Research in cellular memory

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How do fetal cells know what cell types to become? Why do cells in the adult body sometimes forget what they are and develop into cancer cells? These are some of the questions intensively investigated within the research field of epigenetics. Danish epigenetic research has a very strong position internationally and one of the players is Associate Professor Anja Groth from BRIC, University of Copenhagen. She has just received an ERC Starting Grant and has been selected for EMBO's prestigious Young Investigator Program (YIP).

"After the mapping of the human genome, it became clear that genes alone cannot explain the complexity of life. Genes need to be turned on or off in a specific order, to enable development of the 200 cell types in our body and to sustain their normal function throughout life. We have developed a new technology, which we can use to gain insight into how cellular memory is maintained when cells divide," says Anja Groth.

Special proteins called histones function as small building scaffolds, organising the DNA into a complex structure called chromatin. This structure can be open or closed, turning on or off selected genes. Every time a cell divides, the DNA is duplicated so that each daughter cell obtains an identical copy. Also, information on the histones and the chromatin structure needs to be copied, but this process is poorly understood. Research in the Groth laboratory focuses on how chromatin structure and information carried by small molecules on histones are duplicated and passed on during cell divisions. This is crucial for cellular memory and function, as it determines which genes are on or off.

"Losing cellular memory can be fatal. Mechanisms that establish and maintain chromatin structures are central for development of all cell types in our body and to maintain cellular function and prevent cancer later in life," says Anja Groth.

The research group's new technology facilitates investigations of how information carried by histones and chromatin structure is copied when cells divide.

"The technology provides us with a powerful tool to identify new molecular mechanisms important for cellular memory, which is the core of my ERC project," says Anja Groth.

Every year, the ERC awards a number of starting grants to young researchers who have shown excellence in their field of research and present a truly ambitious and visionary research project. Anja Groth has received an ERC starting grant of 12.5 million DKK. In addition, she has been selected for EMBO's prestigious Young Investigator Programme (YIP). EMBO is an organisation of leading life scientists that fosters new generations of researchers to produce world-class scienti?c results. YIP is used to promote the new talents and to allow members to create strong networks focusing on both science and career development.

"The ERC grant gives me a fantastic opportunity to focus on my research and kick-starts this ambitious project that can bring important new knowledge about epigentics and cellular memory. I am also very grateful to become a YIP member, as this will connect me with young top scientists in Europe and provide attractive courses for the students in my laboratory. This is also in line with my engagement in recruiting more young people into a scientific research career," says Anja Groth.

In this context, Anja Groth is engaged as a speaker in "Ungdommens Naturvidenskabelige Forening" (Danish youth organisation within natural sciences) and in the European initiative "TWIST - Towards women in science and technology". The aim of TWIST is to inspire more young people, especially women, to select a career within the natural sciences.

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