

# Introduction/Back ground

Obesity is now called a global epidemic because its prevalence and severity are increasing world-wide at alarming rates, both in adults and in children. The increase in obesity is most marked in affluent parts of the world, including Europe where obesity has become the predominant nutritional disorder in childhood and a major public health problem.

Obese children tend to become obese adults, and they carry a high risk of acute and chronic diseases, reduced life expectancy, and lower income. Treatment and prevention of childhood obesity have been identified as priorities in Europe. However, obesity treatment is costly. The long-term efficacy of established therapeutic options is limited even with intensive efforts, and cost-benefit-ratios of usual therapies are quite unsatisfactory. Therefore, the development of effective strategies for primary prevention is particularly attractive.

Early prevention is important because childhood obesity has severe short and medium term consequences in childhood and adolescence, as well as long-term effects that extend well into adulthood. Obese children tend to experience severe psychosocial distress and considerable discrimination. When they reach adulthood they achieve lower rates of completed advanced education, lower incomes and fewer stable partnerships.

Medical complications of obesity during childhood and adolescence include untoward effects on the cardiovascular risk factors dyslipidaemia, arterial hypertension antioxidant vitamin status, and glucose intolerance. Obesity plays a key role in the marked increase of non-insulin dependant diabetes mellitus that occurs in adolescence. Persistence of childhood obesity into adulthood is common and associated with markedly increased morbidity and mortality, and high costs to the society.

An individual's obesity risk depends on genetic predisposition and current lifestyle, in particular the level of physical activity and dietary choices. Nutritional factors during early life may modulate later obesity risk, a phenomenon called *metabolic programming* or *metabolic imprinting*. Animal studies have shown that dietary manipulation in the perinatal period, in particular an alteration of protein intake, have lasting effects on body weight in adult animals. Studies in humans suggested that maternal undernutrition during the last trimester of pregnancy or the first months of life is associated with significantly less obesity in their children at young adulthood. Postnatal infant feeding also modulates the later risk of obesity and of being overweight. Infants fed formula are more likely to become obese than breastfed infants. A clear dose-response effect has been identified, with a longer duration of breast feeding having a more marked effect on reducing later obesity risk. Thus, in industrialized countries the promotion of breast feeding may help to decrease obesity prevalence in childhood. The underlying mechanisms of this effect remain to be elucidated. The higher protein content of infant formulae, compared with breast milk, could be a causal factor.

The EU Childhood Obesity Programme, which will test the 'early protein hypothesis', could therefore offer valuable opportunities for the prevention of obesity, for improving advice given to parents, and for developing nutritionally improved dietary products for infants.

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**Further reading:**  
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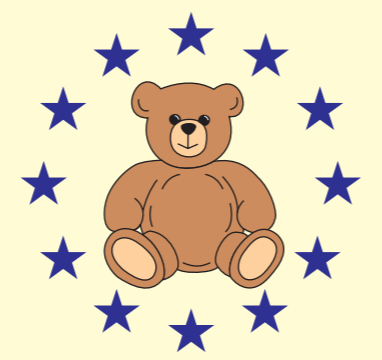
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Rolland-Cachera MF, Deheeger M & Bellisle F. Increasing prevalence of obesity among 18-year old males in Sweden: evidence for early determinants. Acta Paediatrica, 1999;88:365-367



## Relevant Meetings

**9th International Conference of Obesity (9 ICO)**, organised by IASO, will be held from 24-29 August, 2002 in São Paulo, Brazil. Details available from Cerne Consultoria de Eventos. E-mail: cerne@uol.com.br or see www.iotf.org

**Issues and Action in Childhood Obesity** to be held on 17-18 September 2002 in Bristol, UK. Organised by the Association for the Study of Obesity. Details available at www.aso.org.uk

**12th European Congress on Obesity (12 ECO)** to be held on 29 May to 1 June, 2003 in Helsinki, Finland. Organised by The European Association for the Study of Obesity (EASO) and the Finnish Association for the Study of Obesity (FASO) Details available at www.eco2003.net.

**9th European Nutrition Conference (9 ENC)** sponsored by FENS, to be held on 1-4 October 2003 in Rome. Details from www.fens2003.org

## EU Infant Nutrition Cluster

**To ensure exchange of information, this project (QLK1 2001 00389) is linked to two other FP5 shared costs projects in the 'EU Infant Nutrition Cluster'**

- PERILIP: (QLK1 2001 00138 ) Influence of dietary fatty acids on the pathophysiology of intrauterine foetal growth and neonatal development
- TRIGR: (QLK1 2002 00372) Nutritional primary prevention of Type 1 diabetes

**The work in these three projects is complementary and will contribute to the following joint overall objectives of the EU Infant Nutrition Cluster :**

- To assess the roles of early nutritional influences on the current and future well-being of the child and its mother
- To determine the potential of nutritional interventions during pregnancy and infancy to modify health and well-being

These projects are being carried out with financial support of the European Communities, under the 5th Framework Programme for Research, Technology & Demonstration, specific RTD programme "Quality of Life and Management of Living Resources, Key Action 1 "Food, Nutrition & Health". It does not necessarily reflect the Commission's views and in no way anticipates its future policy in this area".

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## Useful Links

EU Infant Nutrition Cluster  
www.wye.ic.ac.uk/Cluster

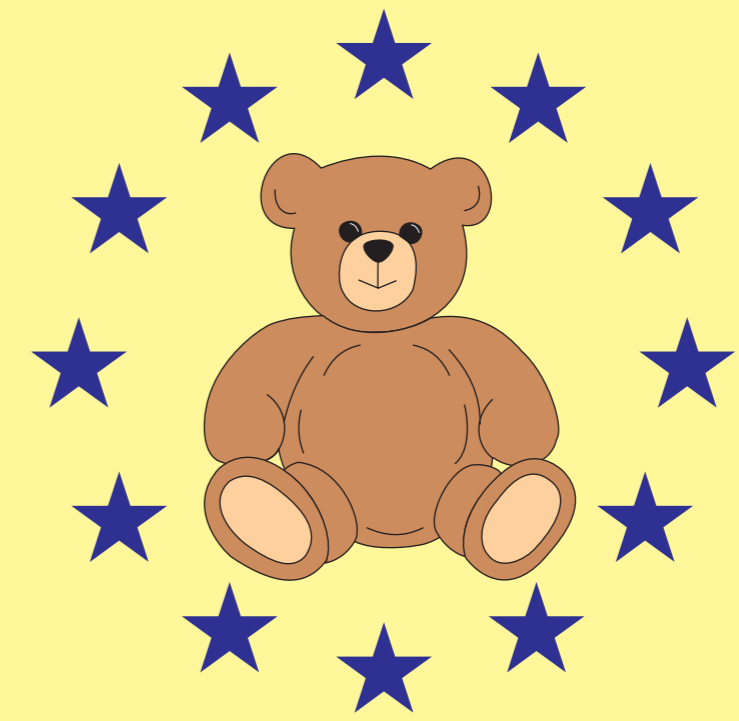
Projects within EU Infant Nutrition Cluster  
CHOPIN: www.danoneinstitute.org/EUchildhoodobesity  
PERILIP: www.wye.ic.ac.uk/Perilip  
TRIGR: Under construction

World Health Organisation  
www.who.int

Association for the Study of Obesity  
www.aso.org.uk

International Obesity Task Force  
www.iotf.org

Danone Institutes  
www.danoneinstitute.org



## EU CHILDHOOD OBESITY PROGRAMME

Breast feeding has been shown to confer a long-term preventative effect against obesity risk in later life. The EU Childhood Obesity Programme will investigate whether the protein/fat ratio in infant formula and complementary feeds has lasting effects on obesity risks. Hence this EU Programme may offer opportunities for long-term health promotion by appropriate modification of dietary products for infants.

[www.danoneinstitute.org/EUchildhoodobesity](http://www.danoneinstitute.org/EUchildhoodobesity)

Project Title: Childhood Obesity: Early Programming by Infant Nutrition?  
Acronym: CHOPIN  
Project Number: QLK1-2001-00389





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## Co-ordinator profile

**The Munich Team**

The Munich team work in three institutes. Two belong to the Ludwig-Maximilian's University (medical faculty). Prof. Berthold Koletzko, the principal investigator of the EU Childhood Obesity Programme, is Professor of Paediatrics and head of a team of physicians and researchers at the Dr. von Hauner's children's hospital. In his ward he treats many children, particularly those with renal diseases, metabolic disorders, neurologic disorders and infections.

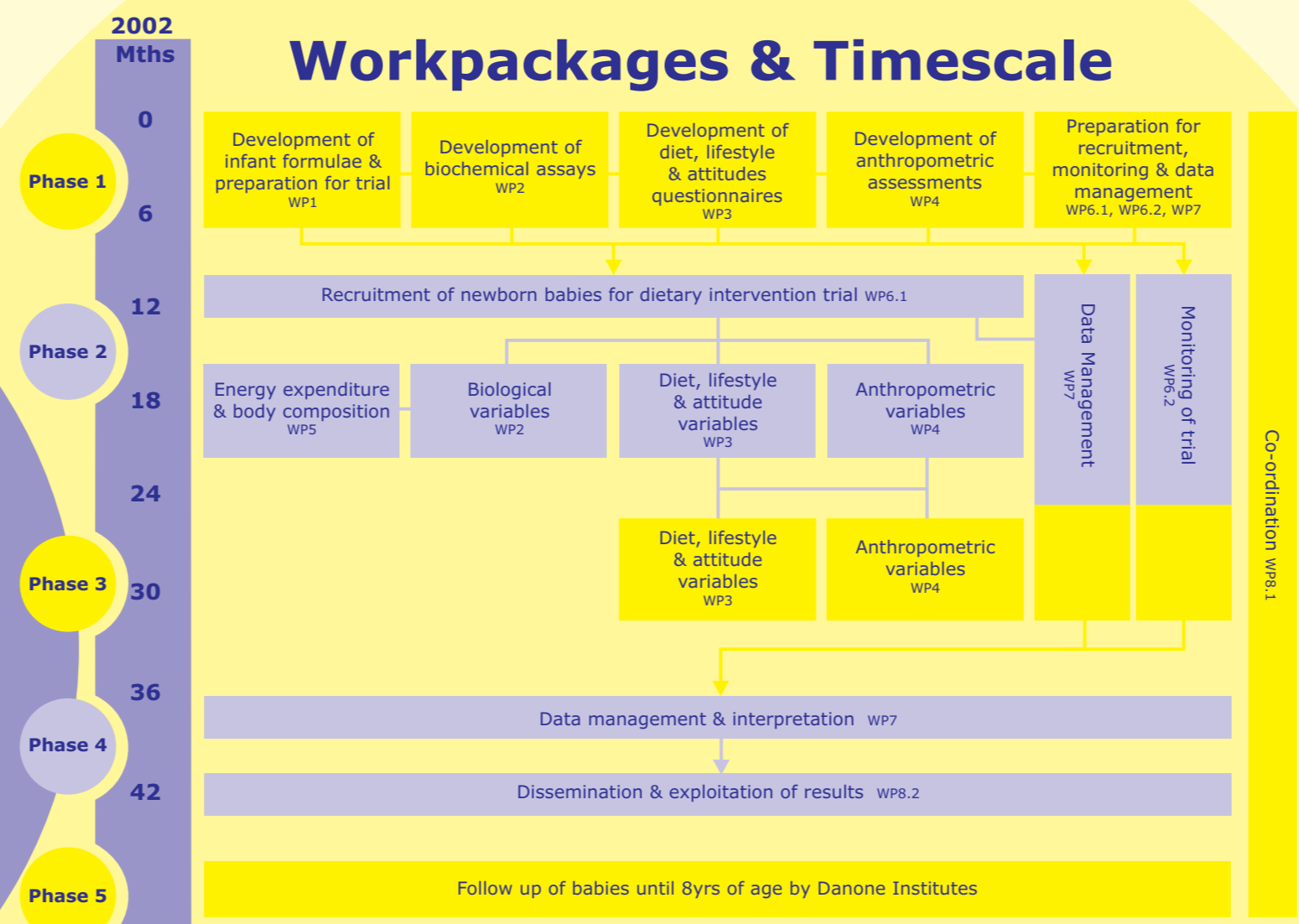
Ilse Broekaert and Bjorn Hoffmann are physicians working at the same hospital. Their duties in the EU Programme will include the design and revision of the medical history CRF. Hans Demmelair works in the (metabolism) laboratory. He is the study secretary. Sabine Verwied-Jorky is the nutritionist responsible for the food records and the parent questionnaires concerning the feeding behaviour of their babies.

Monika Hermann and Doris Oberle from the Department of Paediatric Epidemiology at the Institute for Social Paediatrics and Adolescent Medicine, work in the research group of Prof. von Kries, Professor of Paediatrics and an epidemiologist. His work focuses on childhood obesity, infectious and atopic diseases. Monika Hermann was involved in the initial planning of the project and will plan the statistical analysis. Doris Oberle is a biologist with additional education in medical biometry. She will design the questionnaires regarding infantile behaviour as well as a part of the CRF. She will collaborate with the contract research organisation (CRO) and will also do the statistical analysis.

The third institute, Dr. Schauer's Studien und Marketing in der Medizin, is an independent CRO with its focus on randomised clinical trials and post-marketing surveillance studies. Til Richardson, a co-worker of Dr. Schauer, will set up the remote-data-entry program and supervise the data management of the EU Childhood Obesity Programme.

Other Partners will be profiled in future brochures.

## Workpackages & Timescale



Conclusive information on whether a high protein intake in infancy is causally related to early markers of obesity risk at age 2y (and long-term obesity risk at 8y).

Comparative information on breast feeding, formula feeding and patterns of complementary foods and infant feeding in 5 different centres in Europe.

Standard Protocols for a multicentre trial involving new-born infants from 0 to 1y; Standard Protocols for obtaining ethical approval and compliance in infants from 0 to 2 years of age.

Validated and robust procedures for assessing anthropometric parameters in infants and a better understanding of the dietary and other factors in early life influencing them.

Established and reliable procedures for assessing protein metabolism, endocrine and renal function parameters in infants thus providing insight into mechanisms and new reference data.

Assessment of plausibility of estimating energy expenditure from lifestyle data (physical activity and health status) in questionnaires.

Data for a new science base definition of safe levels of protein intakes in infancy for future revision of Dietary Reference Values.

A reference collection of consumer science data on parental attitudes to infant feeding and insight into attitudes to infant feeding in relation to infant behaviour.

Small scale production of pilot formulae and full scale production of experimental formulae to use in trial. Potential for further refinement and development of infant formulae which can help to prevent childhood obesity and information for review of relevant EU Directives as necessary.



## Summary

- Childhood obesity is a major public health problem and is an identified priority concern for the EU. Infants fed formula are more likely to become obese than breastfed infants. The higher protein content of infant formulae, compared with breast milk, could be a causal factor.
- The EU Childhood Obesity Programme will allow, for the first time, a **one year multicentre intervention trial** on new-born infants, to see whether feeding infant formulae, which differ in their level of milk proteins, can influence the risk of later childhood obesity. The trial will take place in five **countries with different habitual total protein intakes to increase the range of protein intakes and improving the statistical power to test the 'early protein hypothesis'** ( i.e. Early protein intake predicts infant growth and later risk of childhood obesity).
- The EU Childhood Obesity Programme will study, over the first two years of life, body composition, hormonal status, protein metabolism and new, simple anthropometric markers of childhood obesity. Important conclusions will be drawn at age 2 years on the relation between protein intake, growth and obesity risk. In addition, the whole cohort will be followed up until age 8 years, through the network of the Danone Institutes, to assess the long term impact on the prevalence of obesity.
- The EU Childhood Obesity Programme will explore the impact of consumer (parental) attitudes to, and perceptions of, different practices of infant feeding in relation to infant behaviour (satisfaction, crying, sleep duration) in five different European countries (Belgium, Germany, Italy, Poland and Spain). This consumer science information will help improve the understanding of consumer (infants and parents) acceptance of and preference for foods that contribute to healthy diets.
- If a relationship between early dietary protein intake and later childhood obesity risk is confirmed, it offers possibilities for the prevention of obesity, for improving advice given to parents and for developing nutritionally improved dietary products for infants.

## Achievements & Applications

### Expected achievements:

- Improved health and quality of life by preventing childhood obesity,
- Promotion of the benefits of breast-feeding,
- A better understanding of consumer (parental) attitudes to infant feeding.

### Applications

- The potential for the development of new infant foods (formula and complementary foods),
- The provision of safety data for infant formula with adequate protein content,
- The provision of information for the training of health professionals to make it easier for them to advise consumers about infant feeding.

The programme is funded by the EU Framework Five Quality of Life Programme (**QLK1-2001-00389**). EU is providing about 80% of the total funding which is over 2 million euros. Bledina, a French infant formula producer will produce the formula to be tested. The Danone Group contributes to this project through the expertise of its Research Center Danone Vitapole. Moreover, the Danone Institutes, non-profit Scientific Associations in seven European countries, will contribute to the dissemination of the knowledge and will allow the follow up to the project. The programme will last for 3.5 years, starting in Spring 2002.



## Objectives

- To test the primary hypothesis that a possible causal factor for the difference in long-term obesity risk between breast and formula fed infants is the much lower protein content of breast milk compared to infant formulae.
- To do this by performing a double blind randomised multicentre intervention trial in healthy infants, comparing isocaloric infant formulae with high and low protein contents, balanced by fat.
- To validate the primary hypothesis with epidemiological observational studies evaluating the effects of different habitual protein intakes with traditional complementary feeding regimes in infants in the same 5 countries.
- To evaluate the relationship between different types of infant feeding regimes on a novel, early anthropometric marker, namely the difference between length at two years and length at birth, or later obesity development.
- To investigate the effects of these infant feeding regimes on body composition, energy expenditure, physical activity, protein metabolism, renal function, leptin and its binding protein and on insulin like growth factor1.
- To disseminate the results widely to the user communities.
- To explore effective preventive strategies by modification of the composition and use of dietary products for infants and thus contribute to significant potential health benefits for the European population.

