Professor Edith HEARD

Chair in Epigenetics and Cellular Memory

Biography

Edith Heard was born on March 5th, 1965 in London (United Kingdom).

She studied Natural Sciences at Cambridge University, graduating in genetics, and then carried out her PhD at the Imperial Cancer Research Fund (London), working on gene amplification in cancer. During her post doc at the Pasteur Institute in Paris, she began her work on the epigenetic process of X-chromosome inactivation. Since 2001 she has led the Mammalian Developmental Epigenetics team at the Institut Curie and has been director of the Unit of Genetics and Developmental Biology Department since 2010.

She has been awarded several prizes and honours, including the Silver Medal of the CNRS in 2008, the Jean Hamburger Prize (Ville de Paris) in 2009, an ERC Advanced Investigator Award in 2010 and the Grand Prix de la FRM in 2011. She was elected as EMBO member in 2005. In 2012, she was appointed Professor of the Collège de France.

Edith Heard has made many important contributions to the emerging field of epigenetics through her work on one of its most classic examples, X-chromosome inactivation. This process entails the silencing of one of the two X chromosomes during early development in female mammals, enabling dosage compensation between the sexes. This phenomenon of chromosome-wide gene silencing that can be stably propagated during cell division, was discovered more than half a century ago and represents a paradigm for epigenetics. The pioneering work of Edith Heard, using X inactivation as a model system, has shed light on epigenetic mechanisms at multiple timescales: over the cell cycle, during development, across generations and in evolution. Her team revealed the dynamics of this epigenetic process during development – being established early on, then rapidly reversed in a subset of cells that give rise to the embryo-proper. This finding had important general implications for the plasticity of epigenetic states in the embryo, in stem cells and during induced pluripotency. It also had implications in cancer, where dedifferentiation is commonly found and epigenetic plasticity seems to be a hallmark. Edith Heard and her colleagues were also the first to discover the evolutionary diversity of events underlying X inactivation, with striking differences in the timing and manner in which this process is set up between even closely related mammals during early embryogenesis. Her group have also made several discoveries on the mechanisms of X inactivation. They have demonstrated...
the importance of the spatial organization and dynamics of the two X chromosomes in the nucleus during the initiation of X inactivation. They have also defined some of the first changes in the chromatin status of the X chromosome which can be considered as potential epigenetic marks ensuring the cellular memory of the inactive state.