Ultrasonic scaling instruments are widely recognised as an effective alternative to manual instrumentation. Since the Drisko review article of 1993, non-surgical periodontal therapy has advanced far beyond basic calculus removal. This has led to the increasing popularity of ultrasonic scalers among dental professionals, and in many cases has led to the replacement of old manual counterparts.

The small, quick vibrations of an ultrasonic scaler give a whole new level of effectiveness in calculus removal. Benefits include decreased treatment times, more efficient removal of dental plaque, reduced tissue trauma for the patient, excellent stain removal, and less hand and wrist fatigue for the operator.

Such are the advantages of ever-evolving ultrasonic technology, that the ultrasonic scaler is now perhaps the single most important instrument in improving periodontal hygiene and the oral health of patients. As such, demand for ultrasonic products is higher than it’s ever been, and is increasing year on year. In response to this growing demand, several different manufacturers now produce ultrasonic scaler inserts that are designed to work with a standard ultrasound generator.

The research
While the growth in the uptake of ultrasonics is undoubtedly a positive step for dentistry, with so many different inserts and generators on the market we must ask: are we really getting the best out of our ultrasonic scaler inserts?

Recent research would suggest that perhaps we are not. In separate studies on ultrasonic scaler performance, results have shown that inserts nominally of the same size can in fact demonstrate significant differences in their performance in terms of oscillation frequency or amplitude.

These are important performance factors as oscillation frequency determines the number of cleaning strokes per second, while oscillation amplitude relates to the size of the stroke and may correlate with greater cleaning efficiency. Additional factors that also affect instrument performance include the effect of load (which can have a direct impact on the frequency and amplitude of oscillations), and the consistency of instruments – essentially, the ‘repeatability’ of instrument performance. This is a particularly important factor for many clinicians, as consistent instrument performance may enable a greater deal of familiarisation with the product and so give practitioners greater control over their cleaning technique.

Indeed one major piece of research in this field was recently conducted by Simon C Lea and Damien Walmsley. Published in the first edition of the Annual Clinical Journal of Dental Health, Lea and Walmsley investigated whether ultrasonic inserts and generators from the same manufacturer optimise system performance.

In the study, six sets of ultrasonic scaler inserts were tested, from three different manufacturers: Dentsply, Hu-Friedy and Parkell, using Cavitron ultrasonic generators. Inserts were tested at either 25 kHz or 30 kHz, under loaded and unloaded conditions. Scaler inserts were then analysed using a technique called scanning laser vibrometry, which assesses the oscillation characteristics of the working probe of the ultrasonic instruments.

A major part of this study investigated the probe oscillation frequency, which is a measure of the number of times, per second, the ultrasonic scaler probe completes one whole oscillation cycle. During one cycle, the probe traverses the tooth twice, producing a forward and backwards stroke. Therefore, a probe with a frequency of 30 kHz performs 60,000 cleaning strokes per second. For the 30 kHz systems, the Dentsply inserts exhibited the greater oscillation frequency, potentially corresponding to 250-500 cleaning strokes per second more than the Hu-Friedy inserts, and 1000-1500 cleaning strokes per second more than the Parkell inserts.

At 25 kHz the Hu-Friedy demonstrated greater oscillation frequency compared to the Dentsply and Parkell inserts.

One of the study’s most striking finds was the variability exhibited by the different inserts. At 30 kHz, two of the five Hu-Friedy inserts had a significantly reduced amplitude, while one underwent a significant amplitude increase. Further variability was seen with the Parkell inserts, with two of the five showing significantly reduced amplitudes. Interestingly, there were yet further differences at 25 kHz.

Of all the inserts studied by Lea and Walmsley, Dentsply ultrasonic inserts demonstrated the greatest consistency when used in conjunction with the Cavitron ultrasonic generators. What this demonstrates above all else is that clinicians should be aware that inserts produced by a particular manufacturer should be used with that manufacturer’s generator. Il not, system performance may be compromised.

For optimum periodontal hygiene then, clinicians should make best use of insert brands backed up by scientific, evidence-based reports, designed to be used in conjunction with the associated ultrasonic generator. In dentistry, the small things can make a big difference. That’s why it pays to use a brand you can trust.

References

Insert ready for use

Optimising the performance of ultrasonic scaler inserts
Damien Walmsley highlights the benefits of these popular dental instruments

There is a large range of ultrasonic inserts now available