Bioresorbable stent

A bioresorbable stent, also known as a fully resorbable stent, is a medical device that is designed to provide temporary support to a blocked or narrowed blood vessel or artery. Unlike traditional stents made of metal, bioresorbable stents are made of materials that dissolve over time, allowing the blood vessel to gradually regain its natural function and flexibility.

Bioresorbable stents are typically made of materials such as polylactic acid (PLA) or polyglycolic acid (PGA), which are known for their biocompatibility and ability to dissolve safely within the body. Once the stent has served its purpose, it gradually breaks down into smaller molecules that are absorbed by the body and eliminated through natural metabolic processes.

Bioresorbable stents have been developed as an alternative to traditional metal stents, which can cause long-term complications such as restenosis (re-narrowing of the artery), thrombosis (blood clot formation), and inflammation. By providing temporary support to the artery and then disappearing, bioresorbable stents may reduce the risk of these complications and improve patient outcomes. However, the use of bioresorbable stents is still relatively new and their long-term safety and effectiveness are still being studied.

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see Bioabsorbable Magnesium Alloy Stent.

Bioresorbable Poly (L-Lactic Acid) Flow Diverter Versus Cobalt-Chromium Flow Diverter

Bioresorbable Poly (L-Lactic Acid) Flow Diverter

Bioresorbable Poly (L-Lactic Acid) Flow Diverter is a type of flow diverter stent used in neurovascular interventions for the treatment of intracranial aneurysms. It is made from a bioresorbable polymer called poly-L-lactic acid (PLLA), which is gradually absorbed by the body over time. The bioresorbable property of the stent is beneficial because it reduces the risk of long-term complications associated with permanent metallic stents. The PLLA material is designed to maintain its strength and structure during the healing process and gradually degrade and be absorbed by the body after a certain period. The use of bioresorbable PLLA stents in neurovascular interventions is an active area of research and clinical development, and their long-term effectiveness and safety are still being evaluated.

Sasaki et al. developed a bioresorbable poly (L-lactic acid) flow diverter (FD (PLLA-FD) and compared it with an flow diverter composed of cobalt-chromium and platinum-tungsten (CoCr-FD). Flow diverter mechanical performance and in vitro degradation of the PLLA-FD were evaluated. For in vivo testing in a rabbit aneurysm model, FDs were implanted at the aneurysm site and the abdominal aorta in the PLLA-FD group (n=21) and CoCr-FD group (n=15). Aneurysm occlusion rate, branch patency, and thrombus formation within the FD were evaluated at 3, 6, and 12 months. Local inflammation and neointima structure were also evaluated.

Mean strut, porosity, and pore density for the PLLA-FD were 41.7 µm, 60%, and 20 pores per mm2, respectively. The proportion of aneurysms exhibiting a neck remnant or complete occlusion did not

significantly differ between the groups; however, the complete occlusion rate was significantly higher in the PLLA-FD group (48% versus 13%; P=0.0399). Branch occlusion and thrombus formation within the FD were not observed in either group. In the PLLA-FD group, CD68 immunoreactivity was significantly higher, but neointimal thickness decreased over time and did not significantly differ from that of the CoCr-FD at 12 months. Collagen fibers significantly predominated over elastic fibers in the neointima in the PLLA-FD group. The opposite was observed in the CoCr-FD group.

The PLLA-FD was as effective as the CoCr-FD in this study and is feasible for aneurysm treatment. No morphological or pathological problems were observed with PLLA-FD over a 1-year period [1)]

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Sasaki N, Ishii A, Yagi S, Nishi H, Akiyama R, Okawa M, Abekura Y, Tsuji H, Sakurai S, Miyamoto S. Bioresorbable Poly (L-Lactic Acid) Flow Diverter Versus Cobalt-Chromium Flow Diverter: In Vitro and In Vivo Analysis. Stroke. 2023 May 4. doi: 10.1161/STROKEAHA.122.042043. Epub ahead of print. PMID: 37139818.