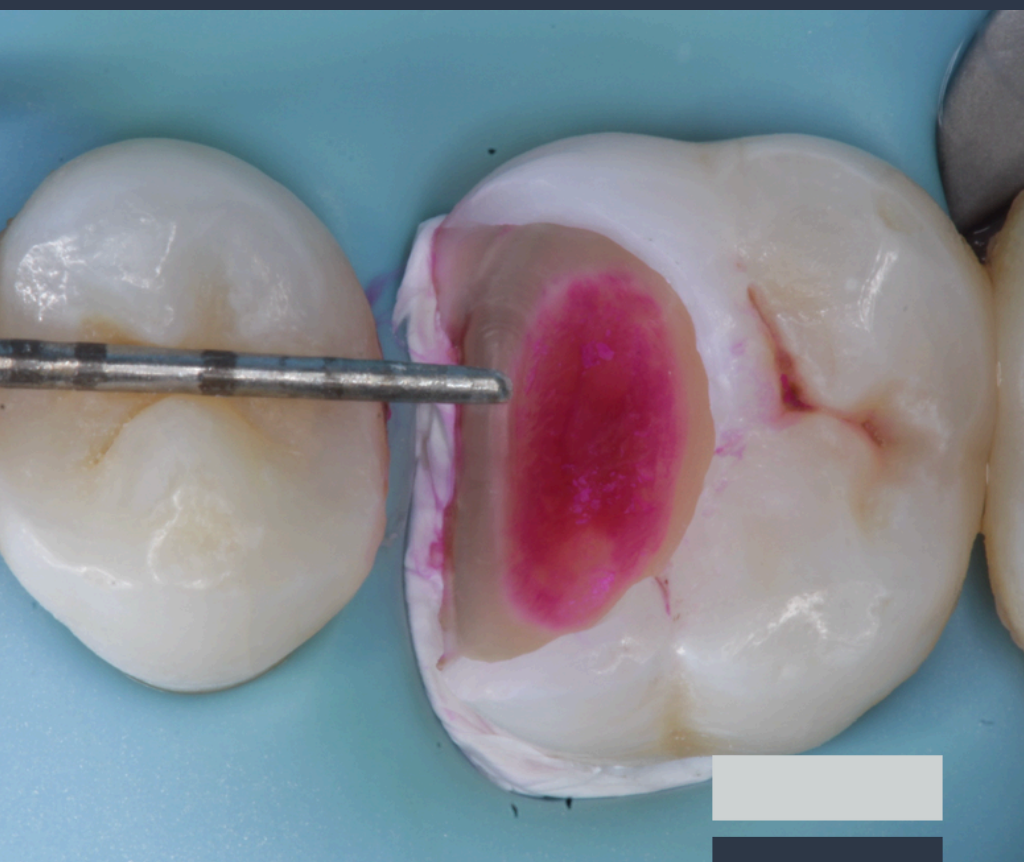


A BIOMIMETIC GUIDE TO

Predictable Caries Removal.

SAVE PULPS. PRESERVE TOOTH STRUCTURE.



THE HYBRID LAYER

www.thehybridlayer.com





INTRODUCTION.

The Six Lessons Approach to Biomimetic Dentistry.

What is the Six Lessons Approach?

The Six Lessons Approach to Biomimetic Dentistry was founded by **Dr. David Alleman**. It is the culmination of decades of research and extensive literature reviews. The approach aims to provide a systematic way to eliminate caries and cracks into dentin, while connecting the tooth back together with bond strengths in the 30-50 MPa range. A number of stress reduced techniques and protocols are followed in order to provide indirect, semi-direct and direct Biomimetic restorations.

What are the Six Lessons?

- Lesson 1 – Diagnosis and Treatment of Caries
- Lesson 2 – Diagnosis and Treatment of Structural Compromises
- Lesson 3 – Immediate Dentin Sealing (IDS) and Resin Coating (RC)
- Lesson 4 – Stress Reduction by Controlling C-Factor & Deep Margin Elevation (DME)
- Lesson 5 – Enamel Replacement (Enamel Preparation and Adhesive Preparation Design & Cementation)
- Lesson 6 – Occlusion and Occlusal Adjustment



Drs. David and Davey Alleman of the Alleman Center of Biomimetic Dentistry.



LESSON 1:

Diagnosis and Treatment of Caries.

This guide will focus on Lesson 1 of the Six Lessons Approach to Biomimetic Dentistry: Diagnosis and Treatment of Caries.

The first lesson primarily revolves around the concepts of the **Peripheral Seal Zone (PSZ)** and **Caries Removal Endpoints (CRE)**. Selective caries removal concepts are followed to avoid pulp exposure and to preserve tooth structure.

Both of these terms (PSZ and CRE) were first coined in the 2012 paper by Dr. David Alleman and Dr. Pascal Magne, titled "*A systematic approach to deep caries removal endpoints: the peripheral seal concept in adhesive dentistry*".

Removal of Caries from the Peripheral Seal Zone (PSZ)

The **Peripheral Seal Zone (PSZ)** is the 2-3 mm of tooth structure (enamel, DEJ, and superficial dentin) in which complete caries and crack removal is indicated.

Caries Detecting Dye is used to ensure that no caries is present 1-2 mm inside of the DEJ. Bond strengths of 30-50 MPa can be achieved in the PSZ.



*Clinical photograph from Dr. Nowais Awan's **lecture** on The Hybrid Layer, showing the creation of a caries-free Peripheral Seal Zone.*



REMOVAL OF DEEP CARIES USING

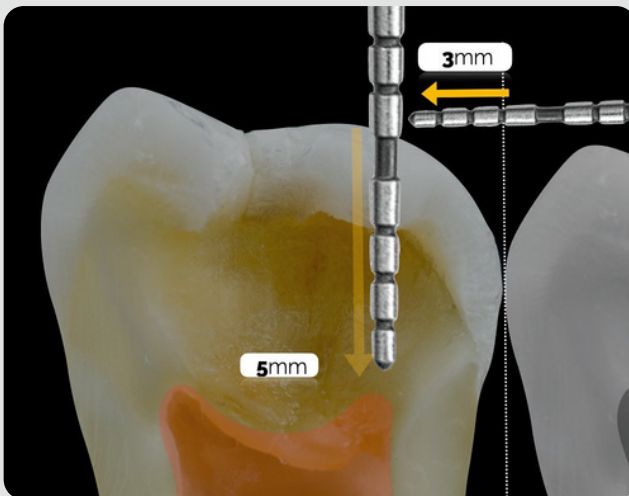
Caries Removal Endpoints (CRE).

After achieving complete caries removal in the **Peripheral Seal Zone (PSZ)**, **Caries Removal Endpoints (CRE)** are used to partially remove deep caries over the pulp while avoiding pulp exposure.

Caries Removal Endpoints are measured using a periodontal probe along the long axis of the tooth:

Horizontally – 3 mm measured interproximally from the adjacent tooth's marginal ridge.

Vertically – 5 mm measured occlusally from the cavo-margin.



Caries Removal Endpoints (CRE) measured using periodontal probes.

Photo Credit: Dr Andres Celi



THE CONCEPT OF

The Central Stop Zone (CSZ).

Caries removal is stopped within the aforementioned **Caries Removal Endpoint (CRE)** boundaries, even if the **Caries Detector Dye (CDD)** is staining red or pink. The area over the pulp, encircled by the **PSZ**, in which partial caries removal is indicated, is known as the **Central Stop Zone (CSZ)**.



A screenshot from Dr. Andras Forster's webinar on The Hybrid Layer, in which he explains the Central Stop Zone (CSZ) concept in detail, in relation to crack dissection. This is also relevant to caries removal.

[Click here to watch the lecture.](#)

Assuming a caries-free **PSZ** has been created, the high resulting bond strength in the **PSZ** allows the deep caries over the pulp to be sealed, therefore avoiding pulp exposure and allowing a Biomimetic restoration to be created.



WHY YOU SHOULD USE

Caries Detector Dye (CDD).

Using **tactile** or **visual** methods to assess for caries is **subjective**. If using an explorer to check if the surface of dentin is 'hard' to probe and therefore free from caries – **how hard is 'hard'**? These techniques can be unreliable.

A more **objective** method of assessing for caries is by using **Caries Detector Dye (CDD)**. CDD works by **staining denatured collagen** a certain colour – usually red or green depending on the product used. It commonly consists of 1% Acid Red solution in a propylene glycol solvent. The collagen fibers of outer carious dentin are loosened, and therefore allow penetration of the solvent and staining of the substrate.



Caries Detector Dye – manufactured by Kuraray Noritake, Japan.



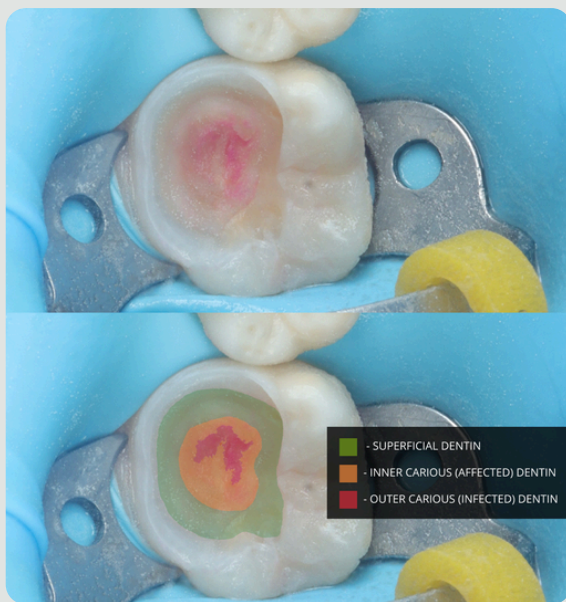
WHAT IS THE DIFFERENCE BETWEEN INNER AND OUTER CARIES?

The Hierarchy of Bondability (HOB).

Outer carious dentin (irreversibly denatured infected dentin) stains darker (red), **whereas inner carious dentin** (reversibly denatured affected dentin) stains lighter (pink). This is important as different substrates have different bonding potentials. This is commonly known as the Hierarchy of Bondability (HOB).

What is the Hierarchy of Bondability?

The **Hierarchy of Bondability** refers to the fact that different tooth substrates form different bond strengths, and these bonds take different lengths of **time** to develop. This can be as a result of the **different substrates** (e.g. enamel and dentin); **substrate conditions** (e.g. inner and outer carious dentin); or the general **substrate location**. As these factors vary, the time taken to establish the hybrid layer varies, and the strength of the resulting bond also varies. This relates to the Biomimetic concept of **Decoupling With Time (DWT)**.



Clinical photograph demonstrating the Hierarchy of Bondability. Note that Caries Detector Dye has been used to determine Caries Removal Endpoints.

Photo Credit: Dr Fran Brelsford



AN OVERVIEW OF

How to Use Caries Detector Dye (CDD).

- Gain initial **access** to the carious lesion as appropriate
- **Clean** the carious lesion using water and then air dry thoroughly
- Apply one drop of **CDD** using a microbrush and allow to penetrate for **10 seconds**
- **Rinse** with water and then **air dry**
- Remove caries following the **PSZ** and **CRE** concepts
- Repeat as necessary until **CRE** achieved.



TOP TIP FROM DR. NOWAIS AWAN'S WEBINAR:

Know the diameter of your bur. This will allow you to measure the distance between the DEJ and the pulp while removing caries from the peripheries.



Clinical example showing application of CDD (top right). After complete caries removal in the PSZ and partial caries removal over the pulp, CRE are established (bottom left).

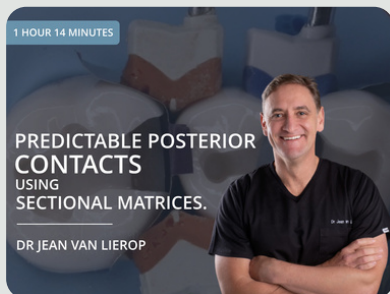
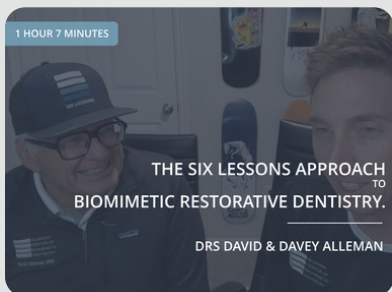
Photo Credit: Dr Jorge Diaz



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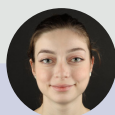
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Hear what our members have to say.



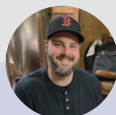
DR. ADNILL GEORGE KOCK 

"The Hybrid Layer has changed the way I practice dentistry. The courses have given me so much insight and lead to growth both scientifically and clinically for me."



DR. ANTONIA SOTIROPOULOU 

"Your content is amazing. I truly have seen a big difference in the way I treat patients after watching your videos. All the speakers are very detailed, and each presentation is to the point."



DR. TREVOR MASON 

"Your website has been an indispensable resource for me from the day it launched."

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READY TO TAKE YOUR DENTISTRY TO THE NEXT LEVEL?

Hear what our members have to say.



DR. CHRISTIAN VÉLAZQUEZ CRAUSTOR 

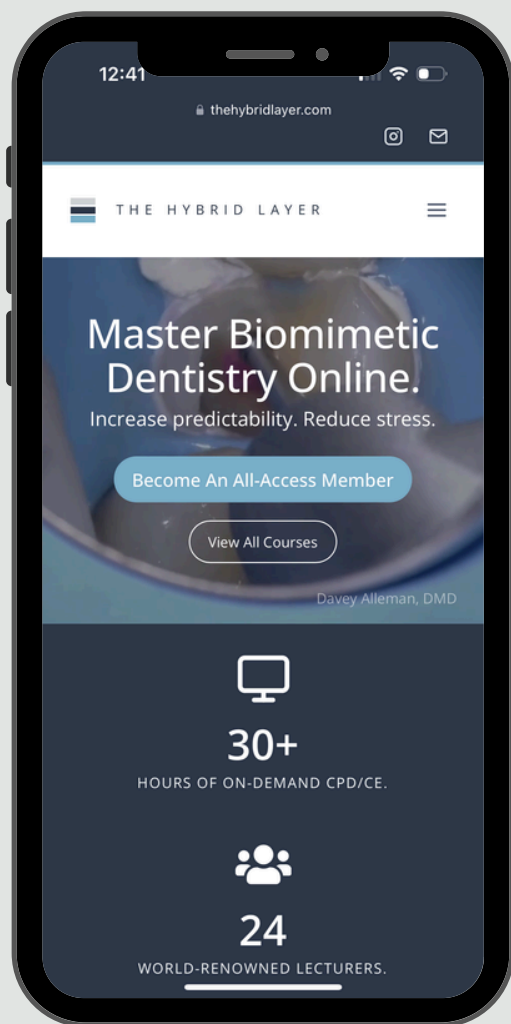
"This website is great. It keeps updating with new classes. It has a wide variety of professionals with different topics very attached to biomimetics, and new concepts that you can use in your daily practice. It is totally worth it."



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"A great platform filled with excellent speakers and content. I really enjoy gaining knowledge in this format. As a learning resource it is really useful to be able to review things as much as you want."

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