INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

Precision Cooling of Oral Tissues for Dental Anesthesia

TECHNOLOGY NUMBER: 2025-229

Technology ID
2025-229

Category
Medical Devices
Life Sciences

Inventor
Kevin Pipe
Shuhao Wan
Elizabeth Ronan
Joshua Emrick

Further information
Katherine Pollard
kpollar@umich.edu

View online page

OVERVIEW

Exploration of cold sensitivity in teeth via intradental neuron responses to temperature changes.

- Enhances understanding of neural responses to tooth cooling beyond known mechanisms
- Real-world applications include development of targeted therapies for cold-sensitive teeth

BACKGROUND

Cold sensitivity in teeth is common, often resulting from dentin exposure or cavities. Traditionally, addressing this issue has relied on desensitizing agents or restorative materials that cover exposed dentin, aiming to reduce cold sensitivity by blocking external stimuli. However, these methods only provide temporary relief and don't address the underlying neuronal mechanisms. Historical approaches inadequately examine the neural response within the teeth, mostly focusing on dentinal tubule fluid movement as the cause. Given these limitations, there's a significant need for deeper understanding and innovative methods to manage dental cold sensitivity. Understanding the precise role of intradental neurons in detecting cold could lead to more effective, targeted treatments that address the root cause of pain, rather than just masking symptoms.

INNOVATION

Researchers at the University of Michigan have developed a device for delivering precise cooling that is directly applied to a tooth or other hard tissues. The underlying research demonstrated that an engineered Peltier probe was capable of achieving targeted cooling of the tooth. The group relied on advanced in vivo calcium imaging with simultaneous cooling techniques to support their ability to achieve anatomical precision. This breakthrough has significant implications for preclinical and clinical testing of the use of cooling in dental anesthesia.