

## **Breakthrough Implantable Medical Devices Use Polymer Nanofabrics**

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New implantable medical devices are being made of electrospun polymer nanofabrics, a biomaterial made of ultra-thin polymer fibers, with properties that mimic those of human tissues and organs.

Among the new products benefiting from the process is the NovaMesh Ventral Hernia Mesh, which features improved resistance to tissue adhesion on the visceral-facing surface, while promoting excellent tissue ingrowth on the fascial surface. The electrospun nanofabric used to manufacture the mesh results in near-perfect flatness, no shrinkage, and virtually no creasing or kinking following tight rolling and unrolling of the mesh. The biomimetic properties of the fabric allow easy handling and laparoscopic insertion, and all sizes can fit through a trocar.

Another innovation is the AVflo vascular access graft used for hemodialysis, a self-sealing vascular access graft that enables unobstructed blood flow, allows for dialysis within 24-48 hours after implantation and a self-sealing feature within less than five minutes of withdrawal of the dialysis needles. The graft is also simple to implant and to suture to blood vessels, as the needle punctures and suture holes seal rapidly. AVflo is also strong enough to withstand the pressure of blood flow, yet thin enough for blood flow to be easily felt through it. Both the NovaMesh Ventral Hernia Mesh and the AVflo vascular access graft are products of Nicast (Lod, Israel), and have received the European Community (CE) Marking of approval.

"Nicast is one of the few companies with expertise in the use of electrospinning. The company's extensive product line is built on its many patents and various technology platforms. Other products in development at Nicast include non-metallic stents, a spinal disc device, and drug release devices," said Dr. Jacob Dagan, chairman of the board of Nicast.

Discovered in the early 1900's, electrospinning is a long-known polymer processing technique that allows for the creation of non-woven fabrics made of ultra-thin polymer fibers. The material can be applied to create many products including medical devices, tissue engineering scaffolds, clothing, and filtration media. The properties of the fibers can be designed in advance and controlled to a high degree, since the fibers can be spun onto any shape using a wide range of polymers. The fibers are very thin and have a high length to diameter ratio, thereby providing a very large surface area per unit mass, so that only a small amount of material is required, and there is very little waste.