IDARS Newsletter

International Drug Abuse Research Society News

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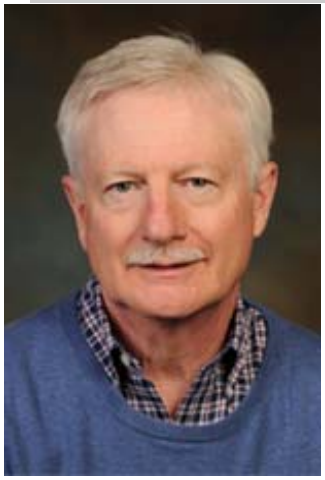
President's Message



Dr. George F Koob

As IDARS moves into its next phase of growth, I am aware of the need to continue to grow our membership so as to maintain the truly international nature and our high goals and aspirations. In preparation for IDARS bi-annual meeting in Mexico-city, our — tireless Executive Officer has put together another impressive scientific and social program in these difficult economic times. We thank Syed for all his dedication and effort to making IDARS a truly international drug abuse research society. Therefore to maintain these high level of activities, it is my hope that members will continue to pay dues to sustain IDARS—the emerging model of drug abuse and research society. This will undoubtedly provide IDARS with a solid financial security now and in the future. IDARS growth and visibility continues with the inauguration of the IDARS journal and I urge members to submit articles to the journal of drug and alcohol research (JDAR). We have also continued in our tradition of having an IDARS booth at the annual society for neuroscience (SFN) meetings with a dinner party and Guest seminar speakers. At last year's SFN meeting in New Orleans, the seminar speaker was Professor James Zadina (see below) and his lecture was titled, "The Holy Grail? Endomorphin analog analgesics with reduced adverse side effects". For this year's IDARS meeting, there are eleven planned oral sessions including the use of zebra fish model and the inclusion of the role of epigenetics in drug abuse vulnerability. Two poster sessions have also been planned and included in the program. With advancing knowledge in the neurobiology of addiction, new concepts and strategies on the neurobiology of addiction are evolving. In this volume our newsletter editor highlights optogenetic strategy that is gaining utility in studying neural circuits that underlie drug addiction and reward mechanism. I look forward to seeing you all in Mexico-city for the fourth IDARS bi-annual meeting.

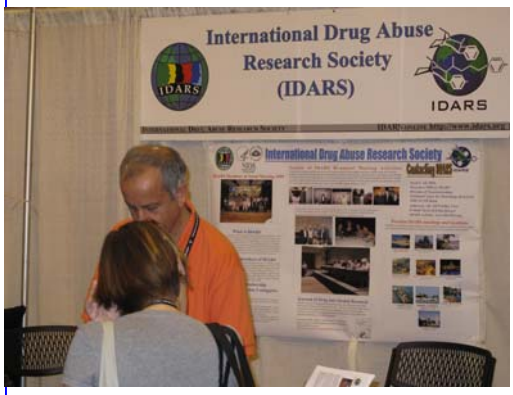
George Koob
IDARS President

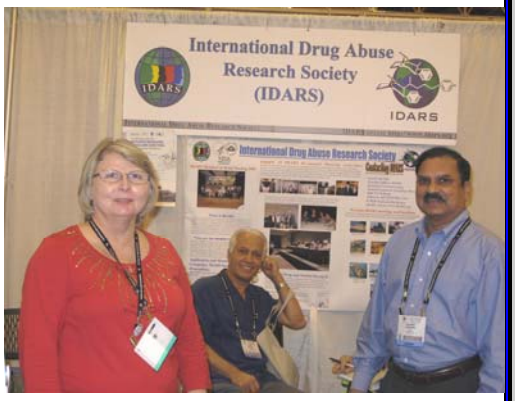
Professor James E. Zadina-Speaker at IDARS Dinner.

IDARS Guest Speaker, Dr. James E. Zadina at the 2012 IDARS-SFN dinner party in New Orleans shown in the picture is Professor of Medicine, Neuroscience and Pharmacology at Tulane University School of Medicine in New Orleans. He presented an overview of his work titled, "The Holy Grail? Endomorphin analog analgesics with reduced adverse effects." Dr. Zadina asserted that the "The Holy Grail", is a metaphor for a goal worthy of great effort to achieve. In the opioid field, it refers to the decades-old challenges of developing novel analgesics with the effectiveness of morphine, but separating the desired from the undesired effects. He presented data using many approaches to screen analogs of the recently discovered endogenous endomorphins, which selectively act on mu opioid receptor. The results demonstrated separation of analgesia from several adverse side effects. He concluded that new compounds and new concepts concerning systems/multiple site approaches as well as differential action at a single site may be critical for achieving the long-standing goal of the opioid Holy Grail.

Dr. James E. Zadina

IDARS AWARDEES AND BOOTH AT 2012 SFN





We have established a tradition to showcase IDARS with an exhibition booth at the society for neuroscience to attract additional members to IDARS for a truly international model of drug abuse research society. Selected pictures above are IDARS members and NIDA-IDARS awardees with IDARS President George Koob and Executive officer Syed Ali, during the 2012 SFN meeting in New Orleans. The two bottom rows are pictures taken in front of the IDARS booth at the 2012 SFN meeting.

IDARS DINNER WITH GUEST SPEAKER AT SFN IN NEW ORLEANS IN 2012.

During IDARS socials at SFN meeting in New Orleans in 2012, our Guest speaker on left top panel was Professor James E. Zadina from Tulane University School of Medicine, whose presentation summary is on page 1. Other pictures are of IDARS members and their guests at the dinner party.

IDARS DINNER PARTY AT SFN IN NEW ORLEANS IN 2012.






Members of IDARS and their guests during the dinner party at the society for neuroscience meeting in New Orleans in 2012.

MEMBERS NEWS

IDARS NEWSMAKERS

Michael H. Baumann, Ph.D., is a Staff Scientist at the National Institute on Drug Abuse (NIDA), Intramural Research Program (IRP), in Baltimore, MD. Dr. Baumann received his Ph.D. in Physiology from Rutgers University in 1991, and he joined NIDA IRP as a Staff Fellow in the laboratory of Dr. Richard B. Rothman shortly thereafter. For more than two decades, Dr. Baumann has carried out research studies to examine the biological effects of therapeutic and abused stimulant drugs. He is the principal author, or a contributing co-author, on more than one hundred publications in peer-reviewed scientific journals.

Dr. Michael H. Baumann

At present, Dr. Baumann's laboratory is focused on determining the mechanism of action for synthetic cathinone analogs found in "bath salts" products. In collaboration with various partner organizations, he has worked to establish a Designer Drug Research Unit (DDRU) at the NIDA IRP. The purpose of the DDRU is to collect, analyze, and disseminate the most up-to-date scientific information about the pharmacology and toxicology of newly-emerging synthetic drugs of abuse.

Member publications

Dr. Michael Baumann

1. Baumann MH, Partilla JS and Lehner KR. Psychoactive "bath salts": Not so soothing. European J Pharmacol 698: 1-5, 2013.
2. Baumann MH, Partilla JS, Lehner *et al.* Powerful cocaine-like actions of 3, 4– Methylenedioxypyrovalerone (MDPV), a principal constituent of psychoactive 'Bath Salts' products. Neuropsychopharmacol 38: 552-562, 2013.

Dr. Amir H. Rezvani
Achievements and Publications

- Elected as President of the Iranian Neuroscientists Community (IRNC) 2013.
- Awarded a visiting fellowship from University of Pennsylvania for teaching Neuroethics.
- Re-elected to the Board of Directors of Triangle Residential Options for Substance Abusers (TROSA), a therapeutic community in Durham, NC.
- Appointed to the editorial board of Pharmacology Biochemistry and Behavior.

1. Levin ED, Cauley M and Rezvani AH. Improvement of attentional function with antagonism of nicotinic receptors in female rats. European J Pharmacol 702: 269-274, 2013.

MEMBERS NEWS

Member publications

Dr. Amir H. Rezvani (Publications)

2. Bartley CP, Rezvani AH. Alcohol and cognition—Consideration of age on initiation, usage pattern and gender: A brief review. Current Drug Abuse Review 5: 87-97, 2012.
3. Johnson JE, Slade S, Wells C *et al.* Assessing the effects of chronic sazetidine– A delivery on nicotine self-administration in both male and female rats. Psychopharmacology 222:269-276, 2012.
4. Rezvani AH, Lawrence AJ, Arolfo *et al.* Novel medication targets for the treatment of alcoholism using inbred and outbred alcohol preferring rat models. Recent Patents on CNS Drug Delivery 7: 151-162, 2012.
5. Rezvani AH, Timofeeva O, Sexton HG *et al.* Effects of sazetidine-A, a selective α4β2* nicotinic receptor desensitizing agent, on body temperature regulation in mice and rats. Eur J Parmacol 682: 110-17, 2012.
6. Rezvani AH, Sexton HG, Johnson J *et al.* Effects of caffeine on alcohol consumption and nicotine self-administration in rats. Alcohol: Clinical and Exp Res. In press 2013.
7. Yong L, Richardson J, Thao T *et al.* Chemistry and pharmacological studies of 3-Alkoxy-2,5-Distributed-Pyridinyl compunds as novel selective α4β2 nAChRs ligands that reduces alcohol intake in rats. J med Chem (In press), 2013.
8. Swartzwelder NA, Risher ML, Abdelwahab *et al.* Effects of ethanol, Δ^9-tetrahydrocannabinol, or their combination on object recognition memory and object preference in adolescent and adult rats. Neuroscience Letters 527: 11-15, 2012.
9. Hussmann GP, Turner JR, Lomazzo E *et al.* Chronic sazetidine– A at behaviorally active doses does not increase nACHRs in brain JPET 343: 441-450, 2012.
10. Rezvani AH, Cauley M, Xiao Y *et al.* Effects of chronic sazetidine-A, a selective α4β2 neuronal nicotinic acetylcholine receptors desensitizing agent on pharmacologically-induced impaired attention in rats. Psychopharmacology (Berl). In press, 2012.

Dr. Meera Vaswani

Achievements and Publications

- Awarded distinguished international scientist award by NIDA, USA.
- Awarded international visiting exchange scientific faculty award by NIDA, USA.
- Appointed to the editorial board of Pharmacology Biochemistry and Behavior.

1. Crist RC, Ambrose-Lanci LM, Vaswani M *et al.* Case-control analysis for polymorphisms in the delta-opioid receptor, OPRD1, with cocaine and opioid addicted populations. Drug Alcohol Depend Epub ahead of print, 2012.
2. Ambrose-Lanci LM, Vaswani M, Glenn TKM *et al.* Association study of the b-Arrestin 2 gene (ARRB2) with opioid and cocaine dependence in a European American sample. Psychiatric Genetics 22: 41-5, 2012.
3. Prasad P, Ambekar A and Vaswami M. Dopamine receptor polymorphisms and susceptibility to alcohol dependence in Indian males: a preliminary study. BMC Genetics: 11:24 2010.

Editorial Corner: Welcome to our Newsletter*

Emmanuel Onaivi, Ph.D., Newsletter Editor for IDARS is delighted to publish our electronic newsletter, with information about the society, seeking contributions to the Newsletter, and opportunities for our members. The intention of this newsletter is not only to communicate to you, but also, for you to be able to respond with suggestions for how IDARS may increase its role in your research. We are interested in the latest advances in drug addiction research including development of vaccines, epigenetics and optogenetic technogical approaches that could help people stop smoking, or stop compulsive use of drugs of abuse. But whether vaccines can prevent smoking or drug addiction remains an open question. Please send us feedback, and get involved! As editor of this newsletter, I invite you to contact me with ideas for articles in future editions, or to volunteer to write an article yourself.

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IDARS-NIDA AWARDEES

- *Frederico Peirera Portugal*
- *Ramon Sotomayor Chile*

GUEST SPEAKER

- *Dr. James R. Zadina USA*

EDITORIAL HIGH LIGHT: OPTOGENETIC STRATEGIES IN DRUG ADDICTION RESEARCH

While optogenetic studies provide new insights in unraveling and understanding neural systems that underlie psychiatric disorders and in addiction, the tools used to conduct such studies are continuously evolving. Here I briefly summarize the use of optogenetics in the neurobiology of drug addiction research. Among the evolving insights into the study of neural circuits involved in brain function and dysfunction, optogenetic strategy has gained utility in studying the neural circuits that underlie drug addiction and reward mechanisms. Thus an optogenetic technique uses a combination of genetics and optical manipulation tools in dissecting neural activity in drug addiction research. This involves the use of microbial opsin proteins including channelrhodopsins for neuronal activation/depolarization and with halorhodopsins and archaerhodopsins to inhibit/hyperpolarization of neurons by light for the investigation of neural circuits in brain function and dysfunction. Channelrhodopsin-2 (ChR2) is a nonspecific cation channel that depolarizes neurons upon stimulation with blue light. Halorhodopsin (NpHR) is a chloride pump that hyperpolarizes neurons upon inhibition with yellow light. The process uses viral vectors to transfect different genes that produce light sensitive opsin proteins in neurons in *in-vitro* and *in-vivo* experimental models from rodents to primates. Optogenetic probes and setup in these models allows for pathway-specific manipulation of brain circuits to study reward seeking and other aspects of drug addiction. ***Continued on page 8***

EDITORIAL HIGH LIGHT:
OPTOGENETIC STRATEGIES IN DRUG ADDICTION RESEARCH

Many investigators have used optogenetics to investigate many aspects of nervous system research. It therefore appears that there are advantages in using optogenetics in *in-vitro* and *in-vivo* animal models that may unravel new insights and perhaps future therapeutic applications into the neural circuits and basis that underlie the neurobiology of drug addiction. Some studies have used cell-type promoters to control expression of opsin proteins and some, the use of cre-mice paired with floxed opsins to control genetically defined population of neurons.

Other studies have examined optogenetic manipulations of neural circuits associated with drug addiction to probe mono-aminergic, cholinergic, glutamatergic, GABAergic and direct effects of abuse substances in the brain. Transgenic mouse lines that selectively express ChR2 or NpHR in specific subtypes of neurons in selected neural pathways under investigation have been extended to neurobiology of addiction research. Different optogenetic manipulation tools are in use and continue to evolve in neuroscience for neuromodulation and with growing enthusiasm and potential for addiction research. These optogenetic manipulation tools deliver light *in vitro* and *in vivo* in combination with cre recombinase – inducible expression systems. Delivery of these cre-inducible opsins provides specificity in opsin expression systems in the target cell type in the brain neural circuits or areas under investigation. Using the cre-mice paired with double–floxed opsins have been targeted to cholinergic interneurons in the NAc, dopaminergic neurons in the VTA and to dopamine transporter (DAT)-cre mice.

The data from studying these neural circuits and molecular architecture of addiction using these optogenetic tools targeted to neurons expressing various neurotransmitters associated with drug addiction in different brain regions are shining light on the neurobiology of addiction. It has been demonstrated that optical activation of dopamine DA2 positive neurons in the nucleus accumbens (NAc) expressing ChR2 suppresses cocaine reward, while activation of DA1 positive neurons increases cocaine reward. Optogenetic inhibition of cocaine seeking in rats was demonstrated by optical inhibition of projection fibers from the prelimbic cortex to the nucleus accumbens core to inhibit the reinstatement of cocaine seeking in rats. The study of the associations between behavioral modifications in neural circuits involved with reward, drug addiction, craving and relapse using optogenetics *in vitro* and *in vivo* models is evolving with enthusiasm. But whether data obtained from optogenetic strategies will illuminate and unravel the neural basis and circuits and mechanisms that underlie drug addiction remains to be determined. It is difficult to see how associations between behavioral modifications in reward and drug addictive behaviors can be associated with studying neural circuits using optogenetics tools *in vivo* or *in vitro*. Therefore, despite new data obtained from optogenetic strategies in unraveling the neural basis and circuits in drug addiction, the mechanism(s) that underlie drug addiction continues to be elusive. Literature cited available from the editor, Dr. Emmanuel S. Onaivi.