

Applications

- Treatment of atherosclerosis, blocked vessels
- Percutaneous Transluminal angioplasty
- Vascular damage due to trauma or disease
- Vascular tissue- engineering
- Endothelial cell transplantation

Advantages

- Increased acceptance of intravascular stents
- Reduced thrombosis
- Allows for use of genetically engineered cells
- Enhanced healing times
- Reduced contamination

Inventors

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Market Need

Treatment of atherosclerosis and/or vascular damage has been aided by the use of intravascular stents and vascular grafts. However, these stents and grafts have several limitations that increase safety risks associated with the development of acute thrombosis and chronic restenosis, resulting in poor long-term outcomes. Seeding the devices with endothelial cells leads to enhanced healing times and reduced failure rates. However, the current techniques employing cell transplantation and seeding for vascular treatments are lengthy and thus limit clinical applicability. Moreover, the most common methods of cell seeding have several limitations related to the use of adhesive proteins or drug therapy that result in low seeding efficiency, rejection of the stent and or increased safety risks.

Technology Summary

Researchers at VCU and the University of Akron have developed an apparatus and method for electrostatic cell seeding of vascular stents and scaffolds to minimize failure rates after implantation. The apparatus is designed to temporarily alter the electrical charge of the stent to attract and adhere endothelial cells or genetically engineered cells. This technique has been shown to increase cell seeding efficiencies up to 90% over current methods. Moreover, it allows for morphological maturation of cells before implantation. Another advantage of this technique is reduced safety risks associated with acute contamination and thrombosis, since the temporary glue disappears when the electrostatic charge is removed. Most importantly, this technique of cell seeding has a significant impact on acute healing of the vessels in preclinical studies.

Technology Status

Patent # 5,714,359 and 6,010,573

This technology is available for licensing to industry for further development and commercialization.