Docket #: S17-417

Systemic targeting of inflammatory sites and enhanced immunomodulatory function by introducing the chimeric antigen receptor (CAR) into mesenchymal stem cells for inflammatory and autoimmune diseases

Stanford inventors have developed a mesenchymal stem cell-based gene therapy that can target the inflammatory environment and secrete immunomodulatory cytokines. The model has been demonstrated in bone marrow mesenchymal stem cells in vitro. The inflammation-targeting molecules are expressed in approximately 90% of mesenchymal stem cells at 24 hours post-electroporation. The immunomodulatory cytokines can be detectable for more than 48 hours and convert the pro-inflammatory response into an anti-inflammatory tissue repair/regeneration response.

Applications

- In clinical therapy, to enhance the immunomodulatory and tissue repair capabilities of mesenchymal stem cell transplantation in inflammatory-associated diseases including diabetes, bone healing, osteoarthritis, myocardial infarction, pulmonary hypertension, spinal cord injury, inflammatory diseases of other organs (hepatitis, nephritis etc.).

Advantages

- Enhanced immunomodulation and targeting specificity of mesenchymal stem cell-based therapy.
- Using transient gene expression instead of genome integration to avoid potential side effects.
- Modulation of the crosstalk between mesenchymal stem cells and immune cells to enhance tissue regeneration.
- Expandable to other cell-based immunomodulation therapies.

Patents

- Published Application: 20190298774
- Published Application: WO2019195142
- Issued: 11,246,890 (USA)

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