



Ozone: The Revolution in Dentistry

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Heralding a new era in dentistry, ozone therapy has been established as a safe and effective method for preventing and treating dental caries. Unlike conventional methods, which are highly invasive, this novel treatment approach promotes caries reversal and the remineralization of teeth without damaging their structure. Ozone's long history as a subject of research and an effective medical tool is well documented in this full-color book. Its 27 chapters explain ozone's antimicrobial mechanisms, present evidence-based research on its clinical dental and oral applications, and describe techniques for implementing its use in dental practice. All modern dental practitioners should educate themselves about this exciting new approach to preventive and restorative dentistry, which is being embraced by clinicians and patients alike.

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Foreword

Much of the research on dental caries in the first half of the Twentieth century dealt with details of the decay of enamel and dentine. This paved the way to a better understanding of the process of destruction of these mineralized tissues. After 1940, when Stephan discovered the very rapid acid production in the microbial dental plaque, prevention-oriented research focused on the demineralizing power of plaque. Well-formulated hypotheses and sophisticated research devices became available, revealing important details about the bacteria in the microbial plaque and their metabolism. Oral hygiene, particularly removal of plaque, was recognized as an important aspect of caries prevention. Subsequently, fluorides were demonstrated as the key players for slowing the demineralization and eventually reversing the destruction of enamel by recalcification, provided its crystals were not yet severely damaged. The dual strategy of (1) lowering the destructive effect by means of oral hygiene (i.e. removing dental plaque and fermentable carbohydrates), and (2) slowing demineralization and, most importantly in the present context, promoting 'healing' of the demineralized enamel using fluorides has proven extremely useful. In fact, this strategy has been very successful in the youth populations of most of the highly industrialized countries, with the benefits increasingly documented in adults.

On the other hand, traditional conservative 'drill and fill' treatment has also met with great success as well as failure. When the rules for fillings were meticulously followed, restorations often survived for decades, particularly in the case of gold inlays. Nevertheless, it has always been known that bacteria were locked in dentine which looked clinically completely sound. In most cases however, unsuccessful fillings failed for other reasons: weakness of materials, negligent work by the dentist and high caries activity leading to secondary caries. The microorganisms surviving in the dentine were rarely thought to play a role.

Recent technical advances have made it possible for ozone, a powerful disinfectant, to be applied to small areas of dental hard tissues while neighbouring tissues and the lungs are protected from this aggressive gas. Its effectiveness has been demonstrated in several well-planned clinical studies. For example, a recently published clinical trial showed the reversal of root caries using ozone in a double-blind, randomized, controlled 18-month trial (Holmes, 2003).

For the patients with two lesions at the leathery stage, a remineralization regimen was set up, which evidently had identical intensity for both lesions. Prior to the start of the remineralization regimen, one of the two lesions in each patient received an ozone treatment lasting 40 seconds, the other a placebo treatment with air using the same machine. After 18 months, of the initial 89 patients in this double-blind study, 87 presented themselves for a final examination. At this time, all the 87 lesions which had been given the initial ozone treatment had become hard. Of the placebo treated lesions, only one had become hard, 54 were again categorized as leathery and 32 had become soft.

Is the new ozone treatment a quantum leap? From a biological standpoint, it represents a breakthrough that microorganisms can be attacked in their traditional niches both in seemingly sound, leathery and otherwise decayed dentine. But how does it compare with the 'first' quantum leap that was brought about by caries prevention which has been reducing caries prevalence by 70 to 90 per cent in entire populations?

For pedodontists and general dentists in their practices, the reduction of caries prevalence only made itself felt after periods of 4 to 10 years, and the respective statistics were often complicated. By contrast, in the Holmes trial, ozone treatment resulted in unequivocal and 100% success after a very short period: all of the 87 leathery lesions had become hard after 18 months.

Dentists who have used ozone every day in their practices for over two years have treated more than one million patients without a single adverse event. New results of various uses of ozone will be published in the near future, and

their long-term effects on carious lesions in conjunction with remineralization and restorative dentistry are of great interest. Some elements of dental academia will have doubts whether enough financial support may be available for retrospective research, which would focus on the stability of remineralized dental hard tissues, the longevity of fillings and related problems. This research will have a significant health impact. Part of the finances now spent for 'white' filling research could be channeled into this field to enhance dental health rather than to satisfy the cosmetic expectations of both patients and dentists. Another aspect is that white fillings have raised the cost of restorative treatment, whereas ozone treatment may lower it.

In fact, by attacking microorganisms in their niches where hitherto they have been able to survive, the use of ozone opens new horizons, and dentistry will be eager to explore the potential of disinfection of dental hard tissues. It appears reasonable to expect enhancements of minimal invasive treatment procedures or even new synergies between traditional treatment and prevention. Research will show whether future developments prove fruitful, or end in disappointment.

Whatever the outcome, this monograph can be expected to mark the beginning of a new period in dentistry.

Thomas M. Marthaler