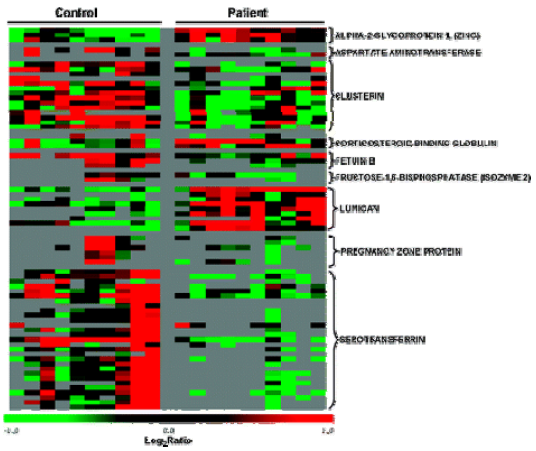
William R. Wiley
EMSL In Brief
Environmental Molecular Sciences Laboratory

New Biomarkers Could Mean Better Screening for Type 1 Diabetes

Screening for people that might have type 1 diabetes could eventually be more reliable thanks to five proteins discovered by users at the Department of Energy's Environmental Molecular Sciences Laboratory. The proteins could help predict type 1, or insulin-dependent, diabetes with higher sensitivity and specificity than current methods, which can vary considerably among testing laboratories. A reliable screening method could identify close family members of diabetics at risk of developing the disease before the first symptoms appear. Further, better screening could provide insight into this disease, which affects 1 in every 400 to 600 children in the United States.



This map shows differences in the amounts of 9 proteins found in the plasma of those with (right) and without (left) type 1 diabetes.

Scientists from the Centers for Disease Control and Prevention and Pacific Northwest National Laboratory used the accurate mass and time tag strategy and EMSL's liquid chromatography-mass spectrometry-based proteomics instrumentation to create a library of peptides (bits of proteins) identified in the plasma of 10 healthy individuals and 10 people recently diagnosed with type 1 diabetes. Plasma, the liquid component of blood, can contain proteins from tissues involved in the development of diabetes.

The researchers also used EMSL's Fourier transform ion cyclotron resonance mass spectrometer to obtain extremely accurate measurements of peptide masses. This information was then compared to the entries in the peptide library. The abundances of proteins and their corresponding peptides were subjected to statistical testing, and those proteins that were behaving in unusual ways in at least 8 out of 10 control and patient individuals were then scrutinized, said PNNL's Tom Metz, principal investigator on the project.

This approach led to the identification of five proteins – zinc-α-2-glycoprotein 1, clusterin, corticosteroid-binding globulin, lumican, and serotransferrin – that differed in abundance in people with type 1 diabetes. The team hypothesized about the different abundance levels, but will be performing further studies with more samples to confirm and extend the results.

This work was supported by the National Institutes of Diabetes and Digestive and Kidney Diseases. The results were published in the February 2008 *Journal for Proteome Research* [2008, 7(2):698-707] and were highlighted in that issue's Research Profiles.

For more information, contact Mary Ann Showalter (509-371-6017).