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Immune cell shuttle for precise delivery of nanotherapeutics for

heart disease and cancer

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The delivery of therapeutics through the circulatory system is one of the least arduous, and less invasive interventions; however, this approach is hampered by low vascular density or permeability. By exploiting the ability of monocytes to actively penetrate into diseased sites, we designed aptamer-based lipid nanovectors that actively bind onto monocytes and are released upon reaching the diseased sites. Our method was thoroughly assessed through treating two of the top causes of death in the world, cardiac ischemia/reperfusion injury and pancreatic ductal adenocarcinoma with or without liver metastasis, and showed a significant increase in survival and healing with no toxicity to the liver and kidneys in either case, indicating the success and ubiquity of our platform. We believe that this system provides a new therapeutic method which can potentially be adapted to treat a myriad of diseases that involve monocyte recruitment in their pathophysiology.