

# RECELLULARIZATION: THE FUTURE OF LIVER TRANSPLANTATION

**P**atients with heart failure have heart pumps and ventricular assist devices that allow their hearts to keep beating. Patients with kidney failure have dialysis to clean the toxins from their blood. Diabetics have insulin to correct the under performance of their pancreas. But there are no options other than transplantation for patients with liver failure, and unfortunately more people are in need of liver transplants than there are donor organs available.

John LaMattina, M.D., assistant professor and director of the University of Maryland Medical Center's living donor liver transplant program, is committed to finding new options for patients with end-stage liver disease. His first step was to work with colleagues in the Division of Transplantation to establish the largest adult living donor liver transplant program in the state of Maryland, which enables close friends or relatives to donate part of their liver to their sick loved one after a thorough examination and extensive physical evaluation. This living donor surgery is designed to help transplant patients earlier in their liver failure so that they recover more quickly and do not become sicker while awaiting a deceased donor organ.

In addition to his clinical solutions for maximizing available livers, Dr. LaMattina fosters a passion for basic science research, which culminated during his training years in a fellowship in Dr. David Sachs' Transplant Biology Research Center at Massachusetts General Hospital in Boston where he studied transplant immunology and tolerance of transplanted tissue.



DR. JOHN LAMATTINA'S research focuses on the possibility of patients becoming their own donors for new livers.

Now with a lab of his own, Dr. LaMattina uses a large animal pre-clinical model to investigate the possibility of stripping native cells from cadaver porcine livers, leaving only the translucent scaffolding of the liver, and recellularizing them with stem cells from a human recipient. If perfected, this procedure could eliminate deaths caused by the shortage of livers available for transplantation. The science is complex, but the concept is fairly simple, like gutting the inside of a home and rebuilding the floor plan.

## BECOMING DONOR AND RECIPIENT

Imagine if patients could become both their own donor and recipient. It would look something like this: patient donates his/her own healthy stem cells. Physician-scientists inject stem cells into a porcine liver scaffold where cells multiply over a few weeks until they have filled the scaffold and regenerated a full liver. Surgeons would transplant that newly recellularized liver into the donor-recipient.

The risk of rejection would be almost non-existent since the cells came from the recipient's own body. And the wait time to transplant would be weeks instead of months, requiring just a few weeks to harvest stem cells and recellularize a liver scaffold.

Livers could be customized per recipient when advance notice allows. For patients with acute liver failure, recellularization is not an option. Ideally, surgeons would be able to pull from porcine scaffolds that have been recellularized with human stem cells of various blood types — like selecting a unit of blood during a transfusion.

Research is in the early stages, but Dr. LaMattina believes he will see significant advancements in the next five to 10 years with increased funding and research support.

You can easily reach the liver transplant team by downloading an iPhone® app at [umm.edu/LiverApp](http://umm.edu/LiverApp) or scan this QR code.

