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ARRA Funded Supplement: Engineering Functioning Salivary Glands Using Micropatterned Scaffolds

Cells respond to the chemical and mechanical properties of their environment by organizing and differentiating in response to provided cues. With the goal of engineering a scaffold for eventual use in an artificial salivary gland, we have produced a poly(lactic-co-glycolic) (PLGA)-based nanofiber scaffold that mimics the structure of the natural extracellular matrix (ECM) environment. We hypothesize that to mimic the function of ECM, that the nanofiber topology and functionalization with chemically linked ECM proteins/peptides, will be critical to induce optimal salivary gland cell polarization and differentiation. With supplemental funding, we will optimize the nanofiber diameter and produce functionalized nanofibers that promote salivary gland cellular organization, polarization, and differentiation. We expect that to achieve optimal acinar cell differentiation will require a compliant scaffold material. Therefore, we will additionally develop synthetic hydrogels that will serve this purpose and will ultimately be incorporated into a composite multi-material scaffold to achieve optimal salivary gland tissue structure and function for future in vivo studies. Supplemental funding will allow us to hire a research scientist with a chemistry / materials science background and also a graduate student in nanoscience to complete these studies. With the intent to continue this promising line of work, this additional data will position our interdisciplinary research team to compete for follow-on external funding.

RELEVANCE
Novel engineered scaffold materials are needed to faciliate cellular function in engineered tissues. An artificial salivary gland can improve the oral, dental, and overall health of patients suffering from lack of saliva production due to Sjogren's syndrome, radiation therapy, or other causes.