

## LS23-026 - Understanding pancreas biology with AI/ML

### Zusammenfassung

The pancreas is a fascinating organ that senses blood nutrient levels and releases hormones such as insulin accordingly. In this project we will use machine learning to study pancreatic function in health and disease. Until now, scientists have focused on individual pancreatic cells and molecular processes within them, even though these cells strongly coordinate their activity to achieve precise regulation. To learn about these interactions, we simultaneously record the activity of many cells in pancreatic slices at a high temporal resolution while controlling the stimuli they receive. We will use supervised learning to identify different cell types online, unsupervised learning to infer cell-cell interactions across various conditions, and reinforcement learning to predict optimal interactions for maintaining healthy blood glucose levels. This interdisciplinary, theory-experiment collaboration will help us understand pancreatic function at a systems level and improve diabetes prediction.

Wissenschaftliche Disziplinen:

Physiology (51%) | Statistical physics (29%) | Functional anatomy (20%)

Keywords:

pancreas, collective cell behavior, cellular sensing, insulin release, tissue perfusion, probabilistic models of joint cell activity, reinforcement learning, pancreas blood flow, islet physiology, diabetes

---

Principal Investigator: Marjan Slak Rupnik

Institution: Medical University of Vienna

Co-Principal Investigator(s): Gasper Tkacik (IST - Institute of Science and Technology Austria)  
Manami Hara (The University of Chicago)

---

Status: Vertrag in Vorbereitung

GrantID: 10.47379/LS23026

---

Weiterführende Links zu den beteiligten Personen und zum Projekt finden Sie unter

<https://www.wwtf.at/funding/programmes/ls/LS23-026/>