:** Analysis of data from the 2001 Australian National Health Survey (NHS) using lifetable methods. Infant feeding questions were asked by personal interview in respect to 1,883 children aged under three years of age. **RESULTS:** At discharge from hospital, 83.3% of infants were breastfeeding, which is similar to estimates from the 1995 NHS. At 13 weeks postpartum, 64.3% were breastfeeding, 49.0% at 25 weeks and 24.9% were continuing to breastfeed at one year. At 25 weeks, 18.4% of infants were fully breastfed. Solid food was being offered regularly to 15.2% of infants at 13 weeks and 88.0% by 26 weeks. **CONCLUSION:** Fewer than 50% of infants are receiving breast milk at six months, which is considerably lower than the 80% figure recommended by the latest Dietary Guidelines for Children and Adolescents. Very few Australian infants are being exclusively breastfed for the recommended six months. Infant feeding practices in Australia appear to have remained unchanged between 1995 and 2001.

*Southeast Asian J Trop Med Public Health. 2005 Jan;36(1):254-8.*

Assessment of growth and feeding practices in children with cleft lip and palate.

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Feeding difficulties in cleft lip and palate (CLP) infants is commonly observed and is the most traumatic experience the family has to face. These infants are undernourished and have compromised growth. The purpose of this study was to 1) assess general health and growth parameters in children with CLP and in normal children; and 2) investigate the feeding methods of CLP infants and normal infants. A total of 221 children from birth to six years of both sexes, with CLP (60 children) and normal (161 children) were selected. The CLP and normal children were divided into three subgroups by age. The practice of feeding the infants in subgroup I was assessed using standard piloted questionnaires. The assessment of growth was done at baseline and at six months in all the subgroups. The general well being of the children was assessed by noting the number of common infections. Results showed that a significantly higher percentage of mothers with normal babies ( $p < 0.01$ ) had a positive attitude towards breast feeding. When compared to normal children, CLP children were more susceptible to infections ( $p < 0.05$ ) and measured significantly lower on the height growth curve ( $p < 0.05$ ). Hence, height can be used to monitor growth in CLP children.

*J Inherit Metab Dis. 2005;28(4):457-65.*

Breastfeeding experience in inborn errors of metabolism other than

phenylketonuria.

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Breastfeeding has been recommended for the dietary treatment of infants with phenylketonuria, but studies documenting clinical experience in other inborn errors of metabolism are very few. Seven infants diagnosed with methylmalonyl-CoA mutase deficiency (n=2), ornithine carbamoyltransferase deficiency (n=1), propionic acidemia (n=1), isovaleric acidemia (n=1), maple syrup urine disease (n=1) and glutaric acidemia type I (n=1) were tried with breastfeeding over two years. After the control of acute metabolic problems, an initial feeding period with a measured volume of expressed breast milk plus a special essential amino acid mixture was continued with breastfeeding on demand and with the addition of a special essential amino acid mixture. Two patients with methylmalonic acidemia and one patient with glutaric acidemia type I tolerated breastfeeding on demand very well, with good growth and metabolic control for periods of 18, 8 and 5 months, respectively. In the patient with propionic acidemia, on-demand breastfeeding continued for 3 months but was terminated after two acute metabolic episodes. The patient with isovaleric acidemia had insufficiency of breast milk and formula supplementation ended with breast milk cessation. In the patient with severe ornithine carbamoyltransferase deficiency, breastfeeding was stopped owing to poor metabolic control. The patient with maple syrup urine disease also experienced problems, both in metabolic control and in insufficiency of breast milk, resulting in termination of breastfeeding. Breastfeeding of infants with inborn errors of protein catabolism is feasible, but it needs close monitoring with attention to such clinical parameters as growth, development and biochemistry, including amino acids, organic acids and ammonia.

*West Indian Med J. 2005 Jan;54(1):28-33.*

Breastfeeding patterns among six-week-old term infants at the University Hospital of the West Indies.

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Eighty-nine mothers attending post-natal clinics at the University Hospital of the West Indies were interviewed at six weeks postpartum regarding their breast-feeding patterns and problems. Breastfeeding was practised by 97.8% of the mothers, with 29.9% practising exclusive breastfeeding and 70.1% partial breastfeeding. Only two women were solely bottle feeding. The pattern of breastfeeding was not significantly affected by maternal parity, age, education, employment or socioeconomic status. An intention to wean later (at six months) or when the mother felt the baby was 'ready,' was associated with increasing parity, age and further education. Babies who were exclusively breastfed achieved greater weight gain compared with those who partially breastfed but this difference did not achieve statistical significance. Breastfeeding trends appear to have remained stable over the last several years.

*J Trop Pediatr. 2005 May 12; [Epub ahead of print]*

Attitudes Towards Exclusive Breastfeeding and Other Infant Feeding Options--A Study from Abidjan, Cote d'Ivoire.

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The HIV/AIDS-pandemic causes many problems for the most affected societies and their health care systems. One of these is the 'parent to child transmission' (PTCT) through breastmilk and its prevention (PPTCT). As economic and hygienic conditions do not always assure safe replacement feeding in developing countries, a WHO/UNAIDS/UNICEF-expert panel proposed methods to reduce the risk of PTCT but to use breastmilk for infant feeding. The study presented here aimed at identifying the expected acceptance of such a concept by addressing the attitudes of women in Abidjan, Ivory Coast. Interviews were performed with 150 mothers and 60 pregnant women. The vast majority regarded breastfeeding as the appropriate method of infant feeding, although the idea of exclusive breastfeeding was not well accepted. Water, especially, was felt to be a necessary supplement. In case of a suggested HIV-infection of the mother, 74 per cent of the women voted for weaning after 3 months. Eighty-three per cent accepted the exclusive use of breastmilk substitutes from birth. Seventy-six per cent were ready to boil their milk for pasteurization. Only 37 per cent considered a wet-nurse to breastfeed their child. As mixed breastfeeding implies a highest risk of PTCT of HIV, the most favoured option--exclusive breastfeeding and early weaning--requires some effort to convince women that breastmilk is a sufficient source of nutrients, fluid and energy for their child and that this feeding should preferably be practised up to 6 months of age. For affluent women, breastmilk substitutes can also be considered as a means of PPTCT in overall resource-poor countries. For the majority of women, there is no real alternative to breastfeeding and to the use of breastmilk for which appropriate technologies of PPTCT are to be developed with respect to national, local and household specifications.

*J Hum Lact.* 2005 May;21(2):191-8.

Learning to lobby for probreastfeeding legislation: the story of a Texas bill to create a breastfeeding-friendly physician designation.

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Legislation can reduce institutional barriers to breastfeeding. Lobbying is the process by which legislation is influenced by a special interest group. While generally thought of as an activity available only to the rich and powerful, lobbying by lactation activists can be an effective way to change public policy. A breastfeeding coalition in central Texas has been involved with lobbying efforts since 1995. Tactical lessons learned are shared to inspire and assist others seeking to pass probreastfeeding legislation. *Journal of Human Lactation.* 21(2):191-198.

*J Hum Lact.* 2005 May;21(2):186-190.

Advocacy for Breastfeeding: Making a Difference One Community at a Time.

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In response to the need for health care professionals skilled in lactation management, a breastfeeding course was developed and taught at the University of Pennsylvania. Since 1995, Nursing 361 has been offered to undergraduate junior and senior students. The aim of this article is to discuss how through coursework, nursing students can provide breastfeeding advocacy and change the breastfeeding culture one community at a time. This article provides guidelines for others to conduct such projects, as well as exemplars to demonstrate how advocacy can change communities. Through development of an advocacy project during the course of a semester, a student learns about his or her identified community and is able to make an impact that often lasts years after his or her project is completed. *Journal of Human Lactation*. 21(2):186-190.

*J Hum Lact*. 2005 May;21(2):175-83.

Extent, accuracy, and credibility of breastfeeding information on the internet.

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Our objective was to test and describe a model for evaluating Websites related to breastfeeding. Forty Websites most likely to be accessed by the public were evaluated for extent, accuracy, credibility, presentation, ease of use, and adherence to ethical and medical Internet publishing standards. Extent and accuracy of Website content were determined by a checklist of critical information. The majority of Websites reviewed provided accurate information and complied with the International Code of Marketing of Breast-milk Substitutes. Approximately half the Websites complied with standards of medical Internet publishing. While much information on breastfeeding on the Internet is accurate, there is wide variability in the extent of information, usability of Websites, and compliance with standards of medical Internet publishing. Results of this study may be helpful to health care professionals as a model for evaluating breastfeeding-related Websites and to highlight considerations when recommending or designing Websites. *Journal of Human Lactation*. 21(2):175-183.

*J Hum Lact*. 2005 May;21(2):169-74.

Breast pump adverse events: reports to the food and drug administration.

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Breast pumps are medical devices used to express milk and maintain the milk supply. The purpose of this study was to characterize adverse events reported to the United States Food and Drug Administration (FDA) on breast pumps. Thirty-seven adverse event reports on breast pumps were identified from the Manufacturer and User Facility Device Experience database between 1992 and 2003. Four additional reports were found in the Device Experience Network database from 1992 to 1996. The most commonly reported adverse events for electric breast

pumps were pain, soreness, or discomfort; the need for medical intervention; and breast tissue damage. Most frequently reported problems for manual breast pumps were breast tissue damage and infection. Contamination of breast milk during pumping was also reported. Breast pump adverse events are likely underreported to the FDA. Reporting adverse events is important for improving the design and manufacture of breast pumps and subsequently decreasing adverse events. *Journal of Human Lactation*. 21(2):169-174.

*J Hum Lact*. 2005 May;21(2):151-62.

The cup-versus-bottle debate: a theme from an ethnographic study of the supplementation of breastfed infants in hospital in the United Kingdom.

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This article reports 1 theme from an ethnographic study that aimed to describe the experiences, expectations, and beliefs of mothers and health care professionals concerning supplementation in a UK maternity unit. Observation was conducted on the postnatal ward and the newborn infant unit, and 30 mothers, 17 midwives, 4 neonatal nurses, 3 health care assistants, 3 senior house officers, and 3 senior pediatricians gave in-depth interviews during a 9-month period in 2002. One of the major themes that emerged was the cup-versus-bottle debate. There were 3 categories strongly linked to this theme: difficulties returning to the breast, ease of use, and necessary skills and knowledge. It appears there is an urgent need to determine which is the best method of giving supplementary feeds, so that full, accurate information can be given to mothers, appropriate policies be devised, and the necessary resources and staff training be provided. *Journal of Human Lactation*. 21(2):151-162.

*J Am Diet Assoc*. 2005 May;105(5):810-818.

Position of the American Dietetic Association: Promoting and Supporting Breastfeeding.

[No authors listed]

Abstract It is the position of the American Dietetic Association (ADA) that exclusive breastfeeding provides optimal nutrition and health protection for the first 6 months of life, and breastfeeding with complementary foods for at least 12 months is the ideal feeding pattern for infants. Breastfeeding is also a public health strategy for improving infant and child health survival, improving maternal morbidity, controlling health care costs, and conserving natural resources. ADA emphasizes the essential role of dietetics professionals in promoting and supporting breastfeeding by providing up-to-date, practical information to pregnant and postpartum women, involving family and friends in breastfeeding education and counseling, removing institutional barriers to breastfeeding, collaborating with community organizations and others who promote and support breastfeeding, and advocating for policies that position breastfeeding as the norm for infant feeding. ADA also emphasizes its own role by providing up-to-date information to the public, encouraging empirical research, providing continuing education opportunities, providing cultural sensitivity and cultural competence training to dietetics professionals, and encouraging universities to review and update undergraduate and graduate training programs.

*J Urban Health. 2005 May 4; [Epub ahead of print]*

Increasing Breastfeeding Rates in New York City, 1980-2000.

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Office of Family Health, New York City Department of Health and Mental Hygiene, New York, New York, at the time of the research.

Our objective was to determine temporal patterns of breastfeeding among women delivering infants in New York City (NYC) and compare national breastfeeding trends. All hospitals in NYC with obstetric units were contacted in May and June 2000 to provide information on the method of infant feeding during the mother's admission for delivery. Feeding was categorized as "exclusive breastfeeding," "breast and formula," or "exclusive formula." The first two categories were further grouped into "any breastfeeding" in the analysis. Hospitals were classified as "public" and "private," and patients were classified by insurance type as "service" and "private." Data between public and private hospitals and service and private patients were compared. Breastfeeding trends over time were compared by using previous iterations of the same survey. Of 16,932 newborns, representing approximately 80.0% of all reported live births in the city during the study period, 5,305 (31.3%) were exclusively breastfed, 6,189 (36.6%) were fed a combination of breast milk and formula, and the remaining 5,438 (32.1%) were exclusively formula-fed. Infants born in private hospitals were 1.6 times more likely to be exclusively breastfed compared with infants discharged from public hospitals (33% vs. 21%, respectively). Similarly, private patients were more likely than service patients to exclusively breastfeed their infants (39.6% vs. 22.9%, respectively) and to use a combination of breast and formula (i.e., any breastfeeding) (73.6% vs. 62.0%, respectively). From 1980 to 2000, the proportion of exclusive breastfeeding increased from 25.0% to 31.0%, the percentage of combined feeding increased from 8.0% to 37.0%, and the percentage of any breastfeeding increased from 33.0% to 68.0%. NYC has more than doubled the rate of breastfeeding since 1980. However, there is much progress to be made, and continued efforts are vital to maintain current gains in breastfeeding, improve the rates further, and prolong the duration of breastfeeding.

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Factors associated with exclusive breastfeeding in Accra, Ghana.

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**OBJECTIVE::** To assess factors associated with exclusive breast-feeding (EBF) in Accra, Ghana. **DESIGN, SUBJECTS, SETTING::** Data on current and past infant feeding patterns, sociodemographic, biomedical and biocultural factors were collected using a cross-sectional design, from a sample of 376 women with infants 0-6 months, attending maternal and child health (MCH) clinics in Accra. EBF was defined in two ways: (a) based on a 24-h recall, and (b) based on a recall of liquids or foods given since birth. **RESULTS::** Although 99.7% of mothers were currently breastfeeding (BF), only half (51.6%) of them EBF their infants. About 98% of participants had heard about EBF, and 85.6% of them

planned to EBF on delivery. Based on 'since birth' EBF, planned EBF on delivery was associated with higher likelihood of EBF (OR=2.56; 95% CI, 1.06-6.17) and delivery at a hospital/polyclinic was associated with a two times higher likelihood of EBF (OR=1.96; 95% CI, 1.08-3.54). Women living in their own houses were more likely to EBF (OR=3.96; 95% CI, 1.02-15.49) than those living in rented accommodations and family houses. Those with a more positive attitude towards EBF were more likely to EBF (OR=2.0; 95% CI, 1.11-3.57) than their counterparts with more negative attitudes. The '24-h recall' EBF model yielded similar results. CONCLUSIONS:: In this population, EBF was associated with delivery at hospital/polyclinic, having secondary school education, intention to EBF prior to delivery, owning a home and having a positive attitude to EBF. SPONSORSHIP:: Funded by a University of Connecticut Research Foundation grant awarded to Dr Rafael Perez-Escamilla, and the LINKAGES program, Accra, Ghana. European Journal of Clinical Nutrition advance online publication, 4 May 2005; doi:10.1038/sj.ejcn.1602144.

*Nutr Rev.* 2005 Apr;63(4):103-10.

The validity and reliability of maternal recall of breastfeeding practice.

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In large epidemiologic studies, information on breastfeeding practice is often collected from maternal recall through interviews, but there is concern about the accuracy of the data, especially when mothers are asked to recall their practices from many years earlier. This review examines the validity and reliability of maternal recall of breastfeeding history using 11 studies published between 1966 and 2003 in English with a sample of 10 or more. Validity is the degree to which recall compares with a validation standard or reference, and reliability refers to the degree to which the breastfeeding practices obtained by recall are repeatable over time. The existing studies suggest that maternal recall is a valid and reliable estimate of breastfeeding initiation and duration, especially when the duration of breastfeeding is recalled after a short period (< or = 3 years). Validity and reliability of maternal recall for the age at introduction of food and fluids other than breast milk are less satisfactory. Further and more extensive studies on maternal recall of breastfeeding history and ways to improve such recall are warranted.

*Clin Exp Obstet Gynecol.* 2005;32(1):37-40.

Factors associated with initiation and duration of breastfeeding in Greece.

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AIM: Our aim was to study factors affecting the initiation, progress and duration of breastfeeding in Greece. METHODS: We studied 938 infants born in 2001 in 17 maternity hospitals in Greece. RESULTS: The percentage of breastfeeding infants was 85.5%. The actual progress of breastfeeding was different from the one that the mothers intended to follow. Although the

majority of women claimed in the beginning that they would breastfeed mainly for four to six months (23.2%) and 12-14 months (23.1%), the majority had discontinued breastfeeding by the fourth month (58.5%) and only 7.3% breastfed for more than one year. The initiation time of breastfeeding was positively influenced by natural delivery ( $p = 0$ ) and pleasant delivery ( $p = 0.397$ ). Smoking was negatively associated with the duration of breastfeeding ( $p = 0$ ) and the infants of smokers breastfed mainly for one to two months (38.7%). Exclusive breastfeeding in the maternity hospital was positively associated with the mother's intention to refuse to use a mixed diet after being discharged ( $p = 0$ ). CONCLUSION: Greater support is needed so that women can implement their original intentions concerning the progress of breastfeeding.

*Int J Nurs Stud. 2005 May;42(4):409-13.*

Evaluation of the breastfeeding intervention program in a Korean community health center.

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A new model for the breastfeeding intervention program was implemented in a Korean community health center and the effectiveness of the program was evaluated. Thirty health care personnel from 29 smaller community health centers and 23 breastfeeding helpers were trained in four workshops. They then gave information on breastfeeding to pregnant and lactating women, living in each community in groups or individually. The breastfeeding rate after intervention has significantly increased at 1 week and 9 months of age. These results indicate that the community-based breastfeeding intervention program by training both the health care professionals and peer helpers is effective in promoting breastfeeding.

*Cochrane Database Syst Rev. 2005 Apr 18;(2):CD001688.*

Interventions for promoting the initiation of breastfeeding.

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**BACKGROUND:** Despite the widely documented health benefits of breastfeeding, initiation rates remain relatively low in many high-income countries, particularly among women in lower income groups. **OBJECTIVES:** To evaluate the effectiveness of interventions which aim to encourage women to breastfeed in terms of changes in the number of women who start to breastfeed. **SEARCH STRATEGY:** We searched the Cochrane Pregnancy and Childbirth Group trials register (30 May 2004), the Cochrane Central Register of Controlled Trials (The Cochrane Library, Issue 1, 2003) and the following databases from inception to October 2002: MEDLINE, CINAHL, ERIC, Applied Social Sciences, PsychLIT, EMBASE, British Nursing Index, BIDS, EPI-centre. We also searched the following in October 2002 for 'grey literature': SIGLE, DHSS Data, and Dissertation Abstracts. We handsearched the Journal of Human Lactation, Health Promotion International and Health Education Quarterly from inception to October 1998. We scanned reference lists of all articles obtained. **SELECTION CRITERIA:** Randomised controlled trials, with or without blinding, of any breastfeeding promotion

intervention in any population group except women and infants with a specific health problem. DATA COLLECTION AND ANALYSIS: One review author independently extracted data and assessed trial quality for checking by a second author. We contacted investigators to obtain missing information. MAIN RESULTS: Seven trials involving 1388 women were included. Five trials involving 582 women on low incomes in the USA showed breastfeeding education had a significant effect on increasing initiation rates compared to routine care (relative risk (RR) 1.53, 95% confidence interval (CI) 1.25 to 1.88). AUTHORS' CONCLUSIONS: Evidence from this review shows that the forms of breastfeeding education evaluated were effective at increasing breastfeeding initiation rates among women on low incomes in the USA.

*Acta Paediatr. 2004 Dec;93(12):1640-5.*

Comment in: *Acta Paediatr. 2004 Dec;93(12):1560-2.*

Mother-infant skin-to-skin contact after delivery results in early recognition of own mother's milk odour.

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AIM: To determine the effects of mother-infant skin-to-skin contact immediately after birth on infant recognition of their own mother's milk odour and breastfeeding duration until 1 y of age. METHODS: Sixty healthy, full-term neonates were randomly assigned to group A with skin-to-skin contact and group B without. One and 4 d after birth, infant responses to the following odour stimuli were observed: own mother's milk, another mother's milk, formula, orange juice and distilled water. Infant facial action was videotaped and the frequency of mouthing movements was evaluated for each stimulus. Nutritional assessment, focused particularly on breastfeeding, was performed every 3 mo on participating infants. Statistical analysis comparing the frequency of mouthing movements with the aforementioned five different odour exposures was performed by ANOVA with Fisher's PLSD. Kaplan-Meier analysis with a log-rank test was used to compare breastfeeding rates between groups. RESULTS: Infants in both groups responded differently to mother's milk odour (either their own or another mother's milk) compared to the other stimuli on days 1 and 4. However, infants in group A demonstrated a larger difference in mouthing movements between their own and another mother's milk odour at 4 d of age (2.6 +/- 1.6) compared to infants in group B (0.9 +/- 2.0,  $p = 0.01$ ). Infants in group A were breastfed an average of 1.9 mo longer than the others. CONCLUSION: Our study provides evidence that mother-infant skin-to-skin contact for more than 50 min immediately after birth results in enhanced infant recognition of their own mother's milk odour and longer breastfeeding duration.

*Acta Paediatr. 2004 Dec;93(12):1560-2.*

Comment on:

*Acta Paediatr. 2004 Dec;93(12):1640-5.*

The biological significance of skin-to-skin contact and maternal odours.

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Infant-mother bodily contact is believed to be the species-typical pattern of immediate postpartum child care. Mothers and newborns engage in mutually beneficial interactions. Maternal odours stimulate breastfeeding activity and are implicated in individual recognition. CONCLUSION: Skin-to-skin contact and exposure to maternal odours facilitate infants' adaptation to the early postnatal environment.

*J Pediatr Nurs. 2005 Feb;20(1):53-9.*

Breastfeeding initiation and duration in Lebanon: are the hospitals "mother friendly"?

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Eight hundred and thirty mothers and their children aged 1 to 5 years were studied to identify the determinants of breastfeeding initiation and perseverance in relation to hospital policies. Only 18.3% of the mothers initiated breastfeeding within half an hour after birth. Mothers whose baby was brought to them every 3 hours or less were 2.5 times and mothers whose infants were brought to them for night feedings were 3 times more likely to initiate breastfeeding a few hours after birth. Mother's occupational status and whether she was breastfed were significantly associated with breastfeeding duration.

*Soc Work Health Care. 2004;40(1):15-31.*

An evaluation of a breast-feeding education intervention among Spanish-speaking families.

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This study assessed the impact of an educational breast-feeding intervention on the knowledge, attitudes and perceived ability to access breast-feeding resources among Spanish-speaking Latino families making breast-feeding decisions. Conducted in cooperation with the local office of The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), this university-based, multidisciplinary outreach and research project was held in a semirural part of Utah, where Latinos constitute the fastest and largest growing group of the population and have the lowest breast-feeding duration rates. The results suggested that teaching a lactation class in Spanish to Latino women significantly increased their willingness to breast-feed and empowered them by increasing their belief that they could breast-feed even if they work or attend school, that they would not have a problem with insufficient milk, and that they would not need to limit their diet to breast-feed. Additionally, the study indicated that Latino women are more likely to access health care services from agencies providing services in Spanish, regardless of their secondary fluency in English.

*J Dev Behav Pediatr. 2005 Apr;26(2):86-92.*

The calming effect of a familiar odor on full-term newborns.

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We assessed the effectiveness of an odor (familiar or unfamiliar) in soothing healthy full-term newborns undergoing a routine heel stick. Forty-four breast-fed newborns were randomly assigned to one of four groups: Before the heel stick, Group 1 was naturally familiarized with their mother's milk odor, Group 2 was familiarized with a vanilla smell, and Groups 3 and 4 did not receive any familiarization. During and after the heel stick, Group 1 was presented with their mother's milk odor, Group 2 was presented with the familiar vanilla, Group 3 was presented with an unfamiliar odor, and Group 4 was a control group. Infants' crying, grimacing, and head movements were analyzed before, during, and after the heel stick. Results show that infants who smelled a familiar odor (their mother's milk or vanilla) cried and grimaced significantly less during the recovery phase compared with the heel stick phase. Infants who were presented with an unfamiliar odor or no odor showed no significant changes during recovery. Moreover, infants who smelled their mother's milk exhibited significantly less motor agitation during the heel stick compared with the other groups. These findings indicate that smelling a familiar odor reduces agitation during the heel stick and diminishes distress after the procedure.

*Health Promot Int. 2005 Apr 6; [Epub ahead of print]*

Breastfeeding prevalence and practices among Singaporean Chinese, Malay and Indian mothers.

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**SUMMARY** The National Breastfeeding Survey 2001 was the first comprehensive study on breastfeeding conducted on a national level in Singapore. It aimed to establish the prevalence of breastfeeding among Chinese, Malay and Indian mothers and to identify factors influencing breastfeeding. A total of 2098 mothers were interviewed in this two-phase study, with the first interview conducted 2 months after delivery and the second interview 6 months after birth among mothers who were still breastfeeding at 2 months. Frequency distributions of breastfeeding prevalence and types of breastfeeding practices at different time intervals (from birth to 6 months) were produced. Multivariate logistic regression was carried out to construct a model with predictive information on factors which influence continued breastfeeding till 2 months and 6 months after delivery respectively. The study found that about 94.5% of the mothers attempted breastfeeding. At 1 month, 71.6% were still breastfeeding, 49.6% continued to do so at 2 months, and 29.8% persisted till 4 months. By 6 months, the breastfeeding prevalence rate fell to 21.1%. The results of this study show higher breastfeeding prevalence rates compared to past studies in Singapore. Despite this, exclusive breastfeeding is still not a common practice. Various factors were found to be significant in influencing mothers' decision to

breastfeed. Factors such as ethnicity, age, educational attainment, religion and baby's sex are non-modifiable in the short term or at an individual level. However, factors such as awareness of breastfeeding benefits, advice from health professionals and previous breastfeeding experience are potentially modifiable. Efforts aimed at promoting breastfeeding in Singapore need to take these modifiable factors into consideration so as to better tailor health promotion efforts on breastfeeding to women.

*Indian J Pediatr.* 2005 Mar;72(3):209-12.

Breastfeeding and pacifier use in Brazil.

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**OBJECTIVE:** To determine the relationship between pacifier use and the duration of exclusive breast-feeding in the first six months of age, among poor children with unfavourable birth weight, from an underdeveloped region in Brazil. **METHOD:** Prospective cohort study with infants followed from birth to 6 months of age. Healthy children born with unfavourable birth weight (< 3,000), being exclusively breastfed, were selected from 8 maternity hospitals in the city of Fortaleza (Brazil) between November 1996 and April 1997. Two main outcome measures were used: (i) time to stop exclusive breast-feeding at the 1st and (ii) at the 6th month of life. Main exposures were pacifier use at 1st and 6th month of age. Data were collected at maternity hospitals and during home interviews, using structured questionnaires, by trained data collectors unaware of the study aims, and analyzed using survival analysis and the Cox Proportional Hazard Model. **RESULTS:** 500 children were enrolled and 13% were lost to follow up at the 1st month. Most of the families had a monthly income less than five times the minimum wage. One third of the mothers were adolescents, one fifth were working outside the home by the 6th month and most attended prenatal care visits. Approximately 60% of the children were using pacifiers by the 1st month. The average number of days for exclusive breast-feeding for pacifier use by the 6th month was 125.3 compared to 87.0 among non-users ( $p=0.0001$ ). Children using pacifiers were 1.9 more likely to have stopped exclusive breastfeeding by the 6th month compared to non-users, even after controlling potential confounders. **CONCLUSION:** Pacifier use was associated with the early termination of breast-feeding in Brazil, among poor children with unfavourable birth weight, living in an underdeveloped area. As a possible marker of early weaning, pacifier use can help health workers identify those mothers in need of extended counselling to reinforce breast-feeding practices.

*J Adv Nurs.* 2005 May;50(3):272-82.

Initiation and continuation of breastfeeding: theory of planned behaviour.

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**AIMS:** This paper reports a study investigating new mothers' subjective norms in relation to both breast- and bottle-feeding. The influence of norms on women's infant feeding decisions and the relative influence of social referents at

varying degrees of social distance were assessed. **BACKGROUND:** Increasing breastfeeding initiation and continuation rates is a key challenge for health educators. The perceived influence of other people's views (subjective norms), including the views of women's partners and health care professionals, is an important predictor of infant feeding behaviour. **METHODS:** Semi-structured questionnaires were administered to 203 new mothers in central and northern Scotland and followed-up by postal questionnaire at 6 weeks. Infant feeding intentions, feeding behaviour at birth and follow-up, behavioural beliefs and subjective norms for both breastfeeding and bottle-feeding were assessed. The data were collected in 1998-1999. **RESULTS:** Subjective norms were important determinants of initiation and continuation of breastfeeding for breast- and bottlefeeders. Breastfeeders rated close social referents as more in favour of bottle-feeding and more against breastfeeding at follow-up, whereas bottlefeeders' ratings did not change. Partner's and nurses'/midwives' views were an important influence at baseline and follow-up. Breastfeeding 'continuers' perceived their partners as more pro-breastfeeding at 6 weeks. Discontinuers perceived more overall social pressure to bottle-feed. However, sampling limitations may have led to over-representation of the views of breastfeeders at baseline and follow-up. **CONCLUSIONS:** Nurses and midwives have a crucial role in communicating positive views on breastfeeding to new mothers at different time points. Future interventions to promote breastfeeding could adopt a broad social approach, encouraging positive norms for existing and potential mothers and fathers, families and people in general.

*Med Hist.* 2005 Apr;49(2):179-96.

Breastfeeding and health professionals in Britain, New Zealand and the United States, 1900--1970.

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(no abstract)

*J Hum Lact.* 2005 May;21(2):184-5.

Manual expression of breast milk.

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(no abstract)

*J Am Diet Assoc.* 2005 May;105(5):716-7.

Promoting breastfeeding to mothers in the special supplemental nutrition program for women, infants, and children.

Digiorgio LF.

(no abstract)

*Med Educ.* 2005 May;39(5):515.

A successful format for a breastfeeding advocacy skills workshop.

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(no abstract)

*J R Soc Health.* 2005 Mar;125(2):62-3.

Breastfeeding for longer: what works?

Renfrew MJ, Dyson L, Wallace LM, D'Souza L, McCormick F, Spiby H.

(no abstract)

*Med Health R I.* 2005 Feb;88(2):48-50.

First steps: a program for medical students to teach high school students about breastfeeding.

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(no abstract)

## **11. Toxicology**

*Cancer Lett.* 2005 Jun 16;224(1):23-30. Epub 2004 Dec 8.

Equivocal impact of transplacental and lactational exposure to a food-derived carcinogen, 2-amino-1-methyl-6-phenylimidazo[4,5-b]pyridine, on prostate and colon lesion development in F344 rats.

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The carcinogenic potential of maternal dietary exposure to 2-amino-1-methyl-6-phenylimidazo[4,5-b]pyridine (PhIP) was investigated with the focus on the prostate and mammary glands and colons of the offspring. PhIP-DNA adducts were immunohistochemically detected in all three organs of 3-week-old animals after dams had received 200ppm PhIP in the diet from 4 weeks before mating to weaning. The sites were essentially the same as in adult rats, suggesting that the distribution of bioactivating enzymes for PhIP do not differ greatly. Ki-67 labeling indices were increased only in the colons of the female offspring at 3-weeks of age. Development of preneoplastic and neoplastic lesions in the prostate and colon was not enhanced when the rats were maintained on PhIP-free diet until 63 weeks of age, except for significant increase in multiplicity of aberrant crypt foci in the females. The present findings

indicate that PhIP exposure via placenta and breast milk may be important but that high doses and long periods may be necessary for tumor development.

*Environ Int.* 2005 Jul;31(5):643-9. Epub 2005 Jan 6.

Residue of pentachlorophenol in freshwater sediments and human breast milk collected from the Pearl River Delta, China.

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Pentachlorophenol (PCP) was investigated in freshwater sediments and human breast milk collected from the Pearl River Delta, China. The average level of PCP in river sediments was 7.93 ng/g based on dry weight, ranging from 1.44 to 34.4 ng/g. As to the sediments from fishponds, samples from Zhongshan had the highest PCP levels (37.5 ng/g on average), followed by Dongguan (21.1 ng/g on average) and the least in Shenzhen (3.69 ng/g on average) and Shunde (2.20 ng/g on average). Negative relationship was obtained between the PCP level and pH value in sediment ( $r=0.553$ ,  $n=13$ ,  $p<0.05$ ), while positive relationship was found between the PCP levels and the total organic matter (TOM) levels in sediment ( $r=0.700$ ,  $n=17$ ,  $p<0.01$ ). These results indicated that pH and TOM played important roles during the process of PCP settling down to the sediment. PCP was also detected in human breast milk with an average of 2.15 ng/g. The PCP concentration increased with the age increasing of donors. The estimated PCP body burden for mother, daily and yearly PCP intake of infants ranged from 0.16 to 4.17 mg/person, from 0.26 to 10.23  $\mu\text{g}/\text{infant}\cdot\text{day}$  and from 0.09 to 3.73  $\text{mg}/\text{infant}\cdot\text{year}$ , respectively.

*Anal Bioanal Chem.* 2005 May;382(1):164-72. Epub 2005 Apr 29.

Determination of pesticides and some metabolites in different kinds of milk by solid-phase microextraction and low-pressure gas chromatography-tandem mass spectrometry.

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A new analytical method is proposed to determine more than 40 multiclass pesticides in different kinds of processed (whole, skimmed and powdered) and unprocessed (goat and human) milk samples using solid-phase microextraction (SPME). A comparative study between headspace (HS) and direct immersion (DI) was carried out. The effect of milk dilution and the use of acid to reduce the influence of the matrix in DI-SPME mode were also evaluated. DI of the SPME fiber into previously diluted and acidified milk samples achieved the best sensitivity results. Pesticides were determined using low-pressure gas chromatography-tandem mass spectrometry (LP-GC-MS/MS). Both of the selected techniques have been shown to be effective at reduce fat interference and can determine analytes present at very low concentrations (limits of quantification between 0.02 and 1.00  $\mu\text{g L}^{-1}$ ). Performance characteristics such as linearity, recovery, precision, and lower limits, together with an estimation of the measurement uncertainty using validation data, are presented for each pesticide.

All of the pesticides presented recovery rates of between 81 and 110% and precision values lower than 12% (expressed as the relative standard deviation). The overall uncertainty of the method was estimated at three different concentrations (10, 25 and 50 µg L<sup>-1</sup>) and was lower than 25.5% in all cases. The proposed analytical methodology was applied to the analysis of target pesticides in 35 samples: 15 commercial, 3 human and 17 goat milk samples. The metabolite p,p'-DDE was the compound most frequently found in both the breast and goat milk samples, at concentration levels <20 µg L<sup>-1</sup>. However, pesticide residues were not found in any of the other 15 commercial milk samples (skimmed, powdered and whole milk) analyzed.

*J Hazard Mater.* 2005 May 20;121(1-3):1-10.

Levels of polychlorinated dibenzo-p-dioxins and dibenzofurans in primipara breast milk from Taiwan: estimation of dioxins and furans intake for breastfed infants.

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Postnatal exposure to dioxins in breastfed infants occurs mainly during breast-feeding. The exposure to a substantial amount of endocrine disruptors in the early days of life may cause long-term health effects. Test subjects were healthy and primiparous mothers with a mean age of 28 (S.D.=3.8) in 2001. The PCDD/F congeners were analyzed in the breast milk using gas chromatograph/high resolution mass spectrometry. The mean level of PCDD/Fs was 7.4pg-WHO-TEQ/g lipid, which is significantly lower than the level found in individuals from other countries. The total PCDD WHO-TEQ levels in breast milk had a significant positive association with maternal age and a slightly negative association with perinatal BMI (body mass index of the period before and after the delivery). The estimated daily intake of 10.5pg-WHO-TEQ/kg/day from individual breast milk was predicted for a breastfed infant at 6 months of age with proper assumption of 8kg body weight, 854g milk per day of consumption, 95% of dioxin absorption rate, and linear decline of dioxin during lactation. Based on the lower WHO-TEQ levels in the breast milk, breast-feeding should still be encouraged and continued in Taiwan.

*Environ Sci Technol.* 2005 Apr 1;39(7):2011-7.

Perchlorate and iodide in dairy and breast milk.

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Perchlorate inhibits iodide uptake and may impair thyroid and neurodevelopment in infants. Recently, we unambiguously identified the presence of perchlorate in all seven brands of dairy milk randomly purchased from grocery stores in Lubbock, TX. How widespread is perchlorate in milk? Perchlorate in 47 dairy milk samples from 11 states and in 36 human milk samples from 18 states were measured. Iodide was also measured in a number of the samples. Perchlorate was

detectable in 81 of 82 samples. The dairy and breast milk means were, respectively, 2.0 and 10.5 microg/L with the corresponding maximum values of 11 and 92 microg/L. Perchlorate is present in virtually all milk samples, the average concentration in breast milk is five times higher than in dairy milk. Although the number of available measurements are few at this point, for breast milk samples with a perchlorate content greater than 10 microg/L, the iodide content is linearly correlated with the inverse of the perchlorate concentration with a  $r^2$  of  $>0.9$  ( $n = 6$ ). The presence of perchlorate in the milk lowers the iodide content and may impair thyroid development in infants. On the basis of limited available data, iodide levels in breast milk may be significantly lower than it was two decades ago. Recommended iodine intake by pregnant and lactating women may need to be revised upward.

*J Nutr.* 2005 May;135(5):1027-33.

Lead Exposure and (n-3) Fatty Acid Deficiency during Rat Neonatal Development Alter Liver, Plasma, and Brain Polyunsaturated Fatty Acid Composition.

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Lead (Pb) exposure has been reported to increase arachidonic (AA) and docosahexaenoic (DHA) acids. To determine whether Pb effects on fatty acid composition are influenced by dietary (n-3) fatty acid restriction, weanling female rats were fed either an (n-3)-adequate or -deficient diet to maturity and mated. At parturition, dams in each group were subdivided to receive either 0.2% Pb or Na-acetate in their drinking water during lactation only. Pups were analyzed for fatty acid content in liver, plasma, and brain at either 3 or 11 wk. The (n-3)-deficient diets markedly decreased total (n-3) fatty acids, and increased total (n-6) fatty acids including both AA and docosapentaenoic (n-6) in each compartment ( $P < 0.05$ ). The main effects of Pb were in the livers of weanling rats where there was a 56% loss in total fatty acid concentration concurrent with increased relative percentages of AA and DHA. Thus, because there was a greater percentage of liver nonessential fatty acid lost relative to the essential fatty acids (EFA), there was no net change in AA concentration. There was a diet x Pb interaction for a decrease in liver DHA concentration evident only in the (n-3)-adequate group. There were also diet x Pb interactions in plasma at 11 wk and in brain at 3 wk. These data are consistent with the hypothesis of a Pb-induced increase in fatty acid catabolism, perhaps as a source of energy.

*Anal Bioanal Chem.* 2005 Apr 29; [Epub ahead of print]

Determination of pesticides and some metabolites in different kinds of milk by solid-phase microextraction and low-pressure gas chromatography-tandem mass spectrometry.

Gonzalez-Rodriguez MJ, Arrebola Liebanas FJ, Garrido Frenich A, Martinez Vidal JL, Sanchez Lopez FJ.

Department of Analytical Chemistry, University of Almeria, 04120, Almeria, Spain, agarrido@ual.es.

A new analytical method is proposed to determine more than 40 multiclass pesticides in different kinds of processed (whole, skimmed and powdered) and

unprocessed (goat and human) milk samples using solid-phase microextraction (SPME). A comparative study between headspace (HS) and direct immersion (DI) was carried out. The effect of milk dilution and the use of acid to reduce the influence of the matrix in DI-SPME mode were also evaluated. DI of the SPME fiber into previously diluted and acidified milk samples achieved the best sensitivity results. Pesticides were determined using low-pressure gas chromatography-tandem mass spectrometry (LP-GC-MS/MS). Both of the selected techniques have been shown to be effective at reduce fat interference and can determine analytes present at very low concentrations (limits of quantification between 0.02 and 1.00  $\mu\text{g L}^{-1}$ ). Performance characteristics such as linearity, recovery, precision, and lower limits, together with an estimation of the measurement uncertainty using validation data, are presented for each pesticide. All of the pesticides presented recovery rates of between 81 and 110% and precision values lower than 12% (expressed as the relative standard deviation). The overall uncertainty of the method was estimated at three different concentrations (10, 25 and 50  $\mu\text{g L}^{-1}$ ) and was lower than 25.5% in all cases. The proposed analytical methodology was applied to the analysis of target pesticides in 35 samples: 15 commercial, 3 human and 17 goat milk samples. The metabolite p,p'-DDE was the compound most frequently found in both the breast and goat milk samples, at concentration levels  $<20 \mu\text{g L}^{-1}$ . However, pesticide residues were not found in any of the other 15 commercial milk samples (skimmed, powdered and whole milk) analyzed.

*Environ Res.* 2005 Jun;98(2):233-9.

Endosulfan and its metabolites in fertile women, placenta, cord blood, and human milk.

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Although industrialized nations have restricted or banned many organochlorine pesticides, some of these chemicals (e.g., endosulfans) are still used, on the assumption that they pose little threat to the environment, wildlife, or human health. According to available information, Spain is the main consumer of endosulfans within the European Union, accounting for almost half of the total consumption. Reports on human exposure in Southern Spain to persistent bioaccumulable organochlorine pesticides have indicated considerable exposure to endosulfans. The present study investigated the presence of endosulfan I, endosulfan II, and endosulfan metabolites in fatty and non-fatty tissues and fluids from women of reproductive age and children in Southern Spain. The highest concentration of commercial endosulfan I and endosulfan II was found in adipose tissue, with a mean value (I+II) of 17.72 ng/g lipid, followed by human milk, with a mean value (I+II) of 11.38 ng/mL milk. These findings support the lipophilicity of these chemicals and their elimination by milk secretion. The concentration in the placenta homogenate was similar to that in the blood from the umbilical cord (7.74 and 6.11 ng/mL, respectively) and reflected their lower fat content. Endosulfan diol and endosulfan sulfate were more frequently found in placenta homogenate, with a mean concentration of 12.56 and 3.57 ng/mL, respectively, and in blood from umbilical cord, at 13.23 and 2.82 ng/mL, respectively. Therefore, women of reproductive age in Southern Spain appear to be currently exposed to endosulfans. Because these chemicals can be mobilized during pregnancy and lactation, further research is warranted to investigate the health consequence in children resulting from exposure to chemicals suspected of

immunotoxic, neurotoxic, or endocrine-disrupting effects.

*Brain Res Bull.* 2005 Apr 15;65(3):241-7. Epub 2004 Dec 18.

Activation of brain estrogen receptors in mice lactating from mothers exposed to DDT.

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The insecticide dichlorodiphenyltrichloroethane (DDT) interferes with physiological endocrine processes modulating estrogens receptor activity. Most of the data describing the DDT mechanism of action have been collected in vitro or in reproductive tissues in vivo. Here we use a new transgenic mouse model to investigate the DDT effects on estrogens receptor activation in vivo in non-reproductive tissues. In particular, we demonstrate that DDT is able to activate estrogen receptors in the brain and the liver of adult mice after acute administration, and it is active in lactating mice when accumulated in the mother's milk. Furthermore, we demonstrate that the acute administration of DDT activates estrogen receptors with a different kinetics with respect to 17beta-estradiol. Experiments with a breast cancer cell line engineered to express luciferase under the transcriptional control of activated estrogen receptors reveal that the microsomal metabolism of DDT is required for its full activity on estrogen receptors. Taken together these data lead to hypothesize that the delayed DDT time course on estrogen receptor activation in vivo might be due to a necessary step of metabolism of the compound.

*Food Chem Toxicol.* 2005 Jun;43(6):951-9.

The acrylamide intake via some common baby food for children in Sweden during their first year of life--an improved method for analysis of acrylamide.

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The acrylamide levels in breast milk and the main categories of Swedish baby food products, i.e. breast milk substitute (infant formula), gruel, porridge and canned baby food, have been analysed. Furthermore, the acrylamide intake from these products by children up to one year of age has been estimated. Other kind of foods e.g. biscuits, are not included. Because of the expected low concentrations of acrylamide, a new sample extraction method for detection by liquid chromatography, tandem mass spectrometry, was developed and validated. The lower limit of quantification was 0.5 microg kg(-1) for liquid samples and 2 microg kg(-1) for other samples. The average levels found for gruel, porridge and canned baby food, all ready to eat, were 1.4, 26, and 7.8 microg/kg respectively. We found great variations in the acrylamide levels between and in different food categories, <0.5-64 microg/kg. For all breast milk samples except one the acrylamide level was below the limit of quantification (0.5 microg/kg). In three out of eight analysed samples of breast milk substitute, the acrylamide content was verified and possible to quantify. Assuming an acrylamide level of

0.25 microg/kg in breast milk, the mean acrylamide intake during the first six months for children who were exclusively breast-fed was estimated to be 0.04 microg/kg b.w./day. The mean acrylamide intake from breast milk and commercially made baby food during the whole first year varies due to the length of breast-feeding and the choice of baby food. The intake level range was estimated to be 0.04-1.2 microg/kg b.w./day. The mean intake between seven and twelve months of age was estimated to be about 0.5 microg/kg b.w./day.

*J Nutr Sci Vitaminol (Tokyo). 2004 Dec;50(6):404-9.*

Determination of molybdenum in foods and human milk, and an estimate of average molybdenum intake in the Japanese population.

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To evaluate the molybdenum (Mo) status in the Japanese population, the Mo content in various foods and human milk was determined using inductively coupled plasma mass spectrometry (ICP-MS) and the average Mo intake was estimated. The difference in Mo content among food groups was marked; Mo levels in several plant foods such as cereals were more than 0.5 g/g while those in most animal foods were less than 0.1 microg/g. In particular, Mo contents in several samples of seeds and pulses were more than mixed 1 microg/g. The variation in Mo contents in each type of cereal was also conspicuous. Based on the present quantification of Mo in foods and the recent National Nutrition Survey in Japan, the average Mo intake of the Japanese population was estimated as 225 microg/d/capita. The principal Mo source in the Japanese diet was rice followed by soybean products, and approximately 90% of the Mo intake was derived from plant foods. Seventeen human milk samples were collected from 3 healthy mothers once or twice a month from 96 to 327 d after delivery. The median and range of Mo in human milk samples were 4.5 ng/mL and 2.0 to 8.8 ng/mL, respectively. Mo levels in Japanese formula milk were 2 to 3 ng/mL. Based on the Mo levels in human milk and formula milk, the Mo intake of Japanese infants was estimated to be 2 to 4 microg/d/capita.

*J Hum Lact. 2005 May;21(2):115-7.*

Perchlorate in human milk: separating the science from sensationalism.

Heinig MJ.

(no abstract)

*Bull Environ Contam Toxicol. 2005 Feb;74(2):407-14.*

DDT in human milk from Chiang Mai mothers: a public health perspective on infants' exposure.

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(no abstract)

## 12. Drug excretion in human milk

*J Psychiatr Pract.* 2005 May;11(3):177-91.

Psychotropic drugs in pregnancy and lactation.

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The management of psychotropic medications during pregnancy and lactation involves a difficult and complex decision for both patient and provider, particularly due to the many unknown effects medication may have on the infant. Available studies concerning use of psychotropic medications in pregnant and lactating women are limited and there are no universal guidelines. This article reviews the literature on the use of psychotropic drugs, including antidepressants, mood stabilizers, antipsychotics, and benzodiazepines, in pregnant and breast-feeding women and presents relevant data on teratogenic effects, neonatal toxicity, perinatal syndromes, and neurobehavioral sequelae.

*Epilepsia.* 2005 May;46(5):775-7.

Levetiracetam concentrations in serum and in breast milk at birth and during lactation.

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**PURPOSE:** To study the pharmacokinetics of levetiracetam (LEV) at birth, during lactation, and in the nursed infant. **METHODS:** Eight consecutive breast-feeding women with epilepsy treated with LEV twice daily and their infants were studied. **RESULTS:** The mean umbilical cord serum/maternal serum ratio was 1.14 (range, 0.97-1.45) (n = 4). The mean milk/maternal serum concentration ratio was 1.00 (range, 0.76-1.33) at 3 to 5 days after delivery (n = 7). At sampling 2 weeks to 10 months after delivery (n = 5), it was similar (range, 0.85-1.38). At 3 to 5 days after delivery, the infants had very low LEV serum concentrations (<10-15 microM), a finding that persisted during continued breast-feeding. No malformations were detected, and in none of the infants did signs of adverse effects develop. **CONCLUSIONS:** Our data indicate an extensive transfer of LEV from mother to fetus and into breast milk. However, breast-fed infants had very low LEV serum concentrations, suggesting a rapid elimination of LEV.

*Antimicrob Agents Chemother.* 2005 May;49(5):2093-4.

Pharmacokinetics of tenofovir in breast milk of lactating rhesus macaques.

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To study tenofovir transfer into milk, two lactating macaques were given a subcutaneous dose of tenofovir (30 mg/kg of body weight). Peak concentrations and area under the curve values of tenofovir in milk were approximately 3 and approximately 20% of those detected in serum, respectively.

*Pharmacotherapy*. 2005 Mar;25(3):411-25.

The use of tricyclic antidepressants and selective serotonin reuptake inhibitors in women who are breastfeeding.

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Postpartum depression is a well-recognized psychiatric condition that has gained increased attention over the past decade due to several nationally publicized tragedies. Medical management of this condition in women who are breastfeeding provides a unique challenge to health care professionals who may seek to maintain a fine balance between limiting the infant's exposure to hormone-altering drugs and maintaining the benefits of breastfeeding. No controlled trials have examined antidepressant therapy in nursing women; however, numerous case reports and case series have been published. Relatively few serious adverse effects have been reported. Although tricyclic antidepressants have been the treatment of choice in the past, selective serotonin reuptake inhibitors are gaining popularity due to their superior safety profiles. Of all the agents reviewed in the literature, sertraline was the most prescribed, and no adverse effects were reported. Therefore, this agent would be a good first choice for treatment-naïve women. For treatment of postpartum depression in women with a history of successfully treated depression, the most practical approach may be to continue therapy with the previously effective agent. Treatment should be maintained at the lowest effective dosage to minimize infant exposure. Both mother and child should be closely monitored; in addition, collaboration between the prescribing physician and the child's pediatrician is essential.

*J Psychopharmacol*. 2005 Sep;19(3):317-8.

Using guidelines in real clinical situations: clozapine and breast feeding in bipolar disorder.

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(no abstract)

### **13. Other Topics**

*Southeast Asian J Trop Med Public Health*. 2003;34 Suppl 3:212-4.

Dietary management of galactosemia.

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Galactosemia is detected by newborn screening in New South Wales and managed by the metabolic team at the Children's Hospital at Westmead. Infants with the Duarte variant are not treated. Management is based on the Handbook for Galactosemia prepared in 1998. This handbook provides information for the family on the dietary management, inheritance and ovarian function. The major dietary sources of galactose are milk and milk products. Breastfeeding must be ceased and replaced with a soy formula. Once solid foods are commenced certain foods should be avoided. Other foods, which may contain some free galactose are recommended in limited quantities only. There is no restriction on other fruits and vegetables. An ongoing issue with dietary management is adequate nutrient intake, particularly of calcium. Intake of milk substitutes and calcium supplements is often inadequate.

*J Dairy Sci.* 2005 Jun;88(6):2065-71.

Developmental gene expression of lactoferrin and effect of dietary iron on gene regulation of lactoferrin in mouse mammary gland.

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This study evaluated the developmental gene expression of lactoferrin (LF) and the effect of supplementary iron on gene expression of LF in the mammary gland of mice using semi-quantitative reverse transcription-polymerase chain reaction (RT-PCR) analysis. In experiment 1, a total of 12 female mice were used to determine the effect of different lactating stages on mRNA expression of LF. The Institute of Cancer Research mice were divided into 4 groups; each group of 3 mice was tested on d 1, 9, 17, and 25 of lactation. In experiment 2, 6 groups of mice (total of 24 female mice at d 12 after mating) were fed purified diets (without iron or supplement iron) and were assigned to 2 treatments (control and treatment). The experimental feeding period lasted 35 d. During the feeding experiment, 6 mice (3 animals in each group) were chosen on d 1, 9, 17, and 25 of lactation to determine the effect of iron on LF mRNA expression of mice at different stages of lactation. The results of experiment 1 showed that LF mRNA had strong expression on d 1 of lactation, decreased gradually on d 9 and 17 of lactation, and then increased again markedly on d 25 of lactation. These results imply that the expression of LF in the mammary gland at different lactating stages is consistent with the changes in LF concentrations in milk. Iron significantly increased LF mRNA expression on d 1 and 25 of lactation. Iron did not statistically increase LF gene expression on d 9 and 17 of lactation. These findings raised the possibility that iron supplementation may play a role in regulation of LF levels in vivo.

*J Obstet Gynecol Neonatal Nurs.* 2005 May-Jun;34(3):335-41.

Neurobehavioral functioning and breastfeeding behavior in the newborn.

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**OBJECTIVE:** To determine whether central nervous system functioning has an effect on the normal, term infant's ability to breastfeed in the first day following birth. **DESIGN:** Breastfeeding behaviors and neurobehaviors were evaluated at birth and at 24 hrs of age in two groups of neonates. One group of neonates was born to mothers who received epidural analgesia during labor, and one group was born to mothers who received no pain medication. Breastfeeding behavior was evaluated using the Preterm Infant Breastfeeding Behavior Scale, and the infant's neurobehaviors were evaluated using the Neurologic and Adaptive Capacity Score. **PARTICIPANTS:** Fifty-six breastfeeding mother-newborn dyads. All mothers were healthy multiparae who gave birth vaginally to normal, full-term, healthy newborns. **MAIN OUTCOME MEASURES:** Newborns were observed for rooting, latch-on, sucking, swallowing, activity state, and neurobehavior. **Result:** Analysis of the data indicated that the higher the infant scored in relation to neurobehavioral functioning, the higher the infant scored on breast-feeding behaviors. **CONCLUSION:** When determining physiologically what is important for the infant to successfully latch on and feed, it appears that an intact and functioning central nervous system may be one of the crucial elements.

*J Hum Lact.* 2005 May;21(2):131-7.

Screening of Virulence Determinants in Enterococcus faecium Strains Isolated From Breast Milk.

Reviriego C, Eaton T, Martin R, Jimenez E, Fernandez L, Gasson MJ, Rodriguez JM.

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In a previous study, the authors isolated lactic acid bacteria from breast milk of healthy mothers. Since some of the identified isolates belonged to the species *Enterococcus faecium*, the objective of this work was to evaluate their safety. The enterococcal strains were screened by polymerase chain reaction (PCR) and Southern hybridization for the presence of virulence determinants. The potential of the strains to acquire plasmids by conjugation was investigated by screening for genes involved in conjugation processes. Parallel, phenotypic assays were performed. Presence of genes conferring resistance to vancomycin was assessed by PCR. PCR amplifications and Southern hybridizations revealed that all the strains were clear of the majority of potential virulence determinants. None of the strains showed gelatinase activity, hemolysin production, or aggregation phenotype, and none carried the *vanA* or *vanB* genes. These findings suggest that milk of healthy mothers may be a source of avirulent *E faecium* isolates to the newborns. *Journal of Human Lactation.* 21(2):131-137.

*J Hum Lact.* 2005 May;21(2):126-30.

Breast fat and fallacies: more than 100 years of anatomical fantasy.

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The authors studied the anatomy of 136 patients who underwent breast reduction surgery from 1998 to 2003 to determine the relationship of breast fat to the glandular tissue of the breast. Histological sections of freshly preserved breast tissue taken from representative patients were examined and compared to

depictions of normal breast anatomy as portrayed in standard anatomical texts from the classic work of Sir Astley Cooper in 1845 to current publications such as Auberbach and Riordan's *Breastfeeding and Human Lactation*. Most texts portray little intermix of fat with the glandular tissue of the breast. Our studies confirm the texts that demonstrate the fat and glandular tissue to be inseparable and present in continuity with each other except in the subcutaneous plane where only fat is present. The implications of this anatomical fact as it relates to breast surgery and human lactation are discussed. *Journal of Human Lactation*. 21(2):126-130.

*J Dent*. 2005 May;33(5):379-88. Epub 2004 Dec 13.

Oral health, sociodemographic factors, dietary and oral hygiene practices in Jordanian children.

Sayegh A, Dini EL, Holt RD, Bedi R.

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**OBJECTIVES:** To investigate the association between oral health, in terms of dental caries and gingivitis, and sociodemographic factors, dental plaque, oral hygiene behaviours, infant feeding and dietary practices in 4-5-year-old Jordanian children. **METHODS:** Two-stage random sampling procedure was used to select children enrolled in kindergartens in Amman, Jordan. Clinical examinations were carried out by one examiner. Mothers completed questionnaires relating to sociodemographic factors, oral hygiene behaviours, infant feeding and dietary practices of the children. **RESULTS:** About 67% of the children had caries, 31% had dmft greater than 4 and 66% had gingivitis. Of the children who had been wholly breast-fed, 86% had been fed on demand. Mothers of children attending kindergartens with the lowest tuition fees were more likely to have breast-fed their children on demand and for more than 18 months (prolonged breast feeding) compared to those attending kindergartens with higher fees. Savory snacks were consumed by 82%, confectionery by 76% and teas with sugar by 42% of the children. Multivariate analysis showed age, dental plaque, sleeping beside the mother, use of comforters and selected dietary habits to have an independent effect on caries prevalence. Dental plaque and prolonged breast feeding exerted an independent effect on caries severity and gingivitis. The strongest association with gingivitis was dental plaque. **CONCLUSIONS:** In Jordan as elsewhere health promotion strategies need to be targeted to mothers from less advantaged backgrounds. Messages about infant breast feeding should emphasise that the method is beneficial to the oral health of the children if appropriately used.

*Clin Pediatr (Phila)*. 2005 Apr;44(3):249-258.

Presentation of Pediatric Celiac Disease in the United States: Prominent Effect of Breastfeeding.

D'Amico MA, Holmes J, Stavropoulos SN, Frederick M, Levy J, Defelice AR, Kazlow PG, Green PH.

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**SUMMARY:** Childhood celiac disease (CD) is considered rare in the United States. Consequently there are few data concerning its clinical presentation. A

validated questionnaire was distributed to families of children with CD. One hundred forty-one children with biopsy-proven CD were included in the study. We found significant differences in the clinical spectrum of children based on their infant feeding history. Exclusively breastfed children were significantly less likely to report failure to thrive (69% vs 88%,  $p < 0.05$ ) and short stature (37% vs 62%,  $p < 0.05$ ), and had a higher rate of "atypical" symptoms ( $p < 0.01$ ). Breastfeeding alters the presentation and contributes to atypical presentations of CD and diagnostic delay. Pediatricians need to be aware of the diverse manifestations of celiac disease to reduce diagnostic delay. *Clin Pediatr.* 2005;44:249-258.

*Indian J Pediatr.* 2005 Mar;72(3):205-7.

Relationship between serum bilirubin and coagulation test results in 1-month-old infants.

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**OBJECTIVE:** Although the connection between cholestasis and conjugated hyperbilirubinemia is well known, mild hepatic dysfunction or cholestasis may also be associated with unconjugated hyperbilirubinemia in some infants with prolonged jaundice. The aim of this study was to investigate the relationship between serum bilirubin levels and alanine aminotransferase levels, aspartate aminotransferase levels, prothrombin time, activated partial thromboplastin time, and international normalization ratio findings in a group of infants. **METHODS:** The study included 77 healthy, term, breast-fed infants with jaundice and 56 age-matched, healthy, term, non-jaundiced controls. The 133 babies were divided into three subgroups according to their total bilirubin levels [group I (controls)  $< 50$  micromol/L, group II = 50-100 micromol/L, and group III  $> 100$  micromol/L, and the findings for the noted parameters were compared]. **RESULTS:** The mean conjugated bilirubin level was significantly higher, and the mean activated partial thromboplastin time significantly longer in group III than in group I. A significant positive correlation was found between bilirubin levels and PT and APTT results. **CONCLUSION:** Clinical vitamin K deficiency appeared unlikely to develop in this group of infants with prolonged unconjugated hyperbilirubinemia. However, a significant positive correlation between bilirubin levels and PT and APTT suggest that a higher bilirubin load to the liver may cause some degree of vitamin K deficiency due to mild cholestasis. The importance of this finding, and the possible benefits of vitamin K supplementation in 1-month-old breast-fed infants with bilirubin levels higher than 100 micromol/L require further investigation.

*Epidemiology.* 2005 May;16(3):328-35.

Health consequences of breast-feeding: doctors' visits and hospitalizations during the first 18 months of life in Hong Kong Chinese infants.

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**BACKGROUND:** The evidence on whether breast-feeding reduces health services use

in nonwhite infants is scant. We examined the effects of breast-feeding on health services utilization in Hong Kong Chinese infants. **METHODS:** We followed a population-based cohort of 8327 infants born in 1997 for 18 months. The main outcome measures were higher (above the sample mean) utilization of outpatient visits and hospitalizations for jaundice, gastrointestinal or respiratory/febrile illnesses, and all illnesses. **RESULTS:** Breast-fed infants had fewer illness-related doctor visits overall through the first 18 months of life. Results were strongest for infants breast fed exclusively for 2 to 3 months (odds ratio [OR] for higher utilization = 0.78; 95% confidence interval [CI] = 0.62-0.99) and for 4 or more months (0.65; 0.53-0.81). However, breast-fed infants were more likely to receive outpatient care for jaundice, particularly in the first 3 months of life (ORs ranging from 2.5 to 8.4). Any breast-feeding was also associated with more jaundice-related hospital admissions, the effects of which were most acute in the first 3 months of life. Compared with exclusively formula-fed infants, the OR (CI) for mixed breast- and formula-fed was 2.4 (1.7-3.5); for exclusive breast-feeding up to 1 month, 4.5 (2.7-7.6); for exclusive breast-feeding 2 to 3 months, 3.2 (1.8-5.7); and for exclusive breast-feeding 4 or more months, 3.4 (2.0-5.7). **CONCLUSIONS:** Breast-feeding in Hong Kong Chinese infants reduces doctor visits overall, but increases both outpatient visits and hospitalizations for jaundice.

*Pediatr Dent. 2005 Jan-Feb;27(1):28-33.*

Feeding habits and severe early childhood caries in Brazilian preschool children.

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**PURPOSE:** The objective of this study was to analyze the association between the feeding practice and presence or absence of SECC (Severe Early Childhood Caries) in Brazilian preschool children. **METHODS:** This cross-sectional study was conducted with male and female preschool children, aged 36 to 71 months, randomly selected from a low-income population. A 24-hour recall diary was used to assess data about infant feeding practices and dietary habits. The data were statistically analyzed using the chi-square test with a significance level of 5%. **RESULTS:** SECC was observed in 36% of the children examined. Infant feeding practices showed the association between SECC and night-time breast-feeding ( $P = .02$ ) or breast-feeding ( $P = .0004$ ) in children older than 12 months of age. The use of a bottle at night as a substitute for the pacifier and its use on demand during the day were also correlated with SECC ( $P < .0001$ ). **CONCLUSIONS:** It was concluded that night-time breast-feeding in children older than 12 months of age, the use of a bottle at night as a substitute for the pacifier, and use of the bottle on demand during the day are feeding practices correlated with the etiology of SECC.

*J Paediatr Child Health. 2005 Apr;41(4):215-7.*

Delayed infant death following catastrophic deterioration during breast-feeding.

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(no abstract)