Project Title: Cross-tissue and cross-disease immunometabolic landscape characterisation at single-cell resolution *

Lead Supervisor: Calliope Dendrou

Supervisory Team:
Holm Uhlig
Stephen Taylor
Janssen Pharmaceuticals (iCASE partner)

PROJECT OVERVIEW: Immune cells play a fundamental role in health and disease, with many of their functions relying on the careful orchestration of metabolic and energetic pathways. As part of the Oxford-Janssen CARTOGRAPHY consortium we are applying the latest molecular and cellular multi-omics analysis platforms (single-cell and spatial omics) and computational methods to deliver insights into immune cell biology across a range of human tissues (including the gut, joint, skin, liver, kidney, bladder and blood) and diseases (including immune-mediated diseases such as inflammatory bowel disease, coeliac disease, rheumatoid arthritis, psoriatic arthritis, psoriasis and atopic dermatitis; malignancies such as kidney and bladder cancer; and infectious diseases such as HBV). The insights obtained through these omics analyses will help to facilitate and rationalise target selection, drug development, positioning and repurposing strategies, and hence precision medicine across diseases.

The successful applicant will make use of available and emerging single-cell and spatially-resolved multi-omic data to computationally characterise metabolic and energetic fluxes and investigate differences that may be associated with different cell states, tissues types and diseases. In addition to performing analyses with available tools (e.g. COMPASS, scFEA) the student will have the opportunity to further refine or develop computational/machine learning tools and/or to validate findings and putative targets experimentally depending on their interests. The student will also be involved in developing and contributing to a platform for the user-friendly visualization of high-resolution metabolic data, including the incorporation of AI-powered language learning tools.

KEYWORDS (5 WORDS): Artificial intelligence, Bioinformatics, Immunology, Machine Learning, Pathology

TRAINING OPPORTUNITIES: Software developing, machine learning, natural language models

Start date October 2024

Application Deadline 1st December 2023

CONTACT INFORMATION OF SUPERVISORS:

Calli Dendrou calliope.dendrou@kennedy.ox.ac.uk
Holm Uhlig holm.uhlig@ndm.ox.ac.uk
Stephen Taylor: stephen.taylor@well.ox.ac.uk

* Stipend for this studentship is set at MRC rates