



Unraveling Cell-to-Cell Signaling in the Brain with Separations and Mass Spectroscopy

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Abstract:

Understanding the functioning of the brain is hampered by a lack of knowledge of the full complement of its signaling molecules, as well as the spatial and temporal interplay of these chemical systems. Capillary-scale separations and mass spectrometry are ideally suited to characterize neurotransmitter and neuropeptides; in the case of peptides, many only become bioactive only after particular post-translational modifications. Several applications related to cell-cell signaling molecules are highlighted using a variety of capillary-scale separations (both capillary electrophoresis and capillary liquid chromatography) hyphenated to both selective detectors such as wavelength-resolved laser induced fluorescence and to high resolution electrospray ionization MS. Using capillary electrophoresis mass spectrometry, the cellular metabolome is measured and related to cell function; as one example, we demonstrate the use of capillary electrophoresis with an ultra-high resolution tandem time-of-flight MS platform for profiling the metabolites and transmitters within individual neurons. Using mass spectrometric imaging, neuropeptides and hormones are identified directly from tissues including single cells and even individual neuronal processes. Using these techniques, multiple neuroactive compounds have been discovered in a range of model organisms ranging from mollusks, insects to vertebrates. Several sampling approaches for mass spectrometry are described that allow the activity dependent release of peptides from select brain regions to be measured. This suite of separations and mass spectrometry-based measurement tools allow cell-cell signaling to be followed with unprecedented detail.

About the Speaker:

Professor Jonathan V. Sweedler holds the James R. Eiszner Family Chair in Chemistry at the University of Illinois, is associated with the Beckman Institute, is the director of the UIUC Biotechnology Center, and has appointments in the Neuroscience Program, the Department of Physiology and the Bioengineering Program. His research interests are in bioanalytical chemistry, and focus on new metabolomic and peptidomic technologies for assaying small volume samples, and in applying these methods to study novel neurochemistry. Using this suite of technologies, he is investigating novel neurochemical pathways, and the roles that peptide hormones, neurotransmitters and neuromodulatory agents play in behavior, learning and memory. He has received numerous awards including the Merck Prize, the Instrumentation Award from the Analytical Division of the American Chemical Society, the Gill Prize and the Benedetti-Pichler Award for Microanalysis, and he is an associate editor for Analytical Chemistry.

Location:
D'Ignazio's Towne House
117 Veterans Square
Media, PA 19063

Times:
Executive Mtg - 5:00 pm
Social "Hour" - 5:45 pm
Dinner - 6:30 pm
Presentation - 7:30 pm

Directions:
See below

Cost of Dinner:
\$30 or MC/Visa /AmEx

NOTE TO STUDENTS: Full-time students with valid ID may attend dinner meetings at half price. **Faculty members at colleges and universities are urged to bring one or more students to the meeting. If they do, they also can attend at half-price.**

Dinner Choices: Tilapia, Chicken Parmesan, or Grilled Vegetable Cannelloni. Please specify choice of entree when making dinner reservations.

For Reservations:

Please register/call before 4 p.m., **Friday, January 22nd, 2010**. Please note that "no-shows" will be billed for the dinner.

Late reservations: We still want you to attend, so call now. However, we cannot guarantee your entrée selection for dinner.

Contact: We strongly recommend online registration <http://www.cfdv.org/> but you can also e-mail sheree@cfdv.org, or FAX 610-485-9467. For FAX/e-mail, please include your name, employer, work telephone & meal choice. Alternatively, call Ms. Sheree Gold at 610-485-3479 and provide same information.

Mark Your Calendar – Please see our website (<http://www.cfdv.org/>) for more details

- **CFDV Spring Symposium 2010: Chromatographic Advances for Complex Sample Mixtures – April 15, 2010**
- **NEW – Microfluidics and Microchip Technology Chromatography Short Course – April 14, 2010**
- **Introductory HPLC – May 10-12, 2010**
- **Gas Chromatography – May 17-19, 2010**
- **Advanced HPLC with LC/MS – June 7-9, 2010**

List of Officers – Please contact any officer for Forum information, to find out how to participate in the Forum or to find out how to participate in Forum Activities. The CFDV website is <http://www.cfdv.org/>.

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Directions to the Towne House

Take I-95 to the Blue Route, I-476; take Exit 3 (Media). Go west on Baltimore Pike past intersection of Rt. 252. The Towne House is 10 blocks further, on the right corner of Veterans Square. (Address: 117 Veterans Square, Media, PA 19063; Phone: 610-566-6141)

