

## Biography of Dr. Robert K. Yu

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**Dr. Robert K. Yu**

Dr. Robert K. Yu is presently Professor and Former Director of the Institute of Molecular Medicine and Genetics at the Georgia Health Sciences University (formerly Medical College of Georgia), Augusta, Georgia.

He holds the Chair of Georgia Research Alliance Eminent Scholar in Molecular and Cellular Neurobiology, and is the Founding Director of the Institute of Neuroscience at Georgia Health Sciences University (2005).

Professor Yu's major research interests are in neurochemistry and developmental neurobiology, particularly as related to glycoconjugates in health and diseases. He is widely regarded as a leader in the field of glycosphingolipid research. For over 40 years, he and his research team have characterized numerous glycosphingolipid structures

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and elucidated their biophysical properties, biosynthetic pathways, and biological functions. Dr. Yu with Dr. Robert Ledeen was the first to demonstrate that the naturally occurring sialidase-susceptible sialic acid linkage contained the  $\alpha$ -D configuration. This discovery is a major milestone in the field. His laboratory has been credited for the isolation and characterization of nearly one-third of all brain gangliosides and many other glycosphingolipids, including the sulfoglucuronyl glycolipids, which are widely known as markers of the human natural killer cell (the HNK-1 antigens) and neural progenitor cells.

To elucidate the structures of glycolipids, Professor Yu pioneered the development of various physical techniques such as 2D-NMR (with James Prestegard), monolayer and differential micro-calorimetry (with Julian Sturtevant and Bruno Maggio), mass spectrometry (with Kenneth Rinehart and Toshio Ariga), and high-performance thin-layer chromatography (with Susumu Ando). These developments paved the way for research on glycosphingolipid functions and into the solution properties of glycolipids and membrane glycolipid-rich microdomains.

In addition to elucidating numerous glycosphingolipid structures, Professor Yu also discovered the “c” metabolic pathway for ganglioside biosynthesis. This discovery led to the completion of the “a- and b-pathways” of ganglioside biosynthesis, which is now cited in many textbooks. He also provided insights into the regulatory mechanisms of biosynthesis of the various glycosphingolipids during nervous system development. He is among the first to have cloned the cDNAs of many glycosyltransferases and sialidases, established their gene organization, and elucidated their transcriptional and post-translational control mechanisms during nervous system development. He was instrumental in developing antisense technologies as an aid to uncover the biological function of glycolipid expression in cells. He is also among the first to systematically elucidate the expression and functional roles of glycoconjugates in neural stem cells and continues to make major contributions in this developing area.

In addition to the above, Professor Yu elucidated the immunological properties of glycosphingolipids and pioneered immunopathogenic mechanisms of multiple sclerosis, peripheral neuropathies, and other related neurodegenerative disorders. He is responsible for the characterization of many of the glycolipid antigens and antibodies involved in these neurological disorders and established the first experimental models of peripheral neuropathies (Guillain-Barré Syndrome). Most significantly, he provided evidence linking these diseases to infectious agents through the mechanism of molecular mimicry. His work is helping to develop novel treatment

strategies for GBS and is in the forefront of clinical and translational medicine in this area.

## Education

Dr. Yu received his Ph. D. degree in biochemistry under Professor H. E. Carter from the University of Illinois, Champaign/Urbana (1967) and a MedScD degree from Tokyo University, Japan (1980). His past academic positions include postdoctoral (with Professor Robert Ledeen) and faculty appointments at Albert Einstein College of Medicine, Bronx, NY (1967–1972); Assistant Professor to Full Professor, Yale University, New Haven, CT (1973–1988); Professor and Chair, Department of Biochemistry and Molecular Biophysics, Medical College of Virginia, Virginia Commonwealth University, Richmond, VA (1988–2000).

## Accomplishments and Awards

Dr. Yu’s research has culminated in the publication of more than 390 full papers, four patents, and three books. He has trained well over 150 pre- and post-doctoral students. For his achievements, he has been elected as an Academician of the Academia Sinica, Taiwan, ROC (2004). He has also won numerous awards, including the Jacob Javits Neurosciences Investigator Award (1984–1991); Virginia’s Outstanding Scientist of the Year Award (1995); Alexander von Humboldt Senior Scientist Award (1991–1993); an honorary degree from Yale University (1985); Distinguished Alumnus Award, Tunghai University, Taiwan (2002); the Achievement Award, Chinese Engineers and Scientists Association of Southern California (CEASC) (2003); Mahesh Distinguished Research Award, MCG (2006); Medical College of Georgia’s Outstanding Faculty Award (2006 and 2009) and Lifetime Achievements Award (2010). He served as President, American Society for Neurochemistry (2001–2003); President, Society of Chinese Bioscientists in America (SCBA) (2008–2010); US Delegate to IUPUC, National Academies of Sciences (2006–2009). He is a founder and organizer of the China-U.S. Biochemistry Admissions (CUSBA) Program (1994–present). He has served or is still serving on numerous review panels, including NIH, NSF, Veterans Administration, and National Multiple Sclerosis Society, as well the editorial board of numerous scientific journals, such as *Journal of Biological Chemistry*, *Journal of Lipid Research* (Associate Editor), *Neurochemical Research*, *Journal of Neurochemistry*, *Journal of Neurosciences Research*, *Journal of Biomedical Sciences*. He is also an honorary professor at several universities, and many others.

**Principal Contributions to Science by Robert Yu**  
(Selected from a Total of 390 Full Papers)

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