Methods and Reagents for Islet Surface Modification

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Statement of Purpose:
Islet transplantation is a promising approach to provide blood-glucose regulation to type 1 diabetics. Unfortunately a large proportion of transplanted islets are lost quickly after transplantation due to stimulation of the immune system and the instant blood-mediated inflammatory reaction (IBMIR). Our group is working on covalent nano-encapsulation methods to protect the pancreatic islets using passive barrier molecules and/or functional compounds. Using a variety of well-tolerated surface-modification protocols, we covalently link defined coatings as well as bioactive compounds with the ultimate goal of increasing the survival of transplanted islets. This poster will describe various chemical reactions and functional modifications, and the associated biological protection (*in vitro* and *in vivo*) endowed by each encapsulating strategy.

Methods:
Murine, porcine, and human islets have been modified. Chemical characterizations include the coating density, uniformity, and stability. Standard biological assays include acute toxicity and islet function. Additionally, we utilize our recently-reported[1] miniaturized *in vitro* tube model to study reductions in IBMIR in modified islets.

Results:
A variety of chemical modification methods have been examined in murine, porcine, and human islets. These covalent coatings were demonstrated to be well tolerated.[2]

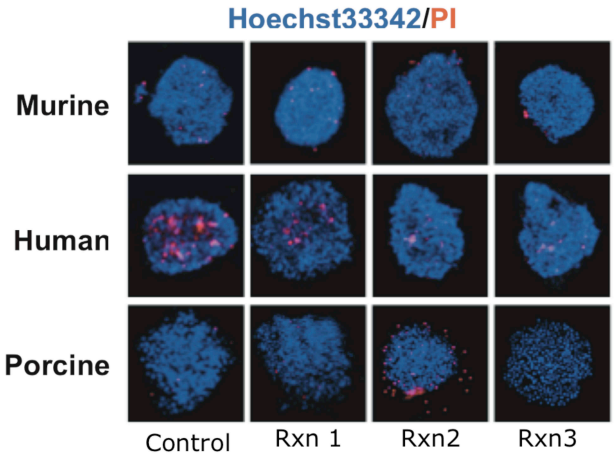
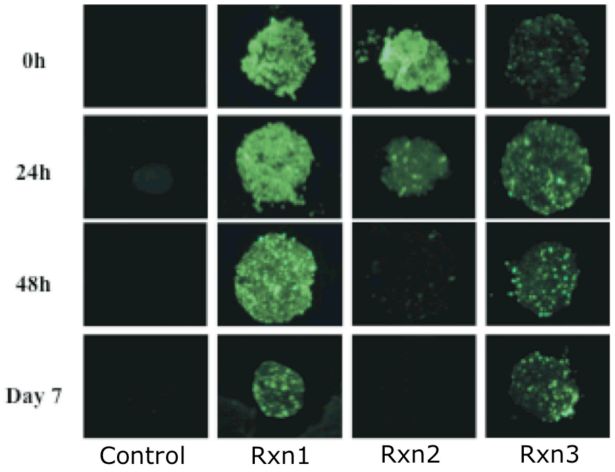


Figure 1. Viability of islets (murine, human, and porcine) after three different treatments

The different chemical modifications were shown to have different efficiencies and stabilities, as shown by the fluorescent detection of the modifications as a function of incubation time post-modification.



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With these generic chemical modification tools in hand we are presently exploring a variety of surface treatments in order to determine the ideal protective reagent (or cocktail of reagents).

References:
[1]Kanak MA Transplantation. 2014 Sep 15;98(5):578-84
[2]SoRelle JA et al. J Biomed Mater Res Part A 2014: 00A: 000–000 (online ahead of print).