



Late gestation undernutrition and post-natal diet program hepatic lipid composition and fatty acid profiles in adult sheep

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MAASTRICHT 2010

9th Conference of the
International Society for
the Study of Fatty
Acids and Lipids



[Welcome](#) | [Program](#) | [Information](#) | [Abstracts](#) | [Accommodation](#) | [Registration](#)
[Awards](#) | [Plenary Speakers](#) | [Satellite symposia](#) | [Travel](#) | [Social Events](#) | [Exhibitors](#) | [Contact](#)

Welcome:

For the pictures taken during the conference click [here](#)

Welcome address

We are pleased to invite you to participate in the 9th biennial scientific meeting of the International Society for the Study of Fatty Acids and Lipids (ISSFAL), to be held May 29 - June 2nd, 2010, in Maastricht, the Netherlands. The overall theme of this meeting is "LIPIDS IN METABOLIC HEALTH AND DISEASE".

The upcoming meeting follows a tradition of high-level conferences devoted to both fundamental and applied research on the biological effects of fatty acids and lipid metabolism in health and disease. The program is comprised of 14 introductory plenary lectures and 21 concurrent sessions arranged in three distinct tracks, with a mixture of invited speakers and oral presentations of submitted abstracts. We have assembled an outstanding group of experts from around the world to present the plenary lectures. In addition, we will have poster sessions, an extensive New Investigator program and we have scheduled ample opportunity for formal and informal scientific discussion.

The venue of the meeting is the Maastricht Exhibition and Congress Center (MECC), situated only 5 minutes (by car) from the historic city center. Maastricht, the Netherlands, is located in the center of Europe and can easily be reached from Amsterdam and Brussel. We will gladly assist you in choosing your best travel and accommodation option.

We look forward to welcoming you to ISSFAL 2010 Maastricht!

Yours sincerely,

Jan Glatz, Renate de Groot, Patrick Schrauwen, Matthijs Hesselink, Kim Willems, Ray Rice



and 30 weeks. Phosphatidylcholine (PC) and phosphatidylethanolamine (PE) molecular species were analysed by mass spectrometry.

Results: Age and diet both significantly altered liver PC composition. For example, PC16:0/18:2 was 28.0% of liver PC in the C/C group at 15 weeks but 23.7% at 30 weeks. Corresponding values for the HF/HF groups were 13.4% and 11.8%, and for the HF/C groups were 21.8% and 15.1%. Age-related changes to aorta PC were similar for all dietary groups. Diet had no effect on aortic PC or liver PE.

Conclusion: Exposure to HF in utero results in changes to phospholipid profiles in liver and aorta that were modified during the life course. HF exposure in utero primed subsequent changes to liver PC composition; HF mice weaned to chow diet exhibited a similar composition to control mice at 15 weeks, but were unable to maintain this composition at 30 weeks. The absence of corresponding diet-related changes to the aortic PC compositions illustrates the robust nature of homeostatic mechanisms controlling lipid profiles.

14.15 - 14.30

Late gestation undernutrition and post-natal diet program hepatic lipid composition and fatty acid profiles in adult sheep

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Objective: To assess whether late-gestational undernutrition (LG-UN) programs hepatic lipid content and composition in the adult animals and whether the postnatal diet affects such foetal programming effects.

Methods: Twenty twin-pregnant ewes were fed either a NORM (~ requirements) or LOW (50% of requirements) diet the last 6 wks of gestation (term=147d). From 3d to 6mo post-partum (around puberty), twin lambs were assigned to each their feeding: CONV (hay) or HCHF (High-Fat-High-Carbohydrate) supplemented with milk replacer from 0-8 wks. Lambs were slaughtered at 6mo and at 2yrs (young adulthood). Liver triacylglycerol (TAG), ceramide and phospholipids were analyzed.

Results: After 6 mo of differential postnatal feeding treatment, HCHF lambs became obese (BMI-28-32), but LG-UN did not impact fat deposition. HCHF feeding resulted in massive accumulation of TAG ($p<0.0001$) and ceramide ($p<0.01$) in the liver in 6 mo lambs, while the prenatal nutrition had no effect. At 2 yrs of age, TAG concentration remained higher ($p<0.05$) in sheep exposed to LG-UN, and at this age, both pre- and postnatal nutrition caused striking differences in fatty acid composition in liver lipids. LG-UN decreased C16:1 n-7 and the ratio of n-6:n-3 PUFA in phospholipids and, noteworthy, altered concentrations of fatty acids derived from rumen microbiotic activity in TAG and PL.

Conclusion: LG-UN programmed for increased baseline levels of liver TAG in adult sheep as well as fatty acid composition in depot and structural lipids. Our findings interestingly suggest that gut microbiotic activity may be subjected to prenatal programming, which persists into adulthood.

Postnatal HCHF feeding caused severe liver steatosis in lambs, manifested both as increased TAG and ceramide. Long-term consequences of HCHF feeding involved repositioning of lipid deposition towards less renal and more abdominal fat in adult sheep.

14.30 - 14.45

Maternal omega-3 supplementation alters fat distribution in the offspring

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Background: Fat cell formation (adipogenesis) and lipid accumulation (lipogenesis) are highly sensitive to the nutritional environment during the period of fat cell development. Omega-3 long chain polyunsaturated fatty acids (LCPUFA) inhibit adipogenesis and lipogenesis in adult rats, however it is not known whether supplementing the maternal diet with omega-3 LCPUFA results in reduced fat deposition in the offspring.

Objective: This study aimed to investigate the hypothesis that maternal omega-3 supplementation during pregnancy and lactation would reduce body fat mass in the adult offspring.

Procedure: Female Wistar rats were fed either a standard chow (Control, n=8) or chow supplemented with 25mg/kg/day of the omega-3 LCPUFA Docosahexaenoic acid (DHA) during pregnancy and lactation (Omega-3, n=8). Tissues were collected from pups at 6wk of age and weights of visceral and subcutaneous fat depots recorded.