Biocompatibility of CAD/CAM Restorative Materials

Received……………………...…..6/7/02
Scientific Review…………………7/5/02
IAOMT Board Review…………..9/27/02
Reevaluation………………………

Explanation of IAOMT position: Although there is general agreement that ceramic materials are biocompatible, no research or literature was found to support this position. Claims of biocompatibility should be only relative to other restorative materials unless specific testing of the material to the patient is made at the patient’s request with informed consent. Advantages and disadvantages of the testing must be part of the informed consent.

Name of Scientific Review: Biocompatibility of CAD/CAM Restorative Materials

Alternative name(s) of Scientific Review: Biocompatibility of Restorative Material available for use in CAD/CAM (CEREC, Sirona) fabrication.

This Scientific Review is related to Dentistry

This Scientific Review is Product & Procedure

Purpose of Scientific Review: To evaluate any existing research on the biocompatibility of the most commonly used CAD/CAM materials.

Vested Financial Interest? No

Scientific Review Topic History: With the advances in CAD/CAM technology, as well as the introduction of new materials, this method of fabricating indirect ceramic restorations now merits consideration1. Currently in it’s 3rd generation of development (CEREC1 – 1986, CEREC2 – 1994, CEREC3 – 2001), This technology allows for chairside or in-house fabrication of ceramic restorations, including inlays, onlays, crowns and veneers. This is achieved by milling the restoration from a solid block of material2. Dentist using this technology can choose from 3 different materials.

Description of the Scientific Review Topic: Ceramic based, non-metal restorations are generally considered to be among the most inert, biocompatible restorative materials available in dentistry today3. The intent of this Scientific Review was to discover and evaluate any literature or research to substantiate this assumption.

Manufacturer(s): Initially the users of this technology were limited to one material: Vitablocs Mark II (Vivadent), a high density, fine grain feldspathic porcelain4.

In 1998, Ivoclar Vivadent introduced ProCAD blocks. Composed of an optimized, leucite-reinforced ceramic (similar to IPS Empress), this material proved to have excellent physical properties5,6. It is also described by the manufacturer as “biocompatible4, highly fracture resistant, and demonstrates natural wear characteristics.”

In 2000, 3M ESPE introduced the Paradigm MZ100 blocks. Ceramic based, this material is made from 3M ESPE Z100 Restorative; 85%wt, ultra fine zirconia-silica filler reinforces a highly cross linked polymeric matrix. While conventional fillers are typically either fumed silica or molten and milled Barium glass, the filler in Paradigm is synthesized by a patented wet chemical method that yields particles with an average size of 0.6 microns, a broad size distribution, and a spherical morphology. The internal structure of the particles consist of nanocrystalline zirconia dispersed in an amorphous silica matrix7.

References: Contact applicant for details.

Scientific Literature: No research or literature supporting claims of biocompatibility of any ceramics used in CAD/CAM could be found.

Legal Aspects of this Scientific Review: No claims as to biocompatibility of any of these materials should be made. Any testing for biocompatibility should be done at the patient’s request. Proper documentation and consent forms are important.

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