

## Obituary

## Stephen G Holtzman

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Stephen G Holtzman passed away in Conover, North Carolina on 23 April 2011 at the age of 68. He was an outstanding neuroscientist and mentor, and past president of three professional societies. Steve was born in Brooklyn, New York and received his BS degree in pharmacy from Columbia University in 1965. He pursued graduate studies in pharmacology at the University of Michigan, conducted research in the laboratory of Julian Villarreal, and received his PhD in 1969. Steve joined the Department of Pharmacology at Emory University School of Medicine as a postdoctoral fellow in 1969 and rapidly rose to the rank of full professor. Steve had a celebrated research career as a faculty member in the Department of Pharmacology at Emory, and as collaborative scientist at the Yerkes Regional Primate Center, until his retirement in 2007.

Steve Holtzman's research career is highlighted by many seminal contributions to understanding the pharmacological actions of opioids and opioid antagonists. He employed quantitative behavioral models to reveal drug actions at the neuronal level that underlie tolerance, sensitization, physical dependence, and withdrawal. He was a pioneer in the use of drug discrimination procedures to investigate the pharmacological properties of opioids. As just two examples, he identified the opioid receptor subtype involved in mediating the discriminative effects of morphine, one of his most highly cited findings, and he used the three-choice drug discrimination paradigm to differentiate the stimulus properties of psychomimetic opioids from phencyclidine. His scientific publications from 1970 to 1990s contributed significantly to the widespread adoption of drug discrimination methodology to study drug-receptor interactions in behaving rodents and non-human primates; this model continues to have a key role in the preclinical development of new drugs for use in psychiatry, and drug and alcohol dependence. Although his research concentrated on the

consequences of chronic administration of opioids, he also contributed to understanding the actions of psychomotor stimulants and the role of the dopamine system in the development of tolerance. In a study of the interaction of naloxone with D-amphetamine on avoidance responding, locomotor activity, and food intake, Steve identified an unanticipated action of the opioid antagonist; naloxone suppressed food intake. This finding, which presaged the discovery of the endogenous opioid peptides, opened a new field of study into the role of opioid peptides and their receptor subtypes in the regulation of eating and drinking behavior, and became Steve's most cited article.

Steve Holtzman published over 230 peer-reviewed articles and chapters, and was recognized internationally for his careful pharmacological and behavioral approaches to studies of drugs of abuse. As a member of many professional societies in pharmacology and neuroscience, Steve contributed a lifetime of service to the scientific community. He was an Emeritus member of the American College of Neuropsychopharmacology (accepted as member into the college in 1994). He was elected President of the Society for the Stimulus Properties of Drugs in 1991. He was dedicated in his commitment to the College on Problems of Drug Dependence (CPDD) where he served on the Board of Directors, was on numerous committees, including two terms as Treasurer, and was elected President in 1997. He was proud to serve as President of the Division for Neuropharmacology of the American Society for Pharmacology and Experimental Therapeutics, as a member of numerous committees, and as President of ASPET in 2004. Steve also served on several editorial boards, including those of the *Journal of Pharmacology and Experimental Therapeutics*, *Psychopharmacology*, *Pharmacology Biochemistry and Behavior*, *Neuropsychopharmacology*, and as editor of the News and Views section of *Drug and Alcohol Dependence*. Steve had a remarkable 42-year record of continuous funding from the National Institutes of Health, including a National Institute of Drug Abuse (NIDA) MERIT award, Research Scientist Development awards, and Senior Scientist awards. He served several terms on NIDA study sections, including the training and career development committee.

At Emory, Steve was well known as an outstanding research mentor. He trained 18 graduate students and mentored 21 postdoctoral fellows, many of whom developed their own productive and influential careers in biomedical research in academia, industry, professional societies, or the federal government. James O'Callaghan, Steve's first doctoral student, and I coordinated mentee dinners at the Society for Neuroscience meetings to celebrate Steve's mentorship and scientific achievements. Steve was especially fond of these gatherings with his mentees and wife, Yung-Fong. In recognition of his commitment to mentoring and career development, Steve was selected as the CPDD Mentorship Award recipient in 2011; his wife and son

accepted the award for Steve posthumously at the June CPDD meeting.

Steve Holtzman will be remembered for his scientific achievement, mentorship, graciousness, and dry wit. Steve was a beloved husband to Yung-Fong Sung, MD, an accomplished physician scientist and emeritus professor at Emory University School of Medicine and his companion of nearly 43 years. He was the proud father of Adrian Wei Holtzman, MD and his daughter-in-law Allison Zelski Holtzman, MD, both practicing physicians in Hickory, NC

and a loving grandfather to Costen James, Elizabeth Sung, Luke JZ, and David Stephen, who shares Steve's birthday on August 14. With his passing, those of us who had the privilege of knowing and working with Steve have lost a cherished friend and colleague.

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