Optimal Gene Delivery In Human Fibroblasts and Embryonic Stem Cells

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Key Research Aims and Goals

To develop and optimize an efficient method for gene delivery into human embryonic stem cells to transiently overexpress genes to control stem cell fate.

Research Highlights and Results

- Recently, our group has developed a novel cationic helical peptide that has cell membrane interaction properties. I thus attempt to use this novel peptide to increase gene delivery efficiency into hESC and fibroblast cells.
- We were able to demonstrate gene transfer into IMR90 and hESC after a screening and modifications of the helical peptide PVBLG-8. (see figure 1) (hESC data not shown)

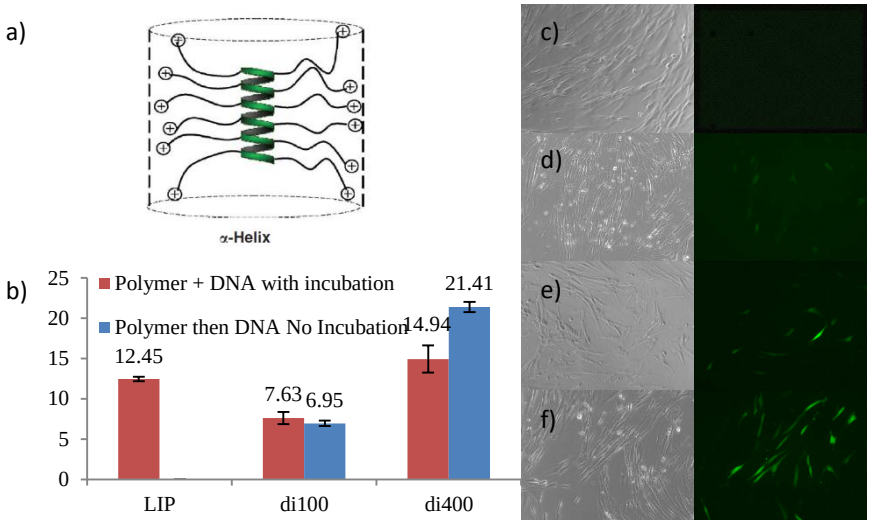

Figure Caption: a) Novel cationic helical peptide structure. b) Highest transfection efficiency obtained with polymers of GFP in IMR90 cells. Brightfield and fluorescence images of c) negative control, d) Lipofectamine 2000, e) diblock 100 and f) diblock 400.

Future Research Plans

- To study the mechanism of this novel peptide of its interaction with DNA/RNA and its ability to enter the cells
- Optimize and functionalize with new side chains or functional groups to increase gene delivery efficiency into hESC
- Use novel method to transiently overexpress key genes for highly efficient direct differentiation of hESC

[1] Lu, H.; Wang, J.; Bai, Y.; Lang, J. Liu, S. Lin, Y.; Cheng, J.* "Ionic Polypeptides with Unusual Helical Stability", *Nature Communications*, **2011**, 2, 206.