

2008
ANNUAL REPORT
TATRC



TELEMEDICINE & ADVANCED TECHNOLOGY
RESEARCH CENTER



The Regenerative Medicine portfolio currently covers at least another 9 projects (an additional \$27M) that fall under other TATRC portfolios such as Neuroscience, Nano-Medicine and Biomaterials, Chronic Disease Management, and Advanced Prosthetics and Human Performance.

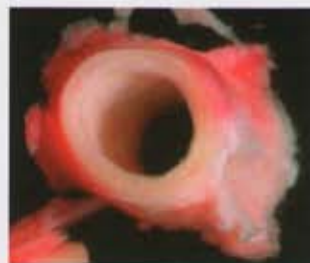
In a collaborative effort, TATRC has been working closely with COL Robert Vandre, Project Director of the newly formed *Armed Forces Institute of Regenerative Medicine* (AFIRM) in 2008, to help meet the institute's mission: *to develop new products and therapies to treat severe injuries suffered by US service members in the current wars*. AFIRM encompasses two large academic-clinical consortiums spanning 30 institutions, the US Army Institute of Surgical Research, and several dozen companies. The two primary leads include the Wake Forest University in partnership with the University of Pittsburgh (i.e. Wake Forest-Pittsburgh Consortium) and the Rutgers State University of New Jersey in partnership with the Cleveland Clinic (i.e. Rutgers-Cleveland Clinic Consortium). A significant number of currently funded TATRC partners are members of these two consortia. Their funded research will help accelerate the AFIRM mission.



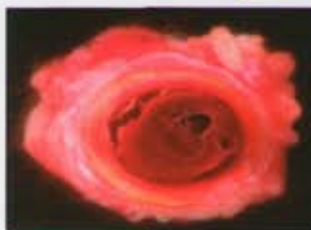
Isolating Autologous Cells for Injury Repairs

Hawaii's Tissue Genesis (TGI), Inc. has successfully developed a portable, automated cell separation system and patented process that can isolate and sort a small amount (60cc) of human fat tissue into approximately 30 million therapeutic cells (e.g., microvascular

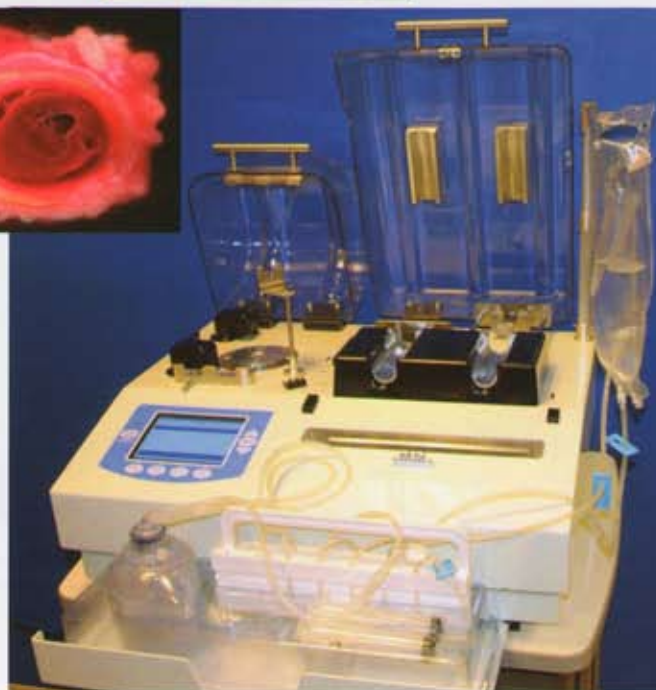
Artificial artery graft coated with TGI's fat derived cell mixture (top right) compared to an uncoated graft after 3 months (below left)



endothelial cells, adult stem cells, etc.), which can be delivered back to a patient with severe



TGI™ Cell Separation System isolates adult stem cells from harvested fat tissue. (Courtesy of TGI)



“The future of regenerative medicine is truly amazing. We’re embarking on a new generation of research that’s going to redefine Army and military medicine as we know it today.”

**— The Army Surgeon General
Lieutenant General
Eric B. Schoomaker
April 17, 2008**

vascular damage. The current process has been developed to treat peripheral vascular disease (PVD) where the therapeutic cells can be delivered to a patient in a coated vascular graft or stent, or directly injected into damaged tissue. Depending on the type and level of tissue damage, some treatments can be done in a single operation. Results and product development will advance research in regenerative medicine for treating traumatic war injuries. Ongoing product enhancements will enable the provision of treatment for PVD without use of human donor parts — addressing the shortage of donors and available acceptable cadaver parts, as well as reducing rejection rates. Potentially, this could address tissue trauma for battlefield injuries to Warfighters.

Generating Microvasculature Structures to Support New Tissues

Dr. Joyce Bischoff and coworkers at the Children’s Hospital, Boston, MA have established a robust *in vivo* model for blood vessel formation using human endothelial progenitor cells (EPCs), isolated from peripheral or cord blood, and mesenchymal stem/progenitor cells (MPCs), isolated from bone marrow or cord blood. The most recently peer-review research published in *Circulation Research* 2008 demonstrates robust vasculogenic activity *in vivo* can be accomplished via implantation of these two cell types. As noted in the editorial of this issue, this research provides “a significant step forward in the vascularization process necessary for tissue engineering and regenerative medicine.” Demonstrating an extensive and functional microvascular network connected with the host blood supply is a significant achievement. This



proven concept that a functional microvascular network can be achieved through the use of human progenitor cells easily obtained through noninvasive procedures is another important milestone.