

Waggoner Center

for Alcohol & Addiction Research

The University of Texas at Austin

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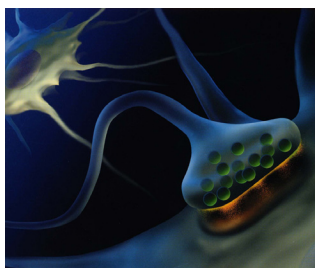
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Waggoner Center for Alcohol & Addiction Research

THE UNIVERSITY OF TEXAS AT AUSTIN

Our Mission

To develop solutions for the prevention and cure of alcoholism and related illnesses.



Above (left to right):
Dr. Jon Pierce-Shimomura
and
Stephen Topper

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



Useful Websites

Addiction Science Research
and Education Center
www.utexas.edu/research/asrec

National Institute on
Alcohol Abuse and
Alcoholism (NIAAA)
www.niaaa.nih.gov

National Institute on
Drug Abuse (NIDA)
www.nida.nih.gov

Research Society on
Alcoholism (RSA)
www.rsoa.org

International Society for
Biomedical Research on
Alcoholism (ISBRA)
www.isbra.com

Building a Partnership

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 sub-

mitted 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

or contact:

UT Austin Development Office
College of Natural Sciences
Office of the Dean
1 University Station G2500
Austin, TX 78712-0548

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

DNA Circuits for Point-of-Care Diagnostics

RO1 | Three-year award | \$898,896

Nat'l. Institute of Allergy & Infectious Diseases

Directed Evolution of RNA Ligases for High-throughput Sequencing

R21 | Two-year award | \$447,680

Nat'l. 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'l. 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

NATIONAL RESEARCH SERVICE AWARDS FOR POSTDOCTORAL FELLOWS

Dr. Jennifer Greeson (Aldrich Lab)

Lanthanide Ions as Spectroscopic Probes of Calmodulin and SK Channel Activation

F32 | Two-year award | \$100,948

Nat'l. Institute of General Medical Sciences

Dr. W. David Johnson II (Harris Lab)

Investigation of a Putative Alcohol Inhibitory Site on the GABA_A Receptor

F32 | One-year award | \$50,474

Nat'l. Institute on Alcohol Abuse and Alcoholism

NATIONAL RESEARCH SERVICE AWARD FOR PREDOCTORAL FELLOWS

Zachary M. Jeanes (Morrisett Lab)

Reversal of Nucleus Accumbens LTD in Ethanol Dependent Mice

F31 | Three-year award | \$97,488

Nat'l. Institute on Alcohol Abuse and Alcoholism

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

Volume 9

Issue 2

Fall 2010

PUBLICATIONS

Ahn KC, Bernier BE, Harnett MT, **Morikawa H** (2010). IP3 receptor sensitization during in vivo amphetamine experience enhances NMDA receptor plasticity in dopamine neurons of the ventral tegmental area. *J Neurosci* 30, 6689-6699.

Chen X, **Ellington AD** (2010). Shaping up nucleic acid computation. *Curr Opin Biotechnol* 21, 392-400.

Feduccia AA, **Duvauchelle CL** (2010). Novel apparatus and method for drug reinforcement. *J Vis Exp. Epub.*

Fromme K, Wetherill RR, Neal DJ (2010). Turning 21 and the associated changes in drinking and driving after drinking among college students. *J Am Coll Health* 59, 21-27.

Ghezzi A, Pohl JB, Wang Y, **Atkinson NS** (2010). BK channels play a counter-adaptive role in drug tolerance and dependence. *Proc Natl Acad Sci U S A* 107, 16360-16365.

Kim SY, **Jones TA** (2010). Lesion size-dependent synaptic and astrocytic responses in cortex contralateral to infarcts in middle-aged rats. *Synapse* 64, 659-671.

Ma ST, Maier EY, Ahrens AM, **Schallert T**, **Duvauchelle CL** (2010). Repeated intravenous cocaine experience: development and escalation of pre-drug anticipatory 50-kHz ultrasonic vocalizations in rats. *Behav Brain Res* 212, 109-114.

Maier EY, Ahrens AM, Ma ST, **Schallert T**, **Duvauchelle CL** (2010). Cocaine deprivation effect: Cue abstinence over weekends boosts anticipatory 50-kHz ultrasonic vocalizations in rats. *Behav Brain Res* 214, 75-79.

Maier EY, Ma ST, Ahrens A, **Schallert T**, **Duvauchelle CL** (2010). Assessment of ultrasonic vocalizations during drug self-administration in rats. *J Vis Exp. Epub.*

Mesce KA, **Pierce-Shimomura JT** (2010). Shared strategies for behavioral switching: Understanding how locomotor patterns are turned on and off. *Front Behav Neurosci* 4.

Moorjani S, Nielson R, Chang XA, **Shear JB** (2010). Dynamic remodeling of subcellular chemical gradients using a multi-directional flow device. *Lab Chip* 10, 2139-2146.

Morikawa H, **Morrisett RA** (2010). Ethanol action on dopaminergic neurons in the ventral tegmental area: interaction with intrinsic ion channels and neurotransmitter inputs. *Int Rev Neurobiol* 91, 235-288.

Volume 9, Issue 2, Fall 2010

DOCTORAL DEGREES AWARDED

Dr. Jennifer Carrillo (Gonzales Lab), September 27, 2010
Dopamine Concentrations in Nucleus Accumbens Core-Shell Border During the Early Stages of Operant Ethanol Self-Administration

Dr. Allison Feduccia (Duvauchelle Lab), December 1, 2009
Effects Of Auditory And Thermal Stimuli On 3,4-methylenedioxymethamphetamine (MDMA)-Induced Neurochemical And Behavioral Responses

Dr. Vorani Ramachandra (Gonzales Lab), July 30, 2010
Dopamine Responses in the Ventral Striatum Contribute to Ethanol Preference and Consumption, and μ -Opioid Receptors do not Mediate Ethanol Stimulated Dopamine Release

Dr. Jelena Todorovic (Mihic Lab), October 11, 2010
Critical Elements Contributing to the Control of Glycine Receptor Activation and Allosteric Modulation

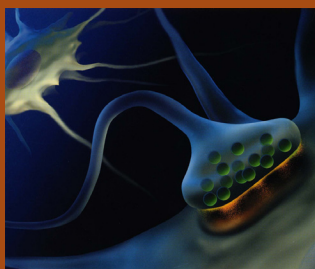
(Publications continued next page.)

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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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Kristina Schlegel

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PUBLICATIONS (Cont'd)

Narayanan R, **Johnston D** (2010). The h current is a candidate mechanism for regulating the sliding modification threshold in a BCM-like synaptic learning rule. *J Neurophysiol* 104, 1020-1033.

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.

Reveron ME, Maier EY, **Duvauchelle CL** (2010). Behavioral, thermal and neurochemical effects of acute and chronic 3,4-methylenedioxymethamphetamine ("Ecstasy") self-administration. *Behav Brain Res* 207, 500-507.

Ritschdorff ET, **Shear JB** (2010). Multiphoton lithography using a high-repetition rate microchip laser. *Anal Chem*. Epub.

Specia DJ, Chihara D, Ashique AM, Bowers MS, **Pierce-Shimomura JT**, Lee J, Rabbee N, Speed TP, Gultarte RJ, Chitwood J, et al. (2010). Conserved role of unc-79 in ethanol responses in lightweight mutant mice. *PLoS Genet* 6, e1001057.

Tennant KA, Adkins DL, Donlan NA, Asay AL, Thomas N, Kleim JA, **Jones TA** (2010). The organization of the forelimb representation of the C57BL/6 mouse motor cortex as defined by intracortical microstimulation and cytoarchitecture. *Cereb Cortex*. Epub.

Tipps ME, Lawshe JE, **Ellington AD**, **Mihic SJ** (2010). Identification of novel specific allosteric modulators of the glycine receptor using phage display. *J Biol Chem* 285, 22840-22845.

Welsh BT, Kirson D, Allen HM, **Mihic SJ** (2010). Ethanol enhances taurine-activated glycine receptor function. *Alcohol Clin Exp Res* 34, 1634-1639.

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.