Complex coacervate: a new vehicle for controlled delivery of growth factors and cytokines

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Clinical translation of protein therapies faces multiples challenges; the most significant is how to maintain bioactivity. My lab uses heparin and biocompatible polycations to form an injectable coacervate that preserves the bioactivities of heparin-binding proteins. This includes many growth factors and morphogens. I designed the delivery vehicle to mimic the interaction among fibroblast growth factor-2 (FGF2), heparin and FGF receptor. The effectiveness of the coacervate delivery system is demonstrated using multiple proteins (FGF2, VEGF, HGF, HB-EGF, IL10, Shh, PDGF, NGF among others) in multiple animal models (mice, rat, pig). The coacervate provides spatial and temporal control of the release of heparin-binding proteins. I will discuss three applications: angiogenesis, skin wound healing, and cardiac repair post- infarction. Promising data in large animals and diabetic animal models suggest the potential of clinical translation. In addition, the ease of preparation and administration of the coacervate reduces costs and increases the likelihood of clinical adoption.