Hydrogel enhanced PET surface for β-isotope brachytherapy during balloon angioplasty and stent implantation

Technology #1059

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Balloon angioplasty and stent implantations are common endovascular procedures used to treat coronary artery disease and atherosclerosis, leading causes of morbidity in adults. However these surgical methods can lead to restenosis, the re-obstruction of blood vessels, due to the development of scar tissue around the site of implantation. This technology proposes the use of a natural β-isotope emitting hydrogel on a PET angioplasty balloon during implantation for intravascular radiation therapy to inhibit the growth of scar tissue and thus prevent restenosis.

β-isotope hydrogel lowers brachytherapy radiation exposure and toxicity, improving the efficacy of angioplasty and stent implantation procedures

This technology utilizes chitosan, a natural β-isotope emitting hydrogel, to coat existing angioplasty balloon surfaces and stent wire geometries. This hydrogel is able to controllably adsorb 32P (which initiates emission of the β-isotope) uniformly and with high efficiency. Using the β-isotope for brachytherapy reduces radiation exposure compared to other isotopes, thus protecting both the patient and technician. The 32P adheres well to the hydrogel surface, eliminating the risk of dissolving into the blood stream, ensuring targeted intravascular drug delivery. Uniform absorption ensures that the various parts of the target area are properly dosed and not under or overdosed, further reducing the risk of toxicity.

The adsorption efficiency of the hydrogel was demonstrated through experiment. The efficacy of radiation ionization on restenosis was demonstrated by simulation.
Lead Inventor:

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Applications:

- Brachytherapy to reduce restenosis after arterial interventions such as angioplasty and stent implantations

Advantages:

- Provides targeted drug delivery during arterial interventions
- Reduces drug toxicity
- Reduces radiation exposure
- Reduces restenosis

Patent information:

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Related Publications:

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