



The Blood Proteoform Atlas:

A reference map of proteoforms in human blood cells

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Nearly all our cells contain the same DNA blueprint, yet humans are a complex amalgamation of ~200 different cell types of various functions. Mass spectrometry-based protein analysis (proteomics) has cemented the linkage between protein biology and cellular phenotype. However, previous efforts to compositionally map proteins (PTN) across different cell and tissue types do not capture posttranscriptional and posttranslational processing. These dictate the distinct molecular **proteoforms** active in cells.

Melani *et al.* compiled a **Blood Proteoform Atlas**, a clarified map of ~30,000 unique proteoforms (PFR) as they appear in 21 different blood cell types. The **MagLab's 21 tesla FT-ICR mass spectrometer** contributed nearly a third of the atlas' proteoforms while comprising ~15% of the total instrument time devoted to what is now the largest "top-down" proteomics study ever conducted. This patient-specific, cell type-specific, and proteoform-specific data enabled the discovery of 24 biomarkers for liver transplant rejection.

This advancement marks the beginning of a new era for more precise study of proteins in specific cells—the **Human Proteoform Project**. As the atlas grows, discoveries about fundamental biology, disease, aging and new therapeutics will accelerate.

Instrumentation used: 21 Tesla Fourier-Transform Ion Cyclotron Resonance (21T FT-ICR) Magnet System **Image Credit: Rafael D. Melani**
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