

# Efficacy of laser and ultrasonic activated irrigation on eradicating a mixed species biofilm grown in the mesial roots of human mandibular molars

A thesis submitted to The University of Adelaide in partial fulfilment of the  
requirements for the Degree of Doctor of Clinical Dentistry (Endodontics)

November 2014

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## **Abstract**

### **Aim**

To compare the efficacy of Er,Cr:YSGG laser and ultrasonic activated irrigation on eradicating a biofilm grown in the mesial roots of human mandibular molars.

### **Methods**

A biofilm containing *Enterococcus faecalis*, *Streptococcus sanguinis* and *Fusobacterium nucleatum* was grown over 4 weeks in the mesial root canals of decoronated human mandibular molar teeth. Following removal from the flow cell, control roots (n=5) received no further treatment. The remaining tooth roots were chemomechanically prepared using different irrigating protocols: saline standard irrigation (Saline SI; n=15); 4% NaOCl and 15% EDTAC with ultrasonic activated irrigation (UAI; n=18); 4% NaOCl and 15% EDTAC with laser activated irrigation using power settings 0.5 W (LAI 0.5 W; n=18) or 0.75 W (LAI 0.75 W; n=10). Following treatment and crushing, bacteria were quantified by culturing (CFU/mL) and quantitative real-time PCR (qPCR). One tooth from each group was subjected to SEM analysis.

### **Results**

Quantification by culturing revealed significant differences between controls and all other treatment groups. Significant differences were found between Saline SI and UAI, Saline SI and LAI 0.5 W and also between LAI 0.5 W and LAI 0.75 W. No significant differences were found between Saline SI and LAI 0.75 W or between UAI and LAI 0.5 W or LAI 0.75 W.

From qPCR results, significant differences were found between controls and all other treatment groups. No statistically significant differences were found between Saline SI and UAI, LAI 0.5 W or LAI 0.75 W.

### **Conclusions**

Both culture and molecular techniques showed that mechanical preparation significantly reduces bacteria from the root canals of lower molar mesial roots. Further reductions were achieved by irrigating with 4% NaOCl and 15% EDTAC UAI or 4% NaOCl and 15% EDTAC LAI. No significant reductions in bacterial number were found between UAI and LAI protocols.

## **Declaration**

I, Jonathan Race, certify that this work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission for any other degree or diploma in any university or other tertiary institution without the prior approval of The University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree.

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Declared by:

Jonathan Race

Date:.....03/03/2015.....

## **Acknowledgements**

Some things in life feel insurmountable until completed. Only by combining persistent hard work with the help and encouragement of others can those things be overcome. Thank you to all who have helped me overcome.

I would like to sincerely thank Associate Professor Peter Cathro for your belief in me. You have provided me with the knowledge and skills to succeed and have been a constant source of encouragement. I could not have asked for a better supervisor and teacher.

Thank you to my research supervisor, Dr Peter Zilm for always being available to discuss the challenges I encountered in my research. Thank you for your microbiological knowledge and invaluable assistance in the scientific writing process.

Thank you to Professor Geoffrey Heithersay. You have graciously given of your time and knowledge. I highly value your perspectives, vast clinical experience and wisdom.

Thank you to Associate Professor Giampiero Rossi-Fedele for your knowledge and clinical insights and allowing me the freedom to place my energies where they were most needed.

Thank you to Ceilidh Marchant for your invaluable help and PCR problem solving abilities. Thank you to Lynn Waterhouse at Adelaide Microscopy Centre. Thank you to Suzanne Edwards, Discipline of Public Health at The University of Adelaide, for providing the statistical analysis.

Thank you to my wonderful wife Alex. I thank you for your love. You have been my reassuring strength and a constant source of encouragement. Your love for me, our family and our God is what truly matters in life – I love you. To my gorgeous daughter Matilda, I love your big “cubbles”. I look forward to seeing you continually explore what life has to offer.

Thank you to my DCLinDent colleagues Drs Jonathan Christo, Elizabeth Lou and Suzy Wang. You have provided me with friendship throughout the course. I wish you all the

best in your lives and careers ahead.

Thank you to the Australian Society of Endodontology for their generous financial support.

Finally and most importantly of all, I would like to thank and acknowledge the Lord Jesus Christ, my God, for all things. For in Him is where all knowledge begins and finds its ultimate meaning and purpose.