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Joint Federal Research Funding for Military Personnel and Veterans

Project Report Summary Template

Funding Opportunity
Development of new approaches to improve the supply of universal "O-type" red blood cells.
Brief Overview
Researchers at the University of British Columbia, in collaboration with Avivo Biomedical Inc., developed and tested a process to convert A-type red blood cells into universal donor blood (enzyme-converted O blood, or ECO blood). The project evaluated whether this technology could be used in battlefield conditions using an automated red blood cell washing device, helping increase the availability of life-saving universal blood for military and civilian transfusions.
What is this Research About? Blood transfusions are essential for treating severe bleeding in military and civilian settings. However, compatible blood supplies can be limited because transfusions typically require matching blood types. Type O blood is considered the universal donor blood type and can be transfused in emergencies when blood typing is not possible. As a result, demand for Type O blood often exceeds supply. This research explored a technology that converts A-type blood into universal donor blood, potentially increasing the availability of blood for emergency transfusions.
What did the Research Do? The research team tested an enzymatic blood group antigen conversion system designed to transform A-type red blood cells into universal donor blood. They evaluated whether the process could be performed under battlefield-relevant conditions using an automated red blood cell washing device. The team optimized a washing protocol capable of producing enzyme-converted O blood at full blood-bag scale in less than one hour. They also assessed the quality, stability, and safety of the converted blood cells and worked with Avivo Biomedical Inc. to develop a formulation that stabilizes the enzyme system for storage at refrigerated or room temperatures.
What did the Research Find? The researchers demonstrated that enzyme-converted O (ECO) blood can be produced successfully at full blood-bag scale using an optimized washing process. The study showed that the enzymes used in the conversion process could be effectively removed without damaging red blood cells. Analytical testing confirmed the quality and stability of the converted blood. The team also developed a new enzyme formulation that improves storage stability, making it suitable for refrigeration or room-temperature storage.
What does this Research Mean? This project provides proof of concept that A-type packed red blood cells can be converted on demand into universal donor blood suitable for transfusion. The technology has the potential to significantly increase the supply of universal blood for military operations, emergency medicine, and

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disaster response, where rapid access to compatible blood can save lives. If further developed and implemented, this approach could help alleviate shortages of Type O blood and improve transfusion readiness in austere environments

Sources

Dr. Kizhakkedathu (Principal Investigator), University of British Columbia
Dr. Withers, University of British Columbia
Dr. Rahfeld, Avivo Biomedical Inc.

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