



Seventh lecture

***Ceramic Implant Materials ,
Composites as Biomaterials***

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Benefits of ceramic implants

Perhaps the most distinctive yet simple difference between titanium and ceramic implants is the color. As a white material, the esthetic properties of ceramics are self-evident, especially in patients with a thin or delicate soft tissue biotype or in cases of soft tissue recession. Zirconia implants also lead to less mucosal discoloration than titanium. For patients who are very concerned about the potential visibility of titanium, especially in the anterior region, a ceramic implant may be a reassuring solution.



Soft-tissue-friendly and less plaque:

Looking deeper into the biology behind ceramic implants, several studies have shown that soft tissue attachment, low or weak inflammatory responses, and osseointegration are similar to those observed in titanium implants. Low affinity for attracting and retaining plaque has also been demonstrated as well as less bacterial adhesion than titanium.



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Challenges with ceramic implants

Fewer clinical indications :

At present, the clinical indications are limited compared to titanium implants. The current use of ceramic implants as a solution for tooth loss is mainly for single tooth replacement and bridge cases. There may be additional limitations in surgical and loading protocols.

Predominantly one-piece cement-retained systems :

Zirconia and titanium have very different material characteristics, so ceramic implants can't simply replicate titanium implants. Until recently, zirconia has been mainly used as one-piece, cement-retained systems, which present several drawbacks in terms of the rigidity and stability of a cemented restoration. One-piece implants are less flexible than those with two parts secured by torqued screws. This limited flexibility also creates problems during placement of the implant, in the design of the restoration, and in the types of forces that may be exerted.

Cost of ceramic implants :

The complex industrial process of manufacturing zirconia implants can impact the price. When selecting a ceramic implant, it is advisable to question the manufacturing method. With this brittle material, manufacturing flaws – even minute imperfections – in the production and surface treatment of a zirconia implant may compromise strength. Manufacturers should take great care with the materials for being clinically successful.

What is a composite materials?

A composite material is a combination of two materials with different physical and chemical properties. When they are combined they create a material which is specialised to do a certain job, for instance to become stronger, lighter or resistant to electricity. They can also improve strength and stiffness. The reason for their use over traditional materials is because they improve the properties of their base materials and are applicable in many situations.

What are the classification of composite materials?

Classification of composite materials occurs at two different levels: The first criterion of classification is based on the matrix (binder) constituent. The main composite families encompass organic matrix composites (OMCs), metal matrix composites (MMCs), and ceramic matrix composites (CMCs)