'Big data' helps to discover key factors driving blood cell specification

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New research led by researchers at the University of Birmingham, alongside teams from the universities of Cambridge, Leeds and Manchester, has identified key factors that drive blood cell development by recapitulating this process in a culture dish. Cells with the ability to give rise to blood are normally specified in the early embryo over a number of developmental stages and eventually form blood stem cells that are maintained for life and generate trillions of blood cells every day.

By studying six consecutive stages of development and adopting a 'big data' approach using computational analyses, the consortium, funded by the Biotechnology and Biological Sciences Research Council, studied the behaviour of thousands of genes and the factors that regulate them.

Their findings, published in *Developmental Cell*, identified previous unknown regulators of blood cell development, significantly furthering our knowledge of this process. They also explained how regulatory elements in the DNA work together, driving gene expression and the switch of one developmental stage to another.

These data also revealed the minimum requirements for generating blood cells from an unrelated, cultured cell type, a method that is vital for the generation of patient-specific blood cells for regenerative medicine. To reach out to the scientific community and the interested public, group generated a website that allows unlimited data access.

The team believes that improved understanding of the key genes that drive the specification of blood cells and how they interact with each other will help to generate the stem cells that could be used to help patients suffering from blood disorders, such as myeloid leukaemia.

Professor Constanze Bonifer from the University of Birmingham explained, "We examined how embryonic cells develop towards blood cells by collecting "multi-omics" data from measuring gene activity, changes in chromosome structure and the interaction of regulatory factors with the genes themselves. Our research shows in unprecedented detail how a vast network of interacting genes control blood cell development. It also shows how we can use such data to enhance our knowledge of this process"

Provided by University of Birmingham

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