



Prof. Edith Heard

Director General of EMBL European Molecular Biology Laboratory | Professor at Collège de France, Paris



Most important awards, prizes and academies

2020 L'Oréal-UNESCO prize for Women in Science International Award 2020 2019 Hansen Family Award, 2019; 2017 Grand Prix of INSERM 2017; 2017 Prix René et Andrée Duquesne of La Ligue contre le Cancer; 2017 The European Society for Human Genetics Award 2013 Prix de la Fondation Allianz, Institut de France 2012 Science Heirloom for Women in Science; 2011 Grand Prix de la FRM, Paris, France; 2009 Prix Jean Hamburger de la Ville de Paris, France; 2008 CNRS Silver Medal ("Medaille d'Argent" du CNRS), Paris, France; 2007 The "Otto Mangold" prize, German Society for Developmental Biology, Germany. 2022 Elected member of the Royal Academy in Denmark; 2021 Elected member of the USA National Academy of Medicine; 2021 Elected member of the Leopoldina, German National Academy of Sciences 2021 Elected member of the USA National Academy of Sciences; 2021 Member of WHO Science Council; 2021 Chair of scientific advisory board, Institut Curie; 2020 Member of scientific advisory board, Janelia Farm HHMI; 2018 Member of scientific advisory board, Crick Institute; 2018 Member of scientific advisory board, Hubrecht Institute; 2013 Elected Fellow of the Royal Society, UK.

Summary of scientific research

A female perspective: from X-chromosome inactivation to a life in science X-chromosome inactivation during early female development is an essential epigenetic process that is required to achieve appropriate dosage for X-linked gene products. The Heard lab is interested in understanding how the differential treatment of the two X chromosomes in the same nucleus is set up during development and how this differential expression is then maintained, or reversed in certain circumstances during development or in a disease context. Our approaches are multiple, in vivo and in vitro and exploring molecular and cellular dynamics in space and time. X inactivation is also a very female process whereby gene dosage variation for X-linked genes can have profound effects during development but also in disease.

Main publications

Peer-reviewed original articles

Marion-Poll, L. Forêt B, Zielinski D, Massip, F. Attia, M., Carter, A.C., Syx, L. Chang, H., Gendrel, A-V., and Heard, E. et al. Locus specific epigenetic modalities of random allelic expression imbalance. *Nature Comm.* 12:5330, 2021.

Dossin F, Pinheiro I, Źylicz JJ, Roensch J, Collombet S, Le Saux A, Chelmicki T, Attia M, Kapoor V, Zhan Y, Dingli F, Loew D, Mercher T, Dekker J, Heard E. SPEN integrates transcriptional and epigenetic control of X-inactivation. *Nature* 578:455-460, 2020

Collombet S, Ranisavljevic N, Nagano T, Varnai C, Shisode T, Leung W, Piolot T, Galupa R, Borensztein M, Servant N, Fraser P*, Ancelin K*, Heard E*. Parental-to-embryo switch of chromosome organization in early embryogenesis. *Nature* 580:142- 146, 2020

van Bemmel JG, Galupa R, Gard C, Servant N, Picard C, Davies J, Szempruch AJ, Zhan Y, Źylicz JJ, Nora EP, Lameiras S, de Wit E, Gentien D, Baulande S, Giorgetti L, Guttman M, Hughes JR, Higgs DR, Gribnau J, Heard E. The bipartite TAD organization of the X-inactivation center ensures opposing developmental regulation of Tsix and Xist. *Nat Genet* 51:1024-1034, 2019

Pollex T and Heard E. Exploring the role of X-chromosome pairing and nuclear organization during the initiation of X inactivation. *Nat Genet* 2019 51:285-295, 2019

Zylicz J, Bousard A, Zumer K, Dossin F, Mohammad E, Texeira S, Schwab B, Syx L, Dingli F, Loew D, Cramer P and Heard, E. The Implication of Early Chromatin Changes in X Chromosome Inactivation. *Cell* 176:1-16, 2018

Giorgetti L, Lajoie B, Carter AC, Attia M, Zhan Y, Xu J, Chen CJ, Kaplan N, Chang HY, Heard E* and Dekker J*. Structural organization of the inactive X chromosome. *Nature* 535: 575-579, 2016 *

Co-corresponding authors

Giorgetti L, Galupa R, Nora EP, Lam F, Piolot F, Dekker J, Tiana G* and Heard E*. Predictive polymer modeling reveals coupled fluctuations in chromosome conformation and transcription. *Cell* 157: 950–963, 2014 *co-corresponding authors

Schulz E, Meisig J, Nakamura T, Okamoto I, Sieber A, Picard C, Borensztein M, Saitou M, Bluthgen N and Heard E. The two active X chromosomes in female embryonic stem cells block exit from the pluripotent state by modulating the ES cell signaling network. *Cell Stem Cell* 14: 203-16, 2014

Nora EP, Lajoie B, Schulz EG, Giorgetti L, Okamoto I, Servant N, Piolot T, van Berkum NL, Meisig J, Sedat J, Barillot E, Blüthgen N, Dekker J* and Heard E*. Spatial partitioning of the regulatory landscape of the X-inactivation center. *Nature* 485:381-385, 2012.