



THE EARLY NUTRITION PROGRAMMING PROJECT

Project Number: FOOD-CT-2005-007036

Acronym: EARNEST

(EARly Nutrition programming – long term follow up of Efficacy and Safety Trials and integrated epidemiological, genetic, animal, consumer and economic research.)

NEWSLETTER 9 – SUMMER 2010

EARNEST final conference in Munich

The Early Nutrition Programming (EARNEST) Project started in 2005 with the aim to create a better understanding of the mechanisms and the extent to which nutritional influences in early life can programme a person's development, metabolism and health in adulthood. The scientific output and the success of this large scale integrated research project were presented at the final conference of the project (www.metabolic-programming.org/munich2010).



The Conference was opened by Dr. Di Giulio (European Commission), Dr. Rothenpieler (Bavarian Ministry of Science), Prof. Putz (Vize president LMU Munich) and Prof. Koletzko (EARNEST Coordinator and Conference Chair) (from left to right side)

From May 6-8, 2010 the Early Nutrition Programming Project (EARNEST), the Early Nutrition Academy (ENA) and the Developmental Origins of Health and Disease Society (DOHaD) invited scientists, politicians and industry representatives to Munich, Germany for the "International Conference on Developmental Origins of Health and Disease - The Power of Programming". It was hosted by the Ludwig-Maximilians-University of Munich and attracted scientists from the EARNEST project as well as from other research groups around the world. The dynamic development and enhanced recognition of the research area were demonstrated with over 200 presentations in 22 scientific sessions and 4 poster exhibitions presenting the results of five years of top level research to an audience of 600 delegates from more than 50 countries.

The excellent organization of the conference and inspiring atmosphere provided an environment for scientists, clinicians and other health professionals, and representatives of industry and politics where state of the art information was exchanged and future perspectives could be discussed for the advancement of the field and its relevance for policy making to promote health in future generations.

The opening session started with an address from the **European Commission** represented by **Dr. Antonio Di Giulio**, Head of Unit – Food, Health and Well-being, Directorate General for Research. He outlined the challenges modern societies are facing in terms of demographic changes, increasing world population, pressure on resources and climate change, aggravated by the present global financial crisis. The European Commission has put forward the new Europe 2020 Strategy for smart, sustainable and inclusive growth. These objectives shall be reached also through the promotion of knowledge, innovation and education. In this context he pointed to the "importance of being EARNEST" meaning "doing honest and solid research" as a demand attached to the funding of the EARNEST project by the EC. An important means to create knowledge for the benefit of the EU population is the co-ordination of research programmes to create synergistic effects through international co-operation. He acknowledged that this has been achieved superbly by the EARNEST project and thanked for the excellent work.

Over the past five years scientists from the Early Nutrition Project as well as other research groups have been attempting to identify the factors that contribute to early nutrition programming.



Welcome speech by Dr. Antonio Di Giulio, European Commissioner

At the conference speakers presented their latest results from a number of different research approaches ranging from long-term follow-up trials, innovative technological achievements, or animal studies to comprehensive considerations towards future directions of the research field and economic and public policy implications.

Professor Berthold Koletzko, the Co-ordinator of the EARNEST project said:

"This research has enormous potential for improving the health and well-being of future generations, reducing costs for health care and social services, and for enhancing the productivity and wealth of societies."

"However, to achieve such benefits, solid science-based knowledge is required to assess the size of the effect in contemporary European populations, to characterize underlying mechanisms and to understand potential differences between subgroups of the populations e.g. by genetic predisposition or gender."

"One important goal of the EARNEST Early Nutrition Programming Project is to translate solid research findings into practice. For example, the project partners have collaborated in developing evidence based recommendations for dietary fat intake in pregnancy, during breastfeeding, and in infancy. Another part of this European research collaboration has explored what drives parental decisions on nutrition and lifestyle, and which messages are provided to them in information materials issued for example by governmental offices, scientific bodies and non-governmental organisations."



The Munich team warmly welcomed the participants to the Bavarian evening on the second evening of the conference

Some conference highlights

Effect of early diet on early growth

Munich based researchers are investigating the effect of early diet on early growth, looking at aspects such as the effects of weaning on growth. **Dr. Veit Grote** described in his presentation that the time of first introducing complementary foods into the diet of some 1000 infants from 5 European countries did not predict infant growth and later obesity risk.

Another member of the team, **Dr. Sonia Schiess** from Dr. von Hauner Children's Hospital, has been researching the introduction of energy providing liquids such as sugared teas and juices across the five countries in the EU. She found that consumption of energy providing liquids by babies replaces breast milk or infant formula. These energy providing liquids do not contain the same nutrients as formula or breast milk and therefore lower the quality of nutrient supply in the diet. As the use of energy providing liquids is becoming more common it is important to understand how their adverse effects are likely to impact on future infant health.

In the EU Childhood Obesity Project (CHOP), also co-ordinated by **Professor Koletzko**, over 1000 infants were followed over a 2 year period. The first results show that, after 2 years, the infants fed a formula with a lower protein content – closer to the composition of breast milk, weighed significantly less than those on higher protein formula, and their weights were more similar to breast fed infants. Differences emerged by 6 months of age and persisted, even after the intervention ceased and the children went onto similar diets. The researchers predict that these differences in early growth will reduce obesity at 14-16 years of age by 13 %. The results confirm the protective effects of breastfeeding on later obesity risk.

Effects of programmers

Considering the decisive, long-term effects of early nutrition factors on human health and development the identification of "positive" and "negative" programmers as constituents of maternal and infantile diet were pointed out in a number of presentations.

Breastfeeding and bone

At the session on the programming of bone health, **Dr. Mary Fewtrell** showed that giving pre-term babies breast milk significantly increases their whole body bone size and mineral content 20 years later, although this was not related to the mineral content of their early diet. It is possible therefore that there are other non-nutritive components of breast milk which promote bone strength. At the same session, **Dr. Tobias** described how increased sun exposure during the last trimester of pregnancy is associated with better bone mass at age 9 years.

Impact of maternal diet

Another 'positive programmer', the Mediterranean or 'Healthy' Diet, can protect mothers from premature delivery and pre-eclampsia and from postnatal depression, as well as improving the immune function of their babies, and the IQ of their children at the age of five. Exciting new research allows to identify the top foods in these diets – which include fish and vegetables. So what are the active nutrients? Within fish, it appears that long chain omega 3 fatty acids provide the benefits.

Dr. Chatzi concluded from a prospective mother-child cohort study ('Rhea study') in Crete that a 'health conscious' dietary pattern based on vegetables, fruits, pulses, nuts, dairy products, fish, and olive oil, was associated with reduced risk for postnatal depression. Interestingly, olive oil intake (>40-gr/day) was significantly associated with low levels of depressive symptoms.

Dr. Granström used data from the Danish National Birth Cohort to show that the associations observed between maternal dietary folate and early psychomotor development in their 18 month old children are unlikely to reflect an effect of folate itself but may instead be attributed to some food constituent(s), which coexist with folate in specific vegetables and fruit. Higher maternal dietary folate intake was associated with higher child development scores, whereas higher folic acid from supplements was not. Dietary folate from onion, tomatoes, and green leafy vegetables was associated with higher child development scores, whereas folate derived from grain, dairy, and egg was not.



Programming and gender

Until now it has been assumed that any nutritional programming would have the same effects on all offspring, boys and girls alike. One session in the conference programme was devoted to exploring 'gender effects in programming'. EARNEST project information showed that the effects of early nutrition on later cognitive achievements were found to differ between girls and boys born prematurely, with much larger effect sizes in boys.

During the same session, **Rachel Dakin** showed how maternal obesity is associated with programming effects in young adult mice. Crucially, these effects are sex-specific: female offspring have raised blood insulin levels, whilst males have more profound alterations in the expression of liver genes important in lipid and glucocorticoid metabolism in the absence of altered glucose-insulin homeostasis.

Towards the future of early nutrition programming research



The 10 best rated abstracts submitted by new investigators were awarded a travel grant for their outstanding work

Much detailed and specific research has been done, and still requires to be done, to unravel the specific effects of the different environmental exposures which could impact on the development of the fetus in the womb and the young infant.

Associations seen in observational studies are not always confirmed in randomized trials and careful analysis is required to pinpoint the active constituent. Teasing out the specific effects of all these different potential influences requires new ways of doing research. One new approach combines traditional epidemiological and statistical principles with the use of novel and sophisticated analytic methods.

A new, high-technology technique applied at the Dr. von Hauner Children's Hospital at University of Munich allows the measurement of a profile of more than 200 metabolites from one drop of the child's blood. **Dr. Wolfgang Peissner** and his colleagues from LMU use 'Targeted Metabolomics' to look at the metabolic consequences of different diets by analysing the

metabolic profile of groups of infants that were fed formulas with different protein content or breast milk during the first months of life. The new technique allows researchers to understand how infant feeding with different protein levels can affect the metabolic pathways that modulate the growth and health of children.

Another aim of the conference 'The Power of Programming' was that researchers from Europe and the whole world met to start further collaborative research aimed at building even stronger scientific foundations for long-term health prevention. Considering the tremendous implications for public health it will remain an ongoing challenge to the multidisciplinary research community to find a way to capitalise on the beneficial effects of early nutrition programming and reverse its adverse effects for the benefit of future generations.

In the closing session on the future of programming research **Professor Berthold Koletzko** summed up:

"Overall, we have made some significant progress in mapping out the long term consequences of early programming, but like a mountaineer, we feel like we have reached a summit, only for another to appear behind it. Much more research is required to fully understand how environmental factors adversely affect long-term outcomes and the extent to which the mother is able to protect her child against them."

Workshop Report - How to write a successful research proposal

Dr. Margaret Ashwell (Ashwell Associates (Europe) Ltd.) and Dr. Elena Martin-Bautista (European Science Foundation) led this workshop and attracted about 60 keen participants. This interactive session outlined, and then allowed participants to discuss, the 'Ten Golden Rules' for writing research proposals:

1. Give the funders what they want, take all the advice you are offered
2. What are the 'buzz words' in the research call?
3. Make life easy for the evaluators
4. Base everything on a good executive summary
5. Use evaluation criteria as the framework for your proposal
6. Develop a compelling argument
 - what will you do, why and how?
 - why are you the best?
7. Use statistics wisely
 - is your study well designed?
 - is it powered correctly?
8. Promise what you deliver, and deliver what you promise!
 - deliverables are discrete endpoints which you can handle
 - milestones show stages along the way
9. Recognise the priority parts of the application form
10. Failing to prepare is preparing to fail! Ask 'strangers' to read critically and evaluate

Much of the advice was based on lessons learned from the EARNEST proposal and from the chairs' experience of evaluating other EC proposals. We now hope to hear back from successful applicants!

By Margaret Ashwell

Workshop Report - Physical activity in relation to pregnancy outcomes

As explained by the host, the subject for the workshop was in reality broader than the title indicated, as it also included topics such as the measurement of physical activity in pregnant study subjects and physical activity during pregnancy in relation to outcomes in the offspring. The latter was pointed out as a subject characterized by assumptions that beneficial effects of physical activity being passed on to the offspring, but with a lack of knowledge to support these assumptions.

Four presentations provided the participants of the workshop with an overview of previous studies assessing physical activity among pregnant women and validating the data in different ways. Results from recent studies came from the validation study on physical activity in the Norwegian Mother and Child Cohort Study (MoBa), from the newly established Centre for Fetal Programming at Statens Serum Institut, Denmark, from a Chinese experimental trial in a rat model investigating the effect of maternal swimming in pregnancy on overweight in overfed offspring and finally, from a small Greek study.

Following the presentations, a discussion was opened, on how to carry out trials that can explore the effects of physical activity. It was pointed out, that the intervention groups need to be large, including at least 2000 subjects in each group. Furthermore, it was questioned, whether we know enough about the effect of undertaking physical exercise during pregnancy in previously sedentary individuals to be able to recommend that this is done. Many questions were raised, which underline the importance of further research into the effect of maternal physical activity during pregnancy on mother and offspring.

By Marin Strøm



ENA CANTABRIA POSTGRADUATE SCHOOL

2nd NUTRENVIGEN-G+D FACTORS MASTER MEETING
Santander (Cantabria), 15-18 September, 2010

"Early Nutrition and Physical Activity: determinants for metabolic programming"

www.metabolic-programming.org/academy.htm
 www.nutrimenthe.eu
 www.nutrenvigen-gd.com

Logos: UC, HGT Universidad de Granada, Nutri MENTHE, EARLY NUTRITION PROGRAMMING PROJECT, and others.

Relevant Meetings

11th International Congress on Obesity

Stockholm, Sweden, 11-15 July 2010

www.ico2010.org

Nugo Week 2010 "Metabolic Health"

Glasgow, UK, 31 August - 3 September 2010

www.abdn.ac.uk/nugoweb2010/

14th Asia-Oceania Congress of Endocrinology (14th AOCE)

Kuala Lumpur Convention Centre, Malaysia, 2-5 December 2010

www.aoce2010.com

Oskar Keller Symposium on "Metabolic Flexibility on Human and Animal Nutrition"

Warnemünde, Germany, 09-11 September 2011

<http://oks.fbn-dummerstorf.de>

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