Rapid Method for the Detection of Root Canal Bacteria in Endodontic Therapy

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Year: 2015  
Journal: JOE

Aim
- To determine the sensitivity & specificity of the ATP assay to bacterial species commonly found in endodontic infections.
- To compare ATP and culture methods for the determination of viable bacteria from root canal samples of patients undergoing endodontic treatment.

Materials & Methods
Sensitivity of bacteria assay
- 6 bacterial species were used to estimate of the sensitivity of the ATP assay when used for bacterial detection of infected root canal samples.
- Bacteria were incubated in an anaerobic chamber and bacterial no. was determined by serial dilution Which were then subjected to the ATP assay.
- The luminescence produced was measured with a luminometer.

Specificity of bacteria assay
- E. faecalis was treated with freshly prepared 1% NaOCl for 2.5, 5, or 10 min. and the bacterial cell viability was then determined.

Clinical Sampling
Inclusion criteria
1) Single or multi-rooted teeth with pulp necrosis and apical periodontitis
2) Previously initiated therapy if root canal instrumentation was not performed or was incomplete.

Exclusion criteria
1) Severely broken down teeth
2) Teeth with prior root canal fillings, Ca(OH)2 medication, with vital or inflamed pulp tissues
3) Patients who had taken antibiotics 4 weeks before sample collection

- Root canal samples included:
  - A sterility control before endodontic treatment,
  - Bacterial sampling before (S1) and after (S2) root canal instrumentation,
  - Bacterial sampling after removal of Ca(OH)2 and before obturation (S3).

Results
- Sensitivity of the ATP assay was dependent on the efficiency of extraction of ATP from the target organism and the physiological state of the organism.
- The minimum amounts of bacteria required to achieve a signal higher than the background control ranged from 10 -100 cells depending on the bacterial species.

Specificity of ATP assay for viable cells
- Good correlations were obtained between the ATP readings and bacterial viability through culturing.

Comparison between ATP & Culture results
- The ATP readings allowed clear segregation of the +Ve and –Ve anaerobic cultures obtained from the infected root canals of patients.

Conclusion
- The bioluminescence ATP assay correlates well with traditional culturing methods when testing for the presence of viable bacteria during root canal therapy, but in a more efficient manner.
- This method may be potentially useful as an adjunct to root canal treatment.

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