

STEPHEN M. KORAL, D.M.D.

January 4, 2002

Dr. David Winn

Dear David,

*Thanks for sending me that recent issue of your endodontists' newsletter, the Endodontic Files, in which they discuss Biocalex. There are so many misunderstandings, misconceptions, preconceptions and cultural differences about it that it is difficult to know where to start a conversation. The endodontists get a skewed view of course, because as they well know, they often get saddled with the sad results of other doctors' failures. At the same time, there are so few of us who have stuck with Biocalex, learned to make it work and produce consistent clinical success, to counterbalance the image of failure they portray.*

*Biocalex was introduced to the US in the early '90s from Canada, where Guy Duquet of Montreal has used it for over twenty five years. It was first developed in France in the '60s. My motivation to start using it came from the uncomfortable position of being between the rock (knowing the great value and personal satisfaction of endodontic treatment) and the hard place (the evidence that the dentin tubules do indeed harbor residual populations of microbes that produce toxic waste products of anaerobic metabolism). On the most basic level, how often do you extract an asymptomatic endo treated root that looks fine on the film only to discover that it smells like a septic tank? (And it's not just the unrestored roots, either.) It has happened too often for me to think that nothing is wrong.*

*Biocalex was presented as a method of making the calcium hydroxide effect permanent, a more profound disinfection of the roots that would penetrate all the way through the tubules. There was good evidence of the penetration and dissolution of organic matter, some evidence of the disinfection, and only anecdotes to support the notion that it could have clinical longevity, although the anecdotes from the French extend for thirty years. The basic concept is this: as long as there is excess water available, as from an effusive apical lesion, the calcium oxide will continue to hydrolyze into calcium hydroxide, dissolving organic material while disinfecting. When the lesion dries up, and the water supply diminishes, the carbon dioxide that is normally present from respiring tissue enters by diffusion, and reacts with the calcium oxide to form hard calcium carbonate. Calcium carbonate is limestone or calcite. It is not "relatively insoluble," but completely insoluble at any physiological pH.*

*At least one of the major objections derives from a mistranslation or at least a misinterpretation of the French. The early papers refer to "expansion sans pression," although it is the "sans pression" that has been left unmentioned ever since, for some reason. Calcium oxide diffuses through the water layer, but it does not exert an*

*expansive hygroscopic pressure, as would an expanding hydrogel. I would rather see the word “penetration” used to describe the action of calcium oxide in a root canal treatment, because the word “expansion” has caused nothing but misunderstanding. As for broken roots, those of us who actually use the product wonder what all the fuss is about, because clinically, it doesn’t happen. I know there are anecdotes to the contrary, but I can speak for seven years experience of a few dozen US dentists with whom I have personal contact, and report the thirty years’ experience of those French dentists who use it. We just don’t see roots splitting, to any degree beyond the typical fracturing of inadequately restored cases.*

*Radio-opacity has been a problem all along, because neither calcium oxide nor zinc oxide provides any real contrast with tooth structure. Some of us Biocallex users have been mixing it with other, more radio-opaque materials, with much better visibility on post treatment X-rays. I have settled on replacing the zinc oxide with yttrium oxide. There’s no objective reason why barium sulfate wouldn’t work, except that many of the “high touch” biocompatibility practitioners don’t like barium no matter how insoluble the salt. Bismuth oxide when mixed with Biocallex turns the tooth black, so that’s out. Yttrium oxide gives adequate visibility, with no doubts about its biocompatibility. There will be newer products coming out that won’t have the radio-opacity problem. Also, the X-ray appearance is the same years later. I have no idea where that nonsense about changes in radio-opacity came from.*

*I agree with the endodontists in that each failed case I’ve had to retreat has had soft material in the canal. We have learned that the calcium oxide root filling must be checked a week or two later and probed vigorously to make sure it has turned rock hard before proceeding with restorative treatment. If it’s not really rock hard, it must be rinsed out and reapplied. Although most cases harden up well the first time around, many don’t, and it is necessary to be diligent and critical when evaluating the set. This inconvenient feature of calcium oxide treatment was not adequately appreciated in the past, and some dentists certainly didn’t recheck their fills, leading to an unnecessarily high rate of failure. The cases do well over time, though, when we are sure they have hardened, and when certain other items of technique sensitivity are attended to. The three year old case, “washed out and failing,” shown in the Endodontic Files newsletter was probably never fully set, and simply represents the potential lifespan of a calcium hydroxide fill. By the way, hardened Biocallex fills can be removed for retreatment, though tediously, with 17% EDTA.*

*Most of this is, of course, a pile of anecdotes – clinical experience and clever ideas, to be sure – but anecdotal just the same. The only high quality experimental science done about calcium oxide in root canals demonstrates that: 1) it dissolves organic matter in the canal including predentin matrix more effectively than calcium hydroxide, 2) translocates calcium further into dentinal tubules, and 3) alkalizes the root out to the cemental surface just as well as calcium hydroxide. There are no good studies of its properties as a clinical endodontic material, such as obturation and dye penetration, and no clinical outcome studies. I have organized an office-based clinical*

*outcome study which has just begun, so it will be some years until there can be results to report. I know the stuff works, but someone's got to prove it!*

*The most maddening thing about this debate is that those experts who are in a position to do real research are not interested in the subject, while the practicing dentists who are interested have neither the training nor the resources to do the research. The Endodontic Files newsletter represents a group of specialists, both academic and in private practice, who have made snap judgements (prejudiced judgements?) dismissing the possibility that calcium oxide could be an effective root treatment, though they have no more information than me, and none of the clinical experience. They should ask me! There is the potential here for a real contribution to endodontic science, but not if it's dismissed out of hand without honest examination.*

*Sincerely,*

*Steve Koral*