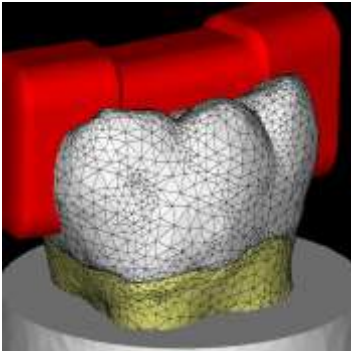


Biomimetic Approach

The concept of biomimetics in dentistry aims to enable us to restore the biomechanical, structural and aesthetic integrity of the tooth. By using adhesive technology in combination with porcelain and composite materials we aim to provide, not just, beautiful natural restorations with little or no destruction of healthy tooth tissue but to restore and even surpass the original structural strength of the teeth.

Biomimetic approach in modern dental practice

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JB(Cons), PhD



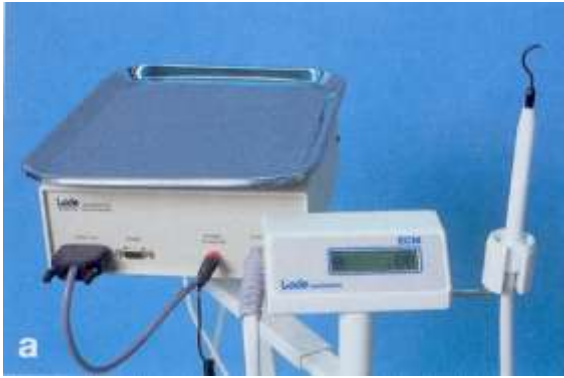
Identifying risk
Minimizing invasion
preventing destruction

I.Pretty, J Dent 2006

Physical principle Application in caries detection
X-rays Digital subtraction radiography
Digital image enhancement
Visible light Fibre optic transillumination (FOTI)
Quantitative light-induced fluorescence (QLF)
Digital image fibre optic transillumination (DIFOTI)
Laser light
Laser fluorescence measurement(DiagnoDent)
Electrical current
Electrical conductance measurement (ECM)
Electrical impedance measurement
Ultrasound
Ultrasonic caries detector

Minimally invasive dentistry

- 1- Early detection
- 2- Minimal surgical invasion
- 3- Repairing defective restorations



Electronic caries monitor

Dentine better than enamel
Bulk resistance

Enhanced visual technique

Fibre optic transillumination.

Radiography

Conventional
Digital enhancement.
Subtraction radiology: Comparison



Fluorescent techniques

QLF: Quantitative light-induced fluorescence.
Laser fluorescence: Diagodont,
more sensitive but more false positives

The biological Price of our treatments

Think!

Think!

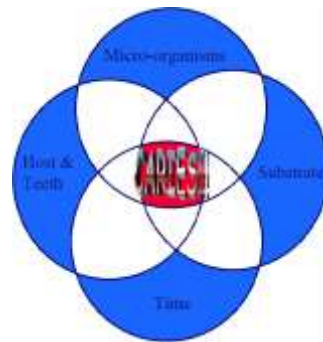
Think!



Dan Erisksson, Dent
Update 2007

Preventive phase

- Diet control
- Fluoride application
- Fissure sealant
- Plaque control



Restorative phase

- Preventive resin restorations.
- Composite/GIC/Compomer.
- Amalgam restorations.
- Endo Tx
- Extra coronal restorations

Blast from the Past!!!!

We need a PARADIAGM SHIFT!!!

EXTENSION FOR PREVENTION

INTO

Prevention from extension

CARIES CLASSIFICATION SYSTEM BASED ON LESION SITE AND SIZE *				
LOCATION	CLASSIFICATION			
	1 = Minimal	2 = Moderate	3 = Advanced	4 = Extensive
Site 1: Pits and Fissures	1.1	1.2	1.3	1.4
Site 2: Proximal Surfaces	2.1	2.2	2.3	2.4
Site 3: Cervical Surfaces	3.1	3.2	3.3	3.4

* Classification courtesy Mead and Paine¹

History of Dentistry

Extractions – 14th Century

Surgical Approach (G.V. Black)- 1890's

Medical Approach (MID)- 1990's

Site specific burs



Preventive Resin Restoration

Used for carious lesions that extend just into dentine, in pits, grooves & fissures.

This design would only remove tooth structure that is confined to carious lesions

Filled with a composite resin, and then seal fissure with a fissure sealant, to prevent further caries invasion.

Has good survival rates, as not a lot of tooth structure is lost, and tooth is still merely unaffected.

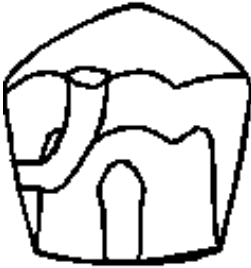
TECHNIQUES

Fissure Sealing

Flowable resin material placed on newly erupted molars for the prevention of dental caries on pits and fissures.

Long term clinical studies have indicated that pit and fissure sealants provide a safe and effective method of preventing caries

Tunnel Prep



Interproximal Lesions

Tunnel Prep

Indicated when the proximal lesion is 2.5mm below the contact point.
 Performed by accessing the carious dentine from the occlusal surface, while maintaining the marginal ridge.

The proximal ridge is only broken if caries has broken into enamel, or it must be left as it is.

Technically difficult to do, due to low access and visibility.

Study showed that tunnel preps had better results than a slot prep, in 3 years.

Adhesive material used to fill cavity.

Sandwich technique is recommended (GIC first and then Lamination with Composite Resin)

Repair Vs Replacement of Defective Restorations

Repairing of restorations is becoming a major part, than replacement since more tooth structure is lost by replacement of restoration

Replacement is common due to concerns: bond strength, residual caries, recurrent caries.

Slot Prep

Also known as mini-box.

These preps involve the removal of the marginal ridge, but do not include the occlusal pits and fissures, if caries removal in those areas is unnecessary.

Cavities normally have a box or a saucer shape, and are restored with composite resin.

Clinical studies have shown 70% survival at an average of 7years.

Ryge criteria 1973

Bravo:

Sufficiently acceptable but with minor shortcomings in areas where any instrumentation may result in damage to the tooth; no adverse effects are anticipated

Alpha:

Excellent, fulfilling all quality criteria; tooth and/or surrounding tissues are adequately protected

2 Highly acceptable, though one or more criteria is not ideal; minor modifications can be made to the restoration but is not necessary

INNOVATIVE TOOLS USED IN MID

Air Abrasion

Pseudo-mechanical, non-rotary method of cavity cutting and removing dental hard tissue.

Several studies have shown that the bonding of enamel and dentin surfaces prepared with air abrasion is much better than that with conventional carbide burs and acid etching.⁸

Kinetic energy is used to remove carious tooth structure.

Charlie:

Unacceptable but repairable

Delta:

Unacceptable and must be replaced

Air Abrasion

Advantages:

Reduced Noise, Vibration and sensitivity
More rounded line angles

Disadvantages:

Cannot be used in all patients; asthmatics, and patients with other pulmonary problems
Dust control is a problem
Not efficient in removing large amalgam restorations
Does not remove gross caries well, as it doesn't cut soft and resilient substances, a spoon excavator has to be used in conjunction with these
Depth of cavity cutting is hard to control

Air Abrasion

A Narrow stream of moving aluminum oxide particles is directed against the surface to cut.

As particles touch the surface, they abrade it with force, without the use of heat, vibration or noise.

These particles exit out of the tip of a hand piece, thus it is an end-cutting device.

The amount of structure cut can be adjusted by:-

Changing the pressure
Changing the particle size
Amount of powder flow, Size of Tip
Tip Angles, and the distance of the tip from the tooth.

Laser Cavity Preparation

Laser stands for - Light Amplification by Stimulated Emission of Radiation.

Device that generates a precise beam of concentrated light energy.

Different wave-lengths are used for cutting different surfaces.

Some good for soft tissue and some good for hard tissues.

Types used in dentistry include: Erbium:yttrium-aluminum garnet lasers, and chromium:yttrium-scandium-gallium-garnet

Air Abrasion



Laser Cavity Prep

Advantages:

- No Vibration
- Little noise
- No Smell
- No Numbness associated with anesthesia

Disadvantages:

- The lack of tactile sense
- Cuts hard tissue more faster than soft demineralized dentin on cavity floor

Laser Cavity Preparation

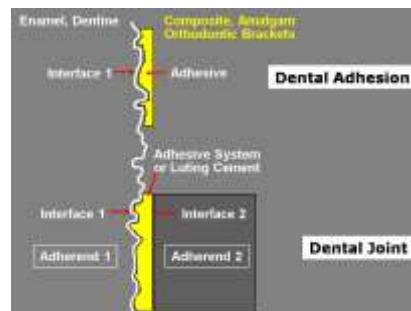
- Can remove soft caries as well as hard tissues
- Can remove caries selectively while maintaining healthy dentine and enamel
- Does not produce smear layer
- Can be used without anaesthetics
- Adhesive restorative materials are used with these preps.
- Laser is generated in machine, then guided by gold mirrors along the hand-piece to emit from the tip with a water-jet.
- Pressure of water does cutting, and guidance is achieved by red laser.

Application of adhesion to restorative dentistry

Direct/Indirect composite restorations (Micromechanical)



Dental adhesion and Dental adhesive joint



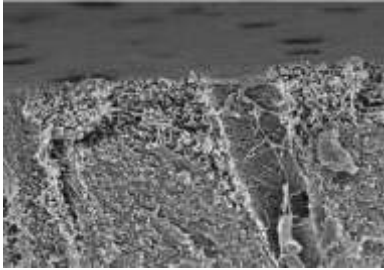
Application of adhesions to restorative dentistry



Porcelain Laminate Veneers



Application of adhesions to restorative dentistry



All-ceramic restorations

