NEW PHOTORECEPTOR TECHNOLOGY AIDS WAGGONER CENTER STUDIES

One of the primary challenges facing neuroscientists today is the ability to precisely influence sets of neurons and the neurotransmitters they release. Until recently, the ability to affect specific neural pathways was largely restricted to removing or stimulating tissues containing numerous pathways. These methods either reveal only those parts of the nervous system that are required but not sufficient for a behavior or result in the release of multiple neurotransmitters, which complicates the study of the effects of a single, target neurotransmitter. Use of photoreceptors, or light-sensitive proteins, now permits precise manipulation of neurons and neurotransmitter release. Stephen Topper, a graduate student in the laboratory of Dr. Jon Pierce-Shimomura, Assistant Professor of Neurobiology, uses Channelrhodopsin-2 (ChR2) to study the effects of dopamine neurons and the release of dopamine on locomotor activity in nematodes.

ChR2, a light-activated cation channel, occurs naturally in green algae and was first isolated in a model organism by the Deisseroth Lab at Stanford University in 2005. As a cation channel, ChR2 allows ions to flow into a neuron to initiate a signaling cascade within the cell. Because the channel is light-activated, intracellular signaling can only occur when the protein is exposed to a particular wavelength of blue light. Combined with the right genetic tools, ChR2 can be inserted into targeted neurons in an organism. By controlling the light source, a researcher can examine both normal and altered cell behavior (resulting from the activity of the protein) in that organism. ChR2 therefore allows precise manipulation of cell behavior.

To investigate the effects of dopamine release on locomotor patterns in the nematode Caenorhabditis elegans, Topper and his colleagues inserted ChR2 into the worm’s dopamine neurons. This nematode crawls on land and swims in water and will transition between crawling and swimming based on these environmental conditions. Topper found that when worms containing ChR2 in dopamine neurons were exposed to light, they automatically switched from swimming to crawling. In addition, activation of dopamine neurons caused a delay in the initiation of swimming of worms in water. This indicates that the worm’s ability to automatically transition from swimming to crawling is dependent on the release of dopamine. The Pierce-Shimomura Lab plans to eventually use the new technology to control the activity of specific dopaminergic neural pathways in the presence of alcohol in order to understand how alcohol modulates dopamine release.
Photos from the ISBRA meeting in Paris:
Pasteur Institute,
Dr. James Trudell,
Dr. Pierre-Jean Corringer,
and
Dr. Rebecca Howard,
ISBRA Young Investigator Awardee
City Hall,
Dr. Giorgio Gorini

HONORS & AWARDS
Dr. R. Adron Harris delivered the 15th Annual Mark Keller Honorary Lecture on October 26, 2010, at the National Institutes of Health campus in Bethesda, Maryland. The National Institute on Alcohol Abuse and Alcoholism (NIAAA) established the lecture series in honor of Dr. Keller’s pioneering contributions to the field of alcohol research, which includes the establishment of the first Center of Alcohol Studies at Yale University in the 1940’s. Every fall, NIAAA invites a prominent alcohol researcher to present the lecture for its honorary series. Invited speakers are those whose work has significantly 1) increased our understanding of the physiological affects of alcohol, 2) addressed prevention and treatment options for alcohol abuse and alcoholism, and 3) demonstrated the beneficial impact of scientific advancements in mitigating disease.

The Research Society on Alcoholism Board of Directors presented Dr. R. Adron Harris with the Seixas Award for Service at its 33rd Annual Scientific Meeting, held June 26-30, 2010, in San Antonio, Texas. The board accepts non-solicited nominations submitted by members and keeps the selection of the recipient confidential until the meeting. Former recipients of this award include Waggoner Center member Dr. Carlton K. Erikson in 1991.

Dr. Rebecca Howard (Harris Lab), Dr. Giorgio Gorini (Mayfield Lab), and Dr. Harris attended the 2010 International Society for Biomedical Research on Alcoholism (ISBRA) World Congress held in Paris, France, September 13-16, 2010. Dr. Howard was honored with the 2010 ISBRA President’s Young Investigator Award. The $1,000 award supports promising young investigators as they pursue careers in alcohol research.

NEW FUNDING - RESEARCH GRANTS
Dr. Andrew Ellington
Professor of Chemistry and Biochemistry:
Amorphous Computation with Transcription Logic Gates
RO1 | Four-year award | $1,210,880
Nat’l. Institute of General Medical Sciences

Individual, foundation and corporate support is essential to the continued growth and success of this world-class research center. To support the Waggoner Center for Alcohol and Addiction Research, please visit:
www.cns.utexas.edu/development/outright.asp

or call: 512-471-3299

www.utexas.edu/research/wcaar
DNA Circuits for Point-of-Care Diagnostics
RO1 | Three-year award | $898,896
Nat’I. Institute of Allergy & Infectious Diseases

Directed Evolution of RNA Ligases for High-throughput Sequencing
R21 | Two-year award | $447,680
Nat’I. Human Genome Research Institute

Dr. Johann Eberhart
Asst. Professor of Molecular Cell & Dev. Biology:
Causes of Variability in Craniofacial Disease
RO1 | Five-year award | $1,877,285
Nat’I. Institute of Dental & Craniofacial Research

Dr. Jon Pierce-Shimomura
Asst. Professor of Neurobiology:
Mechanisms of APP-induced death of cholinergic neurons in C. elegans
Two-year award | $80,000
Alzheimer’s Association

Adaptive Tissue Permeability to Alcohol in C. elegans
RO3 | Two-year award | $76,856
Nat’l. Institute on Alcohol Abuse & Alcoholism

Mandy McCracken (Harris Lab) won the $2,500 Johnson & Johnson Graduate Fellowship in Pharmacy for 2010-2011.

PUBLICATIONS


The Waggoner Center for Alcohol and Addiction Research was established in 1999 at The University of Texas at Austin. The Center was made possible by a donation from M. June and J. Virgil Waggoner and matching funds from UT Austin. The mission of the Center is to create a premier research center for alcohol and addiction research, thereby developing solutions for the prevention and cure of these diseases.

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**PUBLICATIONS (Cont’d)**


Ozburn AR, **Harris RA**, Blednov YA (2010). Behavioral differences between C57BL/6J x FVB/NJ and C57BL/6J x NZB/B1NJ F1 hybrid mice: relation to control of ethanol intake. Behav Genet 40, 551-563.

Quinn PD, **Fromme K** (2010). Self-regulation as a protective factor against risky drinking and sexual behavior. Psychol Addict Behav 24, 376-385.


Wetherill RR, Neal DJ, **Fromme K** (2010). Parents, peers, and sexual values influence sexual behavior during the transition to college. Arch Sex Behav 39, 682-694.