Academy of Prosthodontics 2025 Annual Scientific Session
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Program Speaker – Sarah M. Knox, PhD

Title

Saving the Salivary Gland through Peripheral Nerves

Abstract

It is thought that tissue degeneration, as occurs for salivary glands that have been severely damaged by radiation, is irreversible. Yet, whether this has been truly the case remains unclear. Indeed, very few have tested whether degenerating organs are responsive to regenerative cues, and to date, none have been successful. We discovered that murine salivary glands injured by radiation exposure and treated 2 weeks later could be functionally restored by delivery of a neuromimetic – the muscarinic receptor activator cevimeline (Evoxac). Now we show that this same therapeutic concept can be applied to glands that have been partially destroyed by radiation. We now are moving this discovery from bench to bedside and look forward to providing relief for those patients with salivary gland dysfunction.

Learning Objectives

- Nerves control stem cells in adult salivary glands.
- Cells change into immature cells with injury and stimulation with a neuromimetic agent can return them back to an adult state.
- Severely damaged salivary glands remain responsive to regenerative cues.

Biography

Dr. Sarah Knox received her PhD in Bioengineering from the University of NSW, Australia in 2002 and then moved to the US to do her postdoctoral studies. She became fascinated with the nervous system, finding the murine salivary gland to be an excellent model for understanding how nerves might regulate developmental programs. Dr. Knox revealed that peripheral nerves are essential to salivary gland development, where they regulate stem cell self-renewal, thereby creating a new paradigm for nerve function. As a principal investigator at UCSF, she investigates how peripheral nerve-salivary gland interactions govern not only developmental programs, but also gland regeneration. Her lab has discovered essential functions of peripheral nerves in regulating stem cell maintenance, differentiation, cell identity, tissue growth, and regeneration. She has uncovered multiple aspects of nerve-epithelial cell interactions and the identity of specific factors that drive reinnervation. Combined, these studies have become the platform for developing effective therapies for restoring radiation-damaged salivary glands and returning patient quality of life.