Thinking outside the heart: Use of engineered cardiac tissue for treatment of chronic deep venous insufficiency

Researchers at George Washington University invented a new organ that can return blood flow to veins lacking functioning valves. The organ is a rhythmic cuff made of cardiac muscle cells that surrounds the vein. The cuff acts as a “mini heart” to aid blood flow through the venous segments. It can be made of a patient’s own adult stem cells, eliminating the chance of implant rejection.

Chronic venous insufficiency is one of the most widespread diseases, particularly in developed countries. Its incidence can reach 20-30% in people over 50 years of age. In chronic venous insufficiency, blood pools in affected veins and doesn’t return to the heart efficiently. This can lead to swelling, skin changes, varicose veins, ulcerations, and even loss of limbs. Current treatment options for chronic venous disease, particularly for chronic deep vein insufficiency are limited.

Rather than just repairing a damaged organ, venous engineered heart tissue cuff is a new organ with capabilities greater than the initial veins themselves. GW researchers have shown feasibility of this novel approach in vitro and are currently working toward testing these devices in vivo.

The novel approach of creating ‘mini’ hearts may help to solve a chronic widespread disease. Meanwhile, it also demonstrates a leap for the tissue engineering field, taking it from organ repair to organ creation.

Applications: Combat chronic deep vein insufficiency (CDVI)

Advantages:

- Restores blood flow to damaged veins
- Uses patient’s own adult stem cells
- Immature stem cells can be collected from a variety of sources
- Simple design
- Won’t cause cardiac arrhythmia or interfere with nearby muscles
Inventors

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