Implantable Self-Deploying Shape Memory Polymer Hernia Repair Patch

**Background**

About 600,000 hernia repair surgeries are performed each year; recently, the use of laparoscopic minimally invasive techniques has become increasingly popular in these operations. Use of surgical polypropylene mesh as a tissue reinforcement in hernia repair has shown significantly lower recurrence rates compared to other repair methods. However, placement of surgical mesh can present a challenge and even complicate the procedure. The mesh must be rolled and folded before being released into the abdominal area to be repaired. Once in the abdominal cavity, it must be unrolled, formed to fit the anatomy and attached with sutures or tacks. This process can require significant time, which may increase the risk of surgical complications such as recurrence, infection or pain. Various techniques have been attempted to make mesh placement easier, including use of specialized systems to orient the mesh into a specific shape, with limited success and acceptance.

**Technology**

A University of Colorado research team led by Robin Shandas has developed a novel surgical mesh with automatic unrolling and tissue conforming functionalities that may reduce overall operating time and the likelihood of surgical complications in laparoscopic repair of hernias. By integrating a Shape Memory Polymer (SMP) into commercially available polyester surgical meshes, an automated, controlled deployment surgical mesh was produced. SMPs, which can be applied to surgical meshes using a ultra-violet polymerization process, provide tailorable mechanical functionalities. They are capable of active movement into pre-programmed shapes and can be compressed into a small shape and later unfolded into a functional shape using a trigger. The SMP-integrated surgical meshes developed are triggered by normal body temperature, allowing for easier placement within the body cavity and reducing the operating time of laparoscopic hernia repair.

**Key Documents:**

- Medical Fabric with Integrated Shape Memory Polymer. PCT application filed Dec. 3, 2013.
- Medical Fabric with Integrated Shape Memory Polymer. PCT application filed Sep. 12, 2011; nationalized to U.S.