The First HFSP Nakasone Award goes to Karl Deisseroth of Stanford University

The Human Frontier Science Program Organization (HFSPO) is pleased to announce that the first HFSP Nakasone Award has been conferred upon Karl Deisseroth of Stanford University for his pioneering work on the development and application of optogenetic techniques for the study of the relationship between neural circuits and behaviour. The HFSP Nakasone Award has been established to honour scientists who have made key breakthroughs in fields at the forefront of the life sciences. It recognizes the vision of former Prime Minister Nakasone of Japan in the creation of the Human Frontier Science Program. The recipient will give the first HFSP Nakasone Lecture at the annual meeting of HFSP awardees to be held in Kerala, India in November 2010.

A major challenge in neuroscience is to understand the cellular mechanisms underlying neural circuits responsible for behaviours. Approaches from pharmacology and electrophysiology have made major contributions to our understanding of the chemical and electrical basis of neural activity, but have not allowed the manipulation of specific classes of nerve cells in defined anatomical areas. Karl Deisseroth's contribution has been to engineer neurons of defined specificity in a way that makes them sensitive to light, and to use light as a stimulus to activate or inhibit their activity.

His approach builds on studies of microbial opsins (genes that encode light-activated ion channels and pumps called bacteriorhodopsins, halorhodopsins, and channelrhodopsins), ranging from work by Walter Stoeckenius and Dieter Oesterhelt in 1971 to work by Peter Hegemann and Georg Nagel in 2002, on the microbial biology and biophysics of these proteins. In a paper published in 2005, Karl Deisseroth, the principal investigator of a team at Stanford that included graduate students Ed Boyden and Feng Zhang, took the gene for one of these microbial opsins and inserted it into a virus that was then used to insert the genes into nerve cells in cell culture. The cells could be stimulated with blue light with millisecond time resolution, thus allowing for the first time optical activation of nerve cells at physiological time scales. Using the power of genetics to create different modified viral vectors, Karl Deisseroth has been able to apply this approach in living animals to make defined sets of neurons sensitive to light, even in deep brain structures of mammals. He has also developed sophisticated optical fibre technologies to allow both the optical stimulation and recording of neuronal activity together with behavioural observation. Finally, he has led the molecular engineering of microbial opsins for new classes of function, and the application of these new tools to study neural circuit function in health and disease. This combination of genetics with optics has been dubbed "Optogenetics". Karl Deisseroth has made this technology freely available and it is now being used by hundreds of laboratories throughout the world.

Karl Deisseroth holds joint appointments as Associate Professor of Bioengineering and Associate Professor of Psychiatry and Behavioral Sciences at Stanford University. His pioneering work has been recognised by many prestigious awards, including from the Society for Neuroscience for his development of optogenetics, and from the Howard Hughes Medical Institute.

The Human Frontier Science Program Organization was founded in 1989 to support international research and training at the frontier of the life sciences and on creating opportunities for young scientists. It is supported by contributions from Australia, Canada, France, Germany, India, Italy, Japan, Republic of Korea, New Zealand, Norway, Switzerland, the United States of America, the United Kingdom and the European Commission, which represents the non-G7 states of the European Union. With its collaborative research grants and postdoctoral fellowship programs it has supported approximately 5500 scientists from 65 countries over the last 20 years.

http://www.youtube.com/watch?v=C8bPbHuOZXg

http://www.asklive.org/research/ecs/deisseroth.html

www.optogenetics.org