

# Redesigning composite use in restorative procedures.

Jean Madden, USA.

While classical cavity preparation design works well for amalgam, it may not suit composite, as composite resins have a lower diametral tensile strength. This observation led to the development of the Bioclear method, which alters cavity preparations using engineering principles and modern dental materials. Instead of filling a hole, a monolithic shrink wrap of composite resin is created around the tooth, resulting in a compression joint instead of a tension joint at the tooth/composite interface. The tooth is repaired rather than restored, using a repeatable method that combines the simplicity and economic advantages of direct composite restorations with high aesthetics and strength.



**Interview with  
Dr David Clark,**  
DDS, inventor of the  
Bioclear method.

In January, 2019 3M entered into a partnership with Bioclear Matrix founded in 2007 by Dr David Clark. The company develops and markets matrix systems and techniques that support a modern approach to restorative dentistry. We talked to the inventor and dentist Dr David Clark about his motivation to develop the Bioclear method, and about the basic principles and advantages of this technique.

## **Dr Clark, what made you decide to develop a new method and matrix system for direct composite restorations?**

Several years ago, I started using microscopes in my clinical procedures. Under the microscope I could see that teeth restored with composite sometimes developed cracks and fractures ultimately leading to failures. With 24X magnification, I was also perplexed at the widespread micro-leakage and stain that seemed to happen regardless of mainstream materials or techniques.

Over time it occurred to me that the classical cavity preparation design (according to G.V. Black), which works well for amalgam, might be inadequate for composite. The reason is that composite resins have a high compressive strength, but a lower diametral tensile strength. In traditional GV Black cavity preparations, a tension joint is created. So, I altered my cavity preparations to incorporate engineering principles with the goal of creating compression joints rather than tension joints at the tooth/composite interface.

### How is a compression joint produced using the Bioclear method?

We need two different things to create this compression joint, the right preparation design and a specific method of placing the material. The idea is that we repair the tooth instead of restoring it. In this context, we try to avoid long, narrow cuts and opt for a wide, round bottomed cavity design. Sharp margins are avoided; we prefer to create infinity edge margins, which also offers the benefit of a large amount of enamel available for bonding. On top of the prepared tooth structure, a blend of flowable and heated paste composite is applied. More precisely, the material is injection molded into anatomic forms created with Bioclear's specific clear anatomic matrices. In this way, a monolithic shrink wrap of composite resin is created around the tooth instead of simply filling a hole. This results in the desired compression joint.

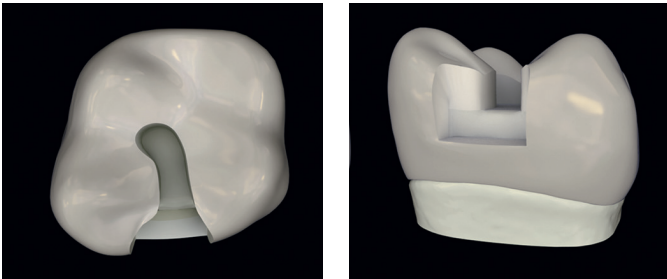


Figure 1: Classical cavity preparation design (Class II) described by G.V. Black around 1880.

### Would you please describe the entire treatment procedure?

The Bioclear method is based on four pillars. Initially, the biofilm needs to be removed to ensure that we will establish a strong bond to enamel. We recommend the use of  $\text{Al}(\text{OH})_3$  powder for blasting, which is an effective method of cleaning without being too abrasive. Afterwards, the Bioclear anatomic matrices are placed around the tooth and phosphoric acid is injected, followed by thorough rinsing and drying, and the application of a universal adhesive. What follows is the injection molding of 3M™ Filtek™ Supreme Ultra Flowable Restorative followed immediately with heated 3M™ Filtek™ Universal Restorative paste from capsules. The materials are then cured together rather than curing the materials in increments. For sculpting, shaping and finishing, we recommend the use of a large 3M™ Sof-Lex™ Extra Thin Contouring and Polishing Disc coarse, while for the pre-polishing procedure, Bioclear Magic Mix should be used with a disposable cup. A mirror finish is obtained with the Bioclear RS (Rock Star) Polisher.

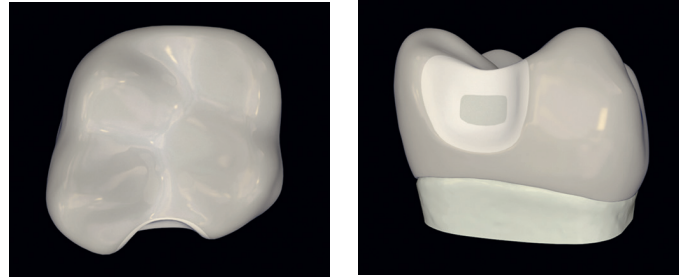


Figure 2 : Modern cavity preparation design (Class II) described by Dr Clark around 2005.

### What are the advantages of this technique for the dental practitioner deciding to use it?



The Bioclear method is a treatment option that combines the advantages of direct composite restorations – low financial and biological cost, simplicity (of a single-shade technique) and a single-visit treatment – with high esthetics and strength. The technique may be used for a broad range of treatments from single tooth repair to full-mouth rehabilitations. Another advantage is that the gingival half of the tooth is treated predictably without negative clinical consequences or unnecessary removal of tooth structure. The method is taught in lectures, hands-on courses and at the Bioclear Learning Centers (USA, UK, Sweden).

To sum up, Bioclear is about preserving the good, replacing the missing or deficient using a repeatable method developed for modern dental materials.



## Jean Madden

Jean Madden obtained her Bachelor of Science degree in Biology combined with a minor in Secondary Education. She joined the 3M's Oral Care Division in 2005 as a Scientific Marketing Communications Manager. She has experience in Integrated Communications, Technical Service and Key Opinion Leader Management with a strong emphasis on Medical Education and eMarketing. She started her current position as a Scientific Affairs Manager in March 2017.

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