

Docket #: S23-446

Development of SDF1alpha containing nanoparticles for the treatment of cardiovascular, Neurovascular, and skin impairments

The lack of effective treatments for myocardial ischemia and reperfusion injury has been a major challenge in decreasing mortality rates from myocardial infarctions. Stromal cell-derived factor-1 α (SDF-1 α) is a key regulator that effectively localizes endothelial progenitor cells (EPCs) to ischemic areas by inducing angiogenesis and increases cardiac cell survival. Normally, SDF and its analogs require a direct injection to the heart with an open chest surgery. Thus, a less invasive delivery method is necessary to better leverage this treatment method.

The Woo and Rajadas Labs at Stanford created novel liposomal nanoparticles encapsulating SDF-1 α . In contrast to the trauma and invasiveness associated with a direct myocardial injection, the invention enables a targeted approach to treating ischemic myocardium. The SDF-NPs are injected systemically, prolonging the circulation time of the compound and enabling a high accumulation at the damaged tissues. The liposomal nanoparticles serve an additional purpose in reducing side effects while increasing the pharmacological effects of SDF-1 α . The invention was shown to exhibit a cardioprotective effect against myocardial ischemia reperfusion injury without harming cardiac tissue or arteries. Not only does this new delivery platform provide a non-invasive treatment method to increase survival rates from heart attacks, it also provides a new tool that can be used to improve the future of drug delivery.

Applications

- Ischemic cardiomyopathy

- Myocardial ischemia
- Diabetic wound healing patch
- Drug delivery

Advantages

- Noninvasive
- Increases drug retention and accumulation at targeted sites
- Protectant against side effects
- Customizable
- Treatment alternative to heart surgery

Publications

- Yajima, Shin, Manoj K. Manna, Yuanjia Zhu, Stefan Elde, Danielle Mullis, Akshay Venkatesh, Sidarth Ethiraj et al. "[Stromal Cell-Derived Factor-1?-Encapsulated Nanoparticles Specifically Target the Ischemic Myocardium and Attenuate Myocardial Injury via Proangiogenic Effects.](#)" Circulation 148, no. Suppl_1 (2023): A14048-A14048.

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