Press Release

Emmanuelle Charpentier and Jennifer Doudna to receive the 2016 HFSP Nakasone Award

The Human Frontier Science Program Organization (HFSPO) has announced that the 2016 HFSP Nakasone Award has been awarded to Emmanuelle Charpentier of the Max Planck Institute for Infection Biology, Berlin, Germany and Umeå University, Sweden and Jennifer Doudna of the University of California at Berkeley, USA for their seminal work on gene editing by means of the CRISPR-Cas9 system.

Emmanuelle Charpentier

Jennifer Doudna

The HFSP Nakasone Award was established to honor scientists who have made key breakthroughs in fields at the forefront of the life sciences. It recognizes the vision of Japan's former Prime Minister Nakasone in the creation of the Human Frontier Science Program. Charpentier and Doudna will present the HFSP Nakasone Lecture at the 16th annual meeting of HFSP awardees to be held in Singapore, in July 2016.

A discovery in the late 1980s revealed that neighboring bacterial DNA segments contain repeating nucleotide sequences which flank short segments. In 2007, it was shown that these repeating sequences, termed CRISPR (clustered regularly interspaced short palindromic repeats), are part of a bacterial defense system against foreign DNA. Through their recent joint study, initiated in 2011, Charpentier and Doudna have shown that the system can be harnessed as a genetic tool to efficiently and specifically edit DNA targeting any sequence in the genome. Emmanuelle Charpentier's laboratory started to focus on the bacterial CRISPR-Cas9 system by investigating it in the human pathogen *Streptococcus pyogenes*. Her team described the three components of the system that consist of two RNAs forming a duplex (tracrRNA and crRNA) and the protein Cas9 (formerly named Csn1) and showed the roles of each component in the early steps of activation of the system (duplex RNA co-processing and *in vivo* phage sequence targeting). This work was published in Nature in 2011. Then Charpentier started to collaborate with Jennifer Doudna's team to investigate the structural aspects of the system. In a ground-breaking 2012 paper in Science, they reported that the RNA-guided protein Cas9 is able to process genetic information within the CRISPR sequences to find and cleave invading viral DNA, thereby destroying it. The publication reports that this cellular defense mechanism had

applications beyond attacking viruses, as the RNA could be engineered to bind to any given gene, thus prompting the Cas9 protein to cut the DNA at that specific location.

The research turned CRISPR-Cas9 into an exceptionally powerful tool resembling "molecular scissors" which can be customized to cleave the DNA of many cells and organisms, including human cells. With this revolutionary technology, it is much easier to modify gene expression, to switch a gene "on" or "off", to change, repair or remove genes. Due to its specificity, ease of use and broad applicability, CRISPR-Cas9 has been rapidly adopted by scientists all around the world.

The HFSP Nakasone Award was established in 2010. Previous recipients are Karl Deisseroth (2010), Michael Elowitz (2011), Gina Turrigiano (2012), Stephen Quake (2013), Uri Alon (2014), and James Collins (2015).

The Human Frontier Science Program Organization was founded in 1989 to support international research and training at the frontier of the life sciences. It is supported by contributions from the G7 nations, together with Switzerland, Australia, India, New Zealand, Norway, Singapore, Republic of Korea and the European Union. With its collaborative research grants and postdoctoral fellowship programs, the Program has approved over 4000 awards involving more than 6600 scientists from all over the world during the 26 years of its existence. The HFSPO supports research at the interface between life sciences and the natural sciences and engineering and places special emphasis on creating opportunities for young scientists.