

In contact with zirconia

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Received: March 21, 2019 | **Published:** March 26, 2019

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A perspective on experiences with zirconia

Since the introduction of zirconia in 1998 as a substructure for veneered crown- and bridgework, we learned a lot about its clinical behavior, mostly the hard way. Soon, many problems were reported, concerning the chipping or delamination of porcelain on zirconia. Failure rates after 5 years were reported of as much as 20% of the restorations. This was unprecedented, because in metal-ceramics chipping was negligible and delamination might reach 5% maximum after 5 years. The reason lies in the high strength of zirconia, even at the firing temperature of the porcelain. During cooling the porcelain builds up pressure immediately from the beginning, in contrast with materials such as metal, alumina or press ceramics. The first reaction to the shared concerns of dentists and technicians was to do away with the porcelain layer and go monolithic with zirconia. This, without taking in consideration that the problem might be lack of resistance or the low strength of the porcelains used. In the meantime, it has become evident that when a crack-stopping mechanism such as leucite crystals is present in the porcelain matrix, no chipping whatsoever is reported, for the porcelains with this build-in mechanism.

Since then monolithic zirconia, either individually colored by

applying coloring liquids in the green stage or the use of color-graded zirconia blanks, has become extremely popular both under dentists and technicians. Because zirconia is the hardest material used up to now in dentistry (it is almost twice as hard as cobalt-chromium), initial concerns came up about the possibility of unacceptable abrasion of antagonists, when in direct contact with zirconia. Laboratory abrasion tests on polished zirconia against natural teeth proved its positive tribological properties. However, more and more clinicians reported recently heavy abrasion of antagonists, because zirconia does not abrade itself, as the rest of the dentition, therefore after a few years exerting more load on the antagonists, then was anticipated in the laboratory abrasion tests. Although researchers that performed the abrasion tests did not find clinically unacceptable abrasion of the opposing natural tissue, all reported fine cracks in the samples. Although there is little abrasion, therepeated contact with hard, resistant zirconia gives a “hammer” effect, of which effect we do not know its long-term effect.

It this a reason to avoid contact with zirconia and go back to zirconia veneered with chip-resistant porcelains with their “cushioning” and natural abrasion?