Intravascular Gelling Protein Polymer

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Technology description

Invention Summary

This invention is a unique gelling protein polymer that can transition from liquid to solid state at physiological temperatures. The gelling polymer is composed of genetically engineered silk-elastin like protein polymers (SELP) which have repeating amino acid sequences of silk and elastin proteins. The sequence is optimized for liquid-to-solid transitioning as an embolic agent as well as sustained drug delivery with applications in transarterial chemoembolization (TACE). The liquid gel can be administered into selected blood vessels via catheter to solidify and constrict blood flow to induce necrosis of tumor vasculature. Targeted tumor killing can also be achieved by localized delivery of multiple chemotherapeutics.

Market Opportunity

State-of-the-art products include synthetic drug eluting beads (DEB) which are solid particles, and have disadvantages of limited tumor penetration, deformation and fracturing, aggregation, off target embolization, non-degradability, elution of only charged small molecule therapeutics, and revascularization induced by an hypoxic state. SELP addresses these short-comings.

Liquid embolics are being increasingly used for the treatment of medical conditions such as arteriovenous malformations (AVMs), aneurysms and arteriovenous fistulas (AVFs). The nanoparticles segment was valued at $3.3B in 2013 and is expected to grow at a CAGR of 24.7% between 2014 and 2020. Increasing prevalence of various types of cancer and a large number of drugs/molecules in clinical trials are expected to contribute to growth of the nano-enabled drug delivery systems during the period 2014 to 2020.

The initial target market is Hepatocellular carcinoma with 700,000 people worldwide. and increasing trend for prevalence. Patients ineligible for surgery undergo loco-regional treatments such as TACE to selectively target tumoral blood supply.

Advantages

Easier to inject through micro-catheters

Not limited by size of arterioles (it can penetrate deeper than the synthetic drug eluting beads on the market now)

Does not have the risk of fracture and deformation like the beads

Protein polymer is biodegradable by local enzymes

Capable of sustained drug release

Institution

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