Docket #: S20-070

Kidney tissue regeneration using pulsed focused ultrasound (pFUS) therapy with mesenchymal stromal cells (MSCs) and/or MSC-derived extracellular vesicles

Stanford researchers at the Thakor Lab have developed methods for kidney tissue regeneration using pulsed focused ultrasound (pFUS) therapy with mesenchymal stromal cells (MSCs) and/or MSC-derived extracellular vesicles (e.g., exosomes or microvesicles). pFUS is a non-invasive technology that sonicates target tissues with short bursts of sound waves, to enhance MSC homing by upregulating local homing signals. Although this combination is not new, this invention further explores the mechanism by which pFUS can stimulate intrinsic tissue regeneration by manipulation of this pathway for facilitating further regeneration and optimization of sound wave parameters to stimulate tissue regeneration.
The main application for this therapy is acute kidney injury (AKI) which is characterized by a sudden failure of renal function. Despite increasing worldwide prevalence, current treatments are largely supportive, with no curative therapies. This invention will move towards a more safe and less invasive therapy for AKI.

Stage of Development

- Animal Data

Applications

- **Acute kidney injury (AKI)**
  - Promotes the repair and regeneration of injured kidneys
  - Prevents the progression to worsening kidney disease

Advantages

- **Precise and more targeted approach** for reaching specific anatomy
- **Safe and efficacious** method for treating kidney damage
- **Minimally invasive therapy**

Publications

- Liu, Daniel D., Mujib Ullah, Waldo Concepcion, Jeremy J. Dahl, and Avnesh S. Thakor. "The role of ultrasound in enhancing mesenchymal stromal cell?based therapies." *Stem cells translational medicine* 9, no. 8 (2020): 850-866.

Patents

- Published Application: WO2021178642
- Published Application: 20230122229

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