

## Obituary

## Erminio Costa

*Neuropsychopharmacology* (2010) 35, 2646;  
doi:10.1038/npp.2009.231



Erminio (Mimo) Costa, one of the co-founding members of the ACNP, died on Saturday, 28 November, from complications of multiple myeloma. Dr Costa is survived by his wife Ingeborg Hanbauer and sons Michael and Max. His son Robert passed away on 1 September 2006.

Dr Costa was born in Cagliari, Italy. He earned his medical degree at the University of Cagliari in 1947 and became Professor of Pharmacology in 1954. Soon after, Dr Costa left Italy for the United States where he joined the Thudichum Research Laboratory in Galesburg, IL and then became Deputy Chief of the National Heart Institute's Laboratory of Chemical Pharmacology. His next position was at Columbia University as Director of Pharmacology of the W. Black Center and he later returned to NIH, where he directed the Laboratory of Preclinical Pharmacology of the NIMH at St Elizabeth's Hospital. In 1982, Dr Costa was elected to the National Academy of Sciences (USA).

Dr Costa was Director of the Fidia-Georgetown Institute for the Neurosciences at Georgetown University for nine years. In 1996, he was appointed Director of The Psychiatric Research Institute, Department of Psychiatry at the University of Illinois Chicago, where he continued to work well into his ninth decade until his recent retirement in October, 2009.

As documented in his autobiography (*An Early Attempt to Foster Neuroscience Globalization*, edited by Oakley Ray and Thomas Ban, ACNP, 2003), Dr Costa's enthusiasm and ability to translate scientific hypotheses into successful experiments were contagious for all his collaborators—more than 300 in 60 years. His students were profoundly stimulated by his influence to pursue exciting and significant work and many

of them have become prominent neuroscientists in their own right. Dr Costa had an exceptional lifelong scientific career that was completely dedicated to discovery in neuroscience. His leadership and fostering of international scientific exchange has had a great impact in modern neuroscience, for which he will long be remembered. During his long career, Dr Costa authored over 1000 manuscripts in prestigious scientific journals. He will be fondly remembered by his former students, collaborators, and peers.

Dr Costa was recognized with numerous awards for his contributions over the years, which have always been at the forefront of research in neuroscience and particularly in neuropsychopharmacology. (1) In 1958, his studies on serotonin established that this neurotransmitter binds to multiple receptor subtypes and is a target for the action of antidepressant and antipsychotic drugs. (2) In the early 1970s, Dr Costa revealed the role of cyclic AMP in the trans-synaptic induction of tyrosine hydroxylase via a cascade of molecular cytosolic and nuclear events triggered by the activation and nuclear translocation of protein kinase A. Currently this mechanism is considered to have an important role in the pathophysiology of depression and in the mechanism of dependence of drugs of abuse. (3) He first proposed and discovered that the GABA<sub>A</sub> receptor is the target of anxiolytic benzodiazepines (1974). From these pioneering studies, he explored the mechanisms of GABAA receptor allosteric modulation and regulation, which led to the discovery of the molecular mechanisms underlying benzodiazepine tolerance and dependence. (4) In 1985, he provided the first biochemical evidence for the existence of metabotropic glutamate receptors, which were cloned several years later. (5) In 1998, Dr Costa and his collaborators discovered that reelin and the enzyme that makes GABA (GAD67) were down-regulated in the brains of schizophrenia patients. Interestingly, those neurons that show reduced expression of reelin and GAD67 also show an increased expression of the DNA-methylating enzyme DNMT1. These findings point to the possibility that an epigenetic mechanism underlies schizophrenia morbidity.

Dr Costa was an incredibly passionate leader and outstanding scientist. He was a creative, dynamic, indefatigable scientist, teacher, editor, organizer, and catalyzer of people and ideas. He has clearly been a major force in the field of neuroscience over the last half a century. Dr Costa (Mimo) has left us with a rich legacy in both his work in neuroscience and in the talented students he has trained.

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