WashU

Office of Technology Management

NORMOTHERMIC EXTRACORPORAL LIVER PERFUSION (NELP)

Banan, Babak, Chapman Sr., William, Lin, Yiing

Hardin, Clyde "Frank"

T-015492

Background: In the U.S., ~15,000 adults and children are medically approved for a liver transplant and ~6,000 liver transplants are performed each year. Unfortunately, 30% of donor livers are unsuitable for transplantation while 1,500 patients per year die waiting for liver a transplant. The high demand for organs leads physicians to use suboptimal livers including livers from older donors and livers kept under prolonged cold storage conditions. Technologies that rely on cool, passive (gravity) liver perfusion are ill-suited for suboptimal liver transplantation causing complications including ischemic-reperfusion injury. Researchers at Washington University in St. Louis have developed a normothermic extracorporeal liver perfusion (NELP) system that better preserves a healthy liver ex-vivo and enables the improvement of marginal livers for transplantation.

Technology Description: Research has shown that NELP reduces ischemia reperfusion injury, improves hemodynamics of the liver and recovers grafts insulted with warm ischemia times (*e.g.* donation after cardiac death). Furthermore, NELP reduces hepatocellular damage and maintains normal bile production along with improved liver transplant survival. As opposed to commonly used low temperature passive (gravity) perfusion systems, the enhanced NELP system (see adjacent figure) uses active perfusion while maintaining the system temperature at 38°C. The unique feature of this NELP system is the incorporation of an inline dialysis circuit. These modifications better preserve a healthy liver ex-vivo and help improve the liver performance of marginal donor livers including livers with steatosis and livers donated after cardiac death. The system further enables assessment of the livers suitability for use in liver transplantation, is built up of fewer components, and is less space demanding.

Key Advantages:

- System uses superior active warm perfusion
- Improvement of marginal donor livers (fatty/steatotic livers)
- Able to monitor parameters and potential for pharmacological manipulation
- Small system with fewer components is simple to setup and operate
- Potentially extensible to transplantation of other organs