

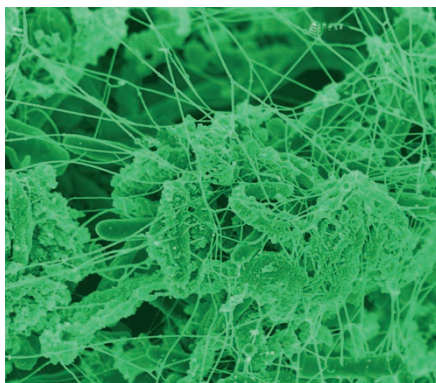
Biofilms: What does subgingival plaque look like?

The ultrastructure of subgingival dental plaque, revealed by high-resolution field emission scanning electron microscopy
BDJ Open 2015; DOI: [10.1038/bdjopen.2015.3](https://doi.org/10.1038/bdjopen.2015.3)

Dental plaque is a complex biofilm or mass of bacteria. Biofilms are abundant in humans and are involved in a variety of infections in the body, such as pneumonia, urinary tract infections and implant-associated infections. In the mouth, the plaque biofilm is a major aetiological factor in several disease processes, including dental caries. In particular, subgingival dental plaque is a major initiating factor in periodontal diseases and is much more challenging to study due to its location beneath the gumline.

Finding out more about what biofilms are made of and how they are structured is key to developing new ways to treat biofilm-related diseases in patients. With this knowledge new methods for disrupting or inhibiting biofilm formation could be found which would be of huge benefit in many different clinical settings.

In this *BDJ Open* article, Richard Holliday



and colleagues discuss how microscopy can be used to do just this. The team from the dental school at Newcastle University worked with a physicist (Durham University) to obtain high-resolution images of undisturbed subgingival plaque using field emission-scanning electron

microscopy (FE-SEM). Previous microscopy techniques which were used to look at the structure of plaque biofilms had limited magnification and/or resolution. However, FE-SEM allowed the team to successfully examine the ultrastructure of plaque from extracted teeth in which the lateral root surface was not touched to preserve the subgingival biofilm.

The FE-SEM pictures showed many different bacterial cell shapes as expected, and allowed extracellular material in the form of strands and vesicles to be detected with a high resolution. The images also showed open-ended tubule structures in the biofilm which, to the best of the authors' knowledge had not previously been reported. The team successfully proved FE-SEM to be a useful tool for obtaining high-resolution images of undisturbed subgingival plaque.

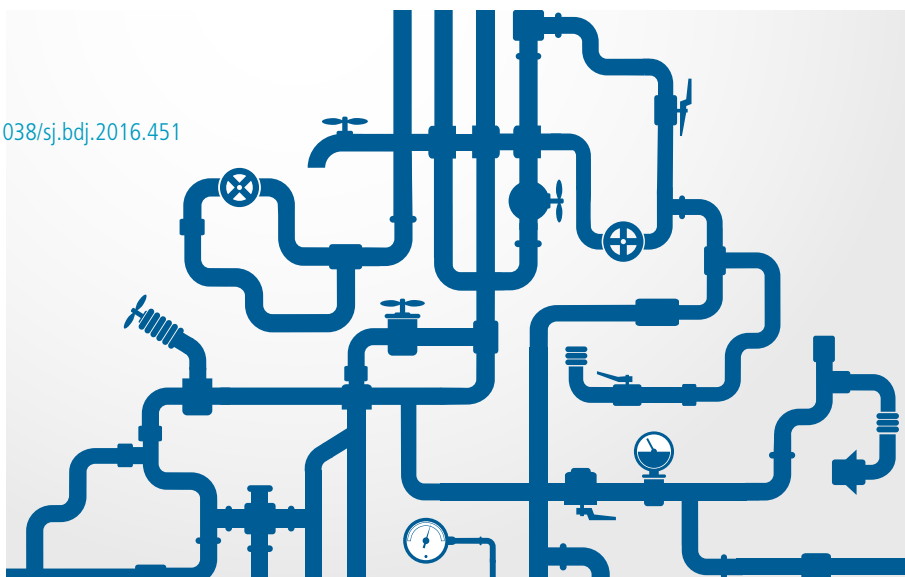
By Ruth Doherty

Preventing evidence leaks

How do we create, and improve, the evidence base?
Br Dent J 2016; **220**: 651–655 <http://dx.doi.org/10.1038/sj.bdj.2016.451>

Providing the best clinical care involves using the best available evidence of effectiveness to inform treatment decisions; evidence that can be gained through research. Oral and dental research shares the same goals as the rest of healthcare research; to benefit people and patients, whether at an individual or a societal level. Clinical trials form the backbone of our clinical evidence in relation to the effect of interventions. Producing this evidence begins with trials and continues through synthesis of the findings towards evidence incorporation within comprehensible, usable guidelines, for clinicians and patients at the point of care. However, there is enormous wastage in this production process, with less than 50% of the published biomedical literature considered sufficient in conduct and reporting to be fit for purpose.

Over the last 30 years, independent collaborative initiatives have evolved to optimise the evidence in order to improve patient care. These collaborations each recommend how to improve research quality in a small way at many different stages of the evidence production and



distillation process. When we consider these minimal improvements at each stage from an 'aggregation of marginal gains' perspective, the accumulation of small enhancements aggregates, greatly improving the final product of 'best available evidence'. The myriad of tools to reduce research quality leakage and evidence loss should be routinely used by all those with responsibility for ensuring that research benefits patients, ie those who pay for research (funders), produce it (researchers), take part in

it (patients/participants) and use it (clinicians, policy makers and service commissioners).

Patients/participants and clinicians are well placed to suggest priority areas for research, based on experience, both as service users and clinical experience. Policy makers and service commissioners have a strong role to play in suggesting priority areas for research based on awareness of gaps in research to inform policy creation.

By Stephen Hancocks