Background: Allogeneic red blood cell (RBC) transfusion is the most common hospital procedure. Current blood bank processes require RBCs to be stored refrigerated at 1-4°C until the time of transfusion. Then the units undergo a rejuvenation process and need to be washed prior to transfusion. The current red blood cell wash devices are typically located within the blood bank setting or in the operating room as cell salvage devices. Cell salvage devices operate best with a low hematocrit input which is not conducive to transfused RBCs where the hematocrit is high. The current cell salvage devices also operate on direct drive principles which involve costly disposable parts. By using an indirect driving mechanism (magnetic fields), rotating seals can be avoided in disposable components.

Objectives: The goal of this design project will be to design and develop a portion of a base unit for a portable red blood cell washing device to work with an existing rotor design. The device must be able to drive a rotor through electrical circuits generating magnetic force. The device must be able to accommodate a rotor 8 inches in diameter and 2 inches tall. The device must be capable of accelerating at 40 RPM/s and hold a speed of 2500 RPM for several minutes before decelerating at 10 RPM/s. The device must be able to be fixed to a cart and rolled in the OR, ICU, patient floor. The device must remain stable and lock the rotor during operation. The device must be capable of providing feedback on the actual RPM of the rotor and adjust control accordingly.

Design team: Ideally the project team would consist of electrical and mechanical engineering students

- Mechanical Engineering - design of the device and stability during centrifugation
- Electrical Engineering – design of electronic circuitry and electronic feedback controls.

Budget: $5,000 for supplies and prototype equipment including 3D printing, motors, controllers, etc.
References:

Red Blood Cell Rejuvenation Information
rejuvesol Solution ([www.rejuvesol.com](http://www.rejuvesol.com))

Comparable Cell Salvage/Wash Devices
Fresenius C.A.T.S
([http://www.terumo-cvs.com/products/ProductDetail.aspx?groupId=1&familyId=46&country=1](http://www.terumo-cvs.com/products/ProductDetail.aspx?groupId=1&familyId=46&country=1))
Sorin Group Xtra
Medtronic Autolog
Haemonetics Cell Saver Elite

Matthew Landrigan, PhD
R&D Project Manager, Biologics
Zimmer Biomet
(o) 574 371 1115
(c) 574 933 4190
matt.landrigan@zimmerbiomet.com