



# Society for Analytical Chemists OF PITTSBURGH



## OCTOBER MEETING

***Monday, October 2, 2006***

**8:00 p.m.**

Duquesne University  
Maurice Falk Hall

DINNER: City View Cafe (6th Floor)



**RICHARD M. CAPRIOLI, PH. D.**

PROFESSOR  
UNIVERSITY OF VANDERBILT

*"In situ Molecular Profiling / Imaging of Proteins  
in Tissues by MALDI MS"*



5:30 PM	Social Hour .....	Student Union, City View Cafe (6th Floor)
6:30 PM	Dinner .....	Student Union, City View Cafe (6th Floor)
7:30 PM	Student Affiliate Meeting .....	Mellon Hall - Room 410
7:40 PM	Business Meeting .....	Mellon Science Building - Maurice Falk Hall
8:00 PM	Technical Meeting .....	Mellon Science Building - Maurice Falk Hall

## ABSTRACT:

Imaging Mass Spectrometry (IMS) is a new molecular discovery technology that takes advantage of the methodology and instrumentation of MALDI mass spectrometry. It can be used to locate specific molecules such as drugs, lipids, peptides and proteins directly from the surface of fresh frozen tissue sections. Frozen tissues specimens are cut in very thin (~10  $\mu$ m) sections and thaw-mounted on flat metallic target plates. Matrix can be manually or automatically deposited on the sections. Molecular profiles recovered upon analysis typically contain from 300 to 500 or more distinct signals in the  $m/z$  range beyond 200,000. When imaging from a tissue section, matrix is deposited in a homogeneous manner minimizing the lateral dispersion of molecules of interest. This can be achieved by automatically printing arrays of small droplets. Each microspot is then automatically analyzed generating a mass spectrum. When monitoring the intensity of a signal within the data array, a two-dimensional ion density map (or image) can be reconstructed giving information on the location and relative abundance of a given analyte. From the analysis of a single section, images at virtually any molecular weight may be obtained.

IMS is an effective discovery tool for the qualitative and quantitative analysis of molecular signatures that may differentiate unhealthy and normal tissues and for identification of potential protein markers in disease progression. In this regard, histology directed profiling permits higher sample throughput and reproducibility. The visual specificity of histology is combined with the positioning accuracy of the robotic microdispenser to direct placement of matrix drops onto specific cells with high placement accuracy. Processing digital images of the spotted plate provides relative locations of each matrix spot. These coordinates are transferred and registered to the mass spectrometer for automated data acquisition. Thousands of molecular profiles can now be acquired from large sample sets in very short periods of time, improving analysis statistics. The margins of lesions can be further imaged to define the extent of the molecular advances in surrounding healthy tissues. The ability to construct 3-D molecular images will also be shown. In addition, IMS technology has been successfully applied to drug targeting and metabolic studies and the measurement of concomitant protein changes in specific tissues after systemic drug administration. Identification of statistically significant protein markers can be identified in high throughput mode by mass spectrometry based proteomic approaches.

## DINNER RESERVATIONS:

Please email Carolyn Benga at [crb.sacp@yahoo.com](mailto:crb.sacp@yahoo.com), by Thursday, September 28, 2006 to make dinner reservations. Carolyn's preference for reservations is an email. Should you not have email, please call 412-487-0915 to make dinner reservations. If you want to be placed on the permanent dinner list, let Carolyn know when you RSVP. The entrée for October is Veal Escallops w/Lemon Caper Sauce. Dinner will cost \$8 (\$4 for students) and checks can be made out to the SACP. If you have any dietary restrictions, let Carolyn know when you leave message.

## PARKING:

Duquesne University Parking Garage entrance is on Forbes Avenue. Upon entering the garage receive parking ticket and drive to upper floors. Pick up a parking sticker at the dinner or meeting. Contact Dr. Mitch Johnson at Duquesne University if any difficulties arise.

## BIOGRAPHY:

Richard M. Caprioli is the Stanley Cohen Professor of Biochemistry and Director of the Mass Spectrometry Research Center at Vanderbilt University School of Medicine. He is also currently Professor in the Departments of Chemistry and Pharmacology at Vanderbilt University. Dr. Caprioli received his B.S. in 1965 from Columbia University in New York, N.Y., his Ph.D. in 1969 in Biochemistry, also at Columbia University with Professor David Rittenberg. He did a one-year postdoctoral fellowship at Purdue University with Professor John H. Beynon. In 1970, he was appointed as Assistant Professor of Biochemistry at Purdue. In 1975, Dr. Caprioli moved to the University of Texas Medical School in Houston where he was Professor of Biochemistry and Molecular Biology and Director of the Analytical Chemistry Center until his move to Nashville in early 1998.

Professor Caprioli is interested in the use of mass spectrometry for the analysis of compounds in biological systems. Current work includes the use of electrospray and laser desorption ionization methods with biological tissues and samples. Applications have focused on the development of this instrumentation and associated methodologies to achieve ultra-high sensitivity detection of endogenous compounds (e.g., neuropeptides) in live animal systems. Recent work involves the development of Imaging Mass Spectrometry, a technique whereby molecular images of peptides, proteins, drugs and other compounds are localized in tissue sections with molecular weight specificity. This method involves molecular mapping of animal tissue through the production of ion images obtained from the analysis of mammalian tissue. Applications to specific research areas involve questions about certain spatial distributions of molecules within specific tissues, e.g., mapping proteins in cancer tissue. Specific applications include human glioblastomas, aberrant mouse colon crypts, and mouse prostate tumors

Dr. Caprioli has been a member of the American Society for Mass Spectrometry since 1975; he recently served two years each as President of the Society and Vice-President for Programs. He is a member of the American Society for Biochemistry and Molecular Biology and the American Association for Cancer Research. Professor Caprioli has been the Editor-in-Chief of the *Journal of Mass Spectrometry* since 1990. He is currently co-editing several volumes of *Encyclopedia of Mass Spectrometry*. He has published over 300 scientific papers, including three books. In 2003, Dr. Caprioli received the Thomson Medal Award from the International Mass Spectrometry Society for "for outstanding achievements in mass spectrometry and for distinguished service to international mass spectrometry." He received the Field and Franklin Award from the American Chemical Society in April, 2006.