Importance of food habits and microbiota for gastrointestinal health and cardiometabolic risk

Background

The importance of microbiota for human health has received great attention during the last years. The advances in analyzing microbiota composition have contributed to the recent knowledge of gut microbiota in development of obesity and other metabolic diseases. Gut microbiota composition differs between lean and obese individuals [1] and between diabetic and non-diabetic individuals [2], and the composition changes during weight loss [1]. Studies have also shown difference in gut microbiota in patients with gastrointestinal diseases such as Crohn’s disease and ulcerative colitis compared to healthy controls [3-5]. The importance of microbiota for the development of irritable bowel syndrome has been discussed [6, 7]. Diet is one of the major determinants of gut microbiota composition, and interactions between dietary factors and gut bacterial genes (metagenome) may contribute to disease risk [8]. A short-term trial with either plant-based or animal-based diets has recently shown to alter the human gut microbiome [9]. Periodontal diseases have been associated with atherosclerosis, and oral as well as gut microbiota showed correlation with bacterial diversity of atherosclerotic plaque samples [10]. The evidence from humans living under normal conditions is largely unknown and unclear, and the so far published studies have been based on relatively small study cohorts. We therefore want to study the role of dietary factors and oral and gut microbiota for gastrointestinal health and cardiometabolic risk in a large number of individuals.

Aim of the project

The overall aim of this project is to clarify the relation between food habits and gastrointestinal health and cardiometabolic risk by taking their effect on oral and gut microbiota composition into account. We will also investigate the importance of oral and gut microbiota on prevalence and incidence of cardiometabolic and gastrointestinal diseases.

Specific aims:

1. Identify dietary factors related to oral and gut microbiota composition in a large number of free-living Swedish individuals; 2. Correlate oral and gut microbiota composition to gastrointestinal symptoms; 3. Correlate oral and gut microbiota composition to cardiometabolic risk factors; 4. To investigate if oral and gut microbiota composition associates with incidence of cardiometabolic diseases (cardiovascular disease and type 2 diabetes) and gastrointestinal diseases (Crohn’s disease, ulcerative colitis, celiac disease and irritable bowel syndrome) using register-based follow-up.

Composition of the team

This inter-disciplinary project will be impossible to conduct without the various expertise held by the included researchers. The team members come from both the medical faculty and LTH. This group of researchers, with four of the six group member being young researchers, is recently formed to address the research questions. With expertise in nutrition, epidemiology, genetics, gene x diet interactions, analysis of microbiota, gastrointestinal conditions, cardiometabolic risk factors, dentistry and oral health we have the ability to conduct this project within our infrastructure.

Project description

Data collection. We will for this project use material from the Malmö Offspring Study (MOS). MOS is an inter-generational study where all children and grand-children to individuals in the population-based Malmö Diet and Cancer - Cardiovascular (MDC-CV) cohort are invited to participate. The
general aim of the MOS study is to map factors of importance for family traits of chronic diseases (e.g. cardiovascular disease, diabetes, cancer, and dementia) in parents participating in the MDC-CV cohort and their offspring. However, MOS also represents in itself a new cohort for future follow-up studies.

Malmö Diet and Cancer (MDC) study is a population-based prospective cohort (n=28,098, mean age 57 years, 60% women) with baseline examination between 1991 and 1996 [11, 12]. The data collection consisted of measuring dietary habits, information on lifestyle and demographic factors, anthropometric measurements and blood samples. A random sample (n=6,103) was invited for an additional visit (the MDC-CV subcohort) including measurement of carotid intima media thickness and plaque prevalence, biomarkers as well as genome-wide data. During 2007-2012, individuals in this MDC-CV subcohort were invited to participate in a re-examination (n=3,682) including physical examination, technical investigations and cognitive testing.

All offspring (children and grand-children) and a number of spouses to individuals in the MDC-CV study cohort (n=6,103) are invited to participate. There are approximately 15,000 living offspring available. Subjects are invited to examinations at the Clinical Research Unit, Skåne University Hospital, Malmö. Our team is in charge for the collection of dietary data and faecal samples for microbiota analysis (SC1631 collection at Region Skånes Biobank).

Only a few studies have collected data, including blood samples, across generations. The most well-known is the Framingham Offspring Study where the children (n=5,124) and grand-children (n=4,095) of index individuals (n=5,209) have been invited; however lacking more extensive phenotypic data from the parental generation. The MOS study cohort is unique with detailed phenotype information from previous generation. It is also unique with detailed information on dietary habits and collection of feces and oral samples, as well as detailed information on cardiometabolic risk factors and gastrointestinal health. Minimizing measurement error during the dietary data collection is of great concern, in order to avoid serious miss-classification of dietary exposure, which may lead to observation of attenuated or incorrect associations. Consequently the choice of diet assessment method is crucial for the possibility to observe true diet associations.

**Dietary data collection.** Dietary intakes are recorded via the internet during 4 days with the method used in the latest national diet survey (Riksmaten 2010-2011) from the Swedish National Food Administration. The diet assessment material includes (i) a food diary, (ii) a portion guide for estimation of portion sizes showing pictures of 24 different food categories (with four to eight different reference sizes for each category), and (iii) an information folder, “How to keep food records”. The participants are asked to keep their normal dietary habits during these days. To assure high compliance and high quality dietary data, the participants receive a telephone call from a nutritionist on the second day of their record period. In addition to the diet record a short food propensity questionnaire is used, in order to obtain information about usual intakes of key foods earlier identified to be consumed irregularly or seldom (e.g. different types of vegetables and fish). A preliminary report from the dietary validation study within the Swedish CArdioPulmonary bioImage Study (SCAPIS), which we were involved to perform, indicates that the ability to rank individuals on energy intakes was better with Riksmaten 2010-2011 method (weighted Kappa of \( \kappa_w=0.26 \)) than with a more rapid food frequency method (MiniMeal-Q) (\( \kappa_w=0.15 \)), when comparing the two methods with the objective total energy expenditure measured with the doubly labeled water method.

**Microbiota analysis.** Feces and oral swabs of the gums and teeth will be collected. Bacterial DNA from fecal and oral microbiota samples will be extracted and amplified with PCR using previously published protocols [10] and thereafter sequenced on a Miseq instrument (Illumina) available at the Antidiabetic Food Center, LU. Microbiota sequences will be analyzed with the software QIIME, resulting in the relative abundance of the respective operational taxa units, \( \alpha \)-diversity (Shannon diversity index) and \( \beta \)-diversity (UniFrac and subsequent principal component analysis). The
functional capabilities of the community will be determined by comparing the sequences to functional databases e.g. Kyoto Encyclopedia of Genes and Genomes (KEGG) and Basic Local Alignment Search Tool (BLAST).

**Cardiometabolic and gastrointestinal traits.** Cardiometabolic biomarkers (including blood lipids, glucose, insulin and inflammation markers) are measured in overnight fasting blood. Clinical examination includes measurement of body composition, blood pressure, and pulse rate. Characterization of gastrointestinal symptoms is collected with a self-administered questionnaire.

Table 1: Summary of the exposures (dietary intakes, gut and oral microbiota), outcomes (cardiometabolic risk and gastrointestinal health) and other variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dietary intake</td>
<td>Web-based 4 days dietary records developed by the Swedish National Food Administration. Additional questions are asked on foods habits.</td>
</tr>
<tr>
<td>Gut microbiota</td>
<td>Faeces samples for determination of secreted factors as well as a genetic screening for evaluation of the gut bacterial content and composition</td>
</tr>
<tr>
<td>Oral microbiota</td>
<td>Samples are taken from teeth, bucca, saliva, tongue dorsum and index teeth</td>
</tr>
<tr>
<td>Cardiometabolic traits</td>
<td>Information on cardiometabolic risk factors and genome-wide genetic screening data in parents and grandparents is already available (15 years follow-up) Blood measurements: fasting plasma glucose, serum lipids (total cholesterol, HDL-C, LDL-C, triglycerides, LpLA2, Lp(a)), inflammation biomarkers Anthropometrics: weight, height, waist and hip circumference, fat mass and fat-free mass Other measurements: arterial stiffness, arteria carotis morphology and function, 24-h blood pressure measurements Cardiovascular diseases and type 2 diabetes from registers</td>
</tr>
<tr>
<td>Gastrointestinal traits</td>
<td>Questions on diagnosis of gastrointestinal diseases Validated questionnaire for assessing gastrointestinal symptoms</td>
</tr>
<tr>
<td>Other variables</td>
<td>Questions on family history, medical history, lifestyle, education, intellectual and cultural activities, sibling rank, and social factors</td>
</tr>
</tbody>
</table>

**Data analysis.**

**Diet – microbiota (aim 1)**

We will define clusters of gut and oral microbiota bacterial constitution (enterotypes) based on intake of selected nutrients and foods. We will examine correlation between dietary factors (macronutrients, selected micronutrients and food groups) and microbiota composition. We will focus on nutrients and foods that earlier have been shown or indicated to affect the risk of type 2 diabetes and cardiometabolic diseases (sugar-sweetened beverages, protein and meat intake, food sources of fat, fiber). Further, we will investigate correlation between gut and oral microbiota constitution, and relate this to dietary factors above.

**Microbiota – gastrointestinal symptoms (aim 2)**

The gut microbiota bacterial constitution (bacterial enterotypes) will be correlated to GI diseases, GI symptoms and other concomitant diseases, adjusted for use of drugs, and lifestyle factors including diet (see above), smoking, and alcohol.

**Microbiota – cardiometabolic risk factors (aim 3)**

The gut microbiota bacterial constitution (bacterial enterotypes) will be correlated to cardiometabolic risk traits (see table), and to genetic risk factors of these traits.

**Microbiota – disease incidence (aim 4)**

We will use Cox regression to investigate association between microbiota composition and incidence of cardiovascular disease and type 2 diabetes (from register-based follow-up) and gastrointestinal diseases (Crohn’s disease, ulcerative colitis, celiac disease and irritable bowel syndrome). We will
take into account potential confounding factors (e.g. sex, age, obesity, smoking habits, physical activity, education, socioeconomic status, and ethnicity).

**Time plan:** The pilot phase of the study with 500 offspring of MDC participants with early cardiovascular disease was finished in March 2014. The study is now expanding for the main study of approximately 6,000 individuals with funding from Swedish research council and Heart and Lung Foundation. A pilot phase of first feces samples of 167 individuals (50% females) with diet data already collected are under sequencing analysis and this data will be correlated with dietary factors ad family history for early cardiovascular disease during summer 2014. We will start with larger scale statistical analyses and associations during autumn 2014.

**Ethical considerations:** MOS has obtained ethical approval at the regional ethics committee in Lund (Dnr 2012/594). Ethical approval has previously been approved for the re-examination of the parents in the MDC Cardiovascular arm cohort 2007-2012 (Dnr. 532/2006 LU) and original application (LU-51-90).

**Importance of the project**

This project will contribute to novel understanding of the importance of microbiota composition and long-term food habits for health. We will for this purpose use a unique novel study cohort with detailed information on dietary habits and newly collected feces and oral samples. In addition, cardiometabolic risk markers and long-term follow-up for incidence of diseases will be available. Clinical information and genetic risk profile of parents and grandparents of the cohort is available. This knowledge will be used as tools for understanding the connection between genetic, environmental (in particular diet) and socioeconomic factors on microbiota (gut and oral) and their interaction on incidence of cardiometabolic and gastrointestinal traits and endpoints. Investigating the role of oral and gut microbiota in a comprehensive prospective cohort study is crucial first step to allow for subsequent intervention studies.

**References**

Description of researchers

Emily Sonestedt, MSc, PhD (suggested coordinator of the creative environment)

Diabetes and cardiovascular disease - genetic epidemiology,
Department of Clinical Sciences Malmö, Lund University

Emily Sonestedt has a MSc in nutrition from Stockholm University and PhD (2008) in public health and nutritional epidemiology from Lund University. She has a position as assistant professor (forskarassistent), and has previously been a visiting researcher at Children’s Hospital Oakland Research Institute, CA, USA. She has funding from Vetenskapsrådet and Swedish society for medical research (SSMF) and is main supervisor for one PhD student. She contributes with expertise in nutrition, epidemiology, statistics, gene x diet interactions and experience on dietary risk factors for cardiovascular disease to this project.

Frida Fåk, PhD, Assoc. Prof.

Applied Nutrition and Food Chemistry, Department of Food Technology, Engineering and Nutrition, LTH

Frida Fåk has a PhD in zoological cell biology (2008, LU) and has been post-doc at University of Gothenburg, in the Fredrik Bäckhed group, where she worked with host-microbiome interactions using next-generation sequencing techniques. She has been Assoc. Prof. in Molecular Nutrition since 2013 and is currently in the start-up phase of her own research team, which consists of 1 PhD student and 1 project assistant. Funding sources include the VINN Excellence Centre Antidiabetic Food Centre, the Direktör Albert Påhlsson Foundation and the Per Håkansson Foundation. Frida will be responsible for the gut microbiota analyses in the project.

Daniel Jönsson, DDS, PhD

Vascular Physiology, Department of Experimental Medical Science, Lund University; Department of periodontology, Faculty of odontology, Malmö University

Daniel Jönsson has a PhD in physiology and periodontology, supervised by Prof. Bengt-Olof Nilsson (2007, LU and Malmö University). He did a two year postdoc at Columbia University, New York, NY, USA 2009 and 2010 funded by the Swedish research council. His postdoc was on the systemic effects of periodontitis. He finished his residency in periodontology March 2014 and is now assistant Professor at Malmö University, and is co-supervising a PhD student at LU. Since coming back from his postdoc in 2011 he has been awarded 1 830 000 SEK in grants from the Swedish research council, Crafoord foundation and others. His current research is on the oral microbiome, its interaction with antimicrobial peptides and the association between the oral microbiome and systemic diseases. Daniel is responsible for the dental arm of MOS – Malmö Offspring Dental Study, MODS.
Ulrika Ericson, nutritionist, PhD

*Diabetes and cardiovascular disease – genetic epidemiology, Department of Clinical Sciences Malmö, Lund University*

Ulrika Ericson is a nutritionist and has a PhD in public health and nutritional epidemiology from Lund University (2010). She has a position as assistant researcher (biträdande forskare). She has been working with diet assessment method development, diet data collection and diet data analysis at Karolinska Institutet and Lund University (the Malmö Diet and Cancer study). She was the Swedish coordinator in the dietary calibration study within the European Investigation into Cancer and Nutrition (EPIC). Ulrika is responsible for the diet data collection in MOS and contributes with her expertise in nutrition, diet assessment methodology, epidemiology, statistics, gene x diet interactions, and experience of dietary risk factors for type 2 diabetes to this project.

Marju Orho-Melander, PhD, professor

*Diabetes and cardiovascular disease – genetic epidemiology, Department of Clinical Sciences Malmö, Lund University*

Marju Orho-Melander is professor of genetic epidemiology. She has MSc in biochemistry from Helsinki University 1995 and she defended her PhD thesis in experimental endocrinology on studies of the human glycogen synthase genes in 1999. Orho-Melander has focused on identification of genes regulating lipid and lipoprotein levels using genome wide association studies and utilizes this information to predict cardiovascular disease and type 2 diabetes in population. Second main field of focus of her research group is interaction between genes and diet in type 2 diabetes, obesity and cardiovascular disease. Her third focus area of research is biomarkers and environmental risk factors linking cardiometabolic disease and cancer. Orho-Melander has the main responsibility for financing the MOS diet and microbiota data collection and analyses. She also contributes with expertise in genetics, genetic statistics, gene-diet interactions and cardiometabolic risk factors to the project.

Bodil Ohlsson, MD, professor

*Division of Internal Medicine, Department of Clinical Sciences Malmö, Lund University*

Bodil Ohlsson is professor of medicine since 2009. She is registered nurse (1982), MD (1991) and specialist of Internal Medicine (2000) and of Gastroenterology and Hepatology (2001). She defended her thesis 1996 on regulation of digestive organs. Her research involves basic research with animal studies and cell culture experiments and clinical experiments in healthy subjects and patients. In recent years, her research has been complemented with clinical studies for evaluation of various examination and treatment methods, and examination of associations between different gastrointestinal diseases and life style factors. She is an expert of functional bowel complaints and dysmotility. Ohlsson has published 120 papers in international scientific journals, has had 7 finished PhD students and 2 on-going. Ohlsson also works as senior consultant at the Department of Internal Medicine, SUS, Malmö. Ohlsson is responsible for a clinical collection of material for questionnaires including clinical data and life style factors, biomarkers, and microbiota, in patients with gut diseases.
Curriculum Vitae - Emily Sonestedt

ACADEMIC DEGREE

**Ph.D.,** Faculty of Medicine (public health, nutrition epidemiology), Lund University  
Thesis: *Plant foods, plasma enterolactone and breast cancer – with a focus on estrogen receptor status and genetic variation*  
Dec 2008

**M.Sc. in Nutrition (nutritionist),** University of Stockholm  
Thesis: *Intake of phytoestrogens among Swedish women and men*  
2003

CURRENT POSITION

**Assistant professor (forskarassistent),** Diabetes and cardiovascular disease – genetic epidemiology, Department of Clinical Sciences, Malmö, Lund University  
Oct 2011-

PREVIOUS POSITIONS

**Postdoctoral fellow,** Diabetes and cardiovascular disease – genetic epidemiology, Department of Clinical Sciences, Malmö, Lund University  
Jan 2010-Sept 2011

**Visiting researcher,** Children’s Hospital Oakland Research Institute, Oakland, CA, USA  
Jan-Aug 2011

**Associate researcher,** Diabetes and cardiovascular disease – genetic epidemiology, and Nutrition epidemiology, Department of Clinical Sciences, Malmö, Lund University  
Jan 2009-Dec 2009

**PhD student,** Nutrition epidemiology, Department of Clinical Sciences, Malmö, Lund University  
Jan 2005-Dec 2008

**Dietician/Dietary interviewer,** University Hospital in Lund  
Jan-Dec 2004

**Fellow student (stipendiat),** Analyzing dietary data, Lund University  
Nov 2003-Dec 2004

**Fellow student (stipendiat),** Analyzing dietary data and developing a food database for phytoestrogens, Karolinska Institute, Stockholm  
Aug-Oct 2003

**Fellow student (stipendiat),** Collecting information on dietary assessment methods for children, Karolinska Institute, Stockholm  
Summer 2002

DEDUCTIBLE TIME

Parental leave: 9.5 months during 2012-2014

GRANTS

- Research grant from Crafoord foundation, 2012 (100 000 SEK)
- 3 years grant as SSMF-researcher, from Swedish Society for Medical Research, 2012 (2 832 000 SEK)
- Research grant from Ernhold Lundström Foundation, 2012 (100 000 SEK)
- Research grant from Albert Pålsson Foundation, 2011 (200 000 SEK)
- Project grant for young researchers from Swedish Research Council (Vetenskapsrådet), 2011 (1800 000 SEK 2012-2014)
- Research grant from Albert Pålsson Foundation, 2010 (120 000 SEK)
- Research grant from UMAS foundation, 2010 (58 000 SEK)
- 2-year postdoctoral stipend from the Swedish Society for Medical Research, 2010 (628 000 SEK)
- Research grant from Crafoord foundation, 2010 (100 000 SEK)
- Research grant from Albert Pålsson Foundation, 2009 (100 000 SEK)
- Scholarship from Diabetesföreningen i Malmö med omnejd, 2009 (3 000 SEK)
- Research grant from Swedish Nutrition Foundation, 2007 (50 000 SEK)
- Research grant from Johanna Andersson Foundation, 2005 (25 000 SEK)

AWARDS

- Swedish Nutrition Foundation award to young nutrition researcher in memory of Nils-Georg Asp, 2013 (50 000 SEK)
- Research prize from Skåneländska Gastronomiska Akademien samt Sparbanksstiftelsen Färs & Frosta, 2011 (100 000 SEK)
- 6 months Visiting Fellowship Award from the International Atherosclerosis Society, 2010 ($8 000)
- Best original presentation in the track “from genetics to personality” at the Nordic Obesity Meeting in Olso, Norway, 2009 (5000 NOK)

**PROFESSIONAL MEMBERSHIPS**

- Member of expert group in nutrition and public health, National Food Administration (Livsmedelsverket), 2013-
- Chairperson of the carbohydrates expert group on revision of the Nordic Nutrition Recommendations, 2010-2013
- Vice president of the Swedish Nutrition Society - south, 2010-2012
- Member of the working group of the Swedish Network in Epidemiology & Nutrition, 2009-present
- Member of the working group of the Swedish Nutrition Society - south, 2004-2008

**SUPERVISOR FOR PHD STUDENTS**

- Sophie Hellstrand (main supervisor), 2010-ongoing (expected degree April 2015)
- Gull Rukh (co-supervisor), 2010-ongoing (expected degree 2015)
- George Hindy (co-supervisor), 2010-ongoing (expected degree December 5, 2014)
- Isabel Drake (co-supervisor), 2010-ongoing (expected degree September 8, 2014)

**LEADERSHIP TRAINING**

- European Nutrition Leadership Programme (Luxembourg, 7 days, 2012)
- Career development program for post doctors at Lund University (LuPOD) 2011

**CONSULTED AS A REFEREE IN THE FOLLOWING JOURNALS**


**SELECTED PEER-REVIEWED PUBLICATIONS (FROM 68 IN TOTAL)**


Sonestedt E, Lyssenko V, Ericson U, Gullberg B, Wirfalt E, Groop L, Orho-Melander M: *Genetic Variation in the Glucose-Dependent Insulintropic Polypeptide Receptor Modifies the Association between Carbohydrate and Fat Intake and Risk of Type 2 Diabetes in the Malmo Diet and Cancer Cohort*. J Clin Endocrinol Metab. 2012 May;97(5):E810-8


CV Frida Fåk

Degrees
Docent (Associate Professor), Applied Nutrition and Food Chemistry, Molecular Nutrition, Lund University, 2013
Fil. Dr. (PhD), Lund University, Zoological Cell Biology, 2008
Fil. Mag. (MS), Lund University, Biology, 2002

Current position
Associate Professor at Applied Nutrition and Food Chemistry, Dept. of Food Technology, Engineering and Nutrition, Lund University. 85 % research, 15 % Teaching. Permanent position. October 2013 –

Post-doc experience
Post-doc at Sahlgrenska Center for Cardiovascular and Metabolic Research, Gothenburg University. Group of Prof. Fredrik Bäckhed. March 2010 – October 2012

Post-doc at Lund University. Feb to Aug 2008

Industry experience
Senior Research Scientist at AstraZeneca. Sept 2009 to March 2010

Project researcher for Probi AB, funded by VINNOVA. Sept 2008 to June 2009

Academic qualifications

- Team leader at Division of Applied Nutrition and Food Chemistry, Lund University 2013 -
- Responsible for gut microbiota analyses in the VINN Excellence Centre “Antidiabetic Food Centre” 2012 -
- Invited Reviewer for 25 papers (Int J Obesity, J Nutr, Br J Nutr, Nutr)
- Opponent to 6 degree projects 2006-2009
- Invited Reviewer for the French Research Council (ANR), 2012
- Responsible for writing and coordinating the ITN EU application MetaMOB 2011
- Total number of peer-reviewed publications: 15. Review papers: 2. Popular scientific papers: 3.

Grants

- 3.000.000 SEK Antidiabetic Food Centre, 2012-2014
- 250.000 SEK Direktör Albert Pålssons Stiftelse, 2014
- 300.000 SEK Håkanssonpriset, 2013
- 200.000 SEK Direktör Albert Pålssons Stiftelse, 2013
- 628.000 SEK Svenska Sällskapet för Medicinsk Forskning, 2011
- 100.000 SEK Direktör Albert Pålssons stiftelse, 2009
- 37.500 SEK Johanna Anderssons Stiftelse, 2009
Application Creative environments 2014

- 9.000 SEK Travel grant from the Royal Physiographic Society in Lund, 2008
- 30.000 SEK The Royal Physiographic Society in Lund, 2004

PhD Student supervision

- Main supervisor to 1 student, 2013 –
- Co-supervisor to 3 students 2012 –

Invited lectures

- EPIHEALTH conference, November 2012, Lund
- ESPGHAN conference, April 2012, Stockholm
- MITOHEALTH Conference, 2011-11-16, Lund
- Nutritional programming, Nantes, 2011-06-05, France
- Probiotikakonferens, SFN, 2010-11-23, Gothenburg

Selected publications


Lactobacillus reuteri prevents diet-induced obesity in Apoe-/- mice. Fåk F and Bäckhed F. PloS One; 7, e46837, 2012


Popular scientific papers:
- Kan tarmbakterier påverka glukosmetabolism och Typ 2-diabetes? Best Practice Diabetes, 2011

Curriculum Vitae – Daniel Jönsson
<table>
<thead>
<tr>
<th>Year</th>
<th>Education</th>
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<tbody>
<tr>
<td>2014</td>
<td>Assistant Professor and Periodontologist, Malmö University.</td>
</tr>
<tr>
<td>2011-2014</td>
<td>Postdoctoral Research Associate, Malmö University.</td>
</tr>
<tr>
<td>2009-2010</td>
<td>Postdoctoral Research Fellow at Columbia University, New York, NY, USA.</td>
</tr>
<tr>
<td>2008-2014</td>
<td>Residency in Periodontics at Malmö University. 3 years full time.</td>
</tr>
<tr>
<td>2007</td>
<td>PhD in Odontology, Malmö University.</td>
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<td>Research Grand Prix (lecturing competition). 3rd price in the national competition.</td>
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<td>2012</td>
<td>IADR Lion Dental Research Award for Junior Investigators.</td>
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<td>2012</td>
<td>Göran Forsell Award for Young Investigators</td>
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<td>2013</td>
<td>The Crafoord Foundation, 200 000 SEK</td>
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<td>2013</td>
<td>The Lars Hierta Memorial Foundation, 50 000 SEK.</td>
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<td>2012</td>
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<td>2012</td>
<td>Thureus Foundation, 75 000 SEK</td>
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<td>2012</td>
<td>The Magnus Bergvall Foundation, 50 000 SEK</td>
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<td>The Lars Hierta Memorial Foundation, 50 000 SEK.</td>
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<td>2011</td>
<td>Swedish Patent Revenue Fund, 100 000 SEK</td>
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<td>2011</td>
<td>The Lars Hierta Memorial Foundation, 50 000 SEK.</td>
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<td>2011</td>
<td>Swedish Research Council, 858 000 SEK</td>
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<td>2009</td>
<td>Swedish Research Council. 2 year postdoc funding.</td>
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<td>2008</td>
<td>American Dental Society of Sweden, 50 000 SEK</td>
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<td>2008</td>
<td>The Foundation of Blanceflor-Lundovisi, 170 000 SEK</td>
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<td>2006</td>
<td>Research grant from TePe, 37 000 SKR.</td>
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<td>2006</td>
<td>Research grant from Swedish Dental Association, 52 200 SEK</td>
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<td>Research grant from Royal Swedish Physiographic Society, 50 000 SEK.</td>
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<td>Research grant from Swedish Dental Association, 15 000 SEK.</td>
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<td>Research grant from Malmö University, 8000 SEK.</td>
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<td>Research grant from Swedish Dental Association, 16 000 SEK.</td>
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<td>Research grant from Swedish Dental Association, 14 604 SEK.</td>
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<td>Scholarship from Malmö University, 8000 SEK.</td>
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CV Ulrika Ericson

University examination  Bachelor of Science, Nutrition and Chemistry
Stockholm University and Karolinska Institutet, Sweden 1989

Doctoral examination  Doctoral examination, PhD, Medical Sciences, Public Health-
Nutritional epidemiology, Lund University, April 10 2010

Current Position  Assistant researcher  Department of Clinical Sciences in Malmö,
Diabetes and cardiovascular disease, genetic epidemiology,
Lund University 2012

Earlier positions  Postdoc position  Department of Clinical Sciences, Diabetes and
cardiovascular disease, genetic epidemiology, Lund University
2010

Doctoral student  Department of Clinical Sciences, Research
group in Nutrition Epidemiology, Lund University 2005-2010
Folate: Associations with breast cancer depending on intake,
metabolism, genetic variation and estrogen receptor status

Engagements at the Malmö Diet and Cancer (MDC) project,
1999-2004
-Translation of the coding system for foods from a European
calibration study (EPIC) into the MDC system.
-Heterocyclic amines: Estimation of dietary intake in the MDC
cohort.
-Trans fatty acids in foods: work for complementary addition to
the MDC Food database

Diet-health-informant, Department of development, Danisco
Sugar AB 1997-1998

Nutritionist, European Investigation into Cancer and Nutrition
(EPIC), Coordinator in Sweden for the calibration study, 1995-97
Dietary interviewer, MDC-study, Lund University, 1991-94

Nutritional research-worker, Department of applied Nutrition,
Karolinska Institutet 1989-90

Laboratory assistant, summer deputy, Ängelholm hospital
1987-88

Research Breaks  Parental leave  periodically for three children  1998-2004

Selected publications
1. Ericson U, Rukh G, Stojkovic I, Sonestedt E, Gullberg B,
Wirfalt E, et al. Sex-specific interactions between the
IRS1 polymorphism and intakes of carbohydrates and fat

2. Maglio C, Ericson U, Burza MA, Mancina RM, Pirazzi C,
Assarsson JA, et al. The IRS1 rs2943641 variant and risk
of future cancer among morbidly obese individuals. J Clin


CV Bodil Ohlsson

Higher education degree
Registered nurse, Kristianstad 820604, worked as a nurse 1982-1985
MD, Lund 910614
Licenced physician 930226

Doctoral degree
Lund 960209, Department of Surgery. Regulation of Digestive Organ Growth. An experimental study on the role of CCK, bile and EGF. Supervisor Jan Axelson

Docent level: 2001

Specialist examinations
Specialist of Medicine 000322. Specialist of Gastroenterology and Hepatology 011009

Current position
Professor in Medicine at Lund University since 26 November 2009. Working with research 50% of full time, funded by the Medical Faculty.

Previous positions
Medical doctor, Department of Medicine, Hässleholm 900618-900805, 910521-930430
Parental leave 930601-940331
Medical doctor, Department of Surgery, Hässleholm 940401-940814
Medical doctor, Department of Medicine, Hässleholm 940815-941231, 951106-970228
Medical doctor, Department of Medicine, Lund 950101-951105
Medical doctor, Department of Medicine, Kristianstad-Hässleholm 951106-000827. From 000828 division of Gastroenterology and Hepatology, Department of Medicine, University Hospital MAS-011031
Specialist of Gastroenterology and Hepatology, Department of Medicine, University Hospital, MAS 011101-050116
Associate professor and Specialist of Gastroenterology and Hepatology 050117-090301
Associate professor and Senior Consultant of Gastroenterology and Hepatology 100% 090301-091125.

Supervision of PhD students
Supervisor for Mikael Truedsson, enrolled 030901. Half-way review 090330.
Supervisor for Oskar Hammar, enrolled 090101. Doctoral dissertation 1 mars 2013
Supervisor Alexandra Vulcan, born 1977, enrolled 140101
Co-supervisor for Martin Salö, born 1985, enrolled 130301

Supervision of postdoctoral period
Elin Sand 770213-4920, postdoc from the autumn 2010
Bodil Roth, 600927-4603, is post-doc from February 2011.
**Others**  
Associated professor with responsibility for the 6th term of the undergraduate medical course in Malmö from 2005-2010  
Written around 10 textbooks and 116 published scientific articles, 6 submitted  
Member of the evaluation committee for dissertation and half-way review 25 times  
Expert for recommendation of professor and associated professor 5 times.  
Around 5-10 invited lectures/years  
Represent Sweden in the European organisation National Society Forum (NSF) of Gastroenterology since 2010  
Advisory Board for Admirall, Astra-Zeneca and Shire in Sweden and Sucampo in Europe  
Member of the committee of Bengt Ihre Fellow-ship  
Member of the nomination committee of Swedish Society of Gastroenterology 2014-2016  
Member of expert committee for Skåne University Hospital for evaluating all staff appointments at the hospital  
Deputy member of Ethical Review Board of Lund University since 2004  
Chairman of the Research and Development Committee at Skåne University Hospital  

**Selected publications**  
Bengtsson M, **Ohlsson B**. The brief VAS-IBS questionnaire can be used to evaluate psychological well-being in patients with irritable bowel syndrome. Eur J Internal Med. 2013;24:82-3.  
CV Marju Orho-Melander

Current Position

Professor, Swedish Research Council Senior Researcher in genetic epidemiology (VR forskare, medicine, 2010-2015, 100%)

Academic examination

Master of Science in Biochemistry, Department of Biochemistry, University of Helsinki, Finland 1995

Doctoral examination

PhD (“Dr.Med.Vet”), experimental endocrinology, Department of Endocrinology, University of Lund, Sweden, 1999

Associate Professor

Associate professor (“docent”) of experimental endocrinology, Department of Clinical Sciences in Malmö, Lund University, 2004

Professor

Professor of genetic epidemiology, Department of Clinical Sciences in Malmö, Lund University, 2010

Post Graduate supervision as main supervisor


7. Christina-Alexandra Schulz, 2012- ongoing

Post doctoral fellow supervision


Prizes

- Best Young Investigator Prize, Malmö University Hospital, 2000
- Greifswald-Lund Award in Community medicine 2002
- LU’s Fernström prize for younger successful scientist 2010
- LU’s Fernström prize for younger successful scientist 2010
- Novo Nordisk Foundation Lecture 2013

Faculty Opponent for PhD Dissertation

- Camilla Fridberg, Sahlgrenska, Göteborg University, 2007
- Dorit Zobel, Copenhagen University, 2008
- Svetlana Adamovic, Sahlgrenska, Göteborg University, 2009
- Niels Grarup, Copenhagen University, 2009
- Anette Prior Gjesing, Copenhagen University, 2011
- Niina Siitonen, Kuopio University, Finland, 2011

11. Other Duties

- Vice-Director of the Strategic Research Area EpiHealth at Lund University
- Main organizer of EASD-SGGD meeting 2013
- Member of NGI (National Genomics Infrastructure) board
- Main organizer of SSSSD meeting 2010 (Scandinavian Society for the Study of Diabetes)
- Scientific Board Member of Swedish Nutrition Foundation 2009-
- Board Member of the SSSD (Scandinavian Society for the Study of Diabetes) 2008-
- Program Committee member of EAS 2013 (European Atherosclerosis Study)
- Honorary Secretary of EASD-SGGD (European Association for Diabetes- Study Group for Genetics in Diabetes 2011-
- Co-PI of LUDC Genomics 2006-
Grant reviewing
- Referee for local ALF committee 2012
- Swedish Institutes Stipend Committee 2012
- SNF young investigator grants 2010-2011
- ERC Synergy grants 2013

Citations
125 papers by Marju Orho-Melander (earlier Orho) have been cited 9126 times (without own citations: H-index 40 (40 papers with more than 40 citations)

Selected Publications