Custom designed microbubble contrast agents and techniques of ultrasound delivery optimized for gene therapy

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Technology description

The invention pertains to the formulation of a microbubble bearing plasmid DNA on the surface, and a method of delivering the DNA to a target site using ultrasound-microbubble interactions. Most microbubble contrast agents used for gene therapy do not efficiently bind DNA. To optimize microbubbles for gene therapy, investigators created and tested a number of candidate cationic microbubble preparations and selected the most effective microbubble with respect to DNA binding. They have also further modified this basic microbubble to increase DNA binding and ultrasound responsiveness. As ultrasound delivery variables have also not been optimized for therapeutic ultrasound-targeted microbubble destruction (UTMD), investigators also set out to determine the most effective ultrasound parameters. To achieve maximal microbubble perfusion and gene delivery, we combined imaging and UTMD to perform low power two-dimensional imaging and high power microbubble destruction simultaneously. Using this system, they have developed the first working model which has shown to be effective at transuding mouse tumor tissue with reporter genes on intravascular microbubbles. In addition, this system has been used in conjunction with therapeutic genes, to slow tumor growth.PCT Patent Application filed

Institution

University of Pittsburgh

Inventors

Flordeliza Villanueva
Jianjun Wang
Andy Carson
Charles McTiernan

联系我们

叶先生

电 话：021-65679356

手 机：13414935137

邮 箱：yeyingsheng@zf-ym.com