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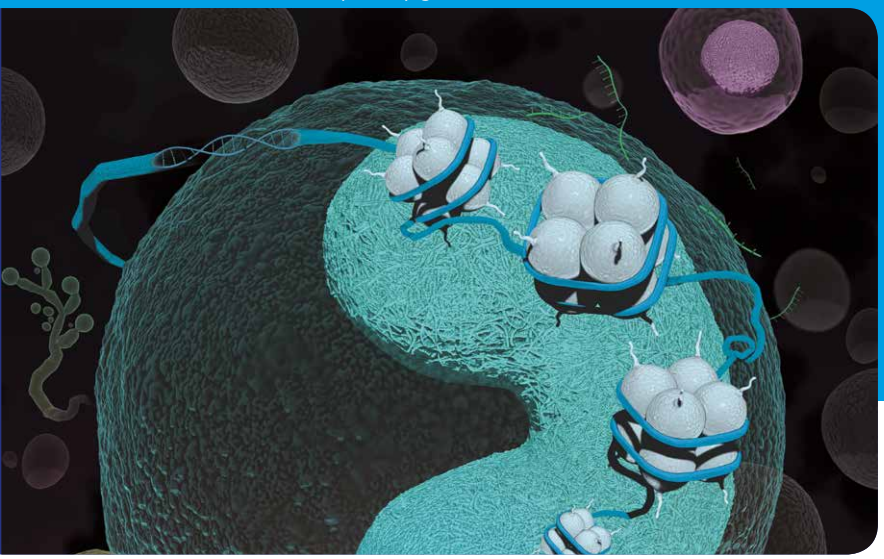

A BLUEPRINT of Haematopoietic Epigenomes

Each of us has a unique genome that has been shaped by evolution, passed along by our parents, and combined in an original way in a fertilized egg. This cell contains the complete set of instructions to spawn the hundreds or thousands of types of daughter cells needed to create a human body. No one knows the exact number – new types of cells are discovered all the time – but much has been learned about the way they develop from generic stem cells to their final specialized forms.

Along the way cells activate different subsets of genes and process them in various ways to create RNAs and proteins. These processes are passed along from parent cells and restrict the fates of their offspring through a sort of "memory" called epigenetics.

Epigenetics is the focus of BLUEPRINT, a €30-million Euro project funded by the European Commission and part of the larger International Human Epigenome Consortium. BLUEPRINT was launched in 2011 and is coordinated by Henk Stunnenberg from Radboud University, the Netherlands. The project brings together the efforts of 41 European universities and scientific institutes to understand epigenetics at all levels, from DNA to RNA to proteins. This work is the EU's major contribution to the International Human Epigenome Consortium (IHEC), which involves many more laboratories from the United States, Europe, and across the world.

Each level of epigenetic regulation plays a crucial role from the earliest stages of embryonic development to the way our bodies respond to diseases, injuries, aging, and a host of factors related to our lifestyles and the environment. BLUEPRINT focuses on a model system that has been studied for decades: the development of all our blood and lymphatic cells from more generic haematopoeitic stem cells. As well as fulfilling essential functions in our daily lives, these cells combat infections and are the first line of defense against many other health threats. Defects in their behavior lead to cancer, autoimmune conditions and a score of other conditions. One of the most promising new areas of biomedical research involves modifying blood cells to combat deadly diseases.

BLUEPRINT has collected blood cells from 100 individuals. Studies of these samples have already produced results that are highly relevant to modern biomedicine. In the process, the project is creating knowledge and scientific networks – not only on the topic of blood cells, but many fundamental aspects of human biology – that will benefit researchers for years to come.