KI – Novo Nordisk Workshop

Thursday September 27th, 2018

CMB Lecture hall, Berzelius väg 21, KI Solna

Organized by the Novo Nordisk Postdoctoral Fellowship Programme at KI
Webpage: ki.se/en/srp-diabetes/novo-nordisk-fellowships
## Seminar Programme

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Novo Nordisk Postdoctoral Fellowship Programme at KI

Novo Nordisk is funding this prestigious fellowship programme at Karolinska Institutet for basic science postdoctoral researchers. The programme is focused in the research areas of diabetes and its comorbidities, endocrinology and metabolism. It aims to support the development of a new generation of exceptional young early career diabetes researchers, who will become future leaders in the field, while further developing scientific excellence within diabetes and ultimately improving the lives of patients.

The fellowship programme was initiated in 2015 and four annual recruitments have been carried out thus far where outstanding researchers have been selected for the fellowship in competition with hundreds of applicants. See brief scientific biographies of each fellow in this booklet.

Based at Karolinska Institutet, Fellows will undertake a cutting edge research project, supervised by world-leading researchers in the field of diabetes from Karolinska Institutet and in addition the fellows will have a mentor from Novo Nordisk. It is offered to the fellows during the course of the fellowship to spend approximately 3 months in the research laboratories at Novo Nordisk in Copenhagen. Thus, Fellows will gain insight into research conducted in both academia and industry. In order to increase coherence around the Fellowship Programme, a number of events will be held throughout the year such as high profile lectures, symposia, etc. which the fellows will attend, both at Karolinska Institutet and at Novo Nordisk in Copenhagen.

• The postdoctoral research fellowships are aimed at early career researchers with a basic science background.

• Fellowships are fully funded for a 3 year period and will provide a salary for the fellow, and travel allowance for the fellow.

• These prestigious fellowships are open to outstanding candidates of any nationality.
Current Fellows within the Programme

Fellow: Dr. Ester Bachar-Wikström, Email: ester.bachar-wikstrom@ki.se
Supervisor: Associate Professor Olov Andersson
Project title: Accelerating regeneration of β-cells and restoration of normoglycemia by reinforcing the gut-pancreas axis in zebrafish.
Affiliation at KI: Department of Cell and Molecular Biology
Mentor at Novo Nordisk: Dr. Nikolaj Kulahin Roed

I did my PhD at the Hebrew University in Jerusalem, Israel. My PhD thesis was focused on the nutrient-sensing kinase mammalian target of rapamycin complex 1 (mTORC1), which is an important regulator of metabolism and autophagy, and its role in endoplasmic reticulum stress and diabetes. In 2014 I started my post-doctoral studies in Prof. Patrik Emfors’s lab, Dept. of Medical Biochemistry and Biophysics in Karolinska Institute- studying drugs aiming to specifically kill brain tumor cells.

In 2016, I received the Novo Nordisk Fellowship and started my second post-doctorate in Dr. Olov Andersson’s lab, Dept. of Cell and Molecular Biology, Karolinska Institute. The group is focusing on studying pancreatic beta-cell regeneration in order to increase the number of insulin-producing beta-cells as a treatment for diabetes. In the lab, we perform unbiased chemical-genetic screens in zebrafish to identify compounds, signals and cellular mechanisms that promote beta-cell regeneration. The zebrafish model is particularly good for studying pancreatic development in vivo. Within the Novo Nordisk Fellowship I investigate a possibility of accelerated regeneration of β-cells and restoration of normoglycemia by reinforcing the liver-pancreas and gut-pancreas axes in zebrafish. In this project, I hypothesize that the gut and liver regenerative secretome controls β-cell regeneration. These peptides may be used therapeutically to accelerate β-cell regeneration and improve glucose homeostasis in diabetes.

Fellow: Dr. Soile Tuomela, Email: soile.tuomela@ki.se
Supervisor: Professor Malin Flodström Tullberg
Project title: Gene-environment interaction studies for the identification of novel disease mechanisms and therapeutic targets in Type 1 diabetes – focus on single nucleotide polymorphisms (SNPs) in beta cell express genes.
Affiliation at KI: Department of Medicine, Huddinge
Mentor at Novo Nordisk: Dr. Ken Coppieters

I hold a MSc degree in genetics from the University of Turku, Finland. I did my PhD studies at Turku Centre for Biotechnology, focusing on the characterization of the priming of human T helper cell differentiation. After obtaining my doctoral degree from the Faculty of Medicine, University of Turku in 2013, I have been engaged in the identification of type 1 diabetes related biomarkers using high-throughput methodologies.

I moved to Stockholm in 2016 after being awarded a Novo Nordisk Postdoctoral Research Fellowship at the research group led by Prof. Malin Fridstrom-Tullberg. Our laboratory resides at the Centre for Infectious Medicine at Karolinska Institutets Huddinge campus. We aim at identifying mechanisms which could predispose to virally-induced type 1 diabetes by analyzing the cross-talk between the immune system, the pancreatic beta cells and the viral factors. My specific goal is to analyse if genetic polymorphisms play a role in this interplay. The data obtained in my project can be utilized for the identification of cellular signalling pathways regulating beta cell function in health and disease, and ultimately in the design of personalized prevention or therapeutic intervention strategies for type 1 diabetes.
Fellow: Dr. Lars Ketscher, Email: lars.ketscher@ki.se
Supervisor: Associate Professor Jorge Ruas
Project title: Exploring myo-exosomes in health and disease.
Affiliation at KI: Department of Physiology and Pharmacology
Mentor at Novo Nordisk: Dr. Bo Falck Hansen

I studied biology at the TU Dresden and obtained a PhD at the University of Freiburg. My PhD thesis was focused on post-translational protein modifications of the innate immune response. Afterwards, I worked at Sanofi-Aventis in collaboration with the EMBL Heidelberg. In this project, I analyzed the secretome of endocrine cells using mass spectrometry and functional assays for the identification of novel secreted peptide hormones in the context of diabetes and metabolic disorders.

In 2016, I came to the Karolinska Institute to start my Novo Nordisk Fellowship in the Molecular and Cellular Exercise Physiology group headed by Prof. Jorge Ruas. My current research project is focused on small extracellular vesicles (exosomes) released from skeletal muscle. Exosomes represent important mediators of inter-organ communication, since they may shuttle biologically active molecules such as RNAs, proteins and metabolites over long distances. This fellowship provides me the opportunity to investigate the function of “myo-exosomes” using skeletal muscle atrophy/hypertrophy models in combination with cellular assays and different "omics" approaches.

Fellow: Dr. Montserrat Visa, Email: montserrat.visa.majoral@ki.se
Supervisor: Professor Per-Olof Berggren
Project title: In vivo imaging of pancreatic β-cell Ca²⁺ signaling in health and disease.
Affiliation at KI: Department of Molecular Medicine and Surgery
Mentor at Novo Nordisk: Dr. Fredrik Wolfhagen Sand

I am a Biologist and a Food Science Technologist who started to work on diabetes and metabolism field as a research assistant studying fetal growth restriction as a risk factor for the development of adult metabolic disease. After that, I obtained an MSc in Biomedicine and I started my PhD at the IDIBAPS Institute in Barcelona focusing my research on pancreatic islets biology. Mainly, I described a new Islet amyloid polypeptide (IAPP) physiologic action on β-cell mass regulation and his implication on the signaling and mitogenic response of β-cells to glucose, as well as I brought new insights into the IAPP role in the correct cross-talk between islet endothelial cells and β-cells. Following my PhD I started my postdoctoral research translating my in vitro islets knowledge into in vivo studies in a project aimed to study potential anti-inflammatory and tissue protective agents to improve β-cells survival and function in transplanted islets.

In 2016 I had been awarded with a Novo Nordisk Postdoctoral Fellowship in the Signal transduction group headed by Prof. Per-Olof Berggren. This fellowship provides me the opportunity to expand my knowledge on in vivo islet biology, focusing my studies on the key role of Ca²⁺ signal in the regulation of pancreatic β-cell function and survival. The project aims to understand how pancreatic β-cells Ca²⁺ dynamics is regulated in normal and diabetic conditions and study the integration of autocrine, paracrine and endocrine signals in this regulation, with special interest in how innervation impacts on Ca²⁺ dynamics. Understanding these processes will help us to define key defects in the machinery regulating Ca²⁺ dynamics and lead us to find novel pharmacological treatment strategies for diabetes treatment.
**Fellow:** Dr. Lucile Dollet, **Email:** lucile.dollet@ki.se  
**Supervisors:** Professor Anna Krook and Professor Juleen Zierath  
**Project title:** Immuno-metabolic modulation of skeletal muscle insulin sensitivity.  
**Affiliation at KI:** Department of Physiology and Pharmacology  
**Mentor at Novo Nordisk:** Dr. Bo Falck Hansen

I studied biology and physiology at the University of Nantes, and joined the Institut du Thorax (Nantes, France) for my PhD. My PhD project was focused on the role of adipose tissue in the regulation of metabolic homeostasis in a particular condition of adipose tissue failure: generalized lipodystrophy. Using mouse and cell model, I studied the consequence of seipin deficiency on adipocyte differentiation and function; and used pharmacological approaches targeting adipose tissue to improve the metabolic complications associated with lipodystrophy.

In September 2016, I started my Novo Nordisk Fellowship at the Karolinska Institutet and joined the Integrative Physiology group, headed by Pr Juleen Zierath and Pr Anna Krook. Regular physical activity has beneficial effect in type 2 diabetes, leading to an improvement of whole-body energy homeostasis. My project is to investigate the crosstalk between skeletal muscle and adipose tissue, using both cell models mimicking exercise and biopsies from patients before/after exercise. Our aim is to identify new factors secreted by skeletal muscle that act on adipocyte and mediate the beneficial metabolic effect of exercise on adipose tissue.

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**Fellow:** Dr. Isabel Cordero Herrera, **Email:** isabel.cordero@ki.se  
**Supervisor:** Associate Professor Mattias Carlström  
**Project title:** Modulation of adenosine receptor signalling provides novel therapeutic strategies in Type 2 diabetes.  
**Affiliation at KI:** Department of Physiology and Pharmacology  
**Mentor at Novo Nordisk:** Dr. Günaj Rakipovski

I graduated in Biochemistry at the Complutense University of Madrid. During my PhD at the Institute of Food Science, Technology and Nutrition (ICTAN-CSIC) I studied the molecular mechanisms involved in the antidiabetic effect of dietary polyphenols. I have studied how these compounds modulate different signalling pathways, improving insulin sensitivity and glucose tolerance as well as they prevent oxidative stress under diabetic situation. Additionally, I conducted a research stay at Gothenburg University and at Texas Children’s Hospital where I deepened my knowledge on the molecular bases of diabetes and obesity and on the relation between diet and health respectively.

I started my Novo Nordisk Fellowship in October 2016 and joined the Renal and Cardiovascular Research group, headed by Prof Mattias Carlström. Oxidative stress and Nitric Oxide deficiency can contribute to the development of Type 2 Diabetes (T2D), or its adverse complications. Adenosine can influence vascular and metabolic functions and modulates oxidative stress. Our translational project aims at characterizing the mechanisms whereby adenosine and nitric oxide signalling modulates oxidative stress, and how this influences metabolic, microvascular and immune cell functions in T2D.
I studied Biomedicine and Biotechnology at the University of Veterinary Medicine in Vienna. My PhD at the University of Innsbruck was primarily focused on the molecular and cellular mechanisms of exocrine pancreas regeneration in zebrafish. Within the scope of my research, I introduced transgenic fishlines encoding two novel inducible cell ablation systems and via lineage tracing I identified a ptf1a positive progenitor cell population important for acinar cell regeneration.

I started my Novo Nordisk Fellowship in November 2016 and joined the Department for Cell and Molecular Biology, under the supervision of Assoc. Prof. Olov Andersson. Increasing the number of insulin-producing beta-cells might prove a better treatment for diabetes, which is at present controlled but not cured by insulin injections. Experimental ablation of beta-cells in zebrafish and rodents is followed by significant recovery of the beta-cell mass, indicating that the pancreas has the capacity to regenerate. This regenerative capacity could potentially be exploited therapeutically - if the underlying mechanisms were better understood. My goal is to identify and characterize compounds and signaling pathways that induce acinar to beta-cell reprogramming, with the overarching goal of developing new therapies for diabetes.
Fellow: Dr. Sanna Hellberg, **Email:** sanna.hellberg@ki.se  
**Supervisors:** Associate Professor Stephen Malin and Professor Göran K Hansson  
**Project title:** The molecular and cellular consequences of acute hypercholesterolemia.  
**Affiliation at KI:** Department of Medicine, Solna  
**Mentor at Novo Nordisk:** Dr. Günaj Rakipovski

I got my Bachelor’s degree in Health biosciences and Master’s degree in Drug development at University of Turku, Finland. During my PhD at Turku PET Centre, I focused on positron emission tomography (PET) imaging of inflammation in atherosclerosis. The evaluated PET radiotracers were targeted to macrophages in atherosclerotic lesions. I also studied the use of PET imaging for the assessment of therapy responses.

I started my Novo Nordisk Fellowship in October 2017 in the group of Stephen Malin and Prof. Göran Hansson in Department of Medicine, Solna. Raised blood cholesterol levels are strongly linked to cardiovascular disease and type 2 diabetes. We are studying what kind of molecular, inflammatory and metabolic effects are initiated in the transition to dyslipidemic state and how do these changes contribute to development of atherosclerotic lesions. Other aim of the project is to study whether these changes be reversed by cholesterol lowering. The studies are conducted in mouse models that permit induced changes in blood cholesterol levels. Finally, the aim is to translate the concept to human disease by evaluating samples from patients with familial hypercholesterolemia.

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Fellow: Dr. Kelvin Kwok, **Email:** ho-man.kwok@ki.se  
**Supervisors:** Associate Professor Carsten Daub, Professor Mikael Rydén (MedH) and Professor Peter Arner (MedH)  
**Project title:** Elucidating the molecular mechanisms behind impaired insulin-induced transcriptional regulation in human adipose tissue.  
**Affiliation at KI:** Department of Biosciences and Nutrition  
**Mentor at Novo Nordisk:** Dr. Sara Vienberg

I studied biochemistry at the University of Oxford. During my PhD studies at the University of Hong Kong, I investigated the role of visceral adipose tissue inflammation in the accelerated development of atherosclerosis in obese mice. Specifically, I examined how obesity-induced JNK activation in visceral fat promotes atherosclerotic plaque development in the aorta through the actions of adipokines.

In October 2017, I started my Novo Nordisk Fellowship under the co-supervision of Dr Carsten Daub from the Department of Biosciences and Nutrition, and Prof Mikael Rydén and Prof Peter Arner from the Department of Medicine. It has recently been demonstrated in humans that obese white adipose tissue exhibits a markedly altered insulin-induced gene expression regulation in vivo. My current project aims to comprehensively identify the responsible regulatory elements and to decipher the mechanisms that underlie this impairment in transcriptional regulation in response to insulin, in an unbiased manner using Cap Analysis Gene Expression (CAGE).
Fellow: Dr. Noah Moruzzi, Email: noah.moruzzi@ki.se
Supervisor: Associate Professor Ingo Leibiger
Project title: The role of insulin receptor isoforms in selective insulin signaling in pancreatic beta cell physiology/pathology.
Affiliation at KI: Department of Molecular Medicine and Surgery
Mentor at Novo Nordisk: Dr. Tine Glendorf

After my graduation in Human Feeding and Nutrition Sciences at the University of Perugia, I joined Karolinska Institutet as Ph.D. student in the Growth and Metabolism Group (Dept. of Molecular Medicine and Surgery, MMK), focusing on cell and mitochondrial metabolism during hyperglycemia in human primary cells. In the last part of my doctoral studies I relocated to the Helmholtz Zentrum München working on the primary cilium and its link with cellular metabolism before to finalize my thesis “Interplay between mitochondria, primary cilium, diabetes and its complications”. During the last year, I worked as a Quality Control and Data Management Consultant in the biotech image analysis company Definiens AG (Münich).

In October 2017, I came back to Karolinska as Novo Nordisk Postdoctoral Fellow in the section of Signal Transduction (MMK) as part of Ingo Leibiger’s group. The project I’m involved in is focusing on understanding the development and progression of beta cell insulin resistance and failure in diabetic mouse models to identify novel target and strategies for treatment of T2DM. Moreover, we will study the insulin receptor A and B isoforms using aptamers as tools to selectively activate/inactivate these receptors and thus study their biological significance in cells and tissues.

Fellow: Dr. Daniel Svensson, Email: daniel.svensson.1@ki.se
Supervisors: Associate Professor Hjalmar Brismar and Professor Anita Aperia
Affiliation at KI: Department of Women’s and Children's Health
Mentor at Novo Nordisk: Dr. Anil Karihaloo

I completed my PhD in the group of vascular physiology at the department of Experimental Medicinal Science at Lund University Sweden in February 2017. My main research focus has been on the host defence peptide LL-37 and its effects on human cell viability. During my PhD and subsequent employment, I have also investigated cytotoxic and immunomodulatory properties by a number of other proteins and small molecules. My earlier academic background lies primarily in chemistry, where I worked with semi-synthesis and isolation/structure elucidation of natural products.

I began my Novo Nordisk fellowship in January 2018, working with Hjalmar Brismar and Anita Aperia at the Pediatric Cell and Molecular Biology lab of the Department of Women's and Children’s Health. Diabetic nephropathy is a common complication for diabetic patients which often results in chronic kidney disease. I will investigate an early event in the nephropathy pathogenesis in which glucose and/or albumin triggers apoptosis of mesangial and proximal tubular cells. Additionally, a Na+,K-ATPase-signaling cascade which attenuates the cell death will be investigated, in order to gain mechanistic understanding of the apoptosis and its medical significance.
Fellow: Dr. Annika Mehlem, Email: annika.mehlem@ki.se
Supervisor: Professor Elisabet Stener-Victorin
Project title: Maternal androgen excess and maternal obesity – Does it program for transgenerational metabolic, reproductive and behavioural disease?
Affiliation at KI: Department of Physiology and Pharmacology
Mentor at Novo Nordisk: Dr. Berit Christoffersen

I studied human molecular genetics at the University of Helsinki. My PhD was conducted at the Department of Medical Biochemistry and Biophysics at Karolinska Institutet, focusing on the impacts of lipotoxicity on Type 2 Diabetes (T2D) and its comorbidities. We showed, that by inhibiting lipid uptake via Vascular Endothelial Growth Factor B (VEGF-B) the progression of T2D was halted in rodent models. Furthermore, we showed that the progression of diabetic kidney disease could be halted, via VEGF-B antagonism.

I will start my Novo Nordisk Fellowship and join the Reproductive Endocrinology and Metabolism Research group led by Elisabeth Sterner-Victorin. Polycystic Ovary Syndrome (PCOS) with androgen excess is the most common reproductive and metabolic disorder with several health consequences including T2D, reduced fertility and psychiatric disorders. The aetiology of PCOS is not well understood. Children and potentially grandchildren from women with PCOS are at an increased risk for developing metabolic, reproductive and psychiatric disease in adulthood. We aim to characterize whether maternal androgen excess and maternal obesity can program for translational changes that promote the development of metabolic, reproductive and psychiatric disease that can persist through generations.

Fellow: Dr. Vladimir Shavva, Email: v.shavva@googlemail.com
Supervisors: Professor Peder Olofsson
Project title: Neural regulation of inflammation in atherosclerosis
Affiliation at KI: Department of Medicine, Solna
Mentor at Novo Nordisk: Dr. Michael Nyberg

After my graduation from the Saint-Petersburg State University, I studied as a PhD student at the Institute of Experimental Medicine in Saint-Petersburg, Russia. My main research focus has been on the genes involved in atherosclerosis development. I have studied the influence of pro- and antiatherosclerotic stimuli on the expression of various genes (such as C3, apoA-I and ABCA1) as well as protein production in human hepatoma cells and human macrophages. During the project I have discovered signaling cascades and characterized new protein complexes between important metabolic transcription factors, involved in these processes.

I will begin my Novo Nordisk fellowship in September 2018 in a project led by Dr. Peder Olofsson in Department of Medicine. The project will focus on the role of T<sub>Chat</sub> cells in human vascular inflammation and atherosclerosis, as well as their function in integrating immune and nervous systems. To this end, T<sub>Chat</sub> cells will be identified in lesions and markers for their isolations will be found. This will allow us to isolate human T<sub>Chat</sub> and functionally characterize them. The next step of the project will involve unveiling mechanisms of T<sub>Chat</sub> differentiation and activation. Regulation of ChAT expression will be studied. The low resolution undirected network representation of the differentially expressed Chat T-cell genes and their most frequent interactors will be identified and used to test for potential disease relevance.
Programme Steering Committee

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