



Danish National Research Foundation
Center for Functional Genomics and Tissue Plasticity
ATLAS

Highlights Summary 2021

The overarching aim of the Center for Functional Genomics and Tissue Plasticity (ATLAS) is to obtain detailed mechanistic understanding of how the many different cell types in the liver and adipose tissue change their functions during diet-induced obesity and regression. We use a combination of mouse models and human biopsies to uncover signaling mechanisms within and between cells that drive tissue plasticity. The long-term ambition is that this insight can be used to improve diagnosis and treatment of obesity comorbidities.

The Covid-19 pandemic continued to cause delays of both clinical and basic research in 2021 and severely affected our possibilities to meet and travel. However, there were also several highlights in 2021 including:



Publication of key papers and reviews in the field:

In the beginning of the year, we published a landmark paper on the plasticity of adipose tissue at single nucleus resolution in *Cell Metabolism*, and we were subsequently invited to publish our detailed methods as a STAR protocol. The technologies and biological findings of this work now constitutes the basis for our studies of adipose plasticity in mouse models and the human ATLAS cohort. We also published two important studies on the transcriptional networks that drive changes in hepatocyte gene programs in response to liver fibrosis and in response to feeding. Reviews published by us included an interdisciplinary review on the role of diagnostic biomarkers, omics strategies, and single-cell sequencing for the ability to diagnose and treat nonalcoholic fatty liver disease. We have several manuscripts in the pipeline on both liver and adipose tissue plasticity.

Jesper Grud Skat Madsen received a Starting Grant from the Novo Nordisk Foundation

Asst. Professor Jesper G.S. Madsen received a prestigious career grant of 8.79 Mill DKK from the Novo Nordisk Foundation enabling him to expand his independent research group and strengthen the computational part of ATLAS.

Aleksander Kragh appointed to Vice-Secretary of European Association for the Study of the Liver (EASL)

Our clinical partner Prof. Aleksander Krag has taken up office as the new Vice-Secretary of European Association for the Study of the Liver (EASL) for a period of two years followed by two years as Secretary General. This is not only a major acknowledgement of the research and leadership Alexander, but it also expands the international network of ATLAS in the field of hepatology.

Collaboration with the Broad Institute and the Oxford Biobank established

New grants obtained by ATLAS members in 2021 have facilitated establishment of new collaborations with potential for major synergies with ATLAS. Center Director Susanne Mandrup and Asst. Prof. Jesper G.S. Madsen were invited to be partners in *Center for Genomic Mechanisms of Disease*, a new Bridgehead center established between the Broad Institute and major Danish Universities with generous support from the Novo Nordisk Foundation. The center funds major collaborative projects, postdocs in partner labs, and exchange and workshops. Furthermore, Mandrup and Asst. Prof. Søren Fisker Schmidt received 5.7 Mill DKK from Sygeforsikringen danmark to study molecular mechanisms of healthy and unhealthy human adipose tissue in collaboration with Professor and Director of the *Oxford Biobank* Fredrik Karpe.



4th Annual ATLAS Meeting at Gl. Avernæs:

In August 2021 ATLAS convened at the beautiful Hotel Sinatur, Gl. Avernæs for our Annual Meeting, held conjunct with Center for Adipocyte Signaling (ADIPOSIGN). All ATLAS members were present in person; however, due to Covid-19 restrictions, our international Scientific Advisory Board could only participate virtually. In addition to the thorough review of project status, we devoted ample time for brainstorming and discussion of ideas for ATLAS 2.0 as well as the priorities for the next year. As in 2020, the overlap with the Annual Meeting of ADIPOSIGN was a huge success offering the opportunity to exchange ideas and progress between the centers, e.g., during poster session and informal “park session” workshop on selected research topics. Furthermore, both centers benefitted from the talks by external speakers and social activities.

