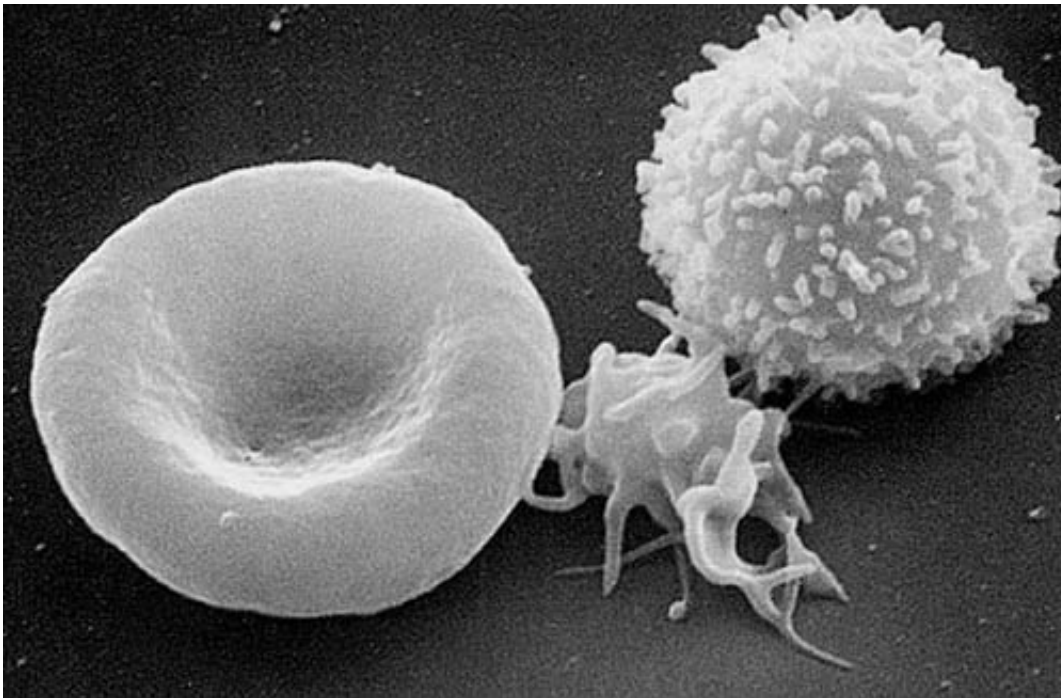


Major breakthrough in the manufacture of red blood cells

March 23 2017



Scanning electron micrograph of blood cells. From left to right: human erythrocyte, thrombocyte (platelet), leukocyte. Credit: public domain

Researchers have generated the first immortalised cell lines which allow more efficient manufacture of red blood cells.

The team, from the University of Bristol and NHS Blood and Transplant, were able to manufacture red [blood cells](#) in a more efficient scale than was previously possible.

The results, published in *Nature Communications*, could, if successfully tested in clinical trials, eventually lead to a safe source of transfusions for people with rare blood types, and in areas of the world where blood supplies are inadequate or unsafe.

Previously, research in this field focused on growing donated [stem cells](#) straight into mature red blood cells. However that method presently produces small numbers of [mature cells](#) and requires repeat donations.

The world-leading team in Bristol have now developed a robust and reproducible technique which allows the production of immortalised erythroid cell lines from [adult stem cells](#). These premature red cells can be cultured indefinitely, allowing larger-scale production, before being differentiated into mature red blood cells.

Dr Jan Frayne, from the University of Bristol's School of Biochemistry, said: "Previous approaches to producing red blood cells have relied on various sources of stem cells which can only presently produce very limited quantities. By taking an alternative approach we have generated the first human immortalised adult erythroid line (Bristol Erythroid Line Adult or BEL-A), and in doing so, have demonstrated a feasible way to sustainably manufacture red cells for clinical use from in vitro culture.

"Globally, there is a need for an alternative red cell product. Cultured red blood cells have advantages over donor blood, such as reduced risk of infectious disease transmission."

Prof Dave Anstee, Director at the NIHR Blood and Transplant Research Unit in Red Cell Products, which is a collaboration between the University of Bristol and NHS Blood and Transplant, said: "Scientists have been working for years on how to manufacture red blood cells to offer an alternative to donated blood to treat patients.

"The first therapeutic use of a cultured red cell product is likely to be for patients with rare blood groups because suitable conventional [red blood cell](#) donations can be difficult to source.

"The patients who stand to potentially benefit most are those with complex and life-limiting conditions like sickle cell disease and thalassemia, which can require multiple transfusions of well-matched blood. The intention is not to replace blood donation but provide specialist treatment for specific patient groups."

The cells were cultured at the University of Bristol and at NHS Blood and Transplant's Filton site.

NHS Blood and Transplant needs to collect 1.5 million units of blood each year to meet the needs of patients across England and the ongoing need for life saving blood donations remains. It would be many years before manufactured cells could be available on a large scale.

NHS Blood and Transplant announced plans for in-man trials of manufactured blood in 2015. This first trial will not use Bel-A cells. The first trial, due to start by the end of 2017, will use manufactured red cells from stem cells in a normal blood donation.

More information: Kongtana Trakarnsanga et al. An immortalized adult human erythroid line facilitates sustainable and scalable generation of functional red cells, *Nature Communications* (2017). [DOI: 10.1038/ncomms14750](#)

Provided by University of Bristol

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