About Dr. Lutz Birnbaumer.

Born in Vienna, Austria, in 1939, Dr. Birnbaumer emigrated with his parents to Argentina in 1948. He went to primary and secondary schools in Buenos Aires, and studied pharmacy and biochemistry at the University of Buenos Aires.

After receiving his Ph.D. in Biochemistry from the University of Buenos Aires, Dr. Birnbaumer moved to the US for postdoctoral training with Dr. Martin Rodbell at the NIH, Bethesda, Maryland. There he studied hormonal stimulation of adenylyl cyclase and performed the experiments that established receptors as entities separate from adenylyl cyclase and became the co-discoverer of the GTP requirement in hormonal stimulation of the adenylyl cyclase. This initiated a life long research theme. In the early 1970s he realized that instead of GTP being necessary for the action of hormones, it is the hormones, through their receptors, that are required for the action of GTP and laid the foundation for the discovery of G proteins. Dr. Birnbaumer's laboratory was among the first to describe the existence of a dual positive and negative regulation of adenylyl cyclases with a role for GTP in both. He was the first to show a requirement for ATP and to propose the participation of a kinase-now called GRK-in the phenomenon of receptor desensitization.

In the early and mid 1980s, Dr. Birnbaumer, together with Ravi Iyengar, established that the activation of an intervening factor-then called N_s or G/F, now G_s-is the rate-limiting step in hormonal activation of adenylyl cyclases. Studies with Iyengar showed further that receptors act by potentiating the effect of Mg ion to accelerate G protein activation-expanding on earlier studies by Dr. Birnbaumer in Dr. Rodbell's laboratory showing that receptors acted by mimicking the effect of high concentrations of Mg. With Juan Codina he purified both G_s and G_i, leading to the discovery by John Hildebrandt in his laboratory, that G_s and G_i were alpha-beta-gamma heterotrimers, until then believed to be alpha-beta dimers. With the advent of molecular biology techniques and the realization that transducin-a light activated GTPase-and the adenylyl cyclase regulatory components belong to a common family of G proteins, Dr. Birnbaumer's laboratory uncovered by molecular cloning the existence of multiple G_i's and of splice variants of both G_s and G_o. His laboratory also cloned G protein coupled receptors, including two novel G_i-coupled serotonin receptors and the M5 muscarinic receptor. Recombinant proteins were then used to study the regulation of G protein effectors.

Newly developed cell lines allowed Dr. Birnbaumer together with Finn Olav Levy and the pharmacologist Alberto. J. Kaumann to determine that human β-1- and β-2 adrenoceptors have differing coupling efficacy.

In the early 1990s, with the help of Allan Bradley at Baylor College of Medicine, Dr. Birnbaumer began developing G protein KO mice. He is currently studying the molecular and physiological basis for the phenotypes that develop in six such engineered mouse strains. Also in the early 1990s with the postdoctoral fellow Michael Xi Zhu, Dr.

Birnbaumer began studying voltage independent Ca entry into cells. By the mid 1990s, six novel mammalian homologues of the Drosophilae protein termed transient receptor potential (trp) had been discovered in his laboratory. Now called TRPCs, they were later proven to be involved in mediating this type of Ca entry. The mechanism of their activation and the roles they play in different tissues constitute a second research theme of Dr. Birnbaumer's laboratory.

Another research topic in Dr. Birnbaumer's laboratory has been the study of voltage-dependent calcium channels. In collaboration, first with Arthur Brown, and then with Enrico Stefani, Dr. Birnbaumer's fellows worked on the functional role of calcium channel β subunits, cloning three of the four known and characterizing their differential effects on the behavior of the pore forming α-1 subunits.

In 2001, Dr. Birnbaumer assumed the positions of Scientific Director of the Division of Intramural Research and Sr. Investigator of this division's Signal Transduction Laboratory, at NIEHS in Research Triangle Park. In February 2007 he stepped down from his administrative post, moved his research laboratory to the Laboratory of Neurobiology of the Institute's Environmental Biology Program and directs his resarerch group on a full time basis. Research in his laboratory is at present done by two staff scientists, three research fellows, five postdoctoral fellows, three laboratory technicians and one mouse colony manger. With their help, Dr. Birnbaumer's laboratory continues research into physiological roles of G protein alpha subunits and TRPC channels, as seen in knockout mice. Through collaboration with the electrophysiologist David Armstrong in the Laboratory of Neurobiology, Dr. Birnbaumer also keeps an active interest in regulation of voltage-gated calcium.channels

Future directions. The laboratory's direction has changed during the last two years (2006-2007) and refocused on two rather different problems. One is the phenomenon of genetic imprinting, with special emphasis on the imprinting of the GNAS locus that codes for the alpha subunit of the Gs G protein. The other is the elucidation at the biochemical and molecular level of the mechanism by which the trimeric G proteins are activated by seven-transmembrane receptors. The focus here is on co-crystallization of rhodopsin with transducin.