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"Characterization of brain areas innervating salivary and lacrimal glands"

Lay Abstract

Sjögren's syndrome is an autoimmune disease where the immune system attacks mainly the saliva and tear-producing glands, causing their partial destruction and loss of function. The lack of saliva interferes with speech, taste and food intake among other physiological functions. A decreased tear production leads to eye irritation and its associated discomfort. Identification of brain areas and neuronal types involved in regulating the function of salivary and lacrimal glands and the characterization of their molecular repertoire should lead to identify pharmacological pathways whose stimulation could boost saliva and tear production by residual cells in the salivary and lacrimal glands. This would certainly enhance the quality of life of Sjögren's syndrome patients.

Scientific Abstract and Research Proposal:

This project seeks to identify neuronal circuits that project toward salivary and lacrimal glands, organs usually affected in Sjögren's syndrome (SS). Neuronal mapping will be achieved using pseudorabies viruses (PRV), a self-amplifying retrograde tracing agent. Preliminary results obtained by injecting a PRV strain encoding green fluorescent protein (EGFP) in mice salivary gland have delineated the neural circuit projecting toward the submandibular salivary glands. Here I propose to use this technique to study the neural circuit innervating the lacrimal glands and to use simultaneous injection of PRVs encoding different reporter proteins –red fluorescent protein (RFP) or GFP – in each type of gland to identify brain areas and/or single neurons projecting toward both peripheral organs. Bran areas identified by this approach will be defined as putative moisture gland control centers (MGCCs). A further characterization of MGCCs and their neuronal gene expression profile will be performed by microarray analysis following brain nuclei microdissection and RNA extraction. This should allow the identification of pharmacological pathways whose function could be essential for saliva and tear production. Results from these studies should provide crucial understanding of the physiological properties of salivary and lacrimal glands, the neuronal circuits that innervate them and pharmacological pathways that could enhance the function of residual cells in the SS moisture glands, offering a treatment for SS patients.