**NIDA**
**National Institute**
**On Drug Abuse**
**Neuroproteomics Center**


# Yale/NIDA Neuroproteomics Research Center

# Advisory Board Meeting (12/3/2008)

# Advisory Board Meeting for the NIDA Neuroproteomics Research Center

- **Meeting Format:** Informal – although we will ask for questions at the end of each talk, if an important question arises during a talk it is fine to interrupt the speaker.
- **Videotaping:** Because the NIH Program Official, Dr. Jonathan Pollock, was unable to attend, we are videotaping the meeting. Please when you ask questions ask for or step up to one of the microphones
- **Program Outline:**
  - Brief Overview of Center
  - Core Technologies intermixed with
  - Progress of established research projects and plans for new projects
  - (Optional) Tour of Neuroproteomics Center & Keck Laboratories
  - Advisory Board Meeting with Angus Nairn, Ken Williams, IAB, and EAB.
  - 25 talks, 2 breaks and lunch: will try to maintain schedule. If I stand up when you're talking, your talk has extended into the 5 min Q&A section at end of each talk.
- **Goal:**
  - Seek advice from Advisory Board on improving the Center

# Yale/NIDA Neuroproteomics Research Center

- **Theme: "Proteomics of Altered Signaling in Addiction"**
- **PI: Ken Williams**
  - **Director, Keck Laboratory & NHLBI Proteomics Research Center**
    - **Associate Director, Proteomics Core, Northeast Biodefense Center**
    - **Professor (Adjunct) Research, Mol. Biophysics & Biochemistry**
  - **Office located in NIDA Protein Identification & Profiling Cores, 300 George St**
- **Co-PI: Angus Nairn**
  - **Charles Murphy Professor of Psychiatry and Pharmacology**
  - **Office located in CT Mental Health Center near laboratories of many Neuroproteomics Center investigators (e.g. in Dept. of Psychiatry)**
- **Background:**
  - **Center funding (8/23/04 – 5/31/09): now in existence for about 4.25 years**
  - **Center grant funds biotechnology research, building of YPED database, and costs of core services provided to center investigators.**
  - **Year Four funding, 6/1/08 through 5/31/09, DC: about $926K**

# Five Neuroproteomics Center Technology Cores

| | | | |
|---|---|---|---|
| Administrative | Ken Williams | Mol. Biophys. Bioch. | PI |
| | Angus Nairn | Psychiatry | Co-PI |
| | Perry Miller | Anesthesiology & Center Med. Informatics | Director |
| Bioinformatics & Biostatistics | Kei-Hoi Cheung | | YPED Database |
| | Mark Gerstein | Mol. Biophys. Bioch. | Bioinformatics |
| | Nick Carriero & Martin Schultz | Computer Science | High Performance Computing |
| | Hongyu Zhao | Epidemiology | Biostatistics |
| Protein & Lipid Profiling | Chris Colangelo | Mol. Biophys. Bioch. | Co-Directors |
| | Pietro De Camilli | Cell Biology | |
| | Erol Gulcicek | Mol. Biophys. Bioch. | Phospho-proteomics |
| | TuKiet Lam | Mol. Biophys. Bioch. | FTICR-MS |
| Protein ID | Kathy Stone | Mol. Biophys. Bioch. | Director |
| Targeted Proteomics | Chris Colangelo | Mol. Biophys. Bioch. | Director |

## Internal Advisory Board (IAB) for the Yale/NIDA Neuroproteomics Research Center

| Name | Departments & Sections |
|---|---|
| Dr. Carolyn Slayman | Deputy Dean for Academic and Scientific Affairs, Yale School of Medicine; Sterling Professor of Genetics and Professor, Cellular and Molecular Physiology |
| Dr. Jose Costa | Vice Chair, Pathology; Deputy Director, Yale Cancer Center |
| Dr. Leonard Kaczmarek | Pharmacology and Physiology |
| Dr. Paul Lizardi | Pathology |
| Dr. Stephanie S. O'Malley | Psychiatry (Psychology) and Director, Division of Substance Abuse Research, Connecticut Mental Health Center |
| Dr. William Sessa | Pharmacology |
| Dr. Robert Sherwin | C. N. H. Long Professor of Int. Med; Section Chief Int. Med. Endocrinology; PI on Yale's (NIH) Clinical and Translational Science Award (CTSA) |
| Dr. Heping Zhang | Public Health (Biostatistics) and Statistics, Yale Child Study Center |

## External Advisory Board (EAB) for the NIDA Neuroproteomics Center (10 Faculty from 10 Institutions)

| Name | Department | Institution |
|---|---|---|
| Dr. David Allison | Prof. Biostatistics | U. Alabama, Birmingham |
| Dr. Brian Chait | Laboratory of Mass Spectrometry and Gaseous Ion Chemistry | Rockefeller U., New York |
| Dr. James Eberwine | Pharmacology, Psychiatry | University of Pennsylvania, Philadelphia |
| Dr. Edward Hawrot | Molecular Pharmacology, Physiology, and Biotechnology | Brown Medical School, Providence |
| Dr. Jonathan Javitch | Pharmacology, Neuroscience | Columbia U., New York |

## External Advisory Board (EAB) for the Yale/NIDA Neuroproteomics Research Center (continued)

| Name | Department | Institution |
|---|---|---|
| Dr. Peter McPherson | Neurology and Neurosurgery | Montreal Neurological Institute, Montreal, Canada |
| Dr. David Muddiman | Mass Spectrometry, Department of Chemistry, | North Carolina State University |
| Dr. Andrey Rzhetsky | Institute of Genomics and Systems Biology | University Chicago, Chicago, IL |
| Dr. Paul Tempst | Molecular Biology | Memorial Sloane Kettering Cancer Center, New York |
| Dr. John Yates | Cell Biology | Scripps Clinic & Research Institute, La Jolla, CA |

# Synergies Between the Neuroproteomics Center & Keck Lab

- **Keck Biotechnology Resource Laboratory – founded in 1980**
  - **50 staff, 110 instruments purchased at a cost of >$19 million.**
  - **Completes >275,000 syntheses and analyses annually for ~1,000 investigators at >275 institutions in 25,000 $ft^2$.**
  - **Synergies:**
    - **Keck instrumentation supports the Neuroproteomics Center**
    - **NIDA Protein Profiling, Identification, and Targeted Proteomics are located *within* the Keck MS/Proteomics Core**
    - **Improved technologies developed in Neuroproteomics Center are leveraged by their rapid availability to Keck users.**
    - **Keck Bioinformatics, Biophysics, Biostatistics, HPC other Keck Resources support NIDA Cores and Center investigators.**
      - **Bioinformatics Resource provides another option (to Dr. Gerstein's Lab) for Center investigators to obtain bioinformatics help**
        - **Bioinformatics software available 24/7 by remote access.**
        - **Bioinformatics Resource works closely with Keck to ensure that software/services are available that complement Keck technologies. Staff in this Resource alert Dr. Gerstein's lab of the need for new tools by Center investigators.**

# NIDA Neuroproteomics Center Accomplishments in 2008

- **New instrumentation**
  - LTQ-Orbitrap: platform of choice for new phosphoproteome profiling and other technologies developed in NIDA Neuroproteomics Protein Profiling Core, funded by NCRR SIG (PI: Erol Gulcicek).
  - Q-TRAP 4000: platform of choice for new, quantitative MS analysis of the in vivo concentrations of multiple, pre-selected biomarker proteins. (Funded by YSM's CTSA Grant (PI: Robert Sherwin)
  - Differential Ion Mobility Analyzer/Q-Star XL loan has been arranged with Dr. Juan de la Mora, Yale U. Chem. Engineering Dept. This exciting technology may have applications in helping to purify targeted peptides (MRM) and/or separate phospho from non-phosphorylated peptides.
- **New Technologies**
  - Phosphoproteome enrichment & analysis technology optimized.
  - MRM (multiple reaction monitoring) Technology has been implemented and is already leading to important biomedical findings.
- **Competing Renewal for NIDA Neuroproteomics Center Grant**
  - Will be submitted for the February, 2009 deadline.
  - First attempt came very close to being funded (score = 166)
- **39 Publications (including 4 in press) since 2005 and:**
  - 4 Submitted manuscripts
  - 4 Publications in preparation
  - 35 abstracts of posters
  - 3 Patent Applications

## NIDA Neuroproteomics Center Core Usage
## (1/2008 through 10/2008 = 10 months)

| Description | Quantity |
|---|---|
| Consulting | 60 |
| DIGE gel analysis | 63 |
| Sample prep (depletion, cleanup) | 55 |
| DIGE-gel scanning | 73 |
| Gel spot picking | 50 |
| MALDI-MS/MS Protein ID of Selected Spots | 1,776 |
| Trypsin Digestions - robotic | 1,920 |
| Trypsin Digestions- manual | 477 |
| LC/MS/MS-Protein ID | 1,301 |
| ESMS-TiO2 Enrichment | 78 |
| FTICR-NanosprayESI | 3 |
| HPLC- 2DLC | 1 |
| HPLC-CEX | 35 |
| MRM-HPLC Purification | 18 |
| MRM-LC-MRM-Sample (Triplicate) | 24 |
| MRM-MALDI-TOF/TOF (Q/C) | 18 |
| MRM-Peptide Optimization | 2 |
| Profiling-MudPIT | 6 |
| Profiling-iTRAQ (4 and 8 plex) | 29 |
| | 5,989 |