C3 exoenzyme coated stents for treating and preventing restenosis

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Technology description

Summary

Problem or Unmet Need:
Coronary artery disease, the leading cause of mortality and morbidity in the developed world, is widely treated by implantation of stents in the coronary artery. It is estimated that each year more than 500,000 Americans and 1,000,000 patients globally undergo dilation of the coronary arteries by balloon angioplasty and/or stent implantation. However, a major limitation of this revascularization procedure is the high incidence of restenosis or re-narrowing of the vessel, which often occurs within 6 months of the procedure. Many strategies have been investigated to prevent restenosis by coating stents with drugs that inhibit smooth muscle cell (SMC) proliferation. The most promising drug evaluated to date for coating stents is rapamycin (sirolimus), an antibiotic that inhibits cell migration and proliferation. However, the prolonged exposure of smooth muscle cells to rapamycin results in drug resistance. Therefore, alternative strategies are required for treating and preventing restenosis.
The technology is a novel implantable stent which is coated with or contains C3 exoenzyme, chimeric C3 exoenzyme, or RhoA inhibitor. C3 exoenzyme inhibits SMC migration through p27.sup.kip1-dependent and -independent pathways. In addition, C3 exoenzyme can enter cells passively with prolonged exposure, providing different rates of release from the stent. The novel therapeutic strategy can be developed to inhibit the process of the restenosis after percutaneous coronary intervention.

Application area

The technology provides a restenosis-proof stent for implantation in a blood vessel for treatment of coronary artery disease.
The SMC migration inhibitor coating can be used in other therapeutic implants where reproliferation of cells is undesirable.

Advantages

The technology provides an effective strategy in treating and preventing the onset of restenosis that does not induce drug resistance.

The method allows for prolonged release of the anti-restenosis agent and thereby extends the effectiveness ad longevity of the stent.

Institution

Columbia University

Inventors

Steven O. Marx