Long-chain PUFA in Granulocytes, Mononuclear Cells, and RBC in Patients With Cystic Fibrosis: Relation to Liver Disease

Background and Aim: Patients with cystic fibrosis (CF) have low levels of n-3 long-chain polyunsaturated fatty acids (n-3 LCPUFA) in plasma or red blood cells (RBC), as also seen in other chronic and acute liver diseases. The differences may be more pronounced in CF transmembrane conductance regulator protein (CFTR)-regulated tissues such as granulocytes, monocytes, and lymphocytes. The aim of the present study was to investigate whether patients with CF-related liver disease have lower n-3 LCPUFA level than patients with CF without liver disease.

Methods: Twenty patients with known CF-related liver disease were matched with 20 CF patients without. Blood samples were analysed for liver biochemistry and haematology. Granulocytes, mononuclear cells, and RBC were separated by density gradient centrifugation, and fatty acid composition was measured by gas chromatography. Hepatic ultrasound was scored according to Williams et al. Hepatic transit time (HTT) was measured with the ultrasound contrast agent SonoVue.

Results: No significant differences were seen in either n-6 or n-3 LCPUFAs in any cell line when the 2 groups were compared. In a multiple regression analysis including HTT, age, Pseudomonas aeruginosa infection, diabetes mellitus, treatment with ursodeoxycholic acid, forced expiratory volume in 1 second (% of predicted value), and Williams' ultrasound scoring scale, only n-3 LCPUFA docosahexaenoic acid in mononuclear cell membranes was positively associated with HTT (P = 0.02). The arachidonic acid/docosahexaenoic acid ratio within the mononuclear cells was negatively associated with both HTT (P = 0.003) and Williams' ultrasound scoring scale (P = 0.03). For RBC-LCPUFAs, no significant associations were seen.

Conclusions: These findings indicate that in patients with CF, the degree of liver disease was negatively associated with LCPUFA n-3 levels in CFTR-expressing white blood cells but unrelated to those levels in CFTR-negative RBC.
cystic fibrosis Cystic Fibrosis (MeSH) respiratory system disease, genetic disease, congenital disease, digestive system disease, diabetes mellitus Diabetes Mellitus (MeSH) endocrine disease/pancreas, metabolic disease, liver disease Liver Diseases (MeSH) digestive system disease, Pseudomonas infection bacterial disease, Gram-Negative Aerobic Rods and Cocci Eubacteria Bacteria Microorganisms (Bacteria, Eubacteria, Microorganisms) - Pseudomonadaceae [06508] Pseudomonas aeruginosa species pathogen, Primates Mammalia Vertebrata Chordata Animalia (Animals, Chordates, Humans, Mammals, Primates, Vertebrates) - Hominidae [86215] human common child, preadolescent child, adolescent host female, CF transmembrane conductance regulator protein CFTR, docosahexaenoic acid 32839-18-2, PUFA, SonoVue 2551-62-4, ursodeoxycholic acid 128-13-2, 02506, Cytology - Animal, 02508, Cytology - Human, 03508, Genetics - Human, 10066, Biochemistry studies - Lipids, 10067, Biochemistry studies - Sterols and steroids, 13002, Metabolism - General metabolism and metabolic pathways, 13020, Metabolism - Metabolic disorders, 14006, Digestive system - Pathology, 15002, Blood - Blood and lymph studies, 15004, Blood - Blood cell studies, 16006, Respiratory system - Pathology, 17002, Endocrine - General, 17008, Endocrine - Pancreas, 25000, Pediatrics, 25503, Development and Embryology - Pathology, 31000, Physiology and biochemistry of bacteria, 34502, Immunology - General and methods , 36002, Medical and clinical microbiology - Bacteriology, Allied Medical Sciences, Human Medicine, Medical Sciences, granulocyte immune system, blood and lymphatics, lymphocyte immune system, blood and lymphatics, monocyte immune system, blood and lymphatics, mononuclear cell immune system, blood and lymphatics, plasma blood and lymphatics, red blood cell blood and lymphatics, density gradient centrifugation laboratory techniques, gas chromatography laboratory techniques, chromatographic techniques, hepatic ultrasound clinical techniques, diagnostic techniques, multiple regression analysis mathematical and computer techniques, Clinical Endocrinology, Gastroenterology, Medical Genetics, Metabolism, Pediatrics

DOIs:
10.1097/MPG.0b013e318249438c

Source: dtu
Source-ID: n:oai:DTIC-ART:biosis/366880844::24929
Publication: Research - peer-review › Journal article – Annual report year: 2012
Maternal Intake of Fish Oil but not of Linseed Oil Reduces the Antibody Response in Neonatal Mice

Dietary levels of n-3 PUFA are believed to influence the immune system. The importance of the source of n-3 PUFA is debated. This study addressed how the content and source of n-3 PUFA in the maternal diet influenced tissue FA composition and the immune response to ovalbumin (OVA) in mice pups. From the day of conception and throughout lactation, dams were fed diets containing 4% fat from linseed oil (LSO), fish oil (FO) or a n-3 PUFA-deficient diet (DEF). Pups were injected with OVA within 24 h of birth and sacrificed at weaning (day 21). Overall, the content of n-3 PUFA in milk, liver and spleen reflected the source and only minor differences were observed in brain phospholipid 22:6n-3. The source had only limited influence on the n-3 PUFA accretion in peripheral tissue, with most pronounced differences in the spleen. The marine PUFA-group had reduced levels of total OVA-specific antibodies and OVA-IgG1 titers in the pup blood, while the response in the LSO-group did not differ from that in the DEF-group. There were no statistical differences in the cytokine responses to OVA-stimulated splenocytes, but the decrease in IgG1 was paralleled by an increase in IFNγ-production and a decrease in IL-6-production. Our results indicate that maternal intake of FO, but not of LSO, changes the offspring's antigen-specific response and potentially increases Th1-polarization.

General information
State: Published
Organisations: Department of Systems Biology, Technical University of Denmark, University of Copenhagen
Authors: Lauritzen, L. (Ekstern), Kjær, T. M. R. (Ekstern), Porsgaard, T. (Intern), Fruekilde, M. (Intern), Mu, H. (Ekstern), Frøkiær, H. (Ekstern)
Pages: 171-178
Publication date: 2011
Main Research Area: Technical/natural sciences

Publication information
Journal: Lipids
Volume: 46
Issue number: 2
ISSN (Print): 0024-4201
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.693 SNIP 0.77 CiteScore 1.94
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.782 SNIP 0.744 CiteScore 1.96
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.792 SNIP 0.876 CiteScore 2.07
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.903 SNIP 0.976 CiteScore 2.59
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.888 SNIP 1.048 CiteScore 2.5
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.765 SNIP 0.931 CiteScore 2.3
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.798 SNIP 0.898
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.694 SNIP 0.892
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.707 SNIP 0.841
Scopus rating (2007): SJR 0.741 SNIP 0.904
Scopus rating (2006): SJR 0.83 SNIP 0.788
Web of Science (2006): Indexed yes
The protease inhibitors ritonavir and saquinavir influence lipid metabolism: a pig model for the rapid evaluation of new drugs

Background: Studies of the effects of antiretroviral drugs on lipid metabolism are limited by the availability of suitable models. We have thus developed an animal model utilising Gottingen mini-pigs. The normal lipid metabolism of mini-pigs closely reflects that of humans and they are expected to have similar reactions to antiretroviral drugs. Methods: The pigs were treated orally with high doses of the protease inhibitors ritonavir and saquinavir for 4 weeks. The model allows repeated concomitant biopsies from liver, muscle, adipose tissue and plasma samples. Results: The study showed a general decrease in polyunsaturated fatty acids; changes in both saturated and monounsaturated fatty acids were also apparent after antiretroviral treatment. The changes were observed after 4 weeks of treatment. At 4 weeks post-treatment, the levels of all fatty acids were lower compared with pretreatment levels, suggesting a prolonged effect of the antiretroviral drug treatment lasting beyond the 4 week post-treatment observation period. Conclusions: The Gottingen mini-pig model is a promising animal model for rapid screening of the metabolic effects induced by antiretroviral drugs.
Postprandial lipid responses of butter blend containing fish oil in a single-meal study in humans

The postprandial effects of a butter product containing fish oil were investigated in a single-meal, randomized crossover study with a commercial butter product as the control. Twelve healthy males consumed two test meals with (13)C-labelled cholesterol (45 mg) and either an interesterified butter blend with fish oil (352 mg n-3 long-chain PUFA (LCPUFA)) or the commercial butter blend. Blood samples were collected after the meals and in the fasting condition on the test day and the following morning, and were analysed for cholesterol absorption, plasma lipid profile and fatty acid composition. No significant difference in the postprandial plasma fatty acid composition was observed between the groups, neither difference in cholesterol absorption, plasma cholesterol or the cholesterol contents of plasma lipoproteins. The incorporation of fish oil in the butter resulted in a significant lower concentration of triacylglycerols in the plasma 2 h after the meal in comparison with the commercial butter blend (p = 0.02); there was, however, no significant difference 24 h after the meal. In conclusion, fish oil-enriched butter blend provides a source to increase the intake of n-3 LCPUFA in the population, but has no acute effect on cholesterol absorption and plasma cholesterol concentration in human.

General information
State: Published
Organisations: Department of Systems Biology, Center for Biological Sequence Analysis
Authors: Overgaard, J. (Intern), Porsgaard, T. (Intern), Guo, Z. (Intern), Lauritzen, L. (Ekstern), Mu, H. (Intern)
Pages: 1140-1146
Publication date: 2008
Main Research Area: Technical/natural sciences

Publication information
Journal: Molecular Nutrition & Food Research
Volume: 52
Issue number: 10
ISSN (Print): 1613-4125
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Butter blend containing fish oil improves the level of n-3 fatty acids in biological tissues of hamster

Many studies have shown beneficial effects of long chain n-3 polyunsaturated fatty acids (PUFA) on human health. Regardless of the positive effects of n-3 PUFA, the intake of these fatty acids remains low. An approach to increase the intake of n-3 PUFA in the population is to incorporate fish oil into food. In the present study, fish oil was incorporated into butter blends by enzymatic interesterification. The aim of the study was to investigate the effects of this butter product in comparison with a commercial butter blend and a product produced by interesterification but without fish oil. Golden Syrian hamsters received hamster feed blended with one of the three butter products. After 6 weeks of feeding, the fatty acid compositions of plasma, erythrocytes, liver, brain, and visceral fat were determined. The intake of butter product with fish oil resulted in a higher level of n-3 PUFA in plasma, erythrocytes, and liver. The incorporation of n-3 PUFA was significantly higher in phospholipids than in triacylglycerols. The results suggest that enriching butter blends with small amounts of fish oil can be used as an alternative method for improving the level of n-3 PUFA in biological tissues.
Food matrices affect the bioavailability of (n-3) polyunsaturated fatty acids in a single meal study in humans

The aim of this study was to investigate the role of the food matrix on bioavailability of (n - 3) PUFA and oxidative stress in plasma. The study was a randomized, cross-over study and included 12 healthy male participants. The participants ingested a test meal, which consisted of a fitness bar, a yoghurt drink, eight oil capsules, bread and butter; 4 g of fish oil was incorporated into one of the matrices. Blood samples were collected and fatty acid composition of chylomicrons was determined together with plasma levels of conjugated dienes and alpha-tocopherol. Fish oil incorporated into food products were absorbed differently from those simply administered as supplements alongside of food products, and yoghurt was the best matrix for providing fast absorption of lipids in general, including (n - 3) fatty acids. No significant difference was observed in the level of plasma alpha-tocopherol after ingestion of test meals. (c) 2007 Elsevier Ltd. All rights reserved.
Effects of dietary triacylglycerol structure on plasma and liver lipid levels in rats fed low-fat diets containing n-3 polyunsaturated fatty acids of marine origin

General information
State: Published
Organisations: Department of Systems Biology, Food Production Engineering
Authors: Porsgaard, T. (Intern), Xu, X. (Intern), Mu, H. (Intern)
Pages: 456-464
Publication date: 2006

Host publication information
Title of host publication: Seafood research from fish to dish: Quality, safety and processing of wild and farmed fish
Place of publication: Wageningen, The Netherlands
Publisher: Academic Publishers
Editors: Luten, J., Jacobsen, C., Bakaert, K., Sæbø, A., Oehlenschläger, J.
Main Research Area: Technical/natural sciences
Lymphatic fatty acids in canine with pharmaceutical formulations containing structured triacylglycerols

The intramolecular structure of dietary triacylglycerols (TAG) influences absorption. In this study, two different pharmaceutical formulations were compared containing TAG differing in fatty acid profiles and intramolecular structures: LML and MLM, where M represented medium-chain fatty acids (MCFA; 8:0) and L represented long-chain fatty acids (LCFA). Lymph was collected from thoracic duct-cannulated canines for 12 h and the fatty acid composition was determined. The lymphatic transport of total fatty acids was significantly higher than the amount dosed; hence, the small exogenously dosed lipid recruited a large pool of endogenous fatty acids. The LML vehicle led to a significantly higher total fatty acid transport than the MLM vehicle. The amount of 8:0 recovered in lymph was almost similar and low for both groups. The amount of LCFA recovered from the animals dosed with the LML vehicle was generally higher than from the animals dosed with the MLM vehicle; however, statistically significant differences were only found for 18:0 and 18:3n-3. In conclusion, these results indicated that the fatty acid profile and intramolecular structure of administered TAG influenced the absorption of fatty acids in canines, also when the TAG was incorporated into a pharmaceutical formulation in low amounts.
The Form of Dietary Conjugated Linoleic Acid Does Not Influence Plasma and Liver Triacylglycerol Concentrations in Syrian Golden Hamsters

General information
State: Published
Organisations: Department of Systems Biology
Authors: Porsgaard, T. (Intern), Xu, X. (Intern), Mu, H. (Intern)
Pages: 2201-2206
Publication date: 2006
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Nutrition
Volume: 136
ISSN (Print): 0022-3166
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.93 SJR 1.956 SNIP 1.335
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.271 SNIP 1.505 CiteScore 4.08
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.089 SNIP 1.596 CiteScore 4.13
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Clinical studies with structured triacylglycerols

General information
State: Published
Organisations: Department of Systems Biology
Authors: Porsgaard, T. (Intern)
Pages: 419-433
Publication date: 2005

Host publication information
Title of host publication: Handbook of Functional Lipids
Publisher: CRC
Edition: 1
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 184388
Publication: Research - peer-review › Book chapter – Annual report year: 2005
Differences in the intramolecular structure of structured oils do not affect pancreatic lipase activity in vitro or the absorption by rats of (n-3) fatty acids

General information
State: Published
Organisations: Department of Systems Biology, Food Production Engineering, Enzyme and Protein Chemistry
Authors: Porsgaard, T. (Intern), Xu, X. (Intern), Gøttsche, J. (Intern), Mu, H. (Intern)
Pages: 1705-1711
Publication date: 2005
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Nutrition
Volume: 135
ISSN (Print): 0022-3166
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.93 SJR 1.956 SNIP 1.335
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.271 SNIP 1.505 CiteScore 4.08
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.089 SNIP 1.596 CiteScore 4.13
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.172 SNIP 1.614 CiteScore 4.6
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.919 SNIP 1.671 CiteScore 4.45
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.838 SNIP 1.603 CiteScore 4.32
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.7 SNIP 1.575
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.559 SNIP 1.545
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 1.575 SNIP 1.42
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.579 SNIP 1.484
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.706 SNIP 1.562
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.51 SNIP 1.403
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 1.399 SNIP 1.45
Effects of antioxidants on the lipase-catalyzed acidolysis during production of structured lipids

In the production process of structured lipids, the influence of the addition of antioxidants before enzymatic acidolysis was investigated. Eight different antioxidants were screened: butylated hydroxyanisole, butylated hydroxytoluene, propyl gallate, ascorbyl palmitate, citric acid, EDTA, a tocopherol blend and lecithin. As substrates, oils with different degrees of unsaturation (rapeseed, safflower or fish oil) as well as caprylic and capric acids were used. Enzyme activity (measured as percent incorporation of caprylic/capric acid into the oils) was not significantly influenced by the addition of antioxidants, neither in a batch process nor in a packed-bed reactor operation. a-Tocopherol concentrations remained stable for those mixtures where tocopherols were added. Primary oxidation products (measured as peroxide values) were reduced after acidolysis in the packed-bed reactor, likely due to the adsorption in the enzyme bed. The study shows that the addition of antioxidants before enzymatic reactions has no negative effects on the reaction progress. None of the antioxidants chosen had a significant positive effect on either the reaction process or the oxidative status of the structured lipid produced.

General information
State: Published
Organisations: Department of Biotechnology, Section for Aquatic Lipids and Oxidation, National Institute of Aquatic Resources, Department of Systems Biology
Pages: 464-468
Publication date: 2005
Main Research Area: Technical/natural sciences

Publication information
Journal: European Journal of Lipid Science and Technology
Volume: 107
Issue number: 7-8
ISSN (Print): 1438-7697
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.06 SJR 0.71 SNIP 1.024
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.642 SNIP 0.881 CiteScore 1.85
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.737 SNIP 1.051 CiteScore 1.98
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.852 SNIP 1.124 CiteScore 2.16
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.873 SNIP 1.207 CiteScore 2.06
ISI indexed (2012): ISI indexed yes
Lymphatic transport in rats of structured oils containing conjugated linoleic acids

General information
State: Published
Organisations: Department of Systems Biology
Pages: 677-684
Publication date: 2005
Main Research Area: Technical/natural sciences

Publication information
Journal: Lipids
Volume: 40
Original language: English
Source: orbit
Source-ID: 227826
Publication: Research - peer-review › Journal article – Annual report year: 2005

Size and number of lymph particles measured by a particle sizer during absorption of structured oils in rats

General information
Effect of orlistat on fat absorption in rats: A comparison of normal rats and rats with diverted bile and pancreatic juice

Orlistat is a specific inhibitor of pancreatic and gastric lipases leading to decreased absorption of fat. In the present study, we measured the effect of orlistat on lymphatic fat transport in rats following intake of oils very different in FA composition and TAG structure, and compared this with the transport in normal rats and rats with fat malabsorption. Rats were subjected to cannulation of the main mesenteric lymph duct, and a feeding catheter was inserted into the stomach. In addition, malabsorbing rats were cannulated in the common bile and pancreatic duct. Emulsified safflower, fish, and randomized oils were administered, and lymph was collected for 24 h and analyzed for FA composition. Administration of 25 mg orlistat together with the dietary oils resulted in very small changes from baseline lymphatic transport, indicating that inhibition of the fat absorption was almost complete and furthermore that the source of fat had no influence on the inhibitory effect of orlistat. Orlistat did not interfere with the absorption of the hydrolysis products, since high absorption of sn-2 MAG and FFA (oleic acid) mixed with orlistat was observed. The baseline lymphatic transport in the orlistat group was higher than in the malabsorbing group, but this was the result of generally lower transport of endogenous FA in the malabsorbing group, presumably caused by the absence of bile FA. The transport of FA in normal rats was several-fold higher than the transport after orlistat addition and in malabsorbing rats. Thus, this study showed that orlistat inhibited fat hydrolysis, and thereby lymphatic absorption, almost completely independently of the fat administered.
Gastric emptying in rats following administration of a range of different fats measured as acetaminophen concentration in plasma

Aim: To investigate the gastric emptying upon administration of ten different fats in order to determine whether major differences in fatty acid profiles resulted in differences in gastric emptying. Methods: Gastric emptying was measured as the appearance of acetaminophen in plasma which represents an indirect measure of gastric emptying. Emulsified fats with added acetaminophen were fed by gavage to rats, and the plasma concentration of acetaminophen was followed for 3 h by repeated blood sampling from the carotid artery. The fats administered included rapeseed, corn, and fish oils, lard, and cocoa butter as well as different structured lipids containing decanoic acid (10:0) and long-chain n-3 polyunsaturated fatty acids of marine origin. Overall, these fats had wide variations in fatty acid compositions and triacylglycerol structures.

Results: No statistically significant differences were observed in gastric emptying between the groups fed the different fats, except for the emptying of tridecanoin (tri-10:0) that was statistically significantly slower than that of randomized oil, cocoa butter, and rapeseed oil (p <0.05). The slower emptying of tri-10:0 could be caused by a lower caloric intake of this fat as compared with the other fats, because similar weights of fat were administered. Conclusion: The gastric emptying of fat was not influenced by fatty acid composition and triacylglycerol structure of the fats administered.
Absorption and metabolism of structured lipids

General information
State: Published
Organisations: Enzyme and Protein Chemistry, Department of Systems Biology, Food Biotechnology and Engineering Group
Authors: Porsgaard, T. (Intern), Straarup, E. M. (Intern), Mu, H. (Intern), Xu, X. (Intern), Høy, C. (Intern)
Pages: 017-AGFD

Source: orbit
Source-ID: 46249
Publication: Research - peer-review > Journal article – Annual report year: 2003
Production of structured lipids in a packed-bed reactor with Thermomyces lanuginosa lipase

Lipase-catalyzed interesterification between fish oil and medium-chain TAG has been investigated in a packed-bed reactor with a commercially immobilized enzyme. The enzyme, a Thermomyces lanuginosa lipase immobilized on silica by granulation (Lipozyme TL IM; Novozymes A/S, Bagsvaerd, Denmark), has recently been developed for fat modification. This study focuses on the new characteristics of the lipase in a packed-bed reactor when applied to interesterification of TAG. The degree of reaction was strongly related to the flow rate (residence time) and temperature, whereas formation of hydrolysis by-products (DAG and FFA) were only slightly affected by reaction conditions. The degree of reaction reached equilibrium at 30-40 min residence time, and the most suitable temperature was 60 degrees C or higher with respect to the maximal degree of reaction. The lipase was stable in a 2-wk continuous operation without adjustment of water content or activity of the column and the substrate mixture.

General information
State: Published
Organisations: Department of Systems Biology
Authors: Xu, X. (Intern), Porsgaard, T. (Intern), Zhang, H. (Intern), Adler-Nissen, J. (Intern), Høy, C. (Intern)
Pages: 561-565
Publication date: 2002
Main Research Area: Technical/natural sciences
Absorption by rats of tocopherols present in edible vegetable oils

General information
State: Published
Organisations: Department of Biochemistry and Nutrition
Authors: Porsgaard, T. (Intern), Høy, C. (Intern)
Pages: 1073-1078
Publication date: 2000
Main Research Area: Technical/natural sciences

Publication information
Journal: Lipids
Volume: 35
Issue number: 10
Original language: English
Source: orbit
Source-ID: 177479
Publication: Research - peer-review › Journal article – Annual report year: 2000

Effect of simulated household heating on fat absorption

General information
State: Published
Organisations: Department of Biochemistry and Nutrition
Authors: Porsgaard, T. (Intern), Høy, C. (Intern)
Pages: 373-382
Publication date: 2000

Host publication information
Title of host publication: Fat digestion and absorption (Eds.: S. de Vries)
Place of publication: Champaign
Publisher: AOCS Press
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 177491
Publication: Research - peer-review › Article in proceedings – Annual report year: 2000

Lymphatic transport in rats of several dietary fats differing in fatty acid profile and triacylglycerol structure

General information
State: Published
Organisations: Department of Biochemistry and Nutrition
Authors: Porsgaard, T. (Intern), Høy, C. (Intern)
Pages: 1619-1624
Publication date: 2000
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Nutrition
Volume: 130
Issue number: 6
ISSN (Print): 0022-3166
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
Time-related fatty acid profiles of plasma and lymph after gastric administration of fats to rats fed high-fat diets

We examined in rats the intestinal absorption of 4 different dietary fats (rapeseed oil (RO), rapeseed oil interesterified with decanoic acid (R/C10), olive oil (OO), and butter) after feeding a high-fat (30 wt-%) diet rich in trans-fatty acids (mainly trans-C18:1) for 3 weeks. The trans-fatty acids were used as markers for the contribution from the endogenous stores to the circulating pool of fatty acids during the absorption, thereby enabling us to measure differences in release of endogenous fatty acids caused by differences in the administered fats. Rats with cannulated left carotid artery were divided into 4 groups after a 24 h fast and fed intragastrically with a fat load. Blood samples were collected regularly and fatty acid compositions as well as insulin and glucagon concentrations were determined (experiment 1). In 2 other groups
of rats the mesenteric lymph duct was cannulated and they were fed intragastrically either R/C10 or butter. Lymph was collected and analyzed for fatty acid composition (experiment 2). The fatty acid composition of plasma lipids changed rapidly according to the administered fats and a biphasic response was observed for nearly all fatty acids investigated. Although decreasing during the early absorptive phase a continuous contribution of endogenous trans-C18:1 and arachidonic acid was observed in plasma. Small differences were observed between the 4 dietary fats. In lymph, the transport of trans-C18:1 rose markedly after butter administration partly caused by the content of this fatty acid in butter, while the transport of trans-C18:1 after R/C10 was unchanged although still transported at a reasonable high rate. The transport of arachidonic acid increased after administration of both butter and R/C10. Minor changes were observed in plasma concentrations of insulin and glucagon during the absorption. (C) Elsevier Science Inc.

**General information**

State: Published
Organisations: Department of Biochemistry and Nutrition
Authors: Porsgaard, T. (Intern), Straarup, E. M. (Ekstern), Brand, C. L. (Ekstern), Høy, C. (Intern)
Pages: 559-573
Publication date: 2000
Main Research Area: Technical/natural sciences

**Publication information**

Journal: Nutrition Research
Volume: 20
Issue number: 4
ISSN (Print): 0271-5317
Ratings:
- BFI (2018): BFI-level 1
- Web of Science (2018): Indexed yes
- BFI (2017): BFI-level 1
- Web of Science (2017): Indexed Yes
- BFI (2016): BFI-level 1
- Scopus rating (2016): SJR 1.095 SNIP 1.002 CiteScore 3.03
- BFI (2015): BFI-level 1
- Scopus rating (2015): SJR 1.208 SNIP 1.062 CiteScore 3.12
- BFI (2014): BFI-level 1
- Scopus rating (2014): SJR 1.081 SNIP 1.074 CiteScore 2.95
- BFI (2013): BFI-level 1
- Scopus rating (2013): SJR 0.998 SNIP 1.175 CiteScore 3.05
- ISI indexed (2013): ISI indexed yes
- BFI (2012): BFI-level 1
- Scopus rating (2012): SJR 0.83 SNIP 0.994 CiteScore 2.55
- ISI indexed (2012): ISI indexed yes
- BFI (2011): BFI-level 1
- Scopus rating (2011): SJR 0.802 SNIP 1.073 CiteScore 2.51
- ISI indexed (2011): ISI indexed yes
- BFI (2010): BFI-level 1
- Scopus rating (2010): SJR 0.645 SNIP 0.802
- Web of Science (2010): Indexed yes
- BFI (2009): BFI-level 1
- Scopus rating (2009): SJR 0.418 SNIP 0.55
- BFI (2008): BFI-level 1
- Scopus rating (2008): SJR 0.334 SNIP 0.426
- Scopus rating (2007): SJR 0.347 SNIP 0.5
- Web of Science (2007): Indexed yes
- Scopus rating (2006): SJR 0.338 SNIP 0.473
- Scopus rating (2005): SJR 0.373 SNIP 0.503
- Scopus rating (2004): SJR 0.294 SNIP 0.398
- Web of Science (2004): Indexed yes
- Scopus rating (2003): SJR 0.331 SNIP 0.463
- Web of Science (2003): Indexed yes
Absorption in rats of rapeseed oil, soybean oil, and sunflower oils before and following moderate heating

General information
State: Published
Organisations: Department of Systems Biology, Food Production Engineering
Authors: Porsgaard, T. (Intern), Zhang, H. (Intern), Høy, C. (Intern)
Pages: 727-732
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Journal: Lipids
Volume: 34
Original language: English
Source: orbit
Source-ID: 177481
Publication: Research - peer-review › Journal article – Annual report year: 2000

Absorption in rats of rapeseed, soybean, and sunflower oils before and following moderate heating

General information
State: Published
Organisations: Department of Biochemistry and Nutrition, Department of Biotechnology, Biotechnological Institute
Authors: Porsgaard, T. C. (Intern), Zhang, H. (Intern), Nielsen, R. G. (Ekstern), Høy, C. (Intern)
Pages: 727-732
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Journal: Lipids
Volume: 34
Issue number: 7
Original language: English
Source: orbit
Source-ID: 193825
Publication: Research - peer-review › Journal article – Annual report year: 1999

Lymphatic Fatty Acid Absorption Profile During 24 Hours After Administration of Triglycerides to Rats

General information
State: Published
Organisations: Department of Biochemistry and Nutrition
Authors: Porsgaard, T. C. (Intern), Straarup, E. M. (Intern), Høy, C. (Intern)
Pages: 103-107
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Projects:

Er der sammenhæng mellem leverenzyme, ultramæssig struktur, portal veneflow og syntesen af langkædet flerumættede fedtsyrer hos patienter med sysitsk fibrose

Enzyme and Protein Chemistry

Department of Systems Biology
Period: 12/03/2003 → 31/12/2005
Number of participants: 1
Project Manager, organisational:
Porsgaard, Trine (Intern)

Financing sources
Source: Forsk. Private danske - Andre
Name of research programme: Forsk. Private danske - Andre
Amount: 60,000.00 Danish Kroner

Dietary fats: Technology - Quality- Nutrition
The production of interesterified fats is optimized in laboratory scale as well as in pilot plant. The intestinal absorption of the fats is examined in animal models and the fats are incorporated into food.

Department of Biochemistry and Nutrition
National Institute of Aquatic Resources

Department of Systems Biology
Period: 01/01/1999 → 31/12/2003
Number of participants: 9
Project participant:
Porsgaard, Trine (Intern)
Jensen, Karen (Intern)
Nielsen, Nina Skall (Intern)
Mu, Huiling (Intern)
Børresen, Torger (Ekstern)
Jacobsen, Charlotte (Ekstern)
Adler-Nissen, Jens (Ekstern)
Xu, Xuebing (Ekstern)
Project Manager, organisational:
Hey, Carl-Erik (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 14,300,000.00 Danish Kroner

Studies on the absorption of vegetable oils in the rat

Department of Systems Biology
Number of participants: 4
Phd Student:
Porsgaard, Trine (Intern)
Supervisor: Christensen, Michael Søberg (Intern)
Main Supervisor: Høy, Carl-Erik (Intern)
Examiner: Christophe, Armand (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Sektorministerium, Stip-SU
Project: PhD

Rapeseed oil in human nutrition.
The project aims at substituting a major part of the dietary fats with rapeseed oil. Rapeseed oil is improved by selection of plants. The effects of processing and storage are examined. Rapeseed oil is compared with alternative fats in both animal models for fat absorption and in human studies.

Department of Biochemistry and Nutrition
Department of Biotechnology
Department of Systems Biology
Royal Veterinary and Agricultural University
DLF-TRIFOLIUM A/S
Bioteknologisk Institut
Period: 01/01/1995 → 30/12/1999
Number of participants: 10
Project participant:
Nielsen, Nina Skall (Intern)
Porsgaard, Trine (Intern)
Nielsen, Kirsten (Intern)
Pedersen, Bente (Intern)
Adler-Nissen, Jens (Ekstern)
Marckmann, Peter (Ekstern)
Sandstrøm, Brittmarie (Ekstern)
Okkels, Finn (Ekstern)
Jacobsen, Ejlif (Ekstern)
Project Manager, organisational:
Høy, Carl-Erik (Intern)

Financing sources
Source: Unknown
Name of research programme: Ukendt
Amount: 3,530,000.00 Danish Kroner
Source: Unknown
Name of research programme: Ukendt
Amount: 2,000,000.00 Danish Kroner
Project