A One-button Activation System for Enhanced Root Canal Irrigation

Abstract:

Activation of irrigants is a crucial cornerstone in endodontic therapy, with the objective of eradicating challenging microbial biofilms within the intricate dental canals. Despite the advancements in root canal treatment, the complex anatomy of dental canals continues to pose a significant challenge in achieving thorough bacterial elimination [1,2].

A new concept, with the possibility of merging two-technologies: Photo-induced Photoacoustic Streaming (PIPS) or Shockwave Enhanced Emission Photoacoustic Streaming (SWEEPS), with a micro cannula and syringe filled with an irrigant. This design will revolutionize root canal treatment, and will combine the best of both worlds [1,2]

The micro cannula, intellectually engineered with pores along its last 4 mm, is placed 1 mm short of the working length of each canal. This micro cannula efficiently suctions the irrigant solution, preventing any inadvertent sodium hypochlorite accidents. Simultaneously, the micro cannula enhances the concurrent removal of almost all of debris within the solution, enhancing irrigation circulation.

This handpiece is connected with a small external unit, being effortlessly triggered with the use of a solitary button. The utilization of PIPS and SWEEPS technologies is implemented within the pulp chamber, hence activating sodium hypochlorite or EDTA, which will facilitate the effective disinfection of the canals or the removal of smear layer. The source of the irrigant is from a reservoir attached with a handpiece.

This concept of a device signifies a paradigm shift in endodontic practice, combining cutting-edge technologies with precise, controlled irrigation, and vacuuming. Its streamlined design functionality guarantee ease of use and precision.

References:

[1] E. Kosarieh et al., "Effect of Er:YAG laser irradiation using SWEEPS and PIPS technique on dye penetration depth after root canal preparation," Photodiagnosis and Photodynamic Therapy, vol. 33, 2021.

[2] M. Mancini et al., "FESEM evaluation of smear layer removal from conservatively shaped canals: laser activated irrigation (PIPS and SWEEPS) compared to sonic and passive ultrasonic activation-an ex vivo study," BMC oral health, vol. 21, no. 1, 2021.

Design images

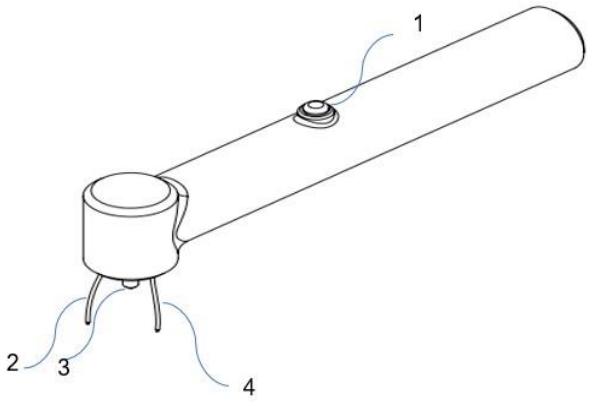

FIG .1

1. Start Button
2. Despensing Needle
3. The Laser projection
4. Micro cannula

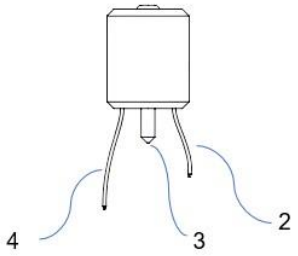

FIG .2

1. Start Button
2. Despensing Needle
3. The Laser projection
4. Micro cannula

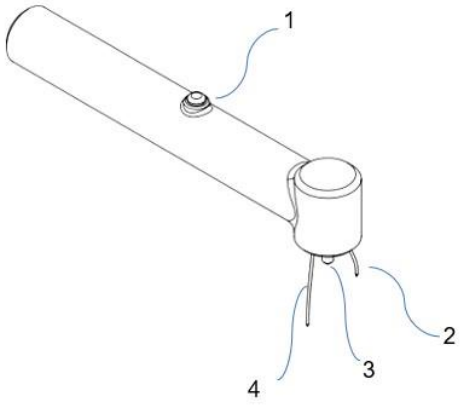

FIG .3

1. Start Button
2. Despensing Needle
3. The Laser projection
4. Micro cannula

FIG .4

FIG .5

FIG .6