*** ENDOACTIVATOR RESEARCH ADDENDUM ***

SUMMARY OF SUPPORTING REFERENCES

ONGOING CLINICAL STUDIES & PUBLICATIONS

   **Result & Conclusion:**
   Sonically powered endodontic files are particularly efficient and are largely unaffected by loading. This study demonstrated that a longitudinal oscillatory pattern of sonic energy was particularly efficient.

   **Result & Conclusion:**
   Sonic devices produce a large disturbance around freely oscillating tips. Importantly, sonically driven tips are unaffected by dentinal wall constraints.

   **Result & Conclusion:**
   This paper showed the interrelationship and importance between apical diameter and apical taper in curved canals on removing the smear layer and related debris. This paper also supports the need to prepare canals on the order of 25/07 (Baumgartner) and 40/06 (Wallace) to facilitate the EA tip producing 2 alpha.

4. Comparative safety of various intracanal irrigation systems
   **Result & Conclusion:**
   This study showed the “EndoActivator extruded statistically significantly less irrigant than manual, ultrasonics, and RinsEndo groups.”
   **AND/OR**
   “Manual, ultrasonics, and RinsEndo groups had significantly greater amount of extrusion compared with EndoVac and EndoActivator.”
5. **Representative images demonstrating the efficacy of the EndoActivator in curved mesial canals in mandibular molar teeth** (Nova SE University: Kuttler S, *Personal Correspondence*, 2009)

**Conclusion:**
Sonic agitation with the EndoActivator in highly curved canals of mandibular molars demonstrated a high level of cleanliness as evidenced by no smear layer and open, patent tubules.


**Result & Conclusion:**
“Sonic activation (EndoActivator) showed the highest levels of bactericidal activity with CHX-plus after both exposure times.”

“The low-intensity ultrasonic or sonic agitation improves the action of disinfectants against biofilm bacteria.”


**Conclusion:**
Automated dynamic irrigation using the EndoActivator System was significantly more effective in removing stained collagen from the root canal than manual dynamic and static irrigation. The efficacy of the EndoActivator was increased with tip size and power setting.


**Result:**
Ultrasonic energy produces a series of nodes/antinodes along the length of an activated tip. Because of this mode of action, when an ultrasonically vibrating tip or canula contacts the surface of a prepared canal, then the displacement amplitudes and the biophysical forces necessary to maximize cleaning are undesirably reduced.

**Conclusion:**
Sonic energy produces a single node/antinode along the length of a nonmetal polymer tip. Sonically-activated polymer tips do not dampen upon canal wall constraint.

   **Result & Conclusion:**
   “The Sonic Activation Group (final rinse 17% EDTA / 3% NaOCl and EndoActivator) showed statistically significantly better smear layer removal (P<0.05) in comparison with the No Activation Group and other Test Groups in the apical third.”


    **Results:**
    “The results show a significant improvement of root canal disinfection in the EA 30 group in which 30 seconds of agitation was applied compared with irrigation alone.”


    **Results:**
    “EndoActivator was significantly more effective than ultrasonic agitation and CanalBrush.”


    **Conclusion:**
    Activation of MTAD with the EndoActivator System completely inhibited the growth of E. faecali in 1.5 minutes, as compared to using the evidence-based 5-minute protocol.


    **Result & Conclusion:**
    • Loose Debris 3mm from Radiographic Terminus: EndoActivator was statistically significantly better than Ultrasonics and the control group.
    • Opened Dentinal Tubules 3mm from Radiographic Terminus: EndoActivator was statistically significantly better than the Ultrasonic group.
    • EndoActivator provided better obturation of lateral and accessory canals (P<0.01)

**Conclusion:**
“Sonic and ultrasonic irrigation produced better removal of the smear layer in the apical third of curved roots compared to conventional irrigation.”


**Results:**
The EndoActivator was superior for removal of smear layer from the apical area of curved roots when compared to the other experimental protocols tested.


**Conclusion:**
The EndoActivator System showed better results in removing Ca(OH)$_2$ in each third of the root canal in comparison with the EndoVac, ProUltra and a master apical file.


**Results:**
The various thirds of prepared canals were evaluated for cleanliness using the EndoActivator, Er:YAG 2490 nm (flat tip), and Er:YAG 2940 nm (PIPS tip). All the groups studied showed superior cleaning versus the control group.


**Results & Conclusion:**
Sonically-driven polymer tips, like the EndoActivator and EDDY, clean root canal systems as well as or better than ultrasonically-driven metal insert tips. Strategically, polymer tips have an amplitude 30 times greater than ultrasonic tips, and sonically-driven polymer tips do not cut dentin or risk changing root canal morphology.