



Photoplethysmography Imaging (PPGI)-Based Pulp Vitality Test

Unmet Need: Endodontic disease (affecting the pulp of the tooth) often presents as an unexpected and emergent condition requiring immediate treatment as a significant percentage of these presentations are not detected/detectable during oral examinations. This is a particularly difficult, costly and resource intensive problem during military deployment or civilian travel. Thus, the development of an improved diagnostic test to assess the health and status of the pulp could improve dentists' ability to diagnose/predict tooth health and inform treatment decision to reduce the costs associated with endodontic emergencies.

Solution: The US Navy, through the Naval Medical Research Unit, San Antonio (NAMRU-SA), has developed a technology for assessing the vitality of teeth by measuring the oxygenation and blood flow in the pulpal tissue. Using photoplethysmography (PPGI), the imaging device provides an array of sensors to provide a spatially resolute map of tissue perfusion. The 2-D spatial array allows the test to differentiate regions of interest from external sources of error, so that the digitized image can provide a spatial representation of blood oxygenation of perfused pulpal tissue. Blood perfused regions of tissue can therefore be spatially differentiated from those that do not receive blood flow allowing direct assessment of pulpal tissue health.

Stage of Development: The technology is in the early stages of development.

IP or IP Status: This technology is embodied in US Patent Application US20210022593 A1 ([US Patent Application 20210022593A1](#)).

- **Command:** NAMRU-SA
- **Categories:** Dentistry, Diagnostics
- **License Status:** Available for exclusive or non-exclusive licensing and collaborations
- **Date Published:** June 15, 2024
- **Date Updated:** N/A
- **Invention No.:** 111462US02
- **Contact:**
usn.detrick.nmrc.mbx.technology-transfer@health.mil