Docket #: S19-089

Focused Ultrasound to enhance function and engraftment of pancreatic islets following transplantation

Stanford researchers have demonstrated the application of pulsed Focused Ultrasound (pFUS), to non-invasively enhance the function and engraftment of pancreatic islets following transplantation. Given a significant number of islets are lost immediately after transplantation, pFUS has the potential to be used as a novel therapy to facilitate islet function (i.e. increase insulin secretion) and enhance the engraftment by facilitating islet revascularization and reducing inflammation.

In addition to islet transplantation, this new non-invasive and drug free approach can hold great promise in treating various pancreatic diseases include pancreatitis, pancreatic cancer and diabetes.

Figure

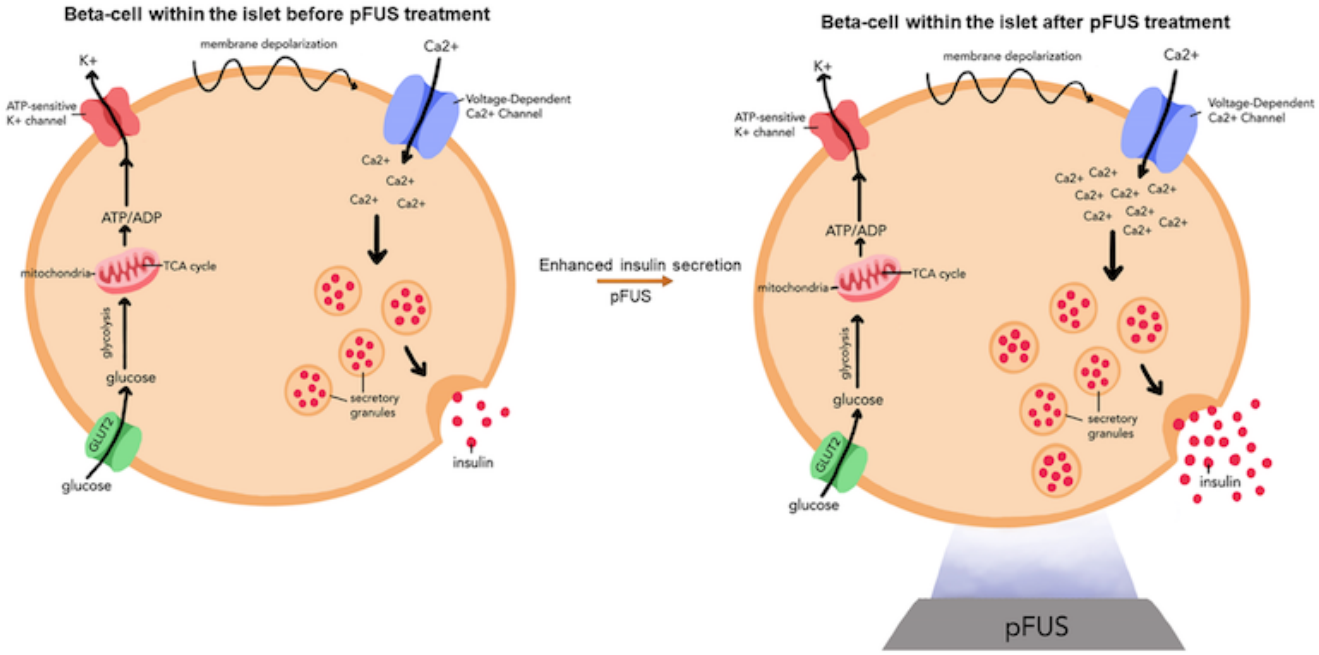

Figure description - Schematic representation of how pFUS can stimulate insulin secretion from ?-cells within pancreatic islets : pFUS enhances insulin secretion by enhancing intracellular calcium levels within ?-cells which then triggers the release of insulin granules via exocytosis.

Stage of Development

- Animal Studies
- Continued optimization of ultrasound parameters and applications

Applications

- **Islet transplantation** for patients with diabetes, pancreatitis, and pancreatic cancer
- **Modulating islet biology within the native pancreas** (potentially used in the treatment of pancreatic diseases including diabetes, pancreatitis, pancreatic cancer)

Advantages

- **Non-invasive and drug-free therapy**
- Applies a new technology (pFUS) to a new area (pancreas)
- **Targeted** – does not impact surrounding healthy tissue

- **Focused** – can be used to target specific sites within the body
- **Tunable** – can use lower or higher dose to control molecular activity in the pancreas

Publications

- Razavi, Mehdi, Fengyang Zheng, Arsenii Telichko, Jing Wang, Gang Ren, Jeremy Dahl, and Avnesh S. Thakor. Improving the function and engraftment of transplanted pancreatic islets Using pulsed focused Ultrasound therapy *Scientific reports* 9, no. 1 (2019): 1-12.
- Razavi, Mehdi, Fengyang Zheng, Arsenii Telichko, Mujib Ullah, Jeremy Dahl, and Avnesh S. Thakor Effect of Pulsed Focused Ultrasound on the Native Pancreas *Ultrasound in Medicine & Biology* 46, no. 3 (2020): 630-638.

Patents

- Published Application: WO2020210458
- Published Application: 20220331611
- Published Application: 20250319330
- Issued: 12,186,594 (USA)

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