Engineered exosomes as new therapeutic tools in disease and tissue regeneration

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Summary:
Exosomes are small extracellular vesicles produced by all types of cells. They are natural carriers of signaling molecules and offer exciting new features for therapeutic delivery, including biocompatibility, stability in the circulation, biological barrier permeability, low immunogenicity, and low toxicity [1].
The molecular mechanisms that regulate cargo loading into exosomes are still poorly understood [2]. Understanding these mechanisms will significantly impact our understanding of exosome biogenesis and open new avenues for the use of exosomes as therapeutic vehicles of bioactive proteins.
Preliminary data from our laboratory demonstrates that proteins can be selectively loaded into exosomes. We have identified the molecular players involved in the mechanism and the amino acid motif necessary to direct proteins into these extracellular vesicles. By taking advantage of those players we will be able to select bioactive proteins into exosomes for subsequent therapeutic use.
Your main goal in this project will be the *in vivo* generation of engineered exosomes to be used as innovative therapeutic agents for age-related diseases or to promote tissue regeneration.

Bibliographic references:

1. Ha, D., N. Yang, and V. Nadithe, *Exosomes as therapeutic drug carriers and delivery vehicles across biological membranes: current perspectives and future challenges.* Acta Pharm Sin B, 2016. **6**(4): p. 287-96.
2. Villarroya-Beltri, C., et al., *Sumoylated hnRNPA2B1 controls the sorting of miRNAs into exosomes through binding to specific motifs.* Nat Commun, 2013. **4**: p. 2980.