Division of Epidemiology of Substance Abuse

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Overview

Major interests of the Division are the epidemiology, risk factors, and consequences of drug use and dependence, in particular smoking and nicotine dependence; the epidemiology of PTSD; developmental pathways of problem behaviors in adolescence; the intergenerational transmission of drug use; the genetics of nicotine dependence; and the use of animal models to explore the molecular basis of epidemiological paradigms, in particular the Gateway Hypothesis and PTSD.

Faculty and Staff

Denise Kandel, PhD	Research Scientist VII
Pamela Griesler, PhD	Research Scientist IV
Christine Schaffran, MA	Associate Research Scientist
Mei-Chen Hu, PhD	Associate Research Scientist

Current Research

Current research activities focus on seven areas: 1) The epidemiology of adolescent smoking and nicotine dependence; 2) The progression from experimental smoking to nicotine dependence; 3) Comorbidity between substance use and psychiatric disorders; 4) Intergenerational transmission of drug use; 5) Animal models of the Gateway Hypothesis; 6) Animal models of PTSD; 7) Establishing a consortium on the genetics of nicotine dependence in adolescence.

Education and Training

Faculty member on two T-32 programs (a) Substance Abuse Fellowship, Francis Levin, M.D., Director; (b) Epidemilogy of Substance Use Disorders Training Program at Columbia University, Deborah Hasin, Ph.D, and Sandro Galea, M.D. Directors; (c) Mentor on K-8 award, Edmund Griffin, M.D., Ph.D., Molecular Analysis of the Gateway Hypothesis.

Honors and Awards

Member, Advisory Board, Transdisciplinary Prevention Research Center, Duke University

Publications (Selected)

1. Mei-Chen Hu, Pamela C. Griesler, Christine Schaffran, Melanie M. Wall, and Denise B. Kandel. “Trajectories of criteria of nicotine dependence from adolescence to early adulthood.” Drug and Alcohol Dependence, 2012, 125:283-289. PMID: 22513378; NIHMS371354.

2. Yan-You Huang, Denise B. Kandel, Eric R. Kandel, and Amir Levine. “Nicotine primes the effect of cocaine on the induction of LTP in the amygdala.” Neuropharmacology. 2013 Apr 15. pii: S0028-3908(13)00127-5 [epub ahead of print]. PMID: 23597510.

3. Denise B. Kandel, Mei-Chen Hu, and Pamela C. Griesler. “Epidemiology of Substance Use Disorders.” Chapter 59 in Charney, D.S. and Nestler, E.J. (eds.) Neurobiology of Mental Illness. Fourth Edition. New York, NY: Oxford University Press, in press.

Divisional Highlights

Continuing our investigation of the natural history of nicotine dependence in adolescence, we found that four developmental trajectories characterized the development of DSM-IV nicotine dependence criteria from adolescence to early adulthood: no dependence (32%); early onset/chronic use (26%); early onset/remission (15%); late onset (24%). Anxiety disorders were associated with all three symptomatic trajectories. Parental smoking and nicotine dependence were associated specifically with the early/chronic class, while pleasant initial sensitivity to tobacco and earlier onset ages of cigarettes and marijuana use characterized the two early onset classes.

Using the mouse model of the Gateway Hypothesis, we continued to investigate the metaplastic brain processes underlying the sequence of drug use, whereby past experiences change the neural circuitry of the brain, and then modulate the experience of a subsequent event. In the prior year, we discovered that nicotine enhanced significantly the changes in synaptic plasticity in the striatum induced by cocaine. Pre-treatment by nicotine enhanced the rewarding properties of cocaine by inhibiting histone deacetylation in the promoter region of ΔFosB, a gene involved in addiction. This past year, we found that pretreatment with nicotine enhances long-term synaptic potentiation in response to cocaine in the amygdala. These results provide further evidence that the priming effects of nicotine may be achieved in part by the inhibition of histone acetylation and indicate that the amygdala appears to be an important brain structure for the processing of the metaplastic effect of nicotine on cocaine. These effects are unidirectional. Priming by cocaine does not affect the response to nicotine.