

UNT Health Science Center Begins Proteomics Research with Installation of High Tech Mass Spectrometer

UNT Health Science Center officially became a major player in the field of proteomics research with the installation of a new, state-of-the-art mass spectrometer on the fourth floor of the Research and Education Building at its Fort Worth campus.

The instrument's arrival was also timed to coincide with the arrival of new Robert A. Welch Professor Laszlo Prokai, PhD, who is in charge of it. Dr. Prokai uses mass spectrometry in his research, which focuses on the areas of aging, neurodegenerative diseases and biodefense.

Mass spectrometry is used to identify unknown compounds, to quantify compounds, and to discover the structure and chemical properties of molecules. The use of mass spectrometry has been around for quite some time, with the beginnings of its use starting in 1899, but recently the technique has become integral in the field of proteomics.



Proteomics is the large-scale study of the proteins that are produced by genes.

"Proteomics is the next step in understanding diseases, for one, but because the field is so new, we are discovering a myriad of applications," Dr. Prokai said. "Mass spectrometry is an essential tool for use in the field."

The new instrument is the most powerful mass spectrometer in the Metroplex. The magnetic field within the instrument is one million times stronger than the earth's own magnetic field, Dr. Prokai said.

"When I saw the specifications for this instrument, I was just blown away," Dr. Prokai said. "This mass spectrometer's capabilities will support biomedical research and drug discovery in and outside of UNT Health Science Center. We are very excited to have it available here."

To accommodate the \$1 million instrument, certain alterations had to be made to the laboratory where it is housed. The sheer weight of the instrument was too much for the building, so personnel in the facilities department at the health science center installed a metal plate on the floor in the laboratory to diffuse the weight across the entire floor.

Another challenge was the constant temperature that has to be maintained to keep the mass spectrometer functioning properly. An additional air conditioning system had to be installed to allow for this requirement.

Finally, the instrument itself requires large amounts of liquid nitrogen and liquid helium upon

start-up and constant maintenance levels of these two cryogenic liquids.

Personnel associated with the new proteomics facility had to be trained on the maintenance and use of the new mass spectrometer for almost a month, even though Dr. Prokai has been using mass spectrometry as an analytical tool for most of his career and many of his lab members have been using mass spectrometry for many years as well.

"To a trained mass spectrometrists, this instrument is going to be very user friendly," Dr. Prokai said. "We are confident that we will be able to operate the instrument so that we will be able to utilize all of its wonderful capabilities."

Mass spectrometry is currently used in a variety of ways, including to identify the use of steroids in athletes, monitor the breath of patients by anesthesiologists during surgery, determine the composition of molecular species found in space, determine whether honey is adulterated with corn syrup, locate oil deposits by measuring petroleum precursors in rock, monitor the fermentation processes for the biotechnology industry, detect dioxins in contaminated fish, determine gene damage from environmental causes, and establish the elemental composition of semiconductor materials. As the field of proteomics continues to grow, the uses for mass spectrometry will also expand, Dr. Prokai said.

The mass spectrometer at the health science center is currently being leased, with the hope that grant monies will be obtained to eventually buy the instrument.

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Contact: Kay Colley 817-735-2553, cell 817-980-5090, e-mail kacolley@hsc.unt.edu