

Stem Cell Beacon for Tissue Repair

Researchers at the University of South Florida have developed a novel method and composition to selectively direct stem cells to repair specific tissues.

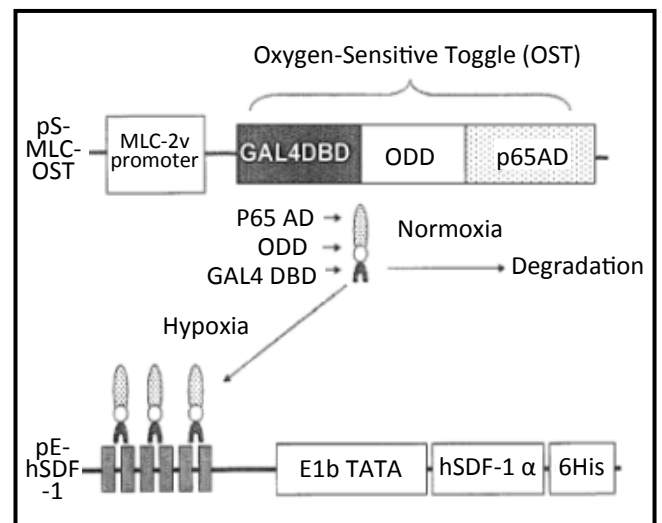
Several common diseases such as heart failure and type one diabetes are often characterized by cellular degeneration in the affected organ. A variety of drugs have been developed that treat the symptoms of these diseases. However, in many cases these drugs do not correct the underlying cellular functions contributing to the diseases, but rather simply alleviate the symptoms. A more effective method to treat these diseases is to replace the diseased or dead cells with healthy cells by an organ or tissue transplant. Although successful in many cases, organ transplantation remains a complex process often plagued by immune system-mediated rejection. Furthermore, organs available for donation are scarce and patients may spend months or years on waiting lists.

USF researchers have developed a novel composition and method to deliver and amplify the expression of a gene that encodes for a stem cell-attracting chemokine in a specific tissue. This method utilizes a system which employs one or more vectors that contain a gene switch/biosensor, a tissue-specific promoter, a gene encoding a stem cell-attracting chemokine, and a gene amplification system. A chemokine, which is a signaling protein secreted by cells, can attract specific cells to an infected tissue. Once in the target tissue, the stem cells can differentiate into new cells to replace the damaged cells and restore organ function. This method is straightforward, effective, and does not cause immune system rejection that is typically exhibited with organ and tissue transplants.

ADVANTAGES:

- Site specific stem cell delivery
- Effective and timely tissue repair
- No bone marrow extraction necessary
- Stem cells are mobilized naturally

Stem Cell Based Tissue Regeneration



A Double Plasmid Model for the Stem Cell Beacon Vector with a Hypoxia Switch