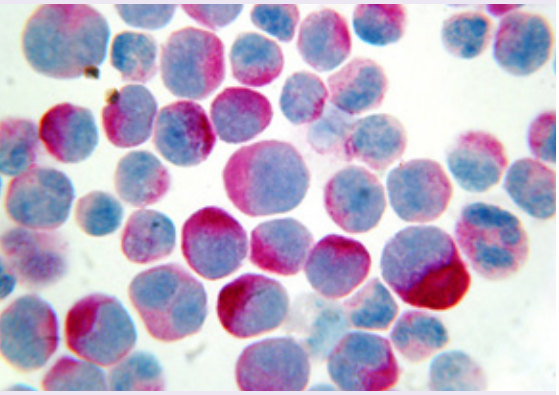
At a glance

Professor Lars Nielsen has developed a process to convert umbilical cord blood into life-saving neutrophils for chemotherapy patients.

Professor Lars Nielsen



Making immune-boosting neutrophils

The need

Cancer patients who undergo chemotherapy face a number of challenges as a result of their treatment regimen: fatigue, hair loss, nausea and appetite changes, to name but a few. One of the more serious side effects, however, is neutropenia, in which the number of immune-fighting white blood cells known as neutrophils are depleted. For chemotherapy patients, neutropenia typically occurs in the weeks following a course of chemotherapy, leaving the patient vulnerable to serious or even fatal infections.

The most common treatment for chemotherapy-induced neutropenia is a drug injection that stimulates blood stem cells located in the patient's bone marrow to produce neutrophils. However, given that most intensive chemotherapy regimens also damage blood stem cells, this approach can be inefficient. New approaches to bolster the number of neutrophils for these patients are desperately needed.

The project

At the University of Queensland, Professor Lars Nielsen may have an answer. With persistence and knowledge gained from years of research, Nielsen's team has devised a method of producing therapeutically valuable neutrophils from umbilical cord blood.

Although neutrophils can be obtained from healthy donors, recruiting donors in the number required is difficult. Possible side-effects associated with the medication given to donors limits the number of times any donor can volunteer. To help a single chemotherapy patient, multiple donors may be required. To overcome these challenges the Nielsen team devised a method to isolate stem cells from umbilical cord blood, then use a bioreactor to expand the number of stem cells and coax them to develop them into neutrophils. This approach, reported in 2014, creates an end product, eNeut, that once approved for clinical use can be administered via an intravenous drip in a similar manner to other types of transfusions.

The impact

To help advance this approach into clinical trials, the process and eNeut product have been licensed by the Canadian-based commercialisation centre, CCRM. One of Nielsen's team members, Dr Nick Timmins, has relocated to Canada and it is hoped in the near future that eNeut is shown to meet the necessary standards and that valuable doses of neutrophils will be available for chemotherapy patients at facilities across the globe.