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Ultrasonic cleaning of root canals BRAM VERHAAGEN, CHRISTOS BOUTSIOUKIS, University of Twente, The Netherlands, LEI-MENG JIANG, RICARDO MACEDO, Academic Center for Dentistry Amsterdam, The Netherlands, LUC VAN DER SLUIS, Paul Sabatier University, Toulouse, France, MICHEL VERSLUIS, University of Twente, The Netherlands — A crucial step during a dental root canal treatment is irrigation, where an antimicrobial fluid is injected into the root canal system to eradicate all bacteria. Agitation of the fluid using an ultrasonically vibrating miniature file has shown significant improvement in cleaning efficacy over conventional syringe irrigation. However, the physical mechanisms underlying the cleaning process, being acoustic streaming, cavitation or chemical activity, and combinations thereof, are not fully understood. High-speed imaging allows us to visualize the flow pattern and cavitation in a root canal model at microscopic scales, at timescales relevant to the cleaning processes (microseconds). MicroPIV measurements of the induced acoustic streaming are coupled to the oscillation characteristics of the file as simulated numerically and measured with a laser vibrometer. The results give new insight into the role of acoustic streaming and the importance of the confinement for the cleaning of root canals.

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