

# Biofilms & caries

By Peter Mackley



Peter Mackley

## Biofilms are everywhere!

In industry biofilms provide many challenges for engineers, microbiologists and healthcare professionals. Biofilms are readily associated with petroleum production, pipelines, cooling towers, paper industry, shipping, medical implants, food processing and dental healthcare. Simply biofilms form when bacteria, a surface and a liquid all come into contact with each other.



The Centre of Biofilm Engineering, at Montana State University ([www.erc.montana.edu](http://www.erc.montana.edu)) provides us with a valuable resource. The Centre for Biofilm Engineering was created following industry's demand to understand and solve the many challenges which biofilms cause in modern day society. Using confocal laser scanning microscopes, researchers have been able to view biofilms in their normal living environment and have discovered that biofilms are far more sophisticated than first thought. They now have confirmed that biofilms communicate at a cellular level. Much of the previous research regarding bacteria was focused on Planktonic (free floating) bacteria, however they have discovered that biofilms react significantly different to that of Planktonic bacteria. A number of previously held beliefs have been proven to be unfound following this research. One of the objectives in studying biofilms is to determine the most effective way to treat or kill them, as biofilms cost industry millions of dollars each year. One of the important findings is that biofilms are generally 1,000 times more resilient to that of Planktonic bacteria, making them much more difficult to change or kill.

## So what impact do biofilms have in oral health?

Possibly the most important consideration is to reconsider our understanding of biofilms. Our teeth are covered by a biofilm. Simply, caries is a transmittable bacterial biofilm disease<sup>1,2,3</sup>. Knowing this is important as the biofilm that covers our teeth can be one of a protective nature, or,

one that is destructive. Changes to risk factors and simple lifestyle changes can innocently change the bacterial balance and alter a protective biofilm to one that is destructive, carious. The appearance of mutans streptococci in the pits and fissures is usually followed by caries 6-24 months later<sup>4</sup>.

Biofilm screening can now be simply integrated into a check-up or hygiene appointment. New technological advances such as the CariScreen® hand held ATP meter can provide a valuable metric. A biofilm bacterial load can be simply determined in less than 1 minute. The ability to screen patients simply and quickly offers a new medical management approach to dentistry.

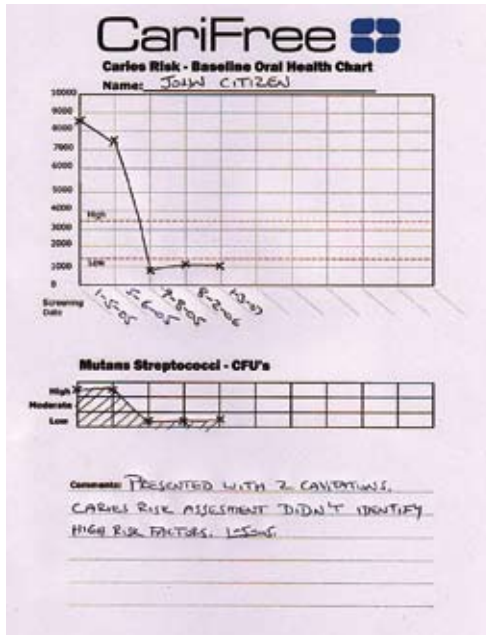


The results from the CariScreen® ATP meter provide dental staff with a valuable biofilm bacterial baseline, high risk individuals can now be identified from the low risk group. Patients have welcomed the new screening test with enthusiasm. Many have become motivated to reduce their caries risk after seeing the results. When they learn about the risk factors and how they can affect their biofilm balance, many actively strive to improve their oral health. The test results can be simply charted. This provides the dental staff with a quick reference and an excellent visual tool that assists in the education and motivation of patients. What's more non compliant patients can be quickly identified, often as soon as 30 days following the commencement of therapy.

The caries risk baseline chart can be extremely valuable once a high risk individual has been identified. As stated earlier in this article, biofilms are generally 1,000 times more resilient to that of Planktonic bacteria. There is the mistaken belief that drilling out caries lesion and placing a restoration eliminates the bacteria and thereby stops caries progression. Antimicrobial therapy must be used to combat a high bacterial challenge<sup>1</sup>. This poses an interesting question.

Once a patient is placed on antimicrobial ther-





apy, how long do they need to remain on it in order to change the biofilm bacterial balance?

Using the CariScreen® ATP meter and charting the test results it becomes easy to monitor the ongoing biofilm health of the patient. Most often patients would represent for screening 30 days following the commencement of antimicrobial therapy. By comparing the test results it is possible to monitor the patients change and offer a timeline for the continued antimicrobial therapy. ♦

For further information, please contact: [Essology](http://Essology.com),  
 Ph 03 9803 8786 or [www.essology.com](http://www.essology.com)

### References

1. John Featherstone, M.SC.,PH.D., JADA, Vol131, July 2000, The Science and Practice of Caries Prevention.
2. Loesche WJ. Role of Streptococcus mutans in human dental decay. Microbiol Rev 1986;50(4):353-80.
3. Loesche WJ. Hockett RN, Syed SA. The predominant cultivable flora of tooth surface plaque removal from institutionalized subjects. Arch Oral Biol 1972;17(9):1311-25.
4. Sturdevant CM. The Art and Science of Operative Dentistry Third Ed. 1995, Mosby.

