Adhesión

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Departamento de Odontología Restauradora.
Cátedra de Operatoria Dental.


dreamstime.com

Acontecimientos importantes:

1. M. Buonocore 1955
2. R. Bowen en 1962
3. Foto polimerización 1970
4. Wilson y Kent 1972
5. Nakabayashi 1982
6. Técnica mínimamente invasiva desde 1987
7. Tecnología de optimización del relleno, en esta década.

J Dent Res. 1955 Dec;34(6):849-53.
A simple method of increasing the adhesion of acrylic filling materials to enamel surfaces.
BUONOCORE MG.

Br Dent J. 1972 Feb 15;132(4):133-5.
A new translucent cement for dentistry. The glass ionomer cement.
Wilson AD, Kent BE.
PMID: 4501690 [PubMed - indexed for MEDLINE]

Kokubyo Gakkai Zasshi. 1982 Jun;49(2):410.
[Bonding mechanism of resins and the tooth].
[Article in Japanese]
Nakabayashi N.

Compendium. 1987 Jun;8(6):428-30, 432.
The preventive resin restoration: a minimally invasive, nonmetallic restoration.
Simonsen RJ.

Adhesivos dentales:

- Los adhesivos dentales, es un termino que implica una familia de productos que se utilizan para promover la unión entre materiales dentales a esmalte, dentina y otros materiales dentales.

Anusavice 2003

Lo cierto es que en el estado actual, seguimos con problemasi

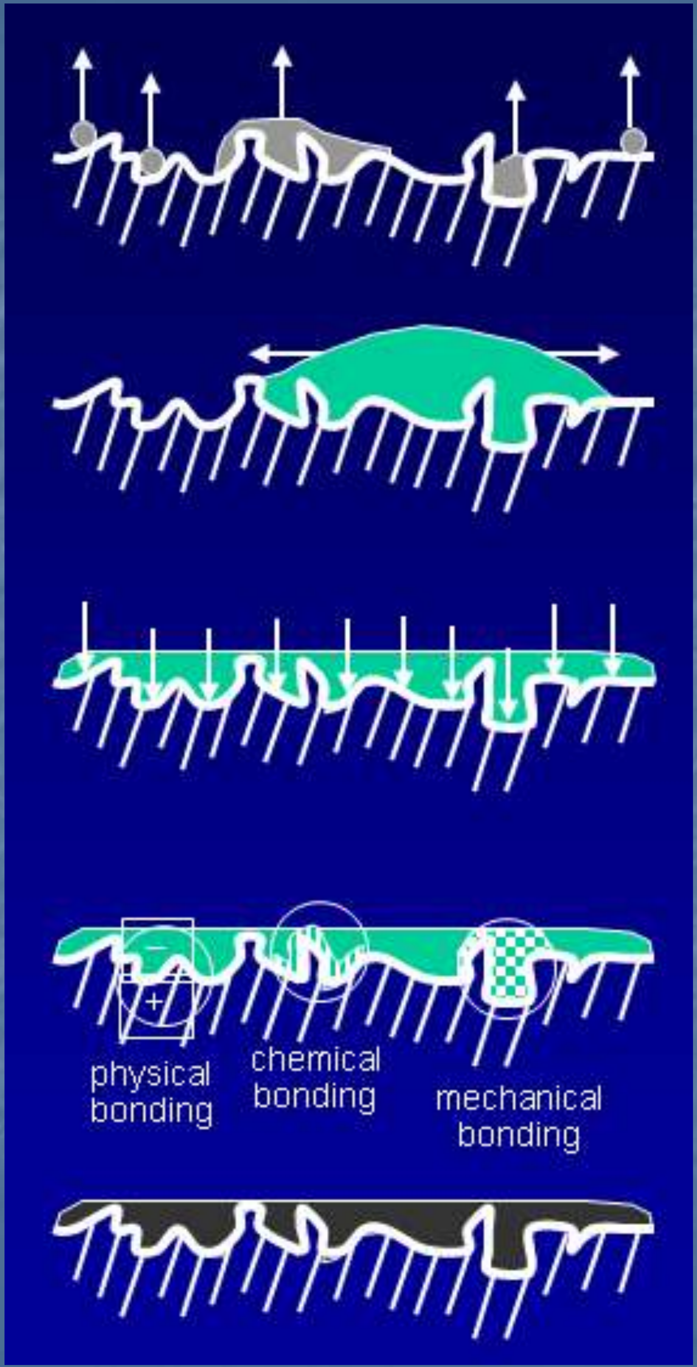
¡TENEMOS PROBLEMASi

- Pasos para formar una buena Adhesión.
- Estrategias de Adhesión a Estructura Dentaria.
- Concepto Adhesión – Descalificación.
- Efectividad Clínica de las Estrategias de Adhesión a Estructura Dentaria.
- ¿Como ocurre la degradación de la Capa híbrida y como prevenirlo?
- Conclusiones Generales.

PUNTOS A DESARROLLAR

Requisitos:

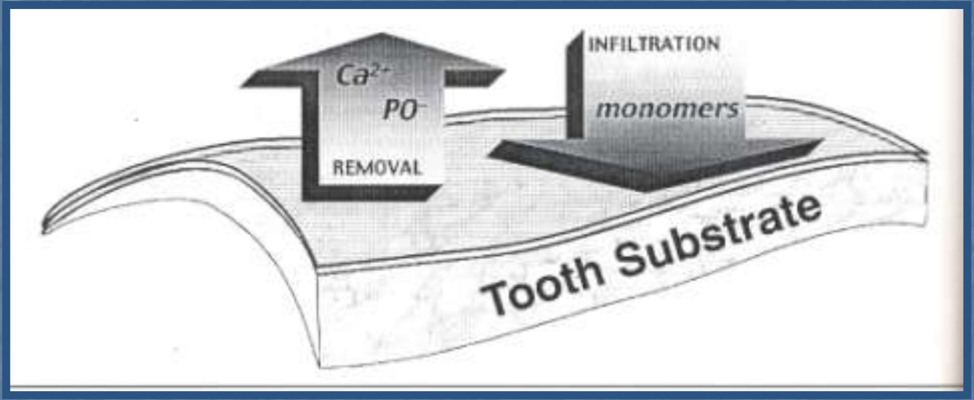
1. Limpiar el Adherente
2. Alto humedecimiento
3. Intima adaptación
4. Unión
5. Buen Curado



S. Bayne

Mecanismo básico de Adhesión a Estructura Dentaria

- Proceso de intercambio:
  - Reemplazan minerales
    - De los tejidos duros
  - Por monómeros resinosos
    - Unión Micromecánica

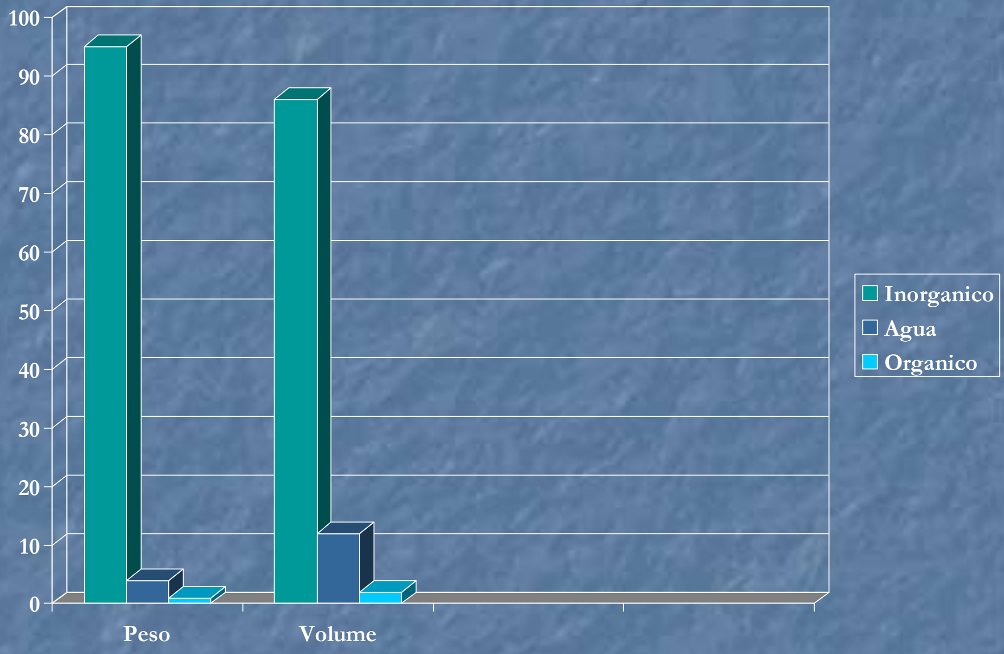


Van Meerbeek in: Summitt,

Fund Oper Dent 2006

La unión a esmalte.

- El esmalte representa un sustrato perfecto para la unión de resinas de baja viscosidad.
- Estructura Homogénea
- Alto contenido Inorgánico
- Superficie con alta energía superficial.

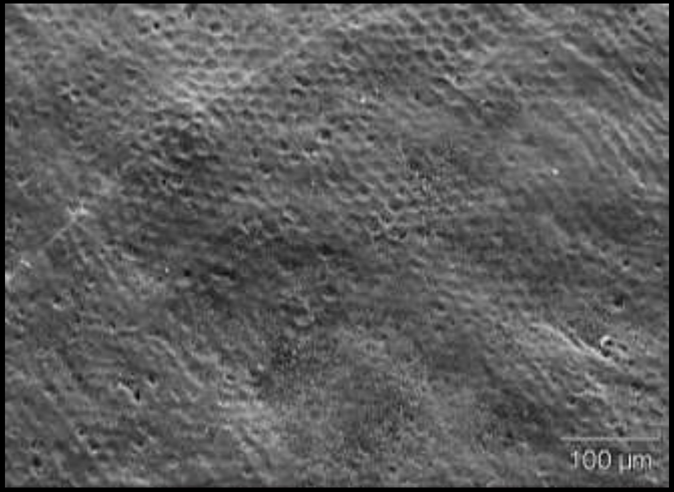


Mjor I A, Ferjerkov. 1986.
Annual review of selected dental literature JPD 2002

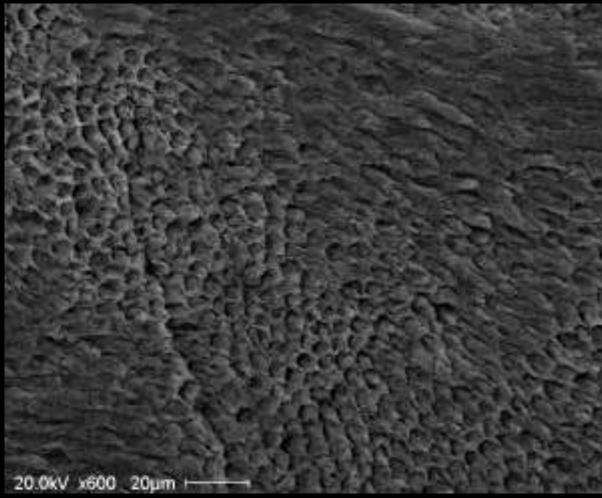
Esmalte

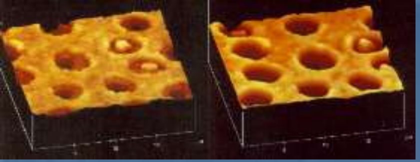
Sin Tratamiento

PC 22% 6x45min



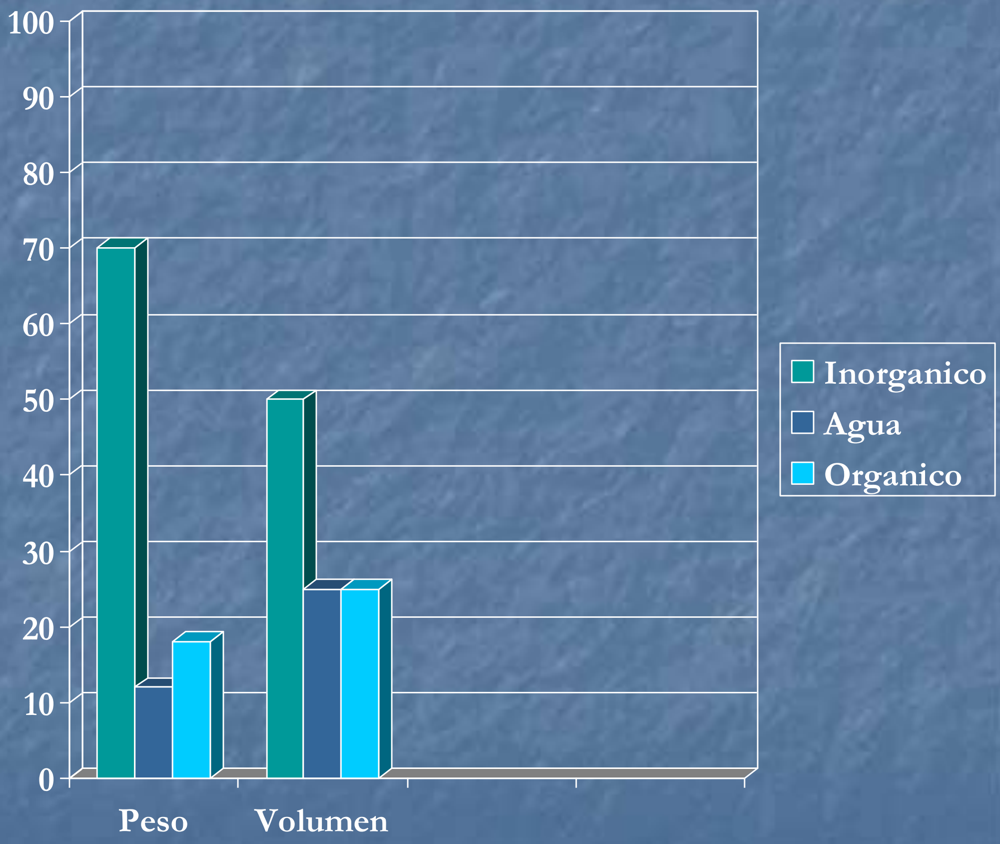
Acido Fosfórico 37% x 15 segundos





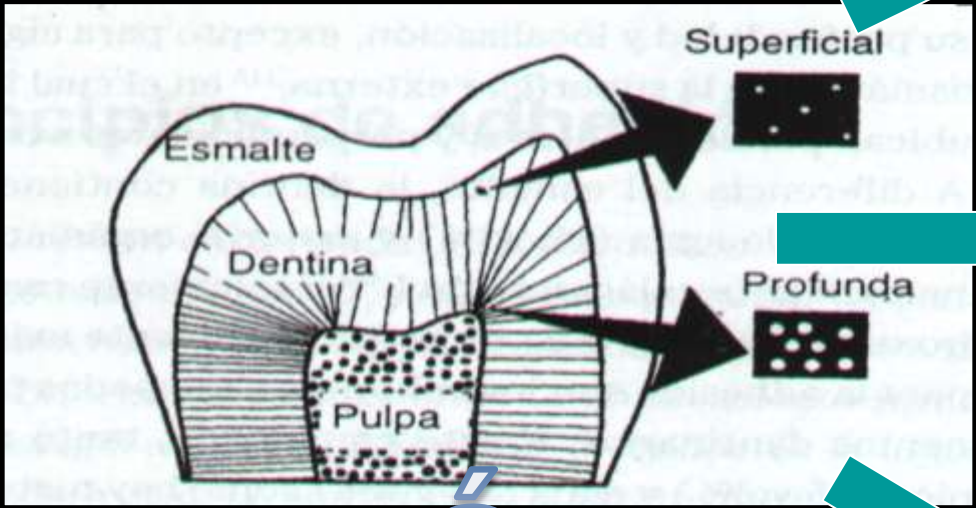
La unión a dentina

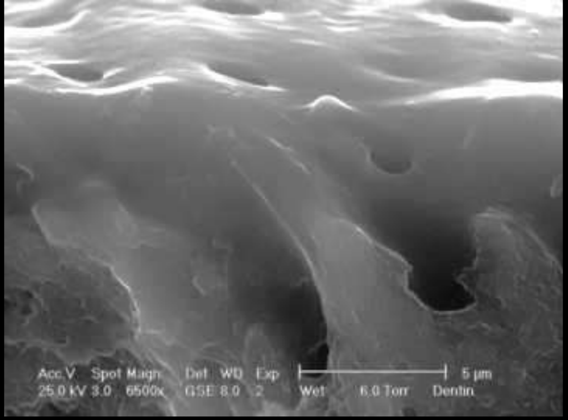
- Estructura heterogénea.
- Unión menos predecible.
- Alta variabilidad en la mineralización.
- Alto contenido orgánico.
- Presencia y movimiento de fluido.

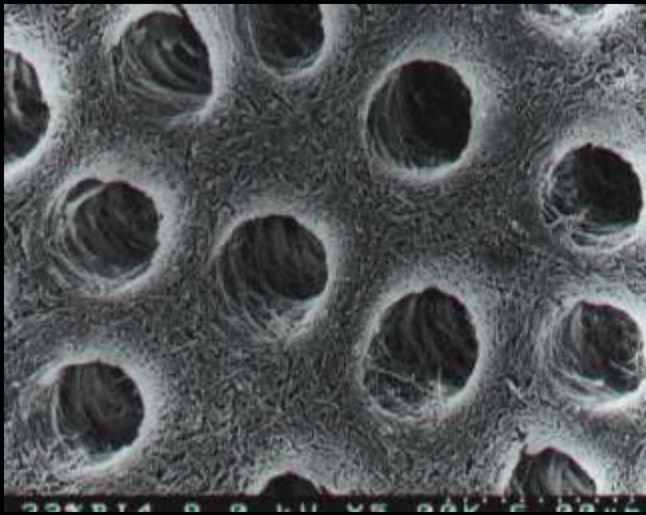


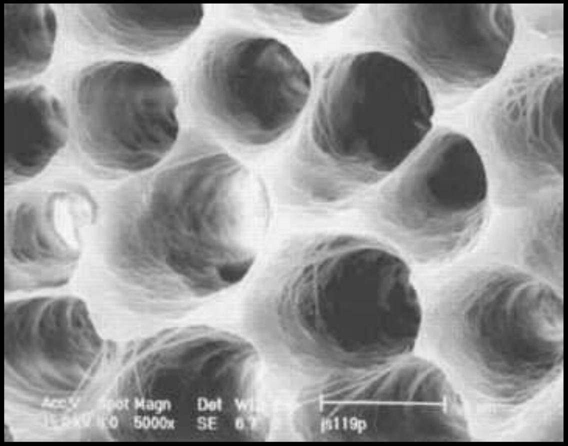
Walshaw and McComd 1995
Mjor I A, Ferjerkov 1986

Dentina









ó

Van Meerbeek in: Summitt,
Fund Oper Dent 2006

Clasificación basada en la aparición cronológica en el mercado:

- **Cuarta generación: tres-componentes.**
- **Quinta generación: dos-componentes.**
- **Sexta generación: dos- componentes.**
- **Séptima Generación: mono- componente.**

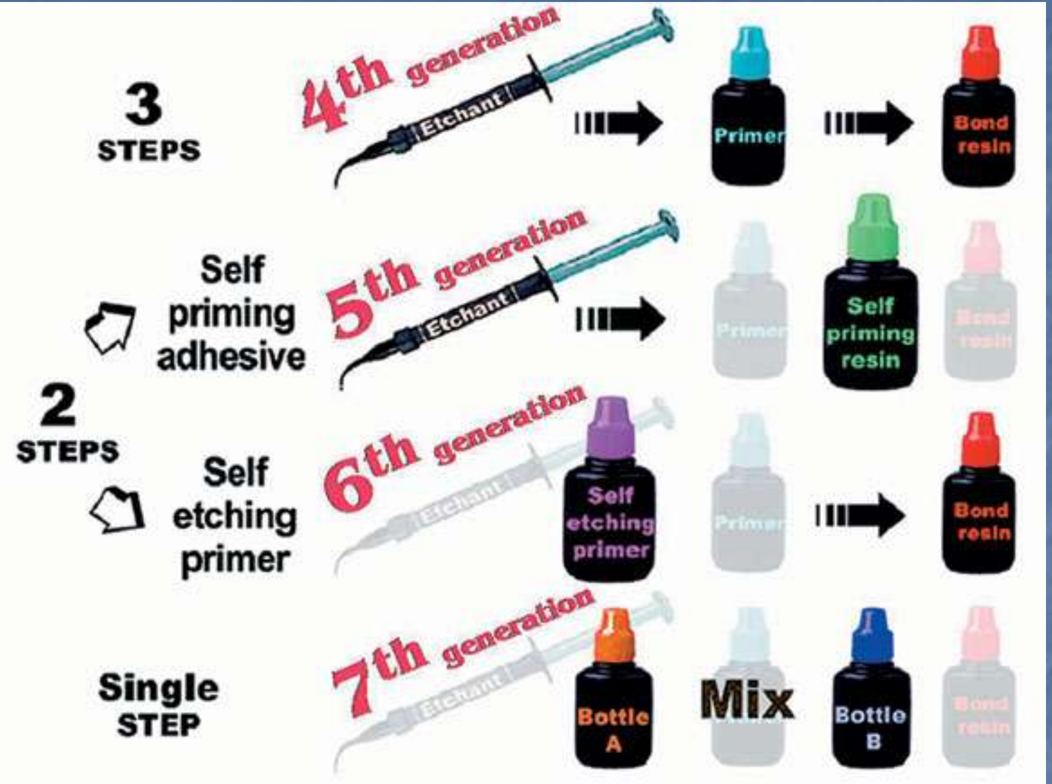


FIGURE 2- Classification of contemporary adhesives into 3-step total etch, 2-step total-etch, 2-step self-etch and the single-step self-etch systems. The 2-step total-etch and the single-step self-etch adhesives may be considered as simplified adhesives in which hydrophilic resins are employed without an additional coating of comparatively more hydrophobic resins

TAY, Franklin R.; CARVALHO, Ricardo M. and PASHLEY, David H.. Water movement across bonded dentin - too much of a good thing. *J. Appl. Oral Sci.* 2004, vol.12, pp. 12-25.

"Esta clasificación carece de bases científicas y no categorizan los adhesivos con un criterio objetivo"

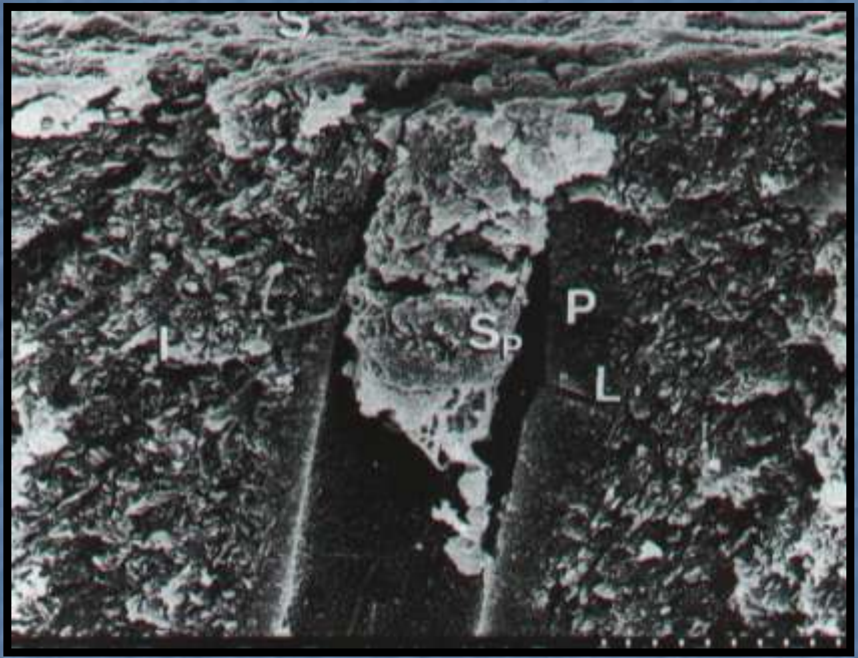
Van Meerbeek in: Summitt,
Fund Oper Dent 2006

Entonces la propuesta científica de clasificación, esta en relación a la estrategia de adhesión e interacción del adhesivo con el

“BARRO DENTINARIO”

“Barro dentinario” (Smear Layer):

Capa de dentina molida con pobre capacidad adherente que se produce al cortar la dentina.



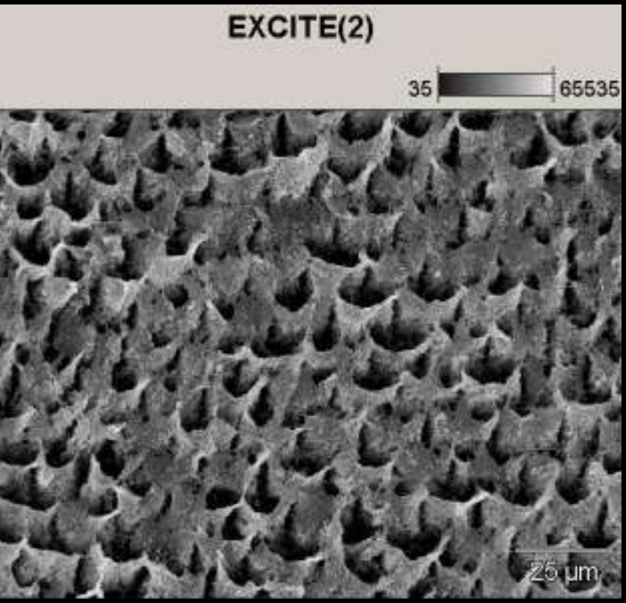
Anusavice K. 2003

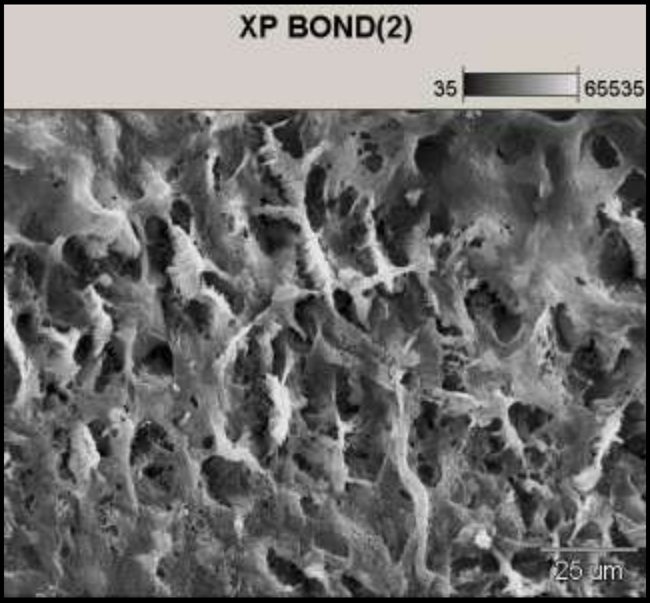
Remoción total del barro dentinario.

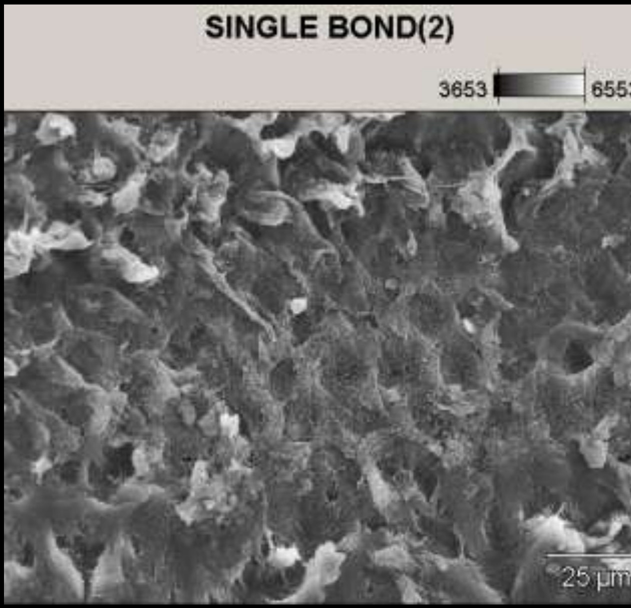
<u>Adhesivos de grabado total</u>

- mono-componentes (2 pasos) GT2
- multi-componentes (3 pasos) GT3

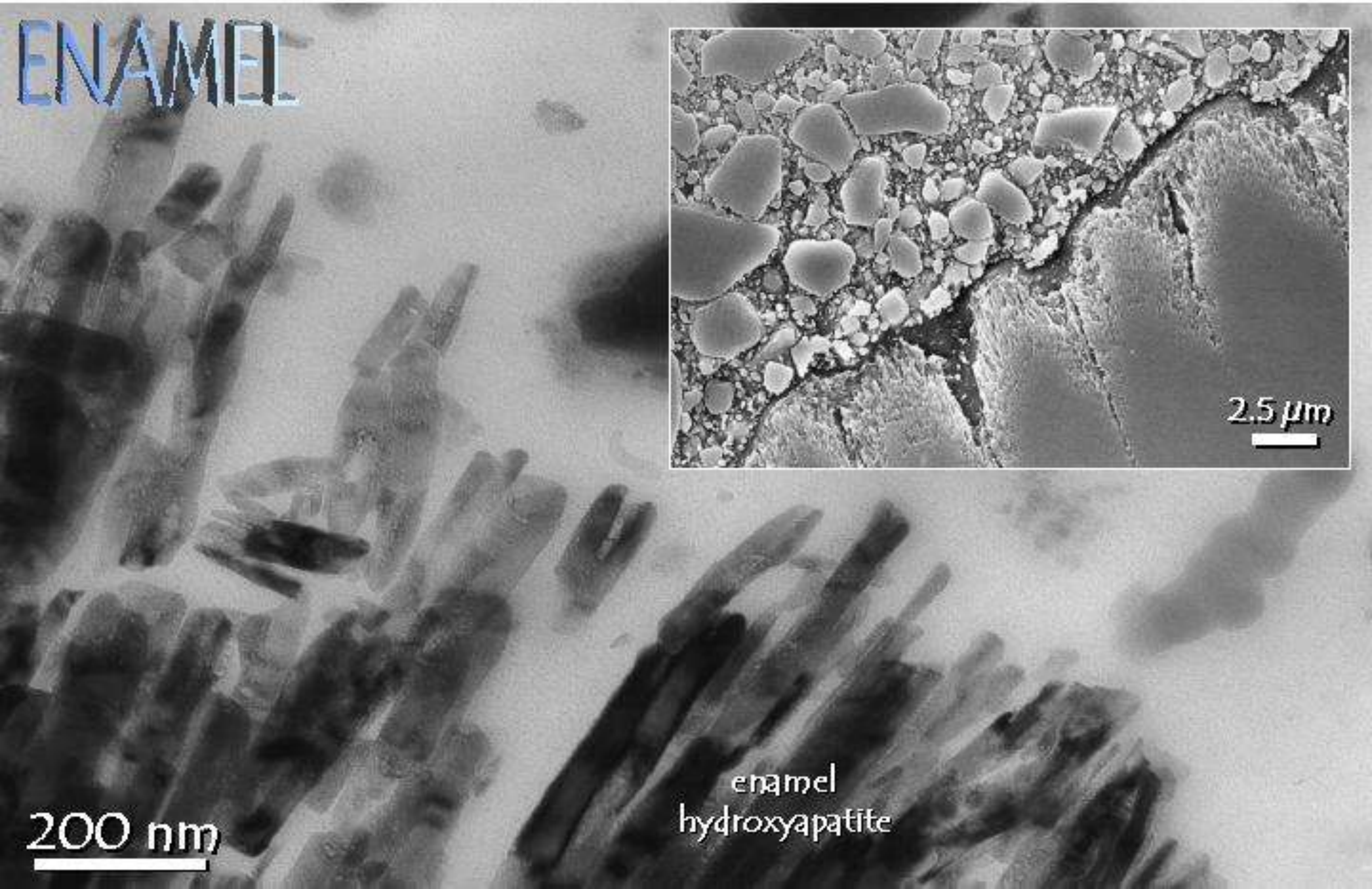
Esmalte


EXCITE(2)
35
65535
25 µm


XP BOND(2)
35
65535
25 µm

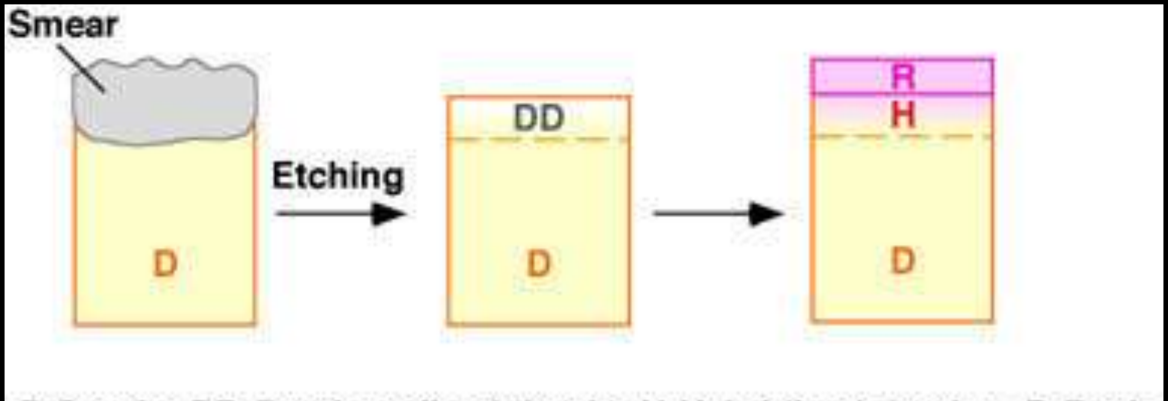

SINGLE BOND(2)
3653
25 µm

1.1 Etch & rinse approach



Dentina

Van Meerbeek in: Summitt, Fund Oper Dent 2006

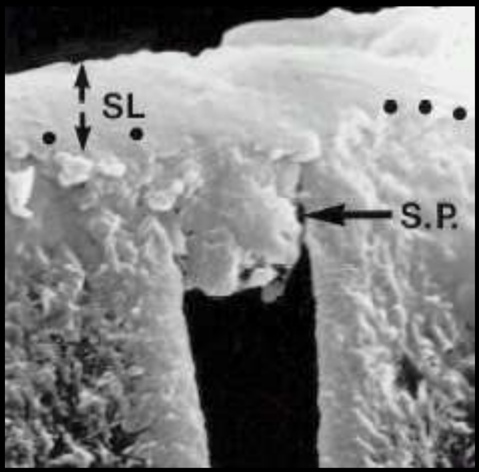


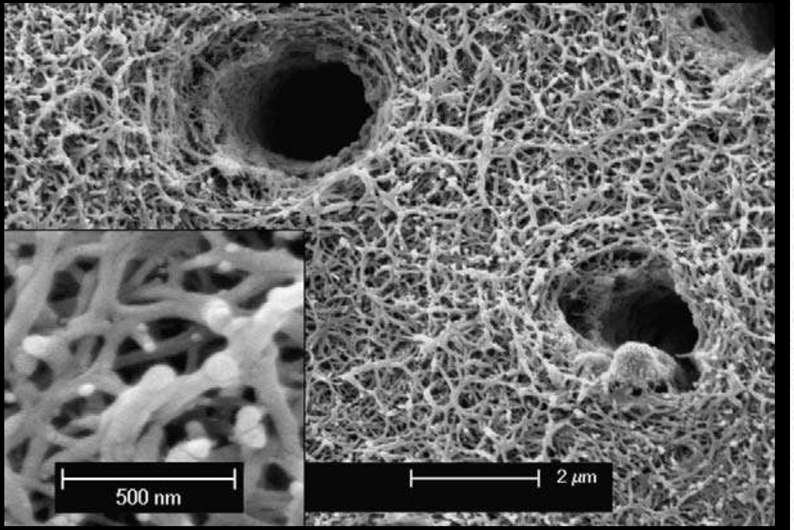
D:Dentin, DD:Demineralized dentin, H:Hybridized dentine, R:Resin

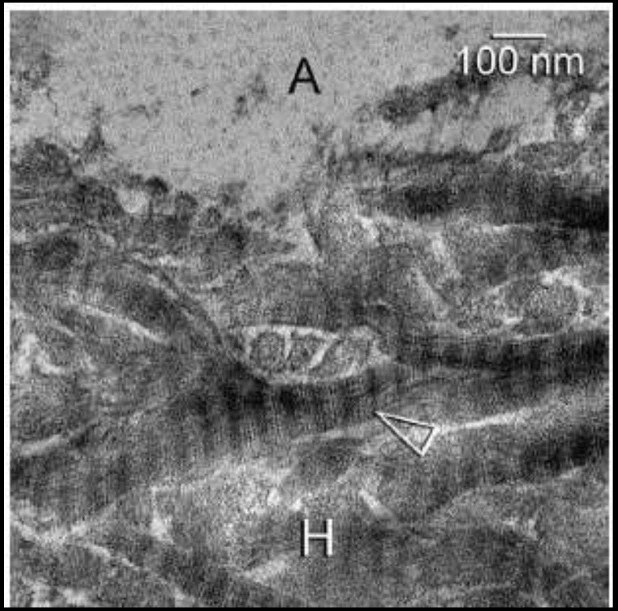
David H. Pashley[a,*], Franklin R. Tay[b], Lorenzo Breschi[c,d], Leo Tjäderhane[e], Ricardo M. Carvalho[f], Marcela Carrilho[g,h], Arzu Tezvergil-Mutluay[i]

DENTAL MATERIALS 27 (2011) 1–16

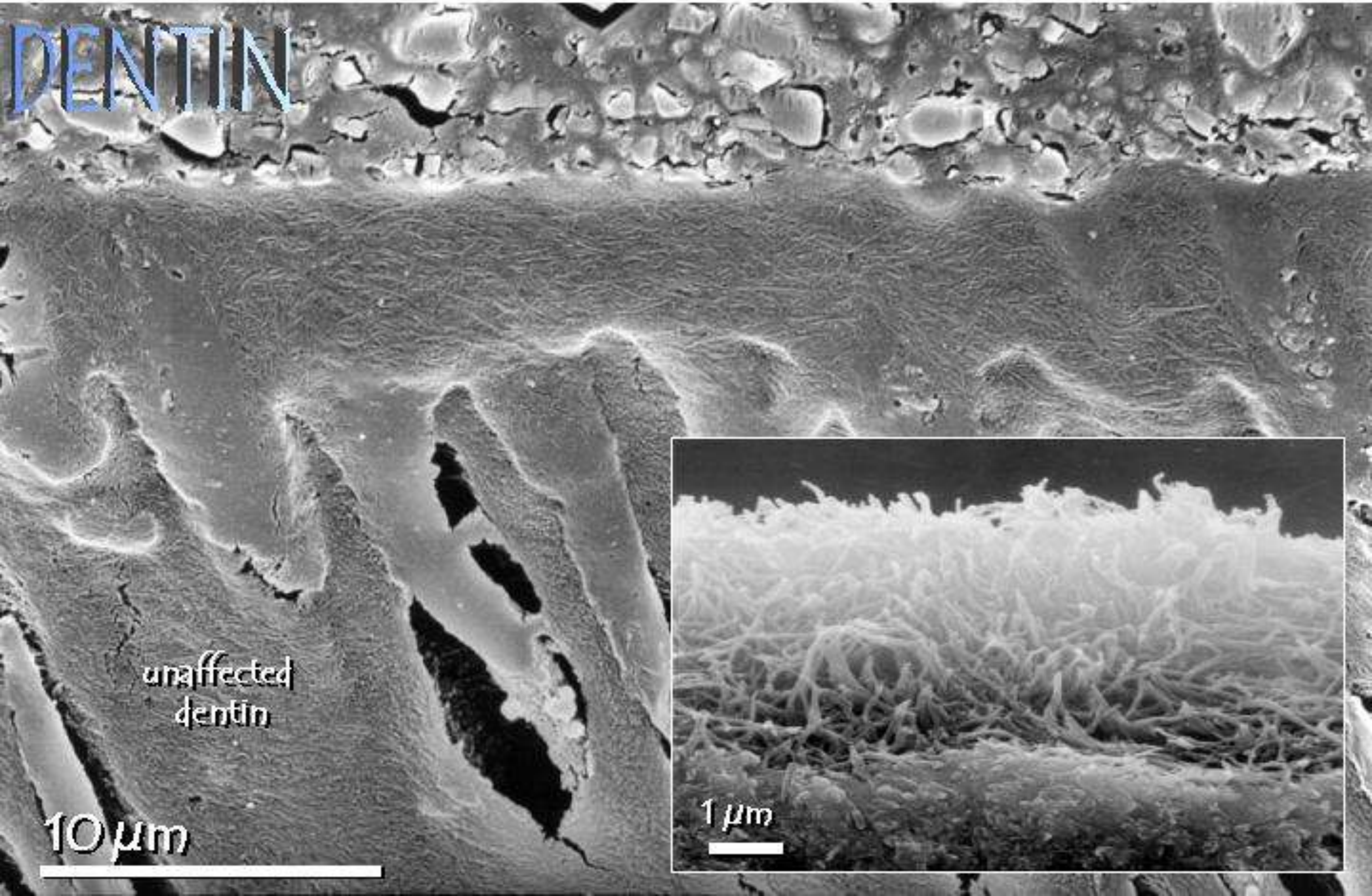
http://www.dimensionsofdentalhygiene.com/ddhright.aspx?id=124



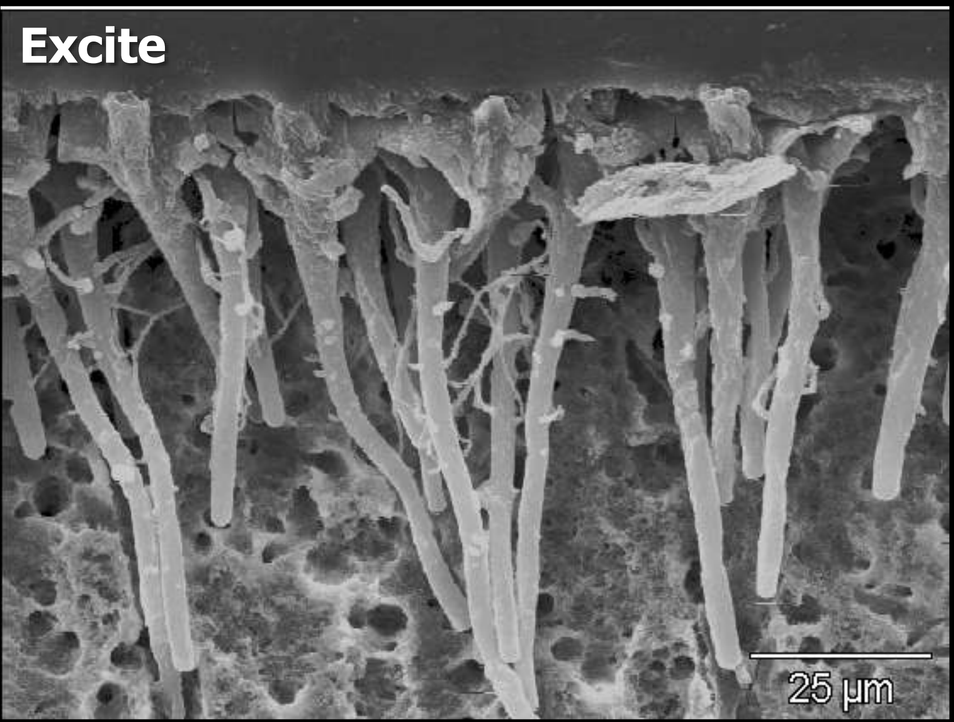


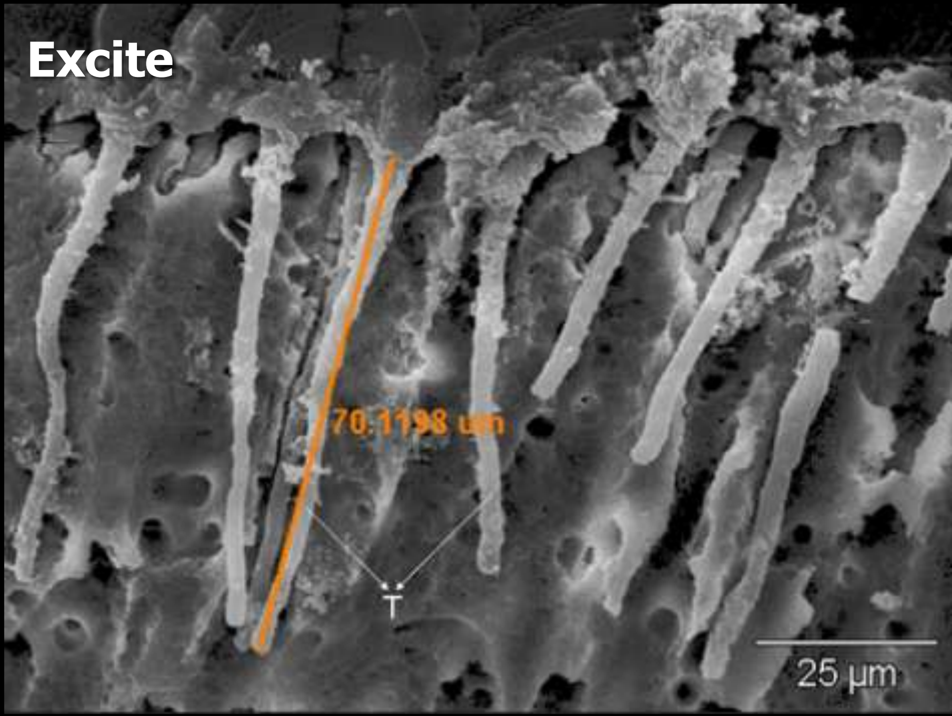


1.1 Etch & rinse approach



Dentina



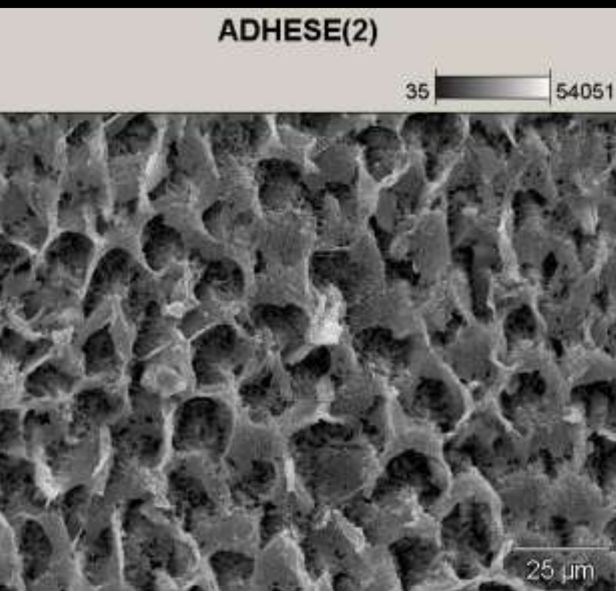


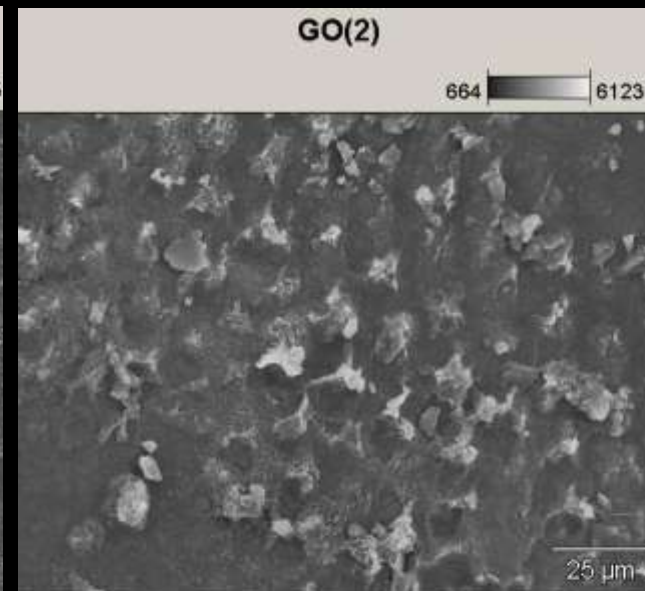
Modificación del barro dentinario.

Adhesivos Autograbadores:

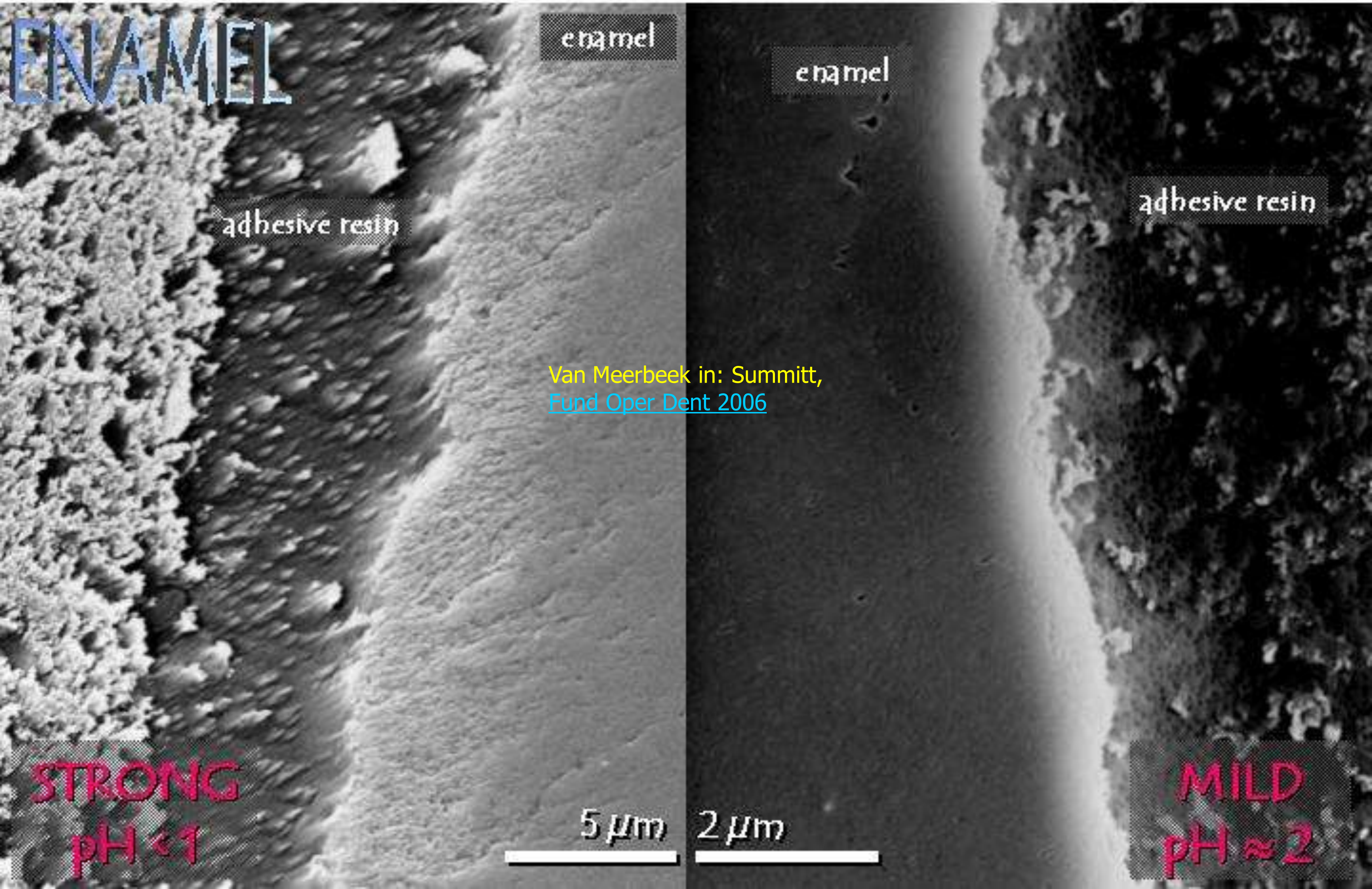
- Primers Ácidos (2 pasos) AG2
- Adhesivos Ácidos. (1 Paso) AG1

Esmalte



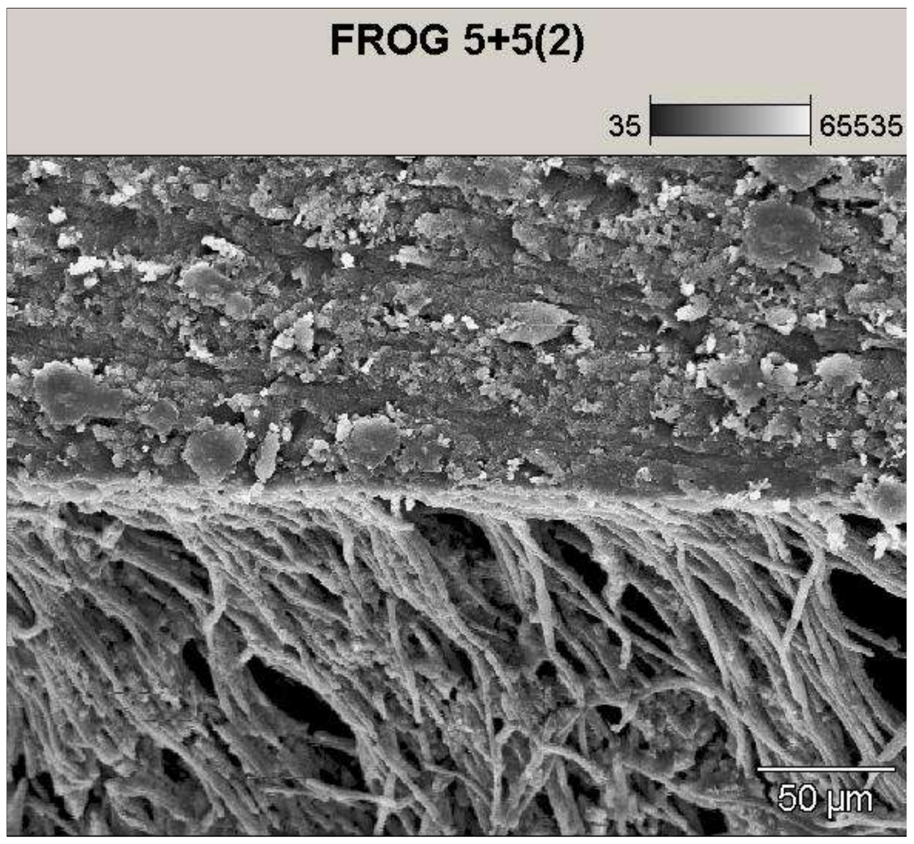


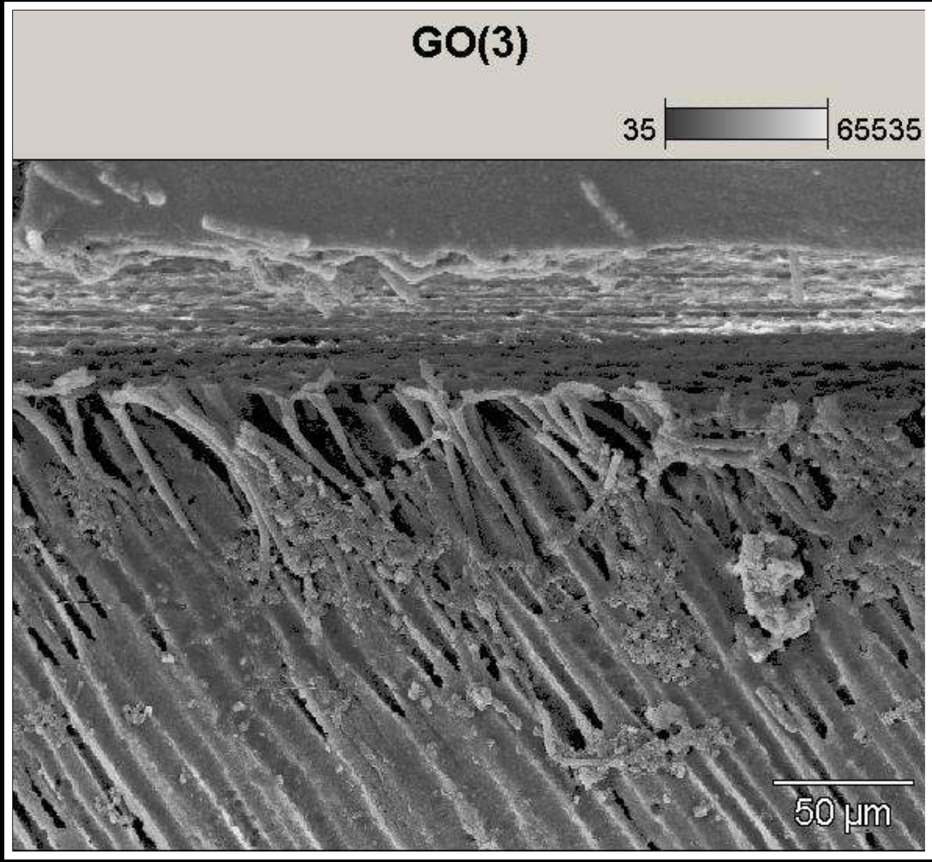
1.2 Self-etch approach: 'STRONG' vs. 'MILD'



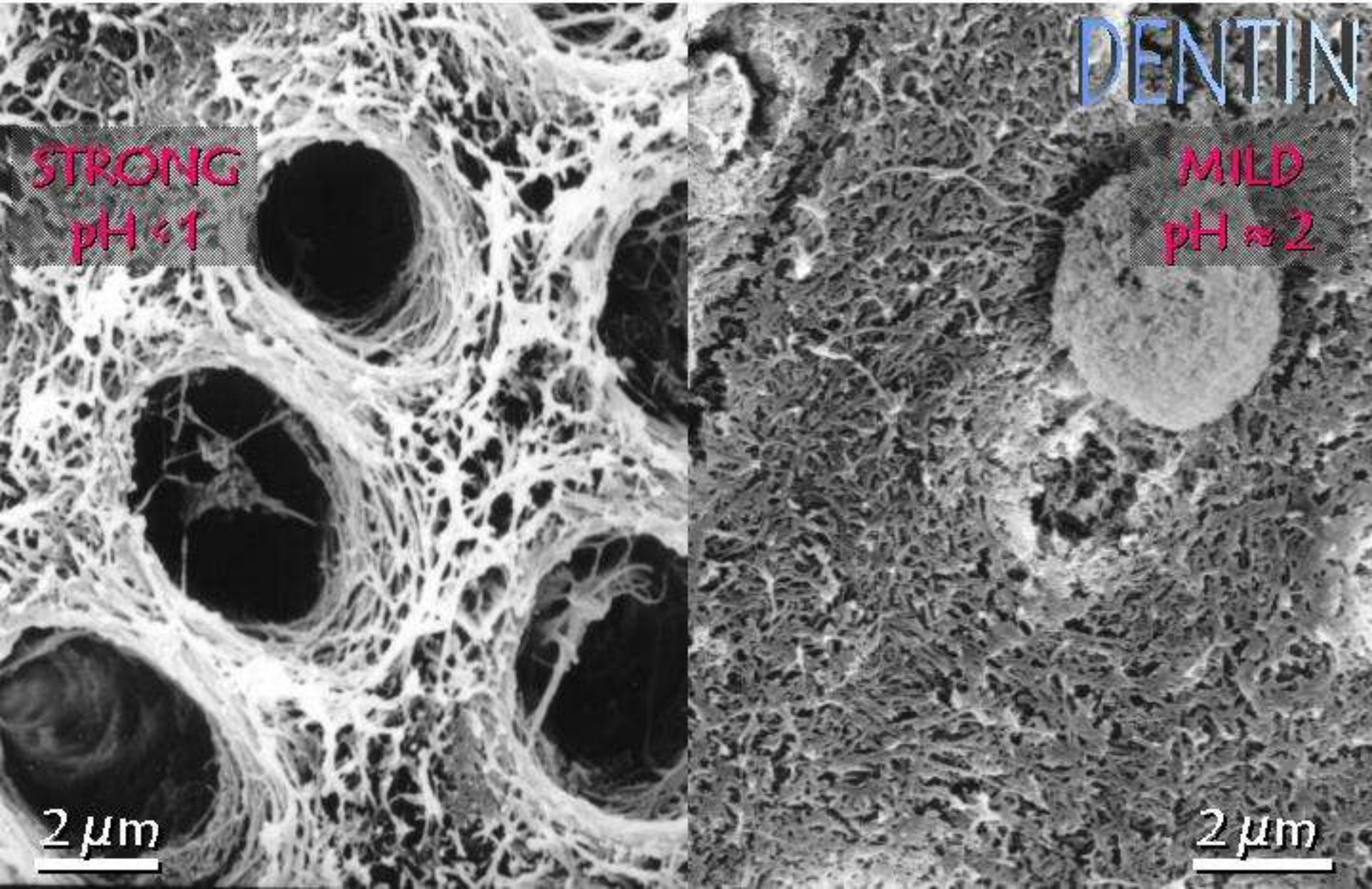
Van Meerbeek in: Summitt,
Fund Oper Dent 2006

Dentina

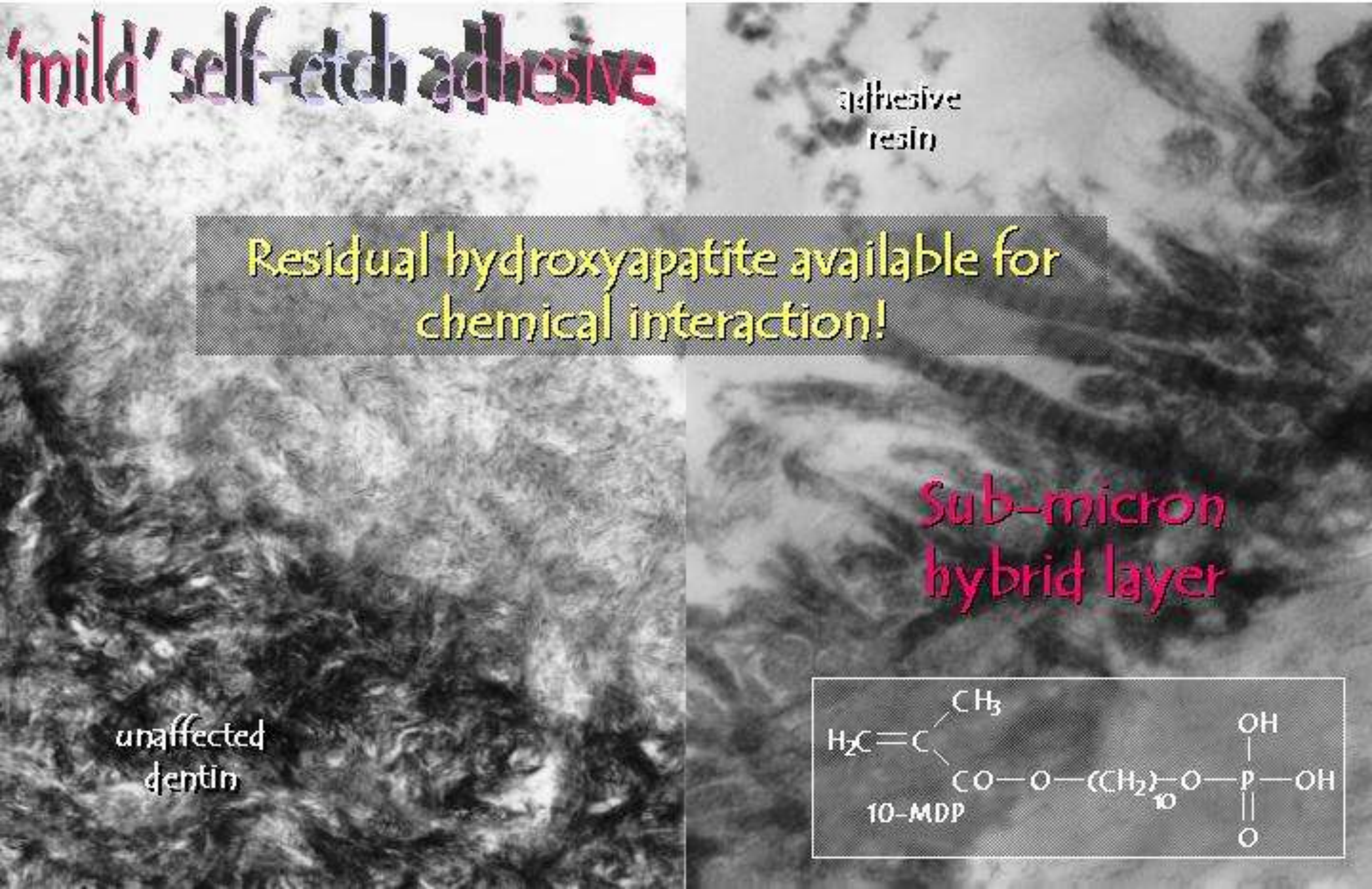




1.2 Self-etch approach: 'STRONG' vs. 'MILD'



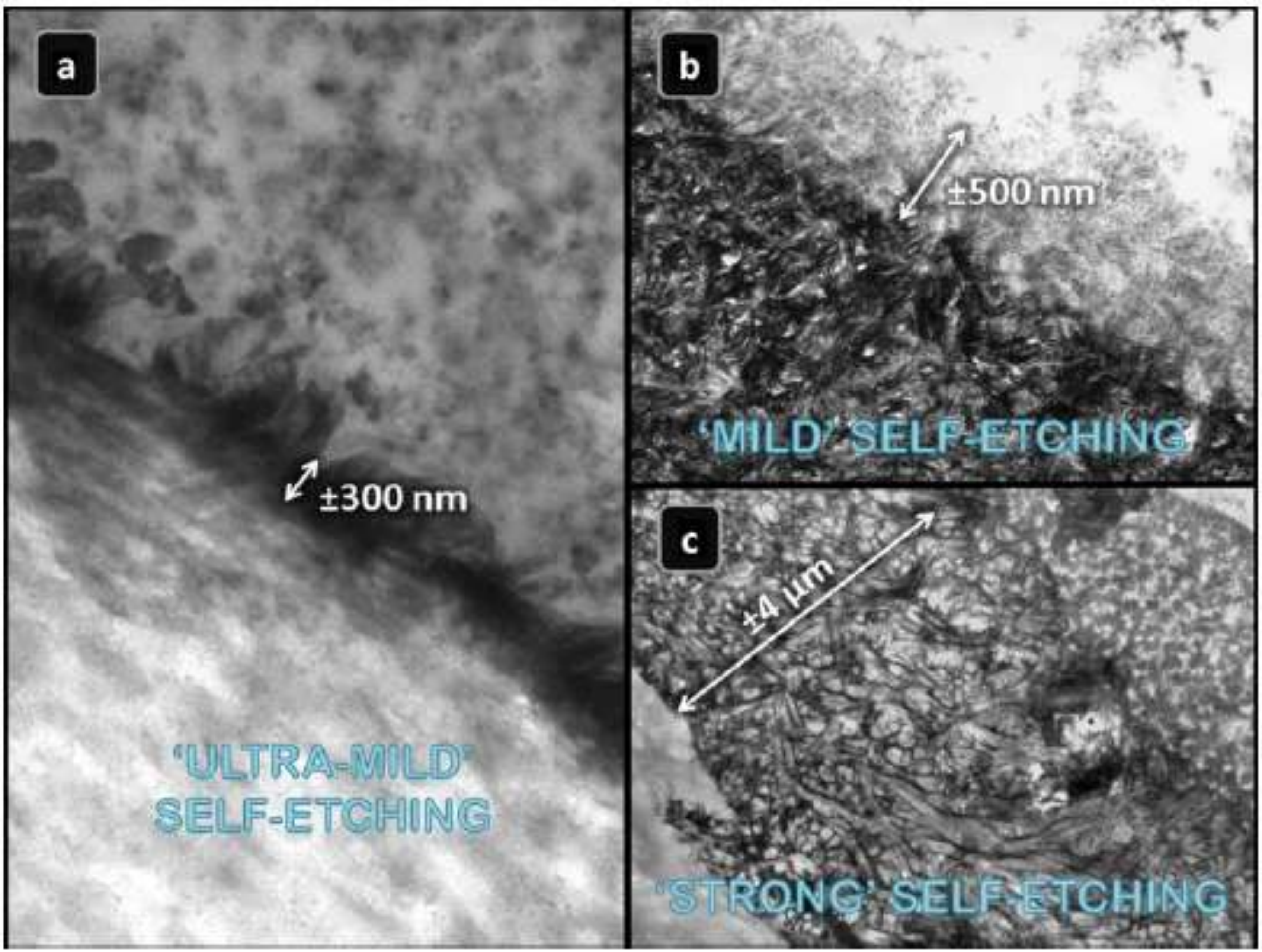
1.2 Self-etch approach: 'STRONG' vs. 'MILD'



DENTAL MATERIALS 27 (2011) 17–28

Van Meerbeek B.[a,*], Yoshihara K.[a], Yoshida Y.[b], Mine A.[c], De Munck J.[a], Van Landuyt K.L.[a]

State of the art of self-etch adhesives



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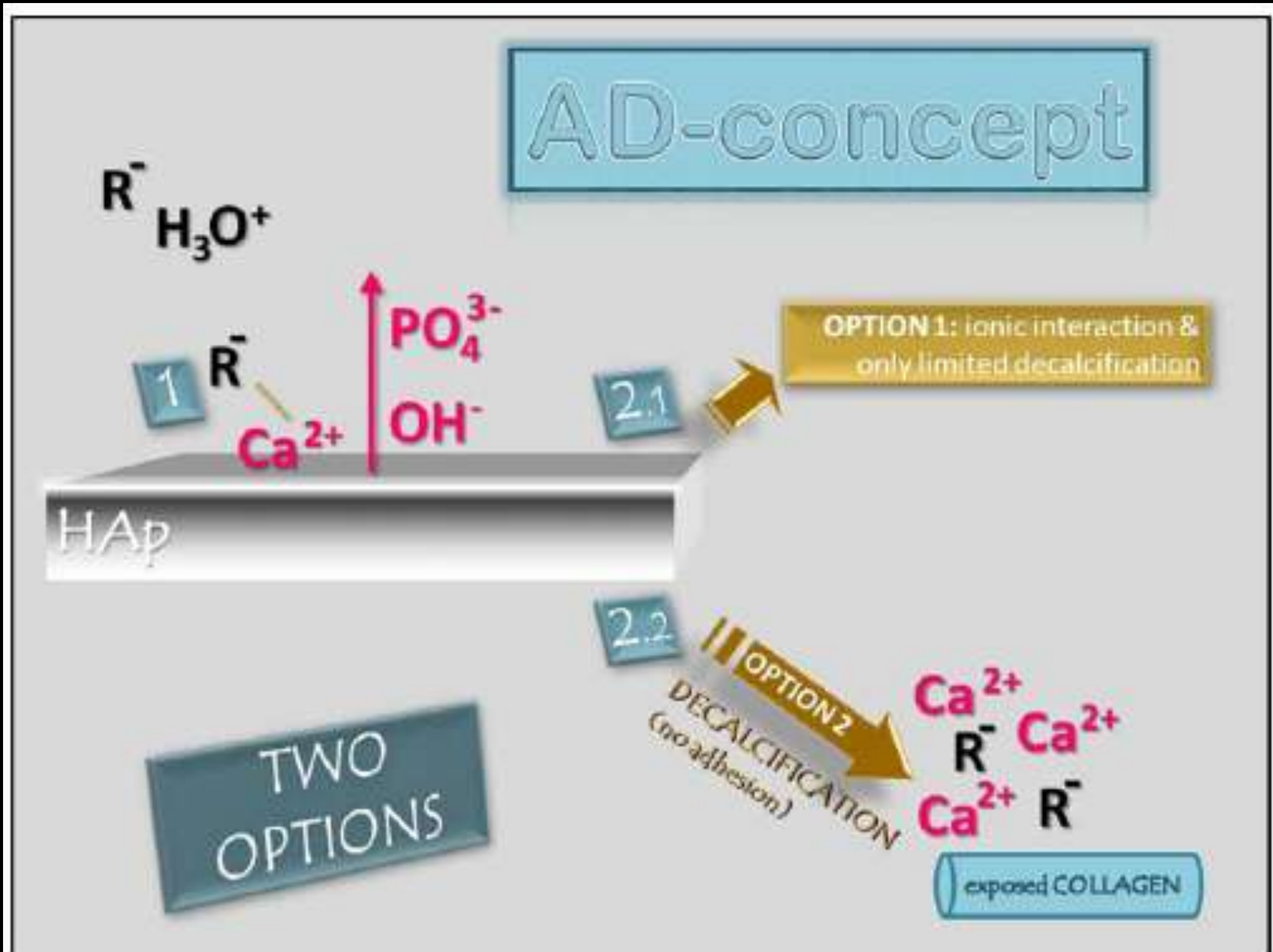


Dental adhesion review: Aging and stability of the bonded interface

DENTAL MATERIALS 24 (2008) 90–101

Lorenzo Breschi[a,*], Annalisa Mazzoni[b], Alessandra Ruggeri[b], Milena Cadenaro[a], Roberto Di Lenarda[a], Elettra De Stefano Dorigo[a]

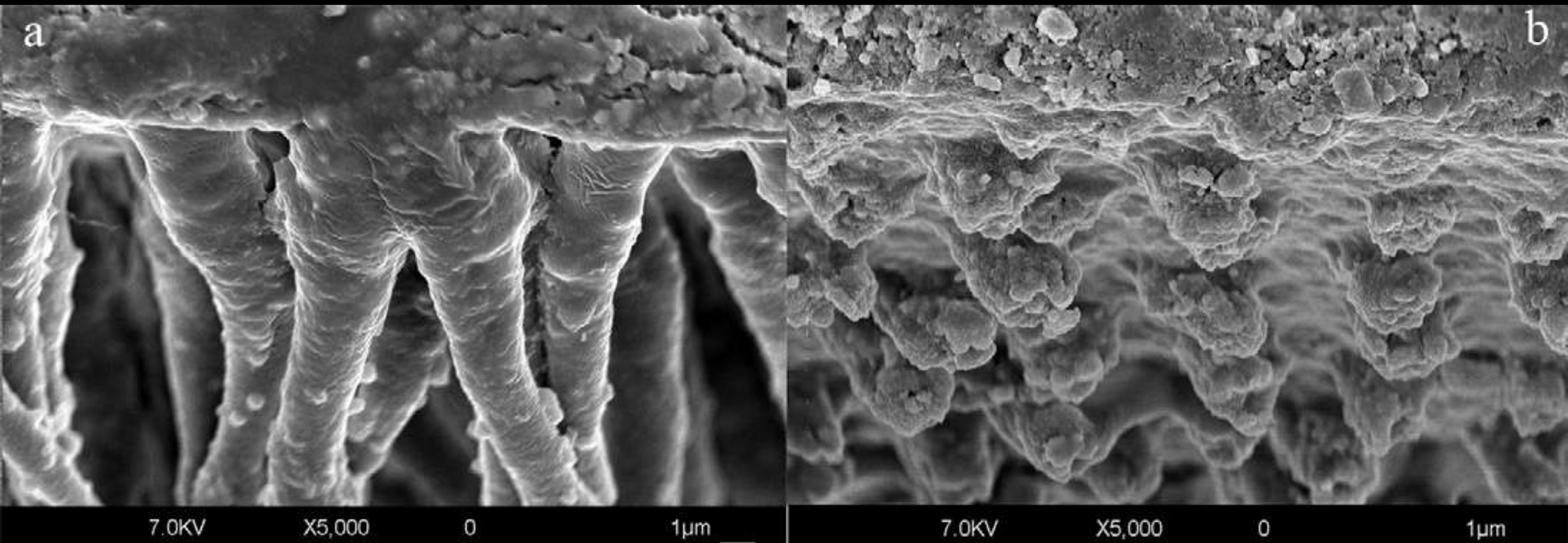


Fig. 1 – FEI-SEM micrographs of an etch-and-rinse (a) and a self-etch (b) adhesive system. Bonded interfaces were created with Scotchbond 1 (3M ESPE) and Protect Bond (Kuraray) in deep dentin tissue. Hybrid layers were then exposed with a slow speed diamond saw and dentin was dissolved by sequential rinses in hydrochloric acid and sodium hypochlorite to reveal resin penetration. Resin tags are clearly detectable in the etch-and-rinse adhesive systems (a) since they infiltrated dentin tubules funneled by the etching agent. Self-etch adhesives often infiltrate no further than the smear layer and smear plugs, revealing a more homogenous morphology that is devoid of long resin tags.

Primers Ácidos con capacidad de unión Química.

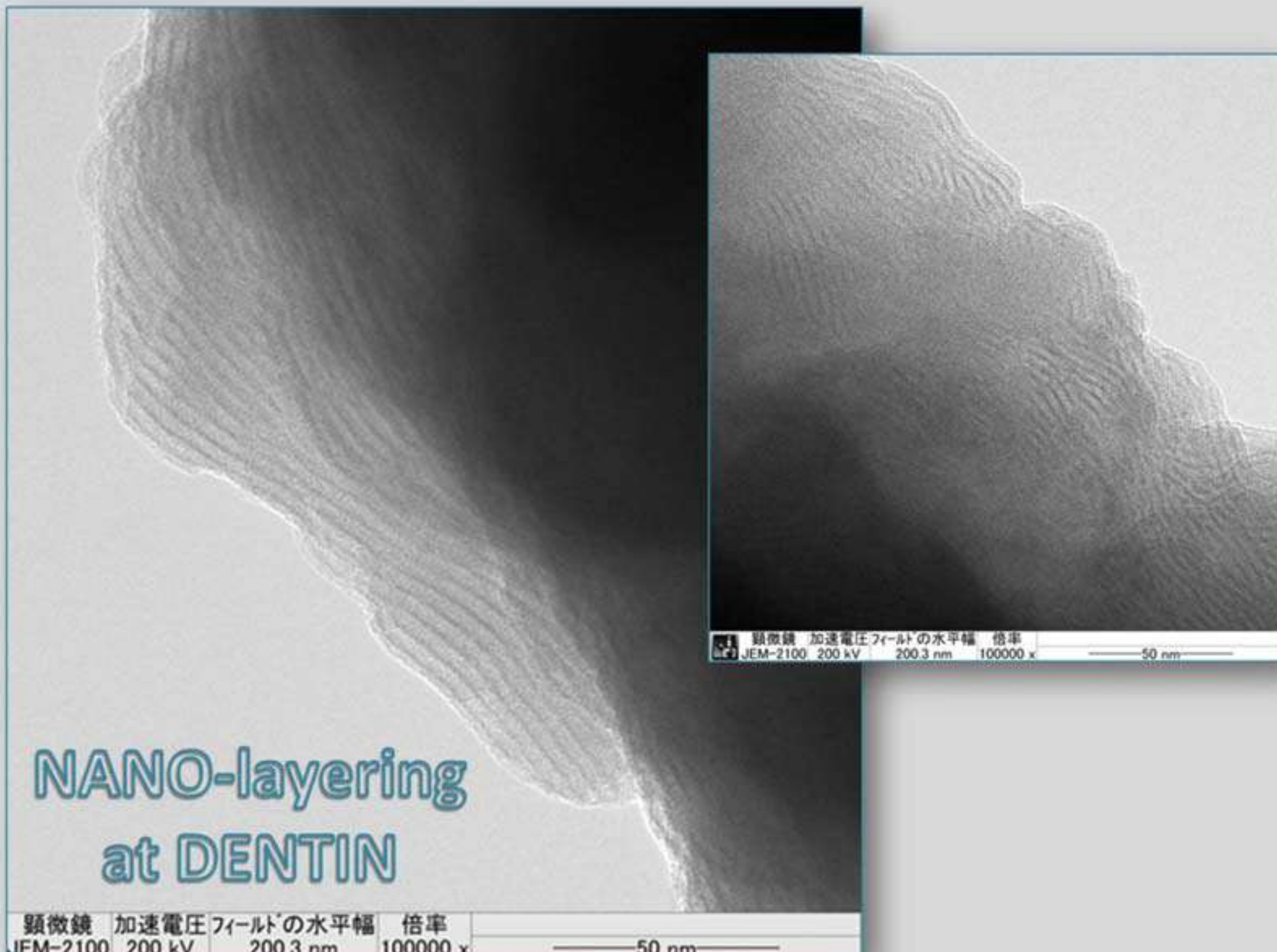
- 10 MPD- Clearfil SE Bond Kuraray.
- 4 META – UniFil Bond GC.
- Phenyl P – Clearfil Liner and Bond II Kuraray.

J Dent Res. 2004 Jun;83(6):454-8.
Comparative study on adhesive performance of functional monomers.
Yoshida Y, Nagakane K, Fukuda R, Nakayama Y, Okazaki M, Shintani H, Inoue S, Tagawa Y, Suzuki K, De Munck J, Van Meerbeek B.

J Dent Res. 2005 Dec;84(12):1160-4.
Hydrolytic stability of self-etch adhesives bonded to dentin.
Inoue S, Koshiro K, Yoshida Y, De Munck J, Nagakane K, Suzuki K, Sano H, Van Meerbeek B.

DENTAL MATERIALS 27 (2011) 17–28
Van Meerbeek B.[a,*], Yoshihara K.[a], Yoshida Y.[b], Mine A.[c], De Munck J.[a], Van Landuyt K.L.[a]

State of the art of self-etch adhesives



Limpieza y remoción parcial del barro.

Adhesivos de RMGI:

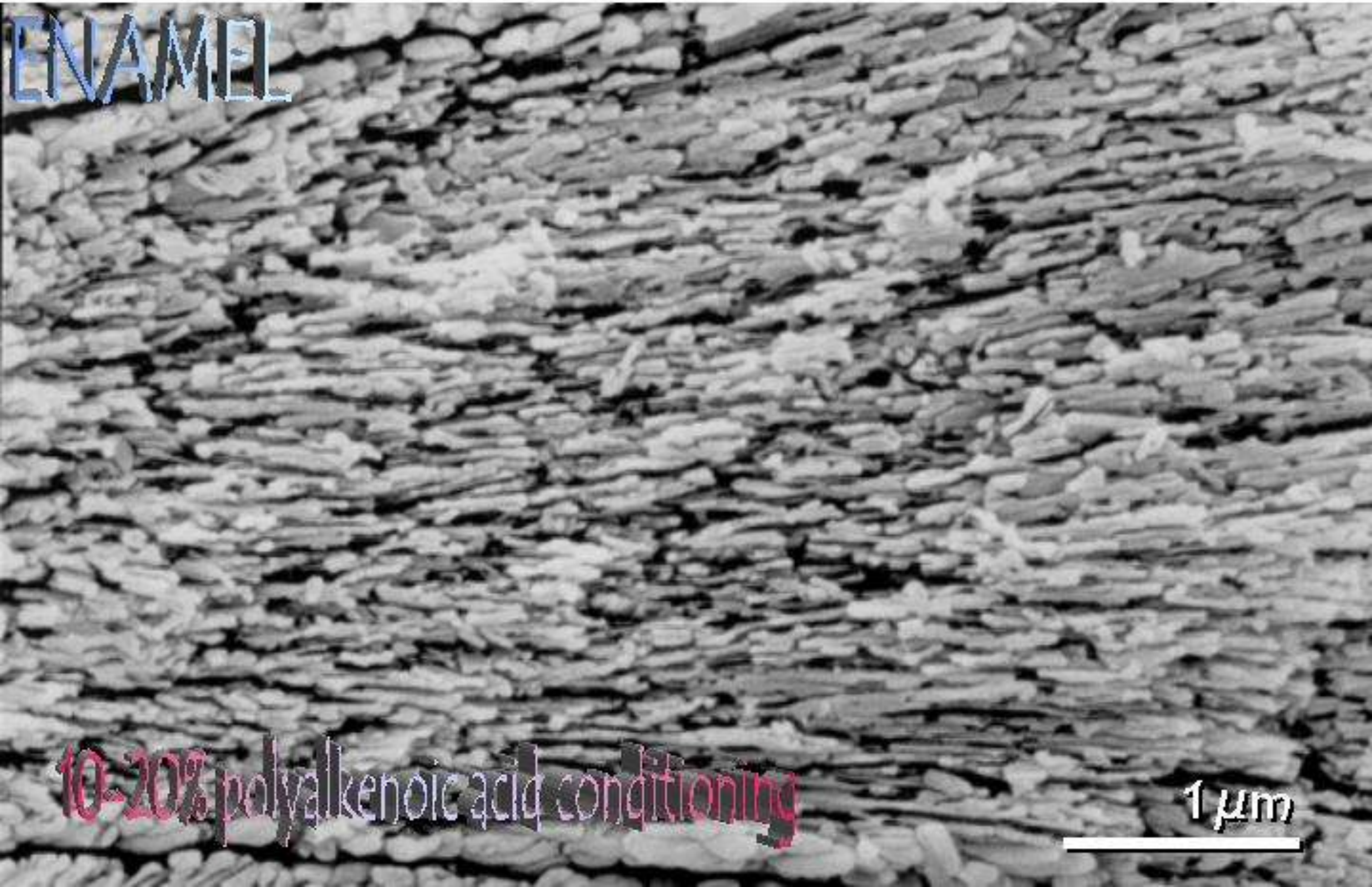
(2 pasos)

J Dent Res. 2005 Feb;84(2):118-32.

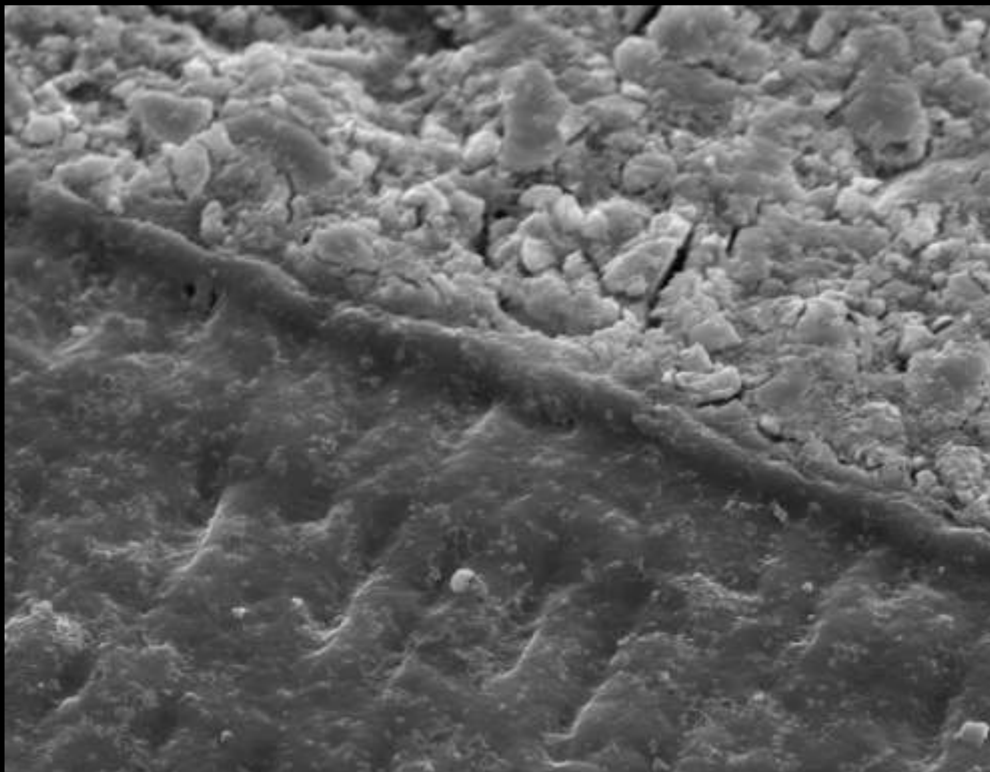
A critical review of the durability of adhesion to tooth tissue: methods and results.

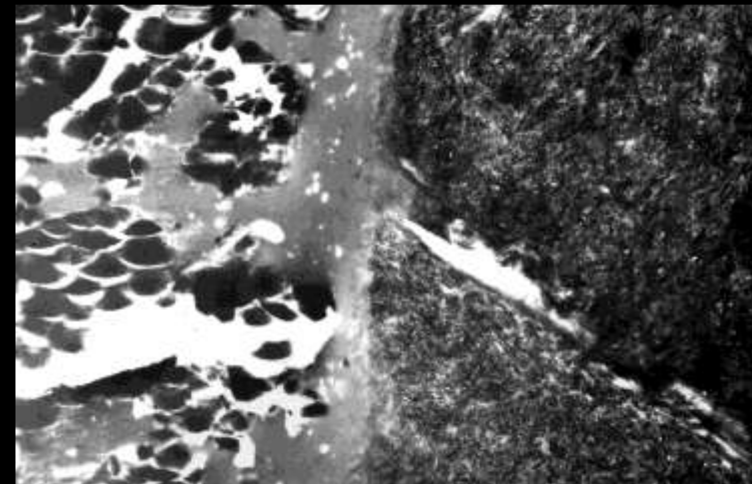
De Munck J, Van Landuyt K, Peumans M, Poitevin A, Lambrechts P, Braem M, Van Meerbeek B.

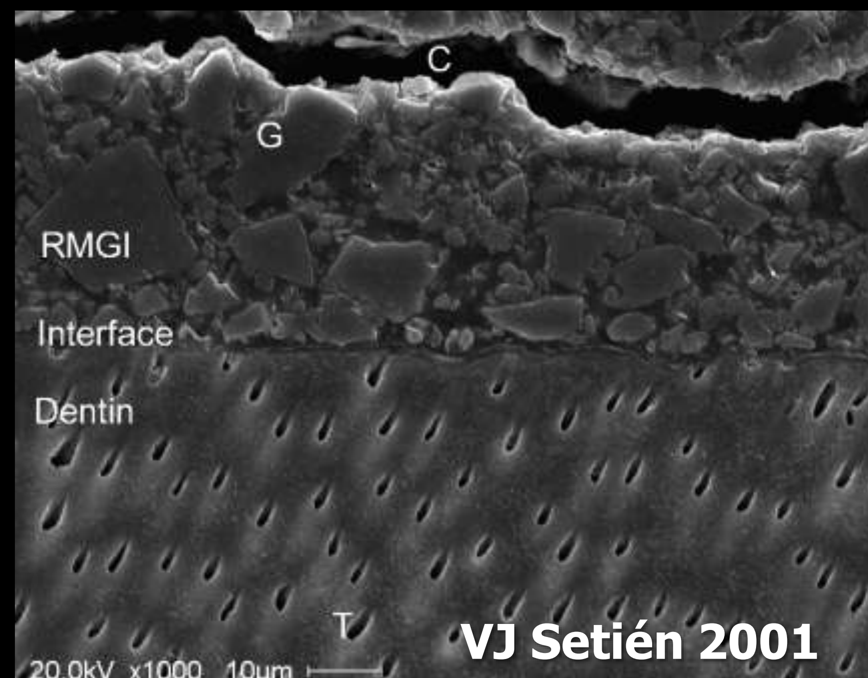
2. Self-adhesion through hybridization



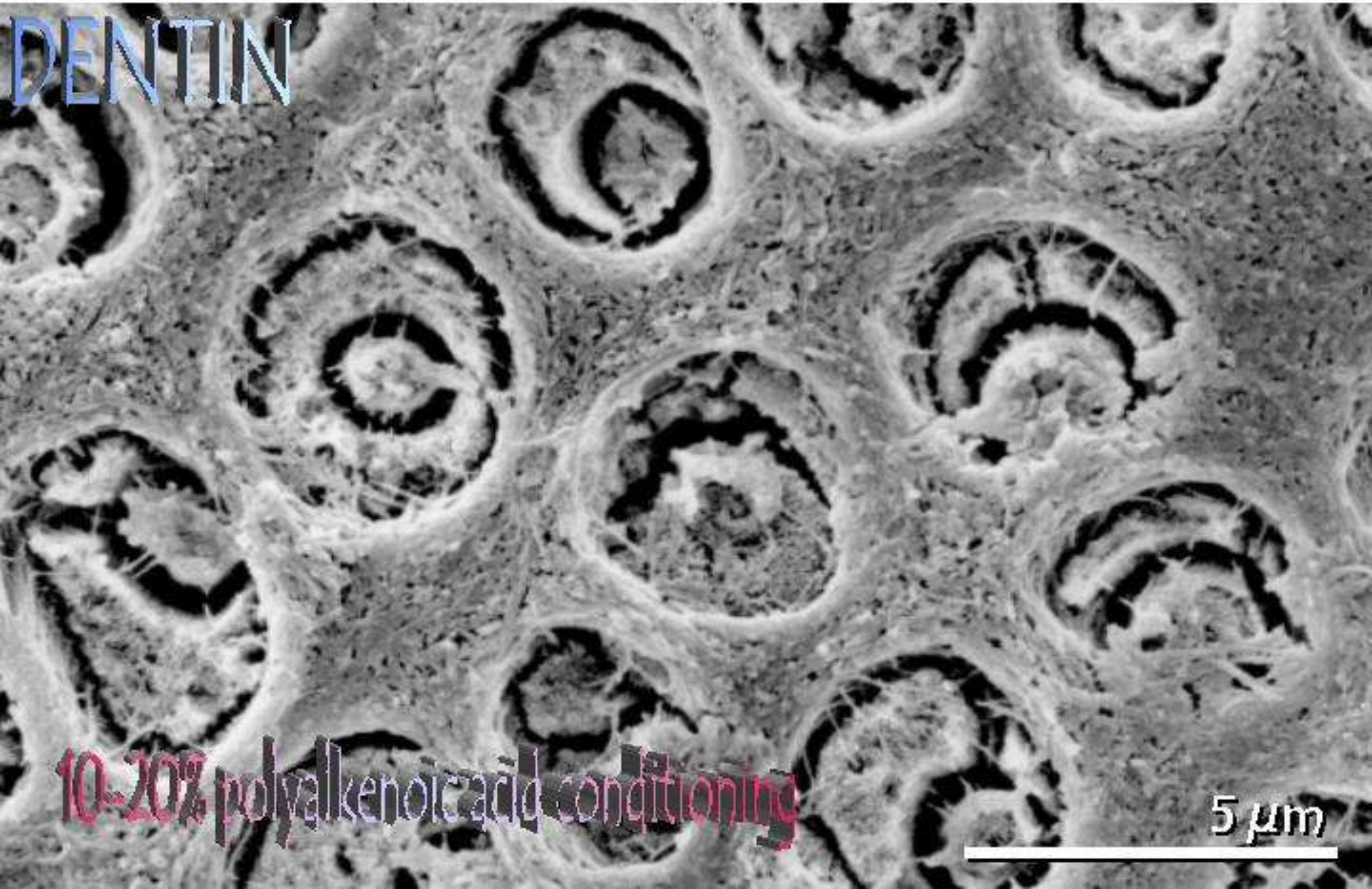
Dentina

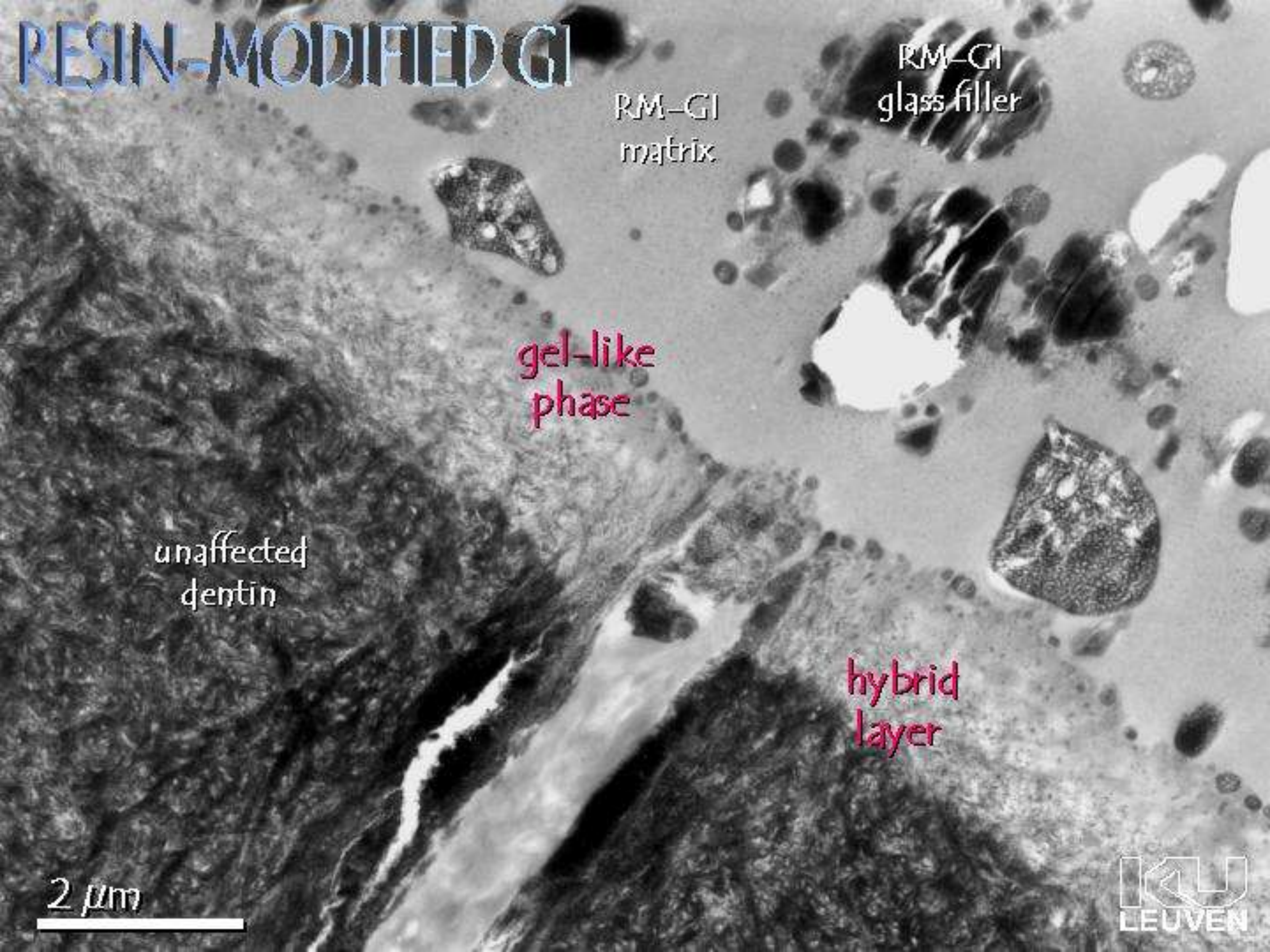






2. Self-adhesion through hybridization




RESIN-MODIFIED GI
RM-GI
matrix
RM-GI
glass filler
gel-like
phase
unaffected
dentin
hybrid
layer
2 μm
LEUVEN

Y. Yoshida[1], B. Van Meerbeek[2]*, Y. Nakayama[3], J. Snauwaert[4], L. Hellemans[4], P. Lambrechts[2], G. Vanherle[2], and K. Wakasa[1]

J Dent Res 79(2) 2000

Evidence of Chemical Bonding at Biomaterial-Hard Tissue Interfaces

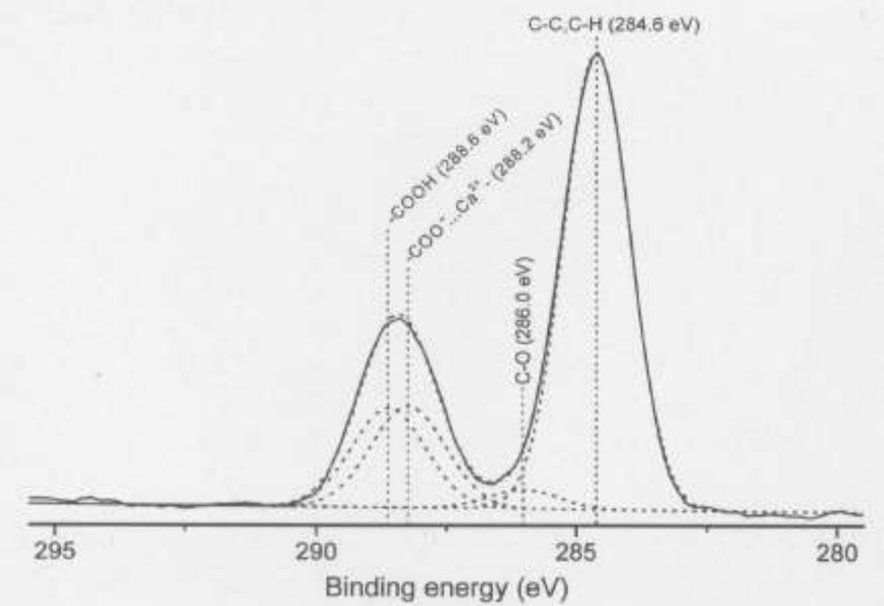


Figure 7. De-convolution of the shifted peak in Fig. 6 disclosed a peak at 288.6 eV, representing unreacted -COOH, and a peak at 288.2 eV, resulting from carboxyl groups bonded to calcium of HA.

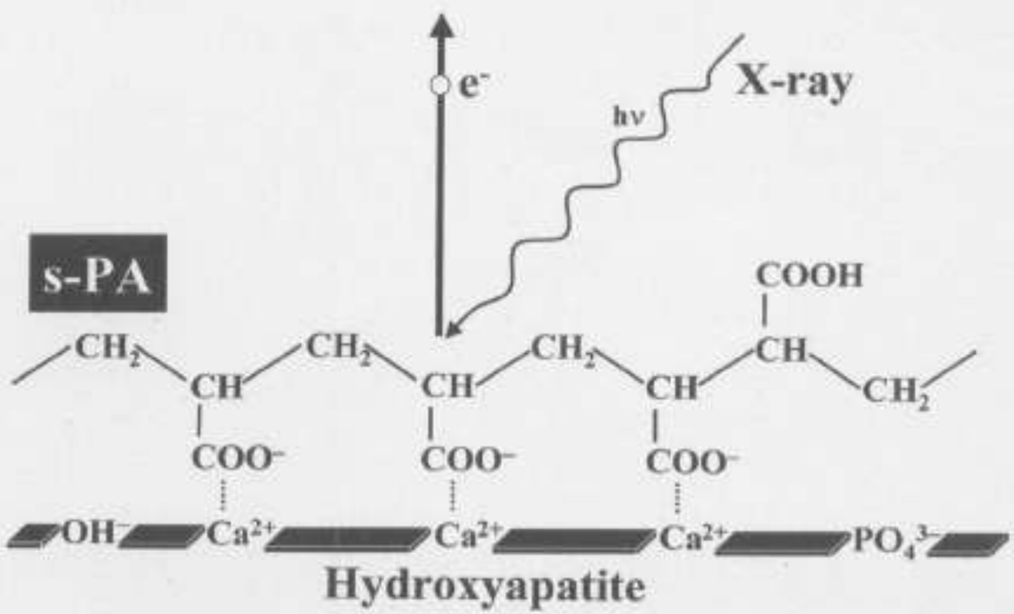


Figure 8. Schematic presentation showing the principle of XPS that involves the detection of ejected electrons (e⁻) as a result of the impact of an x-ray with a certain kinetic energy (hν) on a monolayer-coated substrate.

Polialquenoato de vidrio

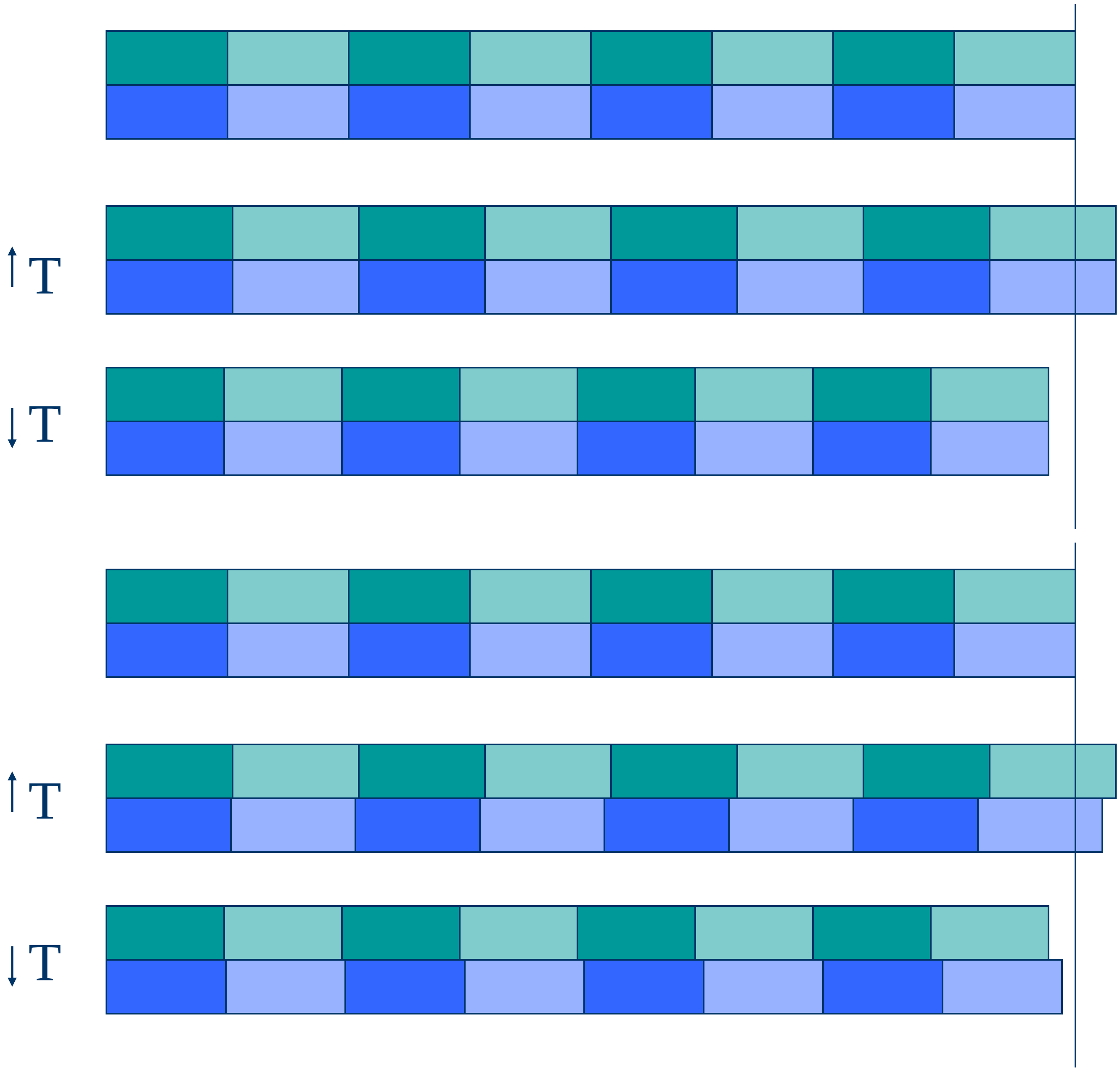
PRO

- Liberación de fluoruros
- Adhesión directa
- Coeficiente de expansión térmica
- Se adhiere a dentina parcialmente desmineralizada

CON

- Baja resistencia al desgaste
- Relativa solubilidad
- Limitada estética
- Dificultad de manipulación

Setién 2005



Setién 2005

Métodos para determinar la efectividad adhesiva.

In Vivo

In Vitro

El método ideal para medir la efectividad adhesiva *In Vivo* son los estudios clínicos:

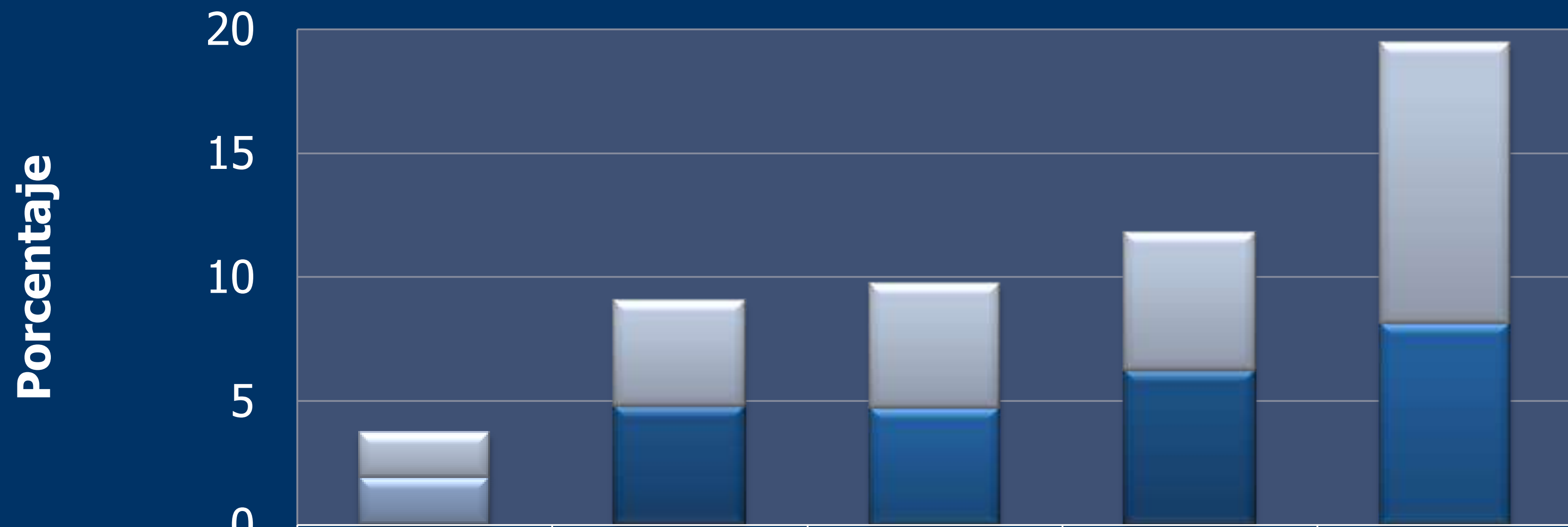
DENTRO DE ESTOS SOLO LOS QUE ENVUELVEN LAS LCNC (CLASE 5) DEBEN SER ALTAMENTE CONSIDERADOS.

1. Estas lesiones no proveen ningún tipo de retención macro mecánica.
2. La retención se evalúa por la presencia ó no de la restauración.
3. Los otros tipos de cavidades proveen al menos algo de retención.

BART VAN MEERBEEK Y COLB. 1998

January 1998 up to May 2004
Peerreviewed, papers and abstracts
IADR–AADR and ConsEuro

Fallas de Restauraciones C5



	Polialkeno ato	Grabado Total 3	Primers Acidos	Grabado Total 2	Adhesivos Acidos
St Dev	1,8	4,2	5	5,6	11,3
GI	1,9				
Self-Etch			4,7		8,1
Etch&Rinse		4,8		6,2	

Clinical effectiveness of contemporary adhesives:
A systematic review of current clinical trials

M. Peumans*, P. Kanumilli, J. De Munck, K. Van Landuyt,
P. Lambrechts, B. Van Meerbeek

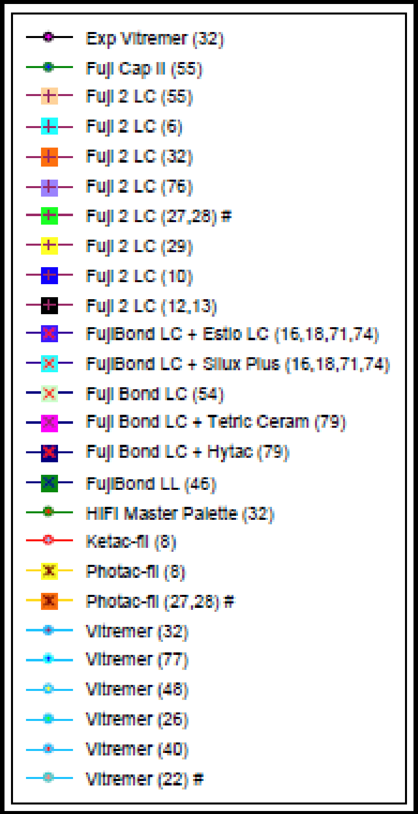
Dental Materials (2005) 21, 864-881

+ Evidencia

ADA provisional 95% 6 meses.
ADA aceptación total 90% 18 meses.

Table 5 Number of restoration retention curves fulfilling the ADA guidelines.

ADA guidelines	Provisional acceptance (6 months)	Full acceptance (18 months)
Three-step etch-and-rinse	91	81
Two-step etch-and-rinse	79	51
Two-step self-etch	82	71
One-step self-etch	68	70
Glass-ionomer	100	96



Ask the Experts

DENTIN/ENAMEL BONDING

Guest Expert
Jorge Perdigão, DMD, MS, PhD*

Associate Editor
Edward J. Swift, Jr., DMD, MS

QUESTION: Several different types of dentin/enamel adhesives are available and I am confused about which one(s) to use in my practice. Can you rate the various categories of resin-based adhesives for me?

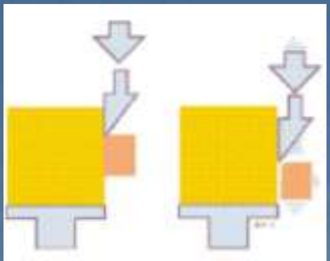
The findings of the most recent studies confirm the trend observed in the 1998–2004 systematic review: three-step *etch-&-rinse* adhesives still result in the best clinical outcome of all resin-based adhesives; one-step *self-etch* adhesives have not yet matched the clinical reliability provided by the other types of adhesives; and ethanol-based *etch-&-rinse* adhesives might be less technique-sensitive than acetone-based *etch-&-rinse* adhesives.

*Professor, Department of Restorative Sciences, University of Minnesota School of Dentistry, Minneapolis, MN, USA

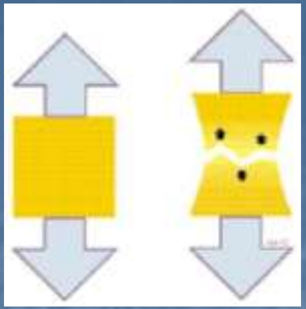
DOI 10.1111/j.1708-8240.2010.00317.x

El método ideal para medir la efectividad adhesiva *In Vitro :*

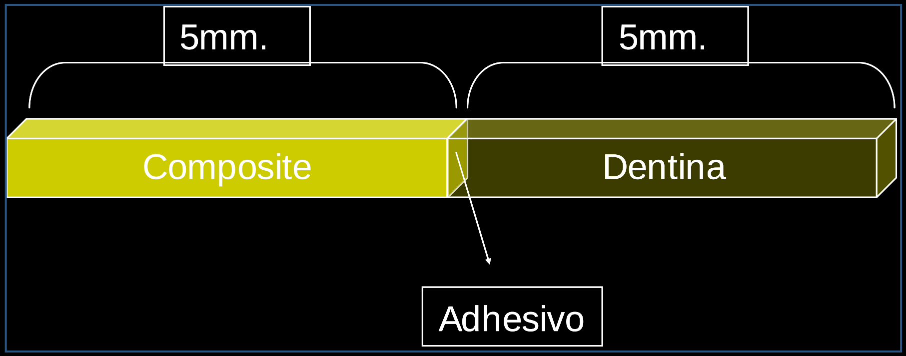
ES LA MICRO-TRACCIÓN

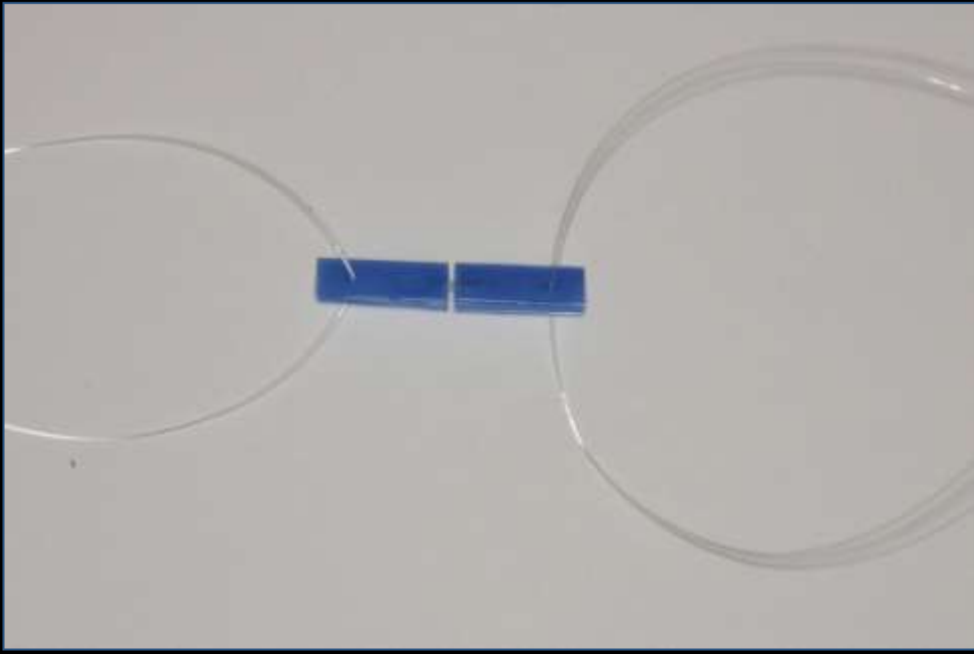


¿Por que Usamos Micro tracción como prueba?

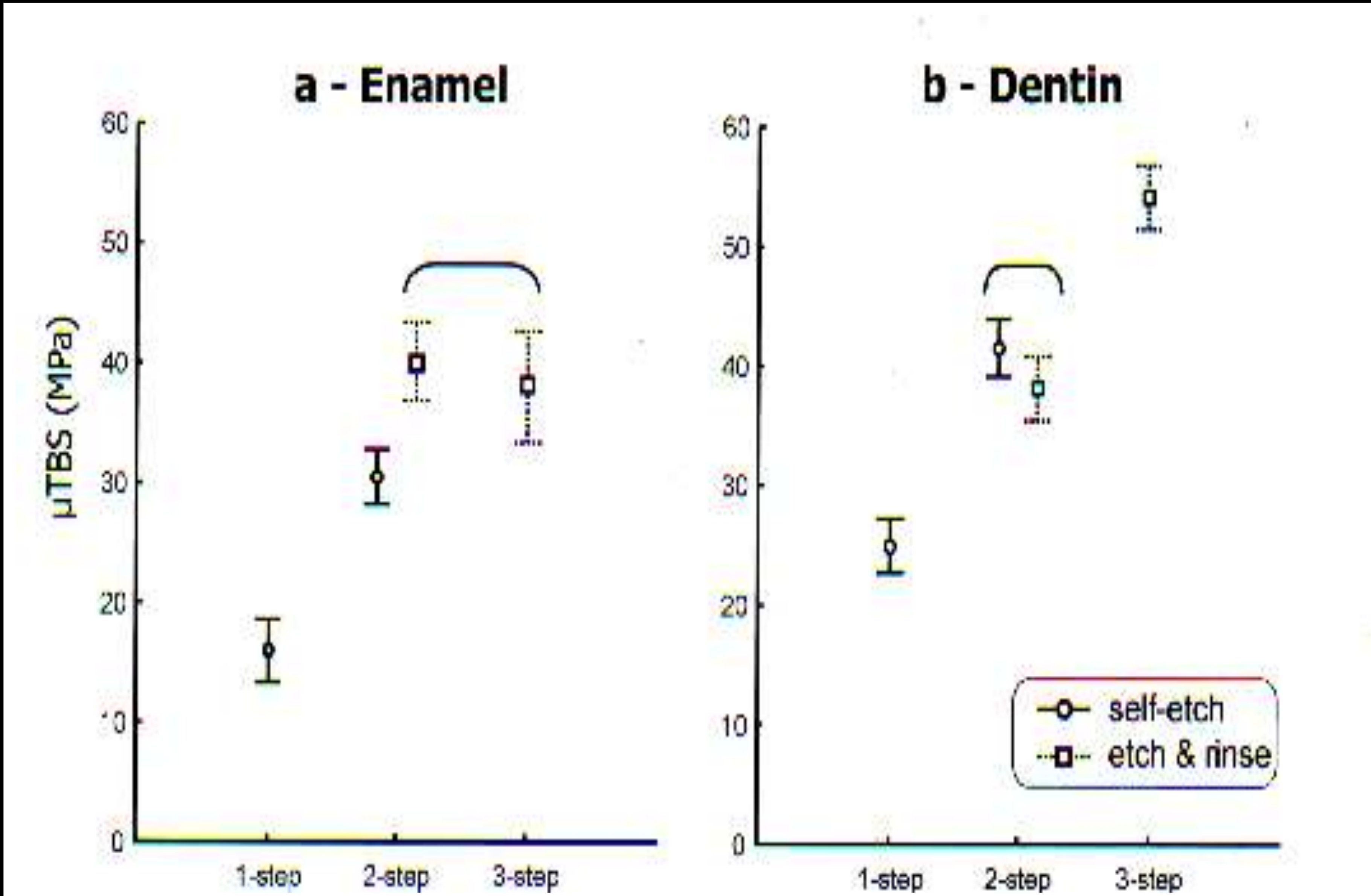


1. Se pueden obtener múltiples muestras de un solo diente. Yoshiyama M, et al 1996. J. De Munck, et al 2005.
2. Sustratos con significado clínico pueden ser evaluados (Dentina afectada por caries, esclerótica etc.) Nakajima M, et al 1995.
3. Los resultados son más reales, por que las muestras son homogéneas y con pocos defectos. Phrukkanon S, et al 1998.
4. Diferencias regionales en resistencia adhesiva puede ser evaluada en un mismo diente.
5. La técnica produce menor cantidad de fallas cohesivas en dentina cuando se compara con resistencia al cohorte. Shono Y, et al 1999.
6. Esta prueba es más sensible al envejecimiento artificial que la tenacidad, nano – microfiltración. Gwinnett and Yu, 1994; Armstrong et al., 2001a; Okuda et al., 2001, 2002.
7. Es una prueba mundialmente aceptada. J. De Munck, et al 2005.





VIDEOS



Leuven BIOMAT research during the period 2001-2004
J. De Munck e al J Dent Res 84(2):118-132, 2005

Leuven BIOMAT, B Van Meerbeek IADR Meeting Brisbane Australia 2006, restauraciones C5

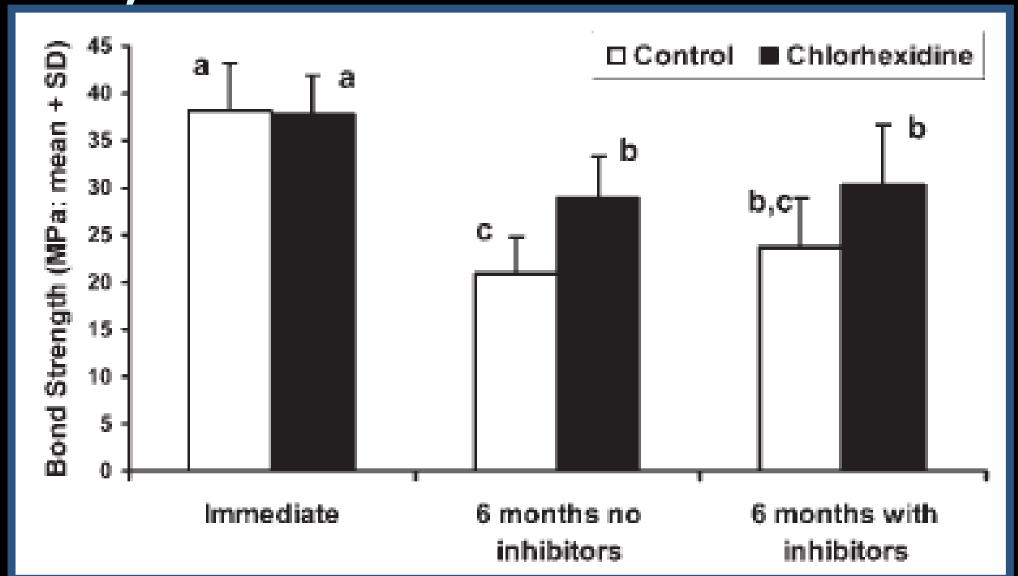
98% en 5 años.

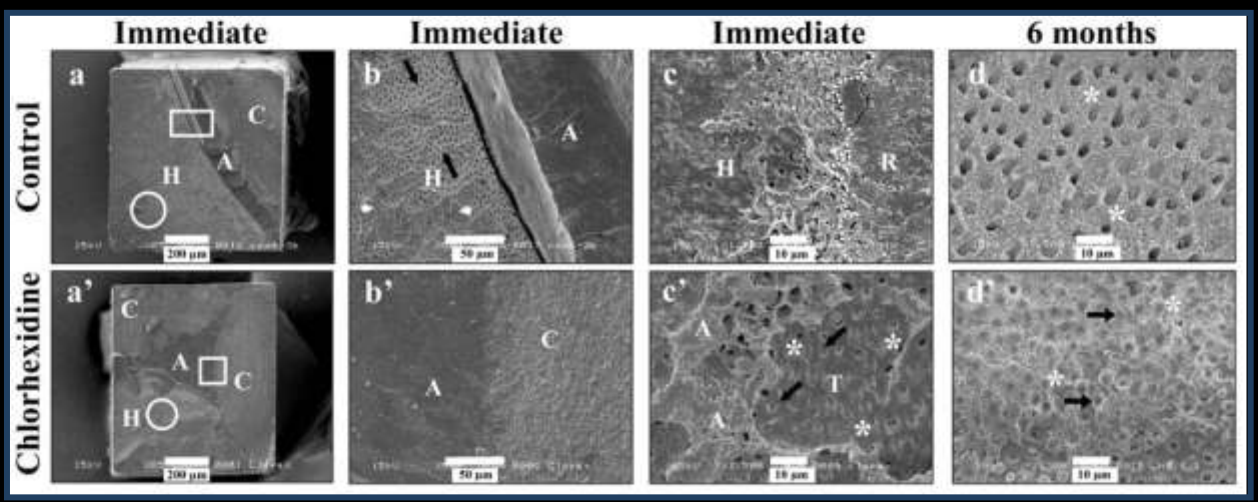
97% en 7 años.

El deterioro de la capa híbrida…

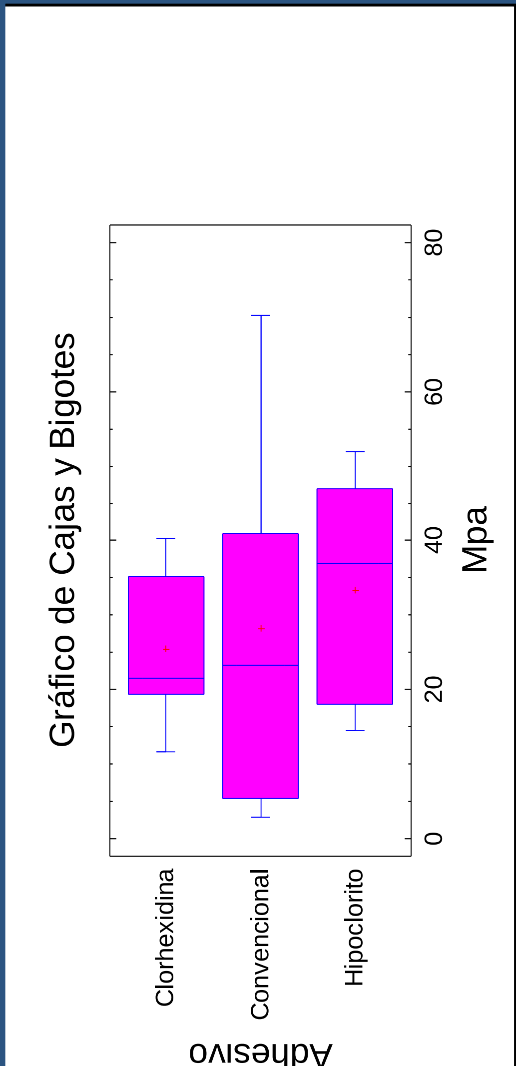
¿POR QUE OCURRE?

M.R.O. Carrilho et al. Chlorhexidine Preserves Dentin Bond in vitro. J Dent Res 86(1):90-94, 2007

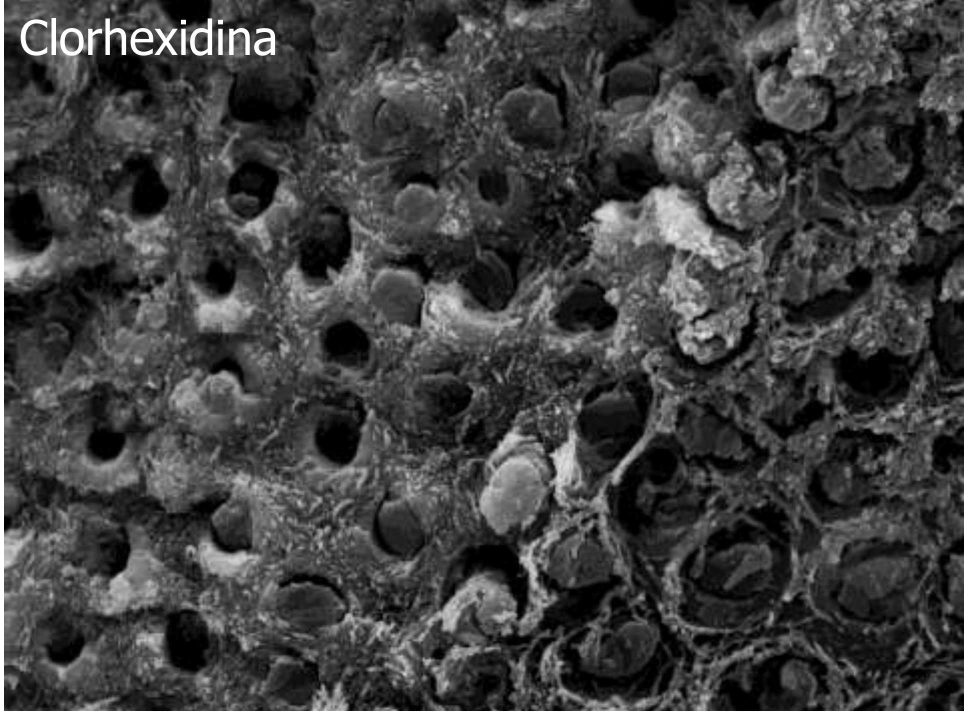


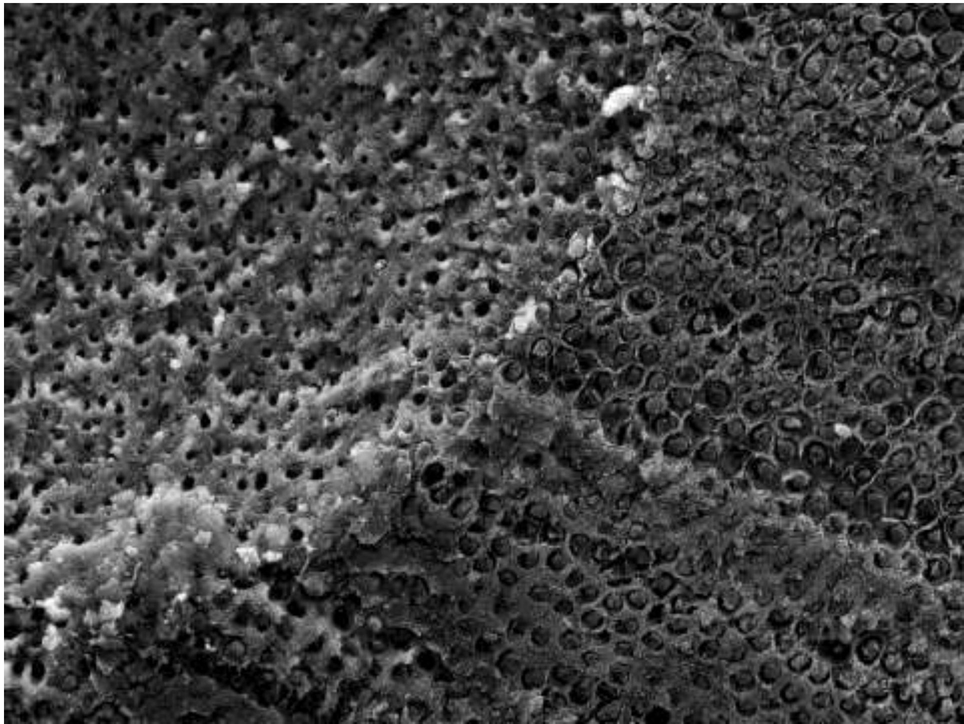


Resistencia adhesiva en micro tracción (μtbs) a dentina variando la técnica de adhesión de grabado total.

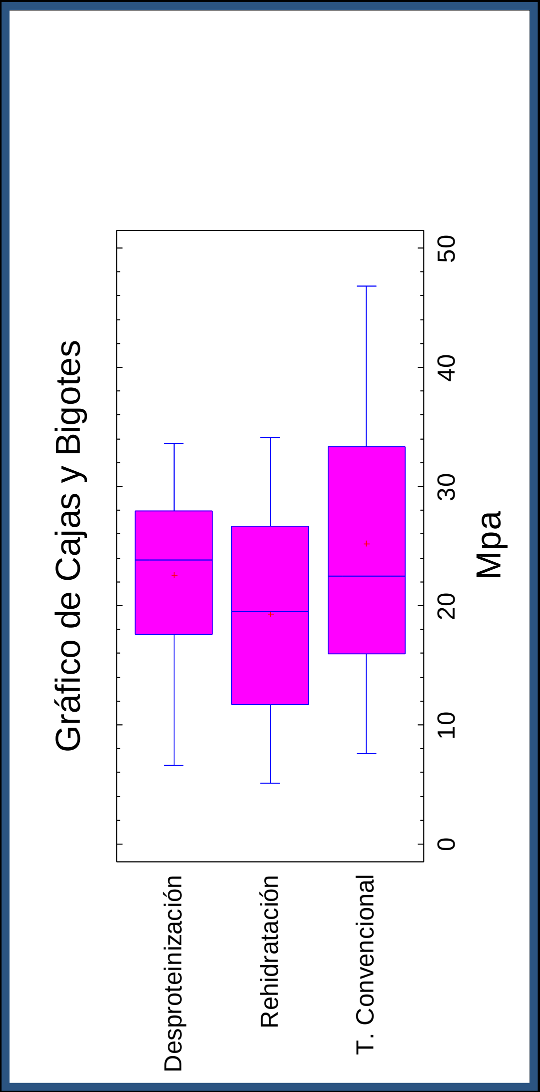


ANOVA p=0,6818
Optibond Solo Kerr
500 Ciclos 5/55ºC

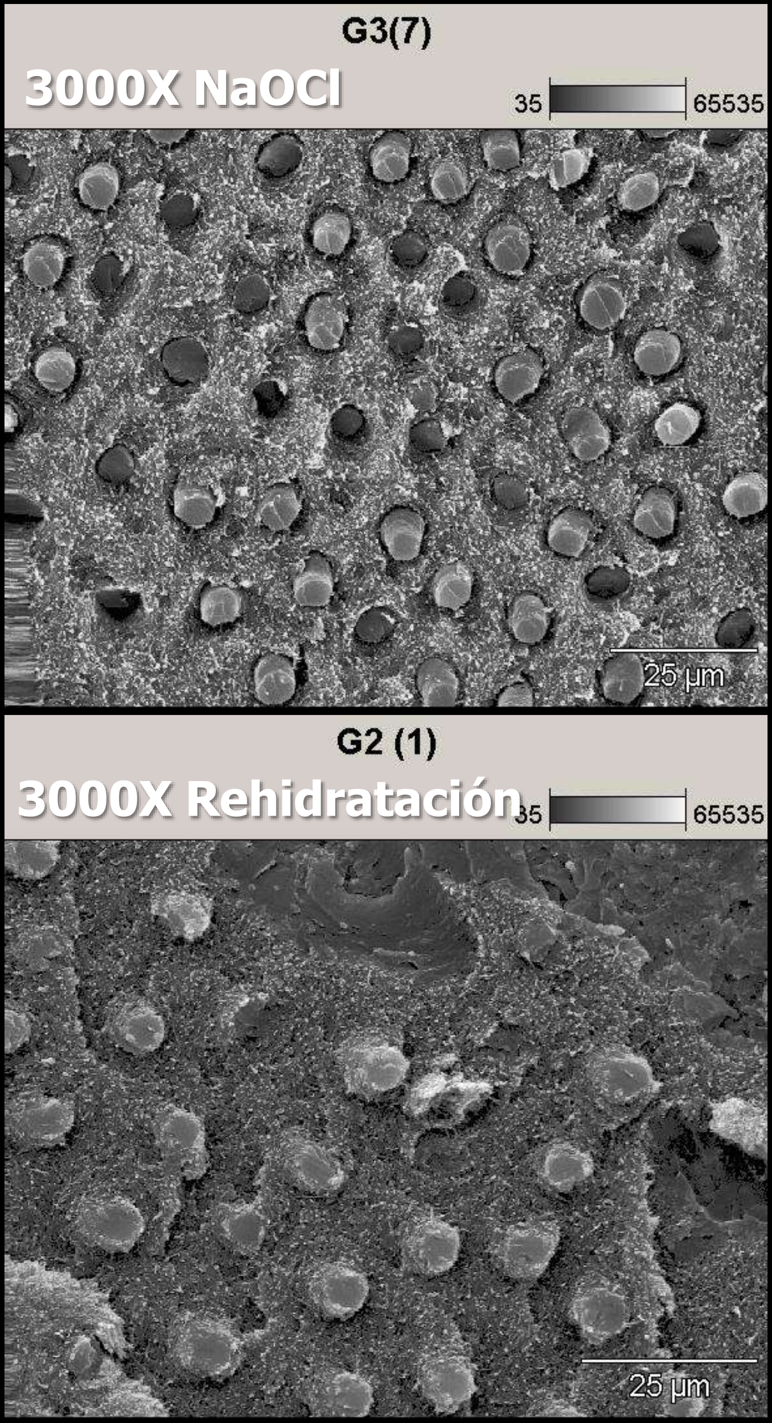




Efecto de la Clorhexidina y NaOCL en la resistencia adhesiva a la microtracción.



ANOVA p=0,1270
Excite Ivoclar/Vivadent
500 Ciclos 5/55ºC y
Almacenamiento x 90 días



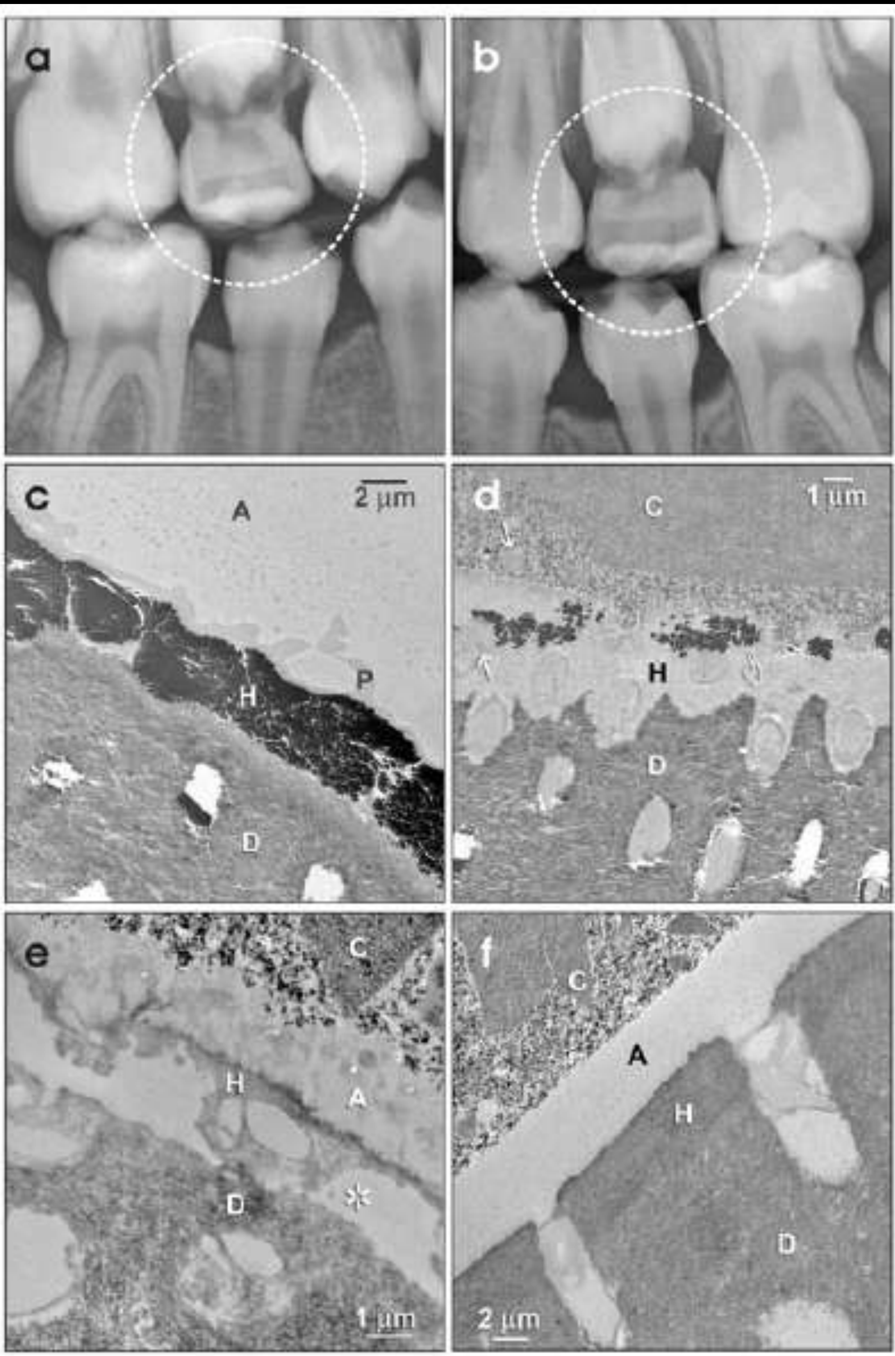
J Dent Res. 2005 Aug;84(8):741-6.

Chlorhexidine arrests subclinical degradation of dentin hybrid layers in vivo.

Hebling J, Pashley DH, Tjäderhane L, Tay FR.

Department of Orthodontics and Pediatric Dentistry, Araraquara Dental School, University of São Paulo State,São Paulo, Brazil.

- " La capa híbrida tratada con clorhexidina exhibe una clara integridad estructural de la malla de colágeno"
- La autodestrucción de la matriz de colágeno ocurre rápidamente en dentina infiltrada por resina *In Vivo* pero puede ser detenida con el uso de clorhexidina como inhibidor de MMPs


a
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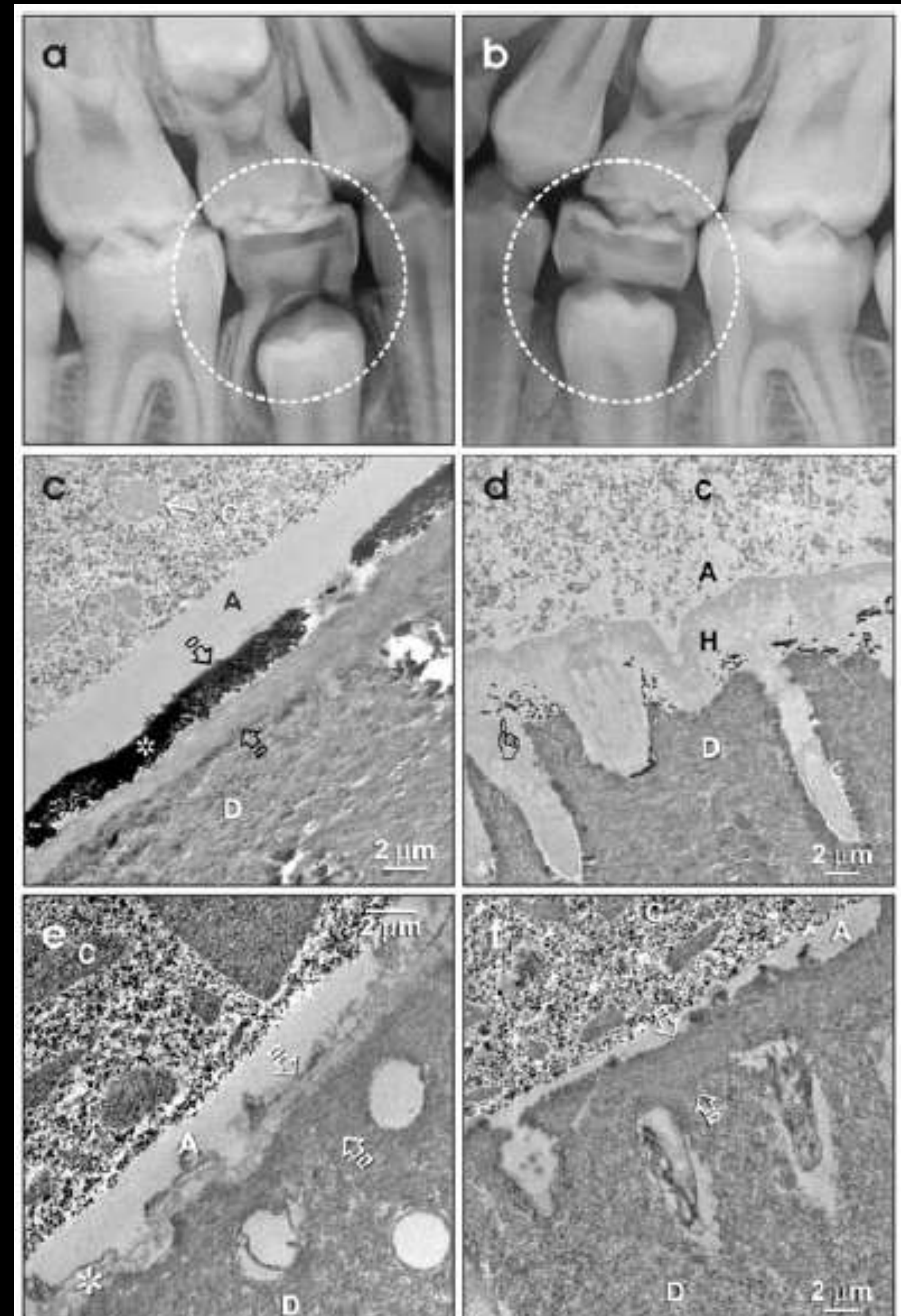
D
2 µm


a
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Dentina saturada con etanol

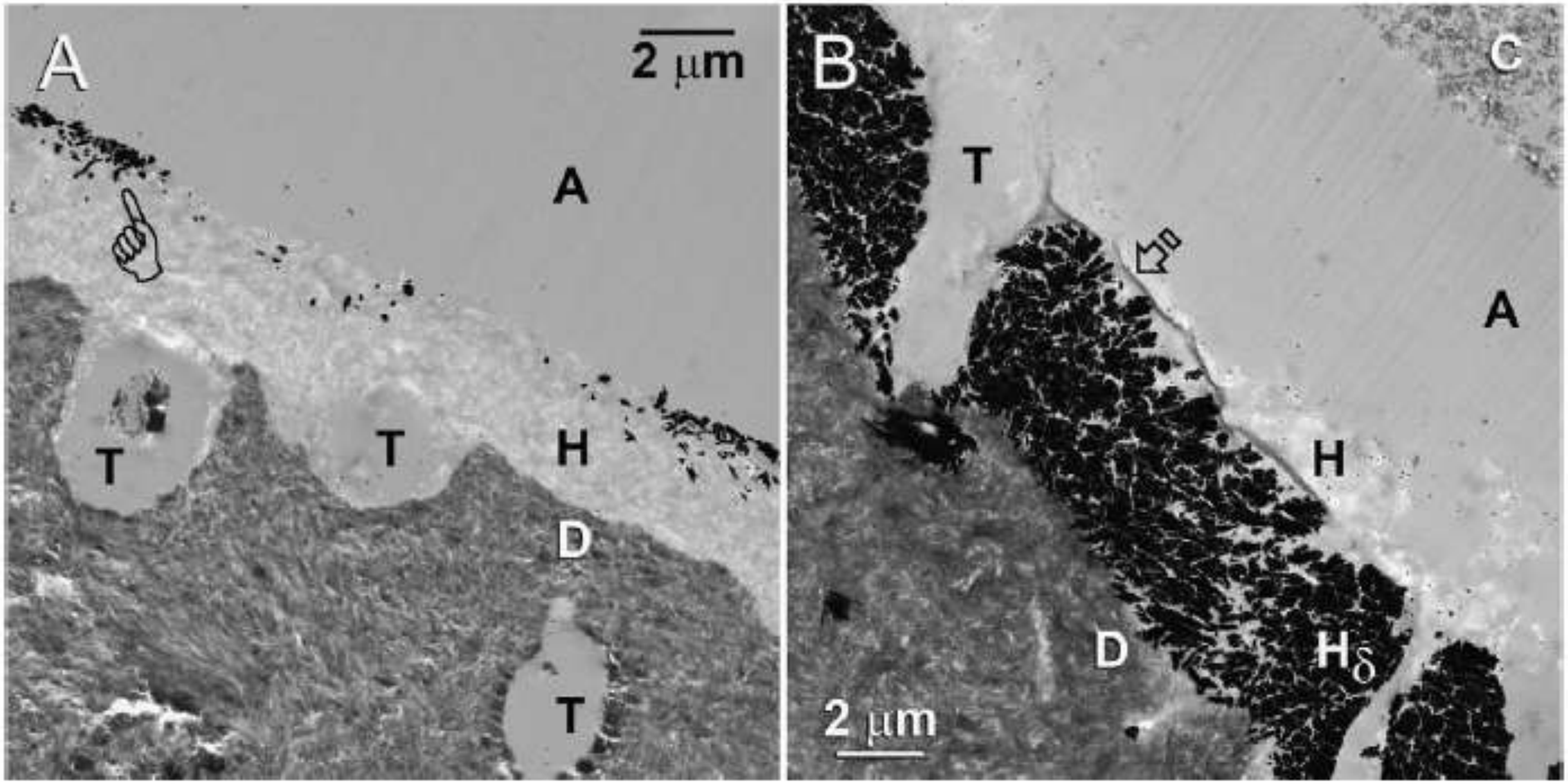


Fig. 12 – (A) Unstained TEM of 1 yr old resin–dentin bond made *in vitro* with BisGMA/TEGDMA resin to acid-etched, ethanol-saturated dentin. After immersion of the specimen in silver nitrate for 24 h, the hybrid layer (H) was seen to take up very little silver grains. (B) Unstained TEM of 1 yr old resin dentin bond made with Scotchbond MultiPurpose to water-saturated dentin. After immersion in silver nitrate, the hybrid layer (Hδ) took up massive amounts of silver indicating that the collagen fibrils with the hybrid layer had been completely destroyed by endogenous MMPs and replaced with water. (Reproduced from Sadek et al., Dent Mater 2010;26:380–386, with permission).

David H. Pashley[a,], Franklin R. Tay[b], Lorenzo Breschi[c,d], Leo Tjäderhane[e], Ricardo M. Carvalho[f], Marcela Carrilho[g,h], Arzu Tezvergil-Mutluay[i]*

+ Evidencia

DENTAL MATERIALS 27 (2011) 1–16

Otros inconvenientes:

CONDICIÓN DEL SUSTRATO Y TIPO DE SOLVENTE

COMPARATIVE STUDY OF THE MICROTENSILE BOND STRENGTH OF THREE DIFFERENT TOTAL ETCH ADHESIVES WITH DIFFERENT SOLVENTS TO WET AND DRY DENTIN. (*In Vitro* Test)

Noé Orellana[1], Robert Ramírez[1], Miguel Roig[2], Luís Giner[2], Montse Mercade[2], Fernando Durán[2], Gerardo Herrera[1]

[1] Dental School, Los Andes University (ULA), Mérida/Venezuela.
[2] Dental School, International Catalonia University (UIC), Barcelona/Spain.

ABSTRACT

The aim of this study was to compare the microtensile bond strength of three different total etch adhesives: XP Bond (Caulk-Dentsply) versus Excite (Ivoclar/Vivadent) and Prime & Bond NT (Caulk-Dentsply).

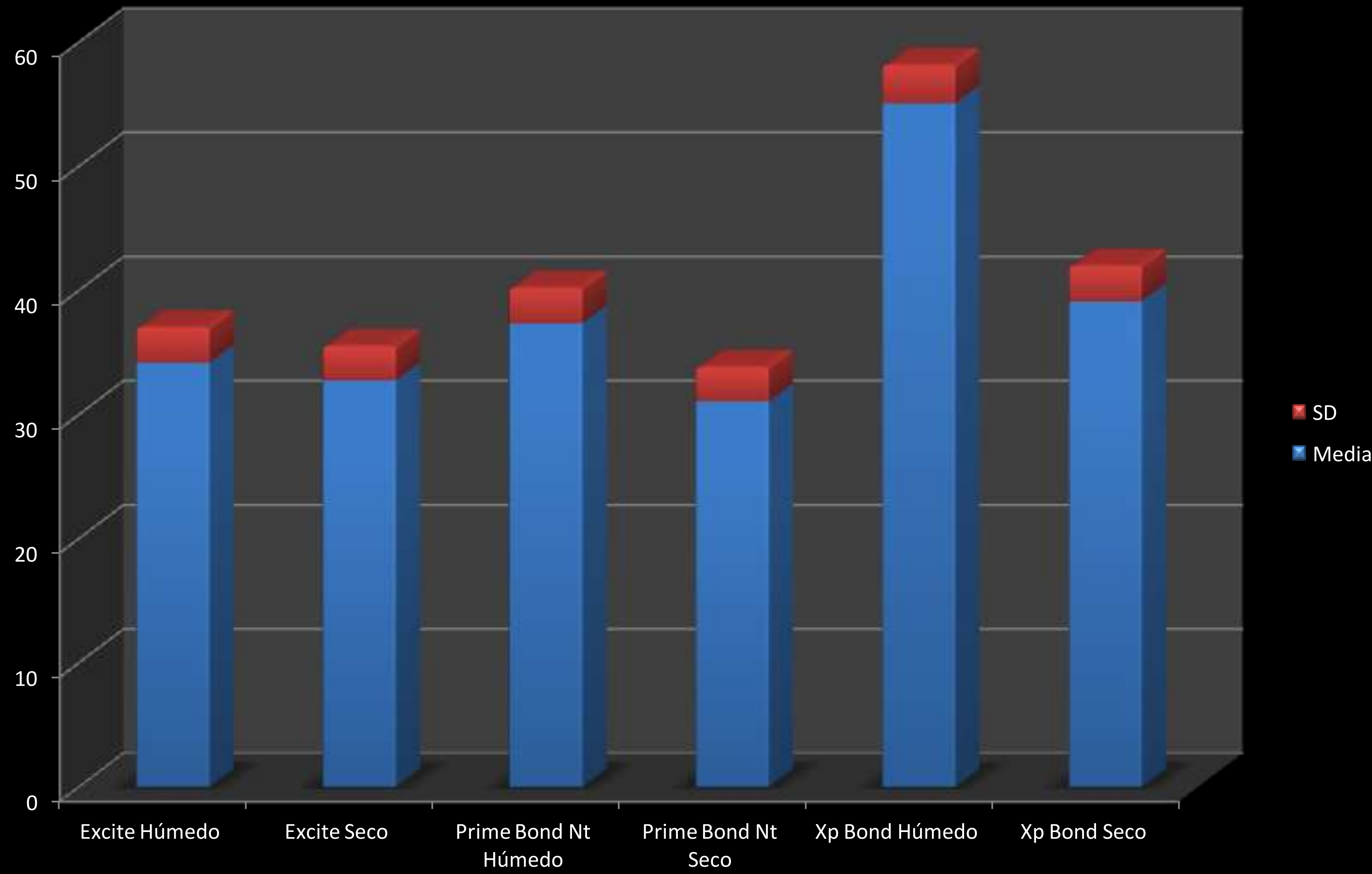
Forty two (42) third human molars were cut to expose the dentinal surface. They were divided into three groups of 14 teeth (G1: XP Bond, G2: Excite, G3: Prime & Bond NT) and two groups of seven teeth for each moisture condition: moist dentin (GM) and dry dentin, (GD). The total-etch technique was used with each moisture variation. The adhesives and composites A3 (Ceram Duo G1, G3 and Tetric Ceram G2) were applied according to manufacturer's instructions. Teeth were cut with an ISOMET 1000 (Buehler Ltd.) to obtain 1 mm ^{2} x 10 mm bars, which were subject to a traction test at 5 mm/min in a universal testing machine (Adamel Lhomargy DY 36). The collected data were recorded and analyzed using an experimental design for studying two factors of fixed effects with software Statgraphics version 5.1.

For the variable type of adhesive, we found p= 0.000; for the variable substrate condition, p=0.0012, and for interaction between both factors, p= 0.0457, which indicates significant statistical differences. The values for microtensile bond strength were G1M= 55.0642 MPa Standard deviation (SD) 3.09768; G1D= 39.115 MPa SD 2.86789; G2M= 34.1607 MPa SD 2.86789; G2D= 32.7373 MPa SD 2.77065; G3M= 37.3407 MPa SD 2.86789 and G3D= 31.0593 MPa SD 2.77065.

XP Bond showed the greatest values of microtensile bond strength under both conditions. Moist substrate increases the values of microtensile bond strength for the adhesives tested; however, Excite shows lower susceptibility to variation of dentinal moisture.

Key words: tensile strength, adhesives, dentin bonding agents, solvents, ethanol, acetone, tert-butyl alcohol

El solvente en el primer de los adhesivos de grabado total son el factor que más afecta la manipulación (Tay *et al.*, *1998) ay el desempeño(Carvalho et al., 2003).*

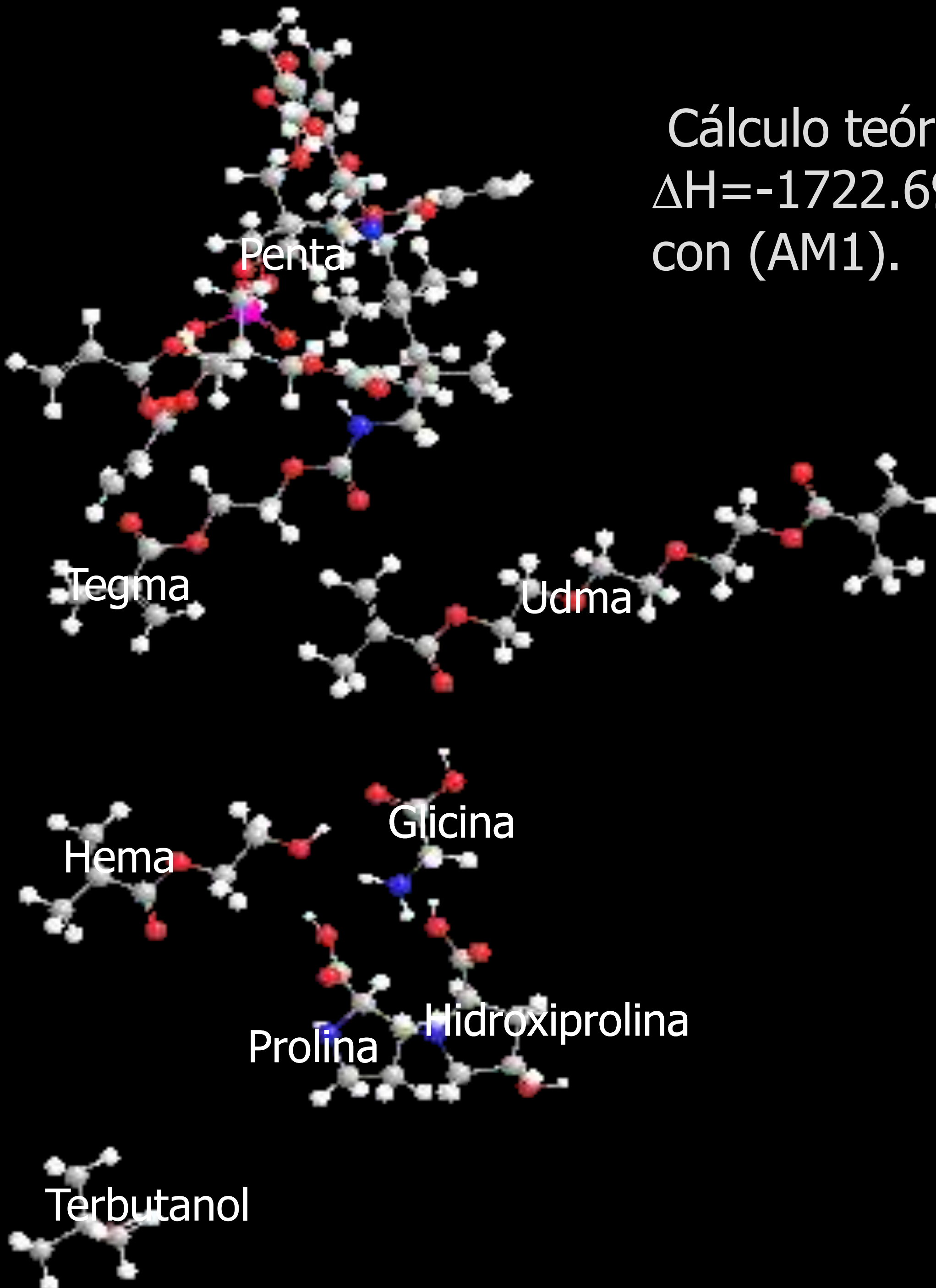


Aplicación clínica

Es conveniente mantener la dentina en condiciones de humedad, secando con papel absorbente y/o una gasa ligeramente humedecida después de lavar el ácido acondicionador.

Goes Mf, et al: resin bond strength with different methods to remove excess water from the dentin, Am J dent 10:298-302,1997.

Cálculo teórico del ΔH del *Xp Bond* + colágeno ΔH=-1722.69565 kcal/mole utilizando mopac con (AM1).



Oxígeno

Fósforo

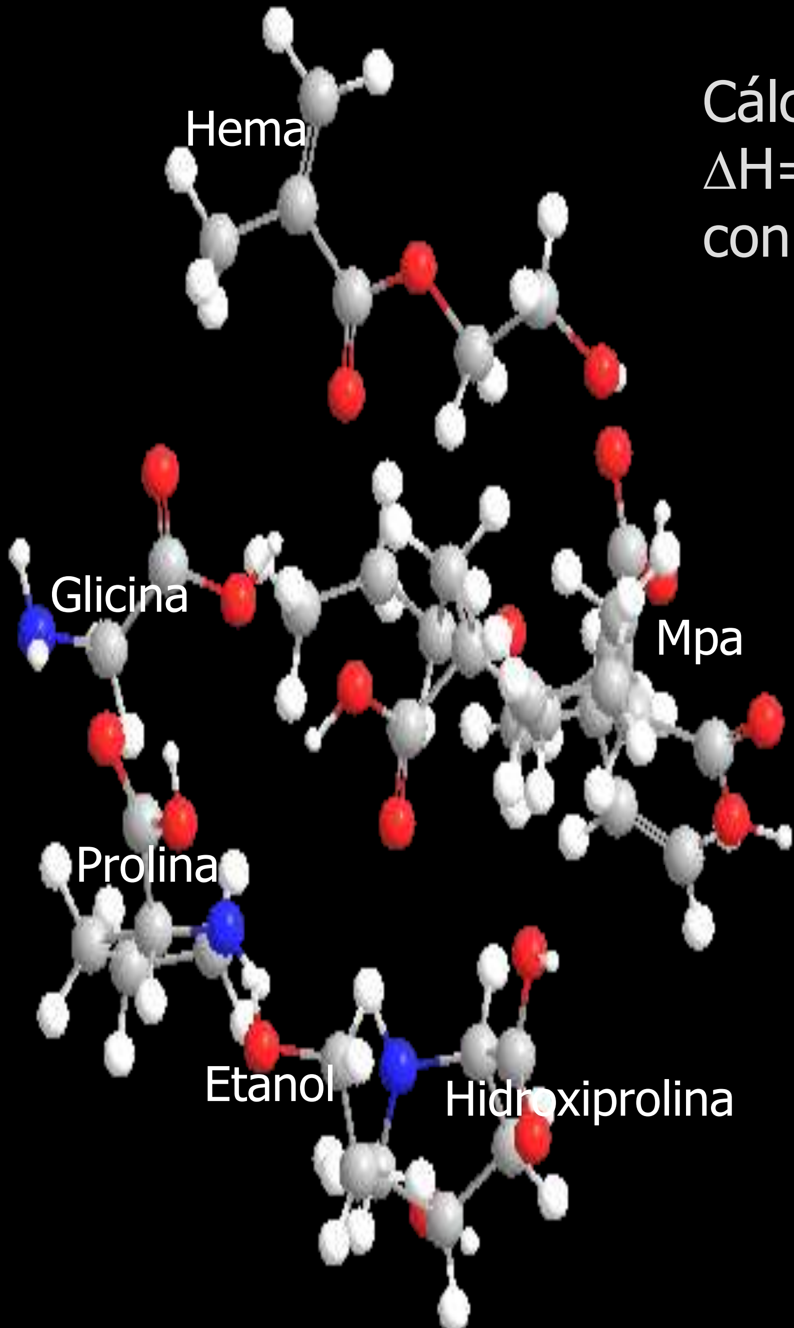
Carbono

Hidrógeno

Nitrógeno

Gerardo Herrera, et al 2009.

Cálculo teórico del ΔH del *excite* + colágeno
ΔH=-919,75766 kcal/mole utilizando mopac con (AM1).



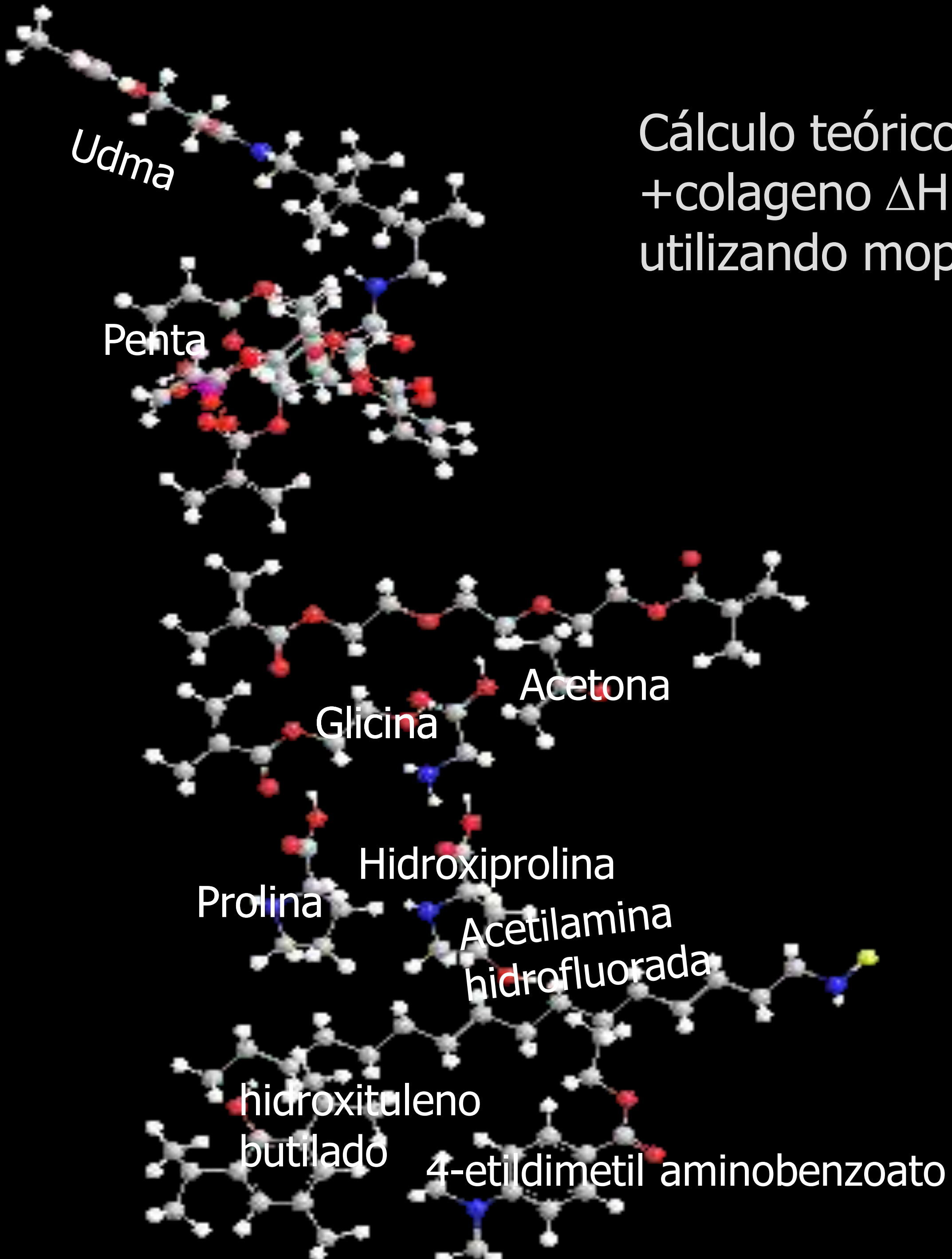
Oxígeno

Carbono

Hidrógeno

Nitrógeno

Cálculo teórico del ΔH del *prime bondt*+ +colageno ΔH=9427.88272 kcal/mole utilizando mopac con (AM1).



Oxígeno

Fósforo

Carbono

Hidrógeno

Nitrógeno

“Capacidad de sellado gingival de tres adhesivos de grabado total con diferentes solventes, condiciones de sustrato y tipo de cavidad”.

Estadísticos de contraste[a,b]

	Adhesivo	Sustrato	Cavidad
Chi-cuadrado	8,738	2,909	21,956
gl	3	3	3
Sig. asintót.	,033	,406	,000

a. Prueba de Kruskal-Wallis

b. Variable de agrupación: Filtración

Frecuencias

		Adhesivo		
		Excite	Prime Bond Nt	Xp Bond
Filtración	> Mediana	24	31	10
	<= Mediana	36	29	50

Frecuencias

		Sustrato	
		Húmedo	Seco
Filtración	> Mediana	27	38
	<= Mediana	63	52

Frecuencias

		Cavidad	
		Clase 5	Clase 2
Filtración	> Mediana	19	46
	<= Mediana	71	44

VIDEO...

Noé Orellana, Robert Ramírez . Catedra de Operatoria Dental ULA (2009)

	GT3 Etanol	**GT2 Etanol**	**GT3 Acetona**	**GT2 Acetona**	**GT3 Agua**	**GT2 Agua**	**AG2**	**AG1**	**GI**
Adhesivo	Optibond FL	Optibond Solo	All Bond 2	One-Step	Scotchbond MP	Single Bond	Clearfil SE Bond	Adper Prompt	FujiBond LC, GC
Almacenamiento H2O	SBS =	SBS - µBTS - en 4 años		-	=	-	= 6 M - + 2A	No sobreviven.	µBTS -
Termo - ciclado.		SBS -	-	-	+/-	-	SBS = 30000 Ciclos		
In Vivo	Bien = 95% en 7 años	= Bien	3 años – 28%	3 años – 50%	3 años Excelente	Excelente/ pobre otros	= 2 A 97% en 5 años	Pobre – 35% 1 año	-50% 1 año C5 ≥ GT3
Micro Filtración			= en 6 meses						
Sensible TECNICA	+/-	+/-	+	+	-	-	-	-	
Fatiga					Resiste				
Función *In Vivo*					µBTS -		µBTS= 1año		
Evaporación Solvente	Fácil	Fácil	Muy Fácil	Muy Fácil	Difícil	Difícil			
Infiltración	Buena	Buena	Alta	Alta	Pobre	Pobre	Media	Buena	Depende Marca

Conclusiones:

- El material restaurador ideal debe tener la misma composición, propiedades físicas químicas y bilógicas que la estructura dentaria.
- Cualquier tipo de simplificación en la aplicación se traduce en perdida de la efectividad adhesiva.
- Se recomienda el uso de la capa de resina hidrófoba carente de solvente.
- El aumento del tiempo de curado debe ser estimado para reducir la permeabilidad.
- Debe considerarse la utilización de inhibidores de proteasas rutinariamente.
- Para adhesivos autograbadores se recomienda el grabado selectivo de esmalte.

Gracias por su Atención, podemos discutir dudasi

robertramirez@ula.ve

http://robertramirez73.blogspot.com/

Envejecimiento de la capa híbrida.

- La estabilidad de la unión depende de la impregnación de monómeros.
- La estabilidad se ve afectada por factores físicos (estrés mecánico, térmico) y químicos (Fluidos, saliva, comidas, bebidas etc.).

Dental adhesion review: Aging and stability of the bonded interface

DENTAL MATERIALS 24 (2008) 90–101

Lorenzo Breschi[a,], Annalisa Mazzoni[b], Alessandra Ruggeri[b], Milena Cadenaro[a], Roberto Di Lenarda[a], Elettra De Stefano Dorigo[a]*

Degradación de la resina.

- Hidrólisis de la resina de los espacios interfibrilares dentro de la capa híbrida.
- Se disminuye la resistencia mecánica de la interface.
- Las resinas hidrófilas absorben más agua.
- Se observa una especie de membrana semipermeable.
- Esta altamente influenciada por el grado de polimerización.

Dental adhesion review: Aging and stability of the bonded interface

DENTAL MATERIALS 24 (2008) 90–101

Lorenzo Breschi[a,], Annalisa Mazzoni[b], Alessandra Ruggeri[b], Milena Cadenaro[a], Roberto Di Lenarda[a], Elettra De Stefano Dorigo[a]*

Degradación de las fibras de colágeno expuestas.

- Causada por el agua y potenciada por la elución resinosa.
- Se han observado en diferentes estudios *In vivo e In vitro.* (esto sugiere que hay muchas disponibles).
- En los adhesivos de GT se observa una incompleta infiltración y fibras de colágeno desnaturalizadas en la base de la HL.
- La utilización de etanol como solvente mejora este problema.

Dental adhesion review: Aging and stability of the bonded interface

DENTAL MATERIALS 24 (2008) 90–101

Lorenzo Breschi[a,], Annalisa Mazzoni[b], Alessandra Ruggeri[b], Milena Cadenaro[a], Roberto Di Lenarda[a], Elettra De Stefano Dorigo[a]*

Actividad colágeno-lítica intrínseca de la dentina mineralizada.

- Se le atribuyen a las proteinasas derivadas del huésped que destruyen la matriz de colágeno.
- La nanofiltración ocurre en ausencia de gaps.
- Estas son susceptibles a la utilización de inhibidores de proteasas específicos.

Regresar

Dental adhesion review: Aging and stability of the bonded interface

DENTAL MATERIALS 24 (2008) 90–101

Lorenzo Breschi[a,*], Annalisa Mazzoni[b], Alessandra Ruggeri[b], Milena Cadenaro[a], Roberto Di Lenarda[a], Elettra De Stefano Dorigo[a]

Regresar

PubMed "J Dent Res"[Journal] AND 2009[PDAT] AND 88[VOL] ANI

Display Settings: Abstract

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See 1 article in J Dent Res 2009:

J Dent Res. 2009 Dec;88(12):1101-6. Epub 2009 Oct 27.

Inhibition of enzymatic degradation of adhesive-dentin interfaces.

De Munck J, Van den Steen PE, Mine A, Van Landuyt KL, Poitevin A, Opdenakker G, Van Meerbeek B.

Leuven BIOMAT Research Cluster, Department of Conservative Dentistry, School of Dentistry, Oral Pathology and Maxillo-facial Surgery, Catholic University of Leuven, Kapucijnenvoer 7, 3000 Leuven, Belgium. jan.demunck@med.kuleuven.be

Abstract

Adhesive procedures activate dentin-associated matrix metalloproteinases (MMPs), and so iatrogenically initiate bond degradation. We hypothesized that adding MMP inhibitors to adhesive primers may prevent this endogenous enzymatic degradation, thereby improving bond durability. A non-specific MMP inhibitor (chlorhexidine) and a MMP-2/9-specific inhibitor (SB-3CT) were admixed to the primers of an etch & rinse and a self-etch adhesive, both considered as gold-standard adhesives within their respective categories. For dentin powder exposed to the adhesives under clinical application conditions, gelatin zymography revealed the release of MMP-2 (not of MMP-9) by the etch & rinse adhesive, while no release of enzymes could be detected for the mild self-etch adhesive, most likely because of its limited dentin demineralization effect. The built-in MMP inhibitors appeared effective in reducing bond degradation only for the etch & rinse adhesive, and not for the self-etch adhesive. Water sorption of adhesive interfaces most likely remains the principal mechanism of bond degradation, while endogenous enzymes appear to contribute to bond degradation of only etch & rinse adhesives.

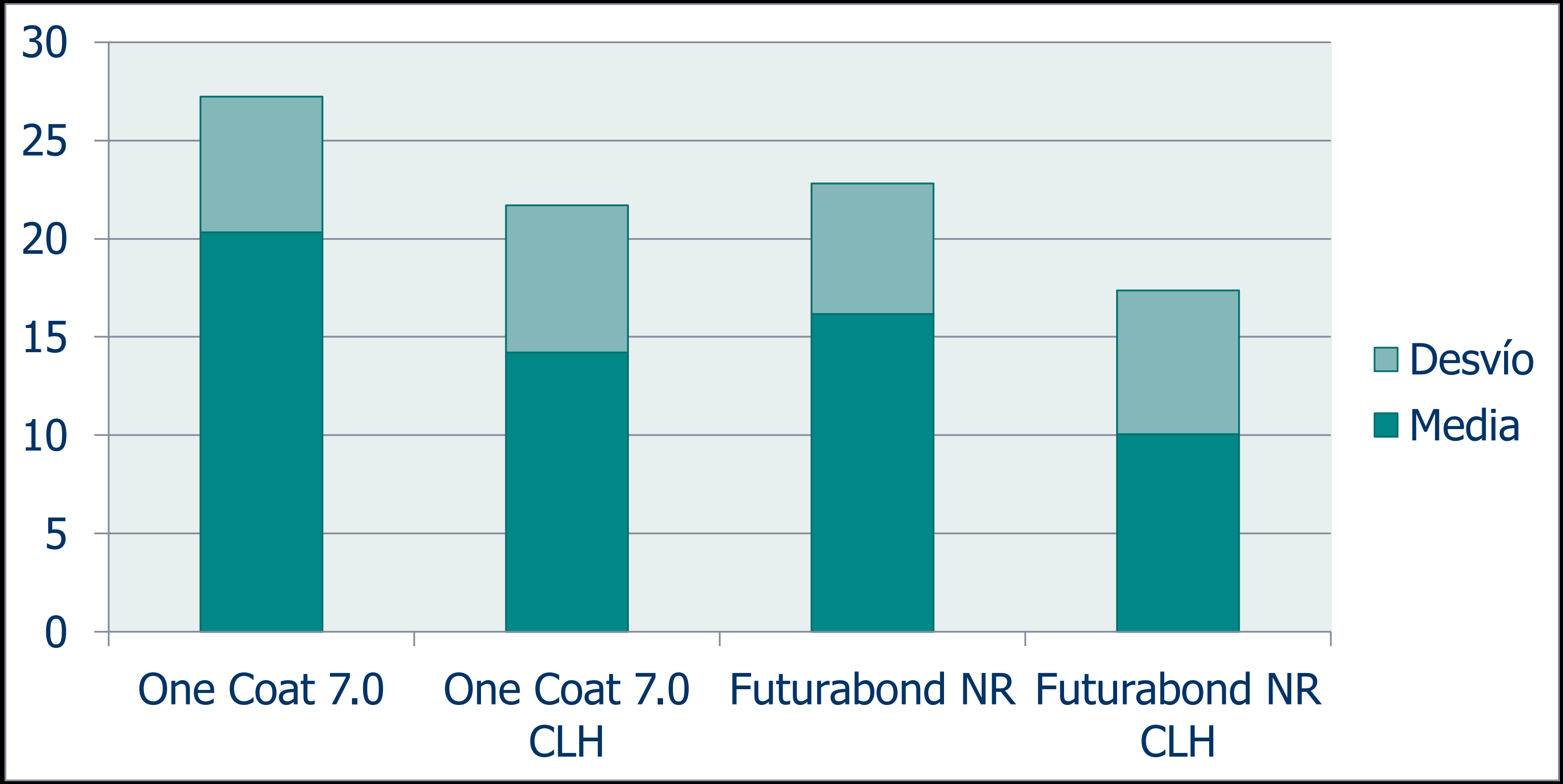
PMID: 19861692 [PubMed - indexed for MEDLINE]

V. SETIÉN[1], N. ORELLANA[1], R. RAMIREZ[1], J.H. ANDRADE[1], K. BIGOTT[2], R. AJLOUNI[3], and J. LEON[1], [1]Universidad de Los Andes, Merida, Venezuela, [2]Private practice, Merida, Venezuela, [3]Baylor College of dentistry, Dallas, TX

Presentation

The use of self-etching dental adhesives have become very practical and popular in dental practice. The effect of chlorhexidine pretreatment on Self-etch adhesive bond is not clearly understood. Objective: To determine the effect of chlorhexidine pretreatment on the micro-tensile bond strength (µTBS) of two different one-step self-etch dental adhesives, One Coat Bond 7.0, Coltene (OC) and Futurabond NR, Voco (FB). Methods: Exposed flat occlusal dentine surface of 16 human molars were polished up to 320-grit silicon carbide paper. Teeth were assigned into 4 groups: Group A (OC), Group B (OC) + Chlorhexidine gluconate 2%, Group C (FB), and Group D (FB) + Chlorhexidine gluconate 2%. A 4-mm layer of Z250 hybrid composite applied in two increments. A water irrigated low speed diamond saw was used cut the samples to obtain 4 micro-specimens from each tooth. Micro-specimens were glued to two stiff acetate veneers and tested to failure in tension at 1 mm/min using a Shimadzu universal testing machine. Data was recorded in MPa and analyzed with ANOVA and Tukey post hoc test in SPSS software. Results: Mean µTBS expressed in MPa and standard deviation (±SD) are shown here: Group A: 20.33 (± 6.9); Group B 14.21 (± 7.49); Group C 16.17 (± 6.65); Group D 10.05 (± 7.32). There was statistically significant difference (p=0.0015) among the groups, being A>B and C>D. Conclusions: The two one-step self-etch dental adhesives used in this study showed decrease in the bond strength when a 2% chlorhexidine treatment is applied prior to composite bonding thus such pretreatment should be used with caution with self-etch adhesives.

Resistencia a la tensión en MPa



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[Regresar]

Dent Mater. 2008 Jul;24(7):915-22. Epub 2007 Dec 21.

Long-term dentin retention of etch-and-rinse and self-etch adhesives and a resin-modified glass ionomer cement in non-carious cervical lesions.

van Dijken JW, Pallesen U.

Department of Odontology, Umeå University, Umeå, Sweden. Jan.van.Dijken@odont.umu.se <Jan.van.Dijken@odont.umu.se>

Abstract

OBJECTIVES: The aim of this study was to evaluate the clinical long-term retention to dentin of seven adhesive systems.

METHODS: A total of 270 Class V restorations of four etch-and-rinse, one self-etch adhesive system and a resin-modified glass ionomer cement were placed in non-carious cervical lesions without intentional enamel involvement. The restorations were evaluated at baseline, 6, 12, 18, and 24 months and then every year during a 13-year follow-up. Dentin bonding efficiency was determined by the percentage of lost restorations.

RESULTS: During the 13 years, 215 restorations could be evaluated. The cumulative loss rate at 13 years was 53.0%, with significant different failures rates for the different systems varying between 35.6 and 86.8%. Four systems fulfilled the ADA 18-month full acceptance retention criteria. Two systems showed at 18 months and earlier high debonding rates. The annual failure rates for the etch-and-rinse systems were Optibond 3.1%, Permagen 13.0%, Scotchbond MP 4.8%, Syntac classic 2.8%; for the self-etch system P&S 4.4%; and the resin-modified glass ionomer cement Vitremer 2.7%.

CONCLUSION: It can be concluded that all systems showed a continuous degradation of the bond with a wide variation, which was independent of the adhesion strategy. Three bonding systems showed a cumulative failure rate after 13 years between 36 and 41% with the best retention for the resin-modified glass ionomer cement and a four-step etch-and-rinse system.

PMID: 18155288 [PubMed - indexed for MEDLINE]

0946 Effect of one-year waterstorage on the effectiveness of dentin adhesives in Class V composite resin restorations

U. BLUNCK, and J.F. ROULET, Humboldt University of Berlin, Germany

Objective: The purpose of this study was to evaluate the effectiveness of eleven adhesive systems combined with composite resins in Class V cavities after one year waterstorage. **Methods:** In 88 extracted human teeth, per group 8 Class V cavities were prepared (approximately 4 mm high, 3 mm wide and 1,5 mm deep, one half of the margin length was located in dentin). The following adhesive systems were used: Admira Bond (AB), AquaPrime & Monobond (AM), AQ Bond (AQ), Clearfil SE Bond (CS), Excite (EX), Gluma Comfort Bond + Desensitizer (GC), Gluma Solid Bond (GS), Optibond FL (OF), Optibond Solo Plus (OS), Prompt L-Pop (PL), and Scotchbond 1 (SB) in combination with the corresponding composite resin. After 21 days of waterstorage (WS), after thermocycling (1. TC), after additional WS of one year and after 2. TC (again 2000 cycles, 5° to 55°C) replicas were taken and a quantitative margin analysis in the SEM was performed at a magnification of 200 x using defined criteria. **Results:** The median values of "continuous margin" in % of total margin length in dentin (after 1.TC / 1 y WS / 2. TC) were evaluated as AB (94,1/80,2/69,2), AM (93,7/92,9/90,3), AQ (100/97,9/94,7), CS (100/100/91,4), EX (98,5/89,7/80,2), GC (95,4/76,3/65), GS (91,1/92,5/47,8), OF (95,7/93,6/93,2), OS (98/90,9/81,7), PL (91,6/81,1/47,6), and SB (94/86,1/63,1). The statistical analysis for the data after the 2. TC us-ing the Kruskal-Wallis- and Bonferroni-test showed the following ranking (different numbers show significant differences, $p<0,05$): AQ (1), OF (1), CS (1), AM (1), OS (1, 2), EX (1, 2), AB (2, 3), GC (2, 3), SB (2, 3), PL (3), GS (3). Conclusion: The effectiveness of one-bottle-adhesives regarding marginal adaptation decreases after long-term waterstorage except for OS and EX, while the tested multi-step adhesive and self-etching systems create a more reliable bond to dentin except PL.

Seq #94 - Aging and Technique Effects on Bond Strength
1:45 PM-3:45 PM, Thursday, 7 March 2002 San Diego Convention Center Room 11B (Upper Level)

Las mayores deficiencias de los adhesivos de un paso

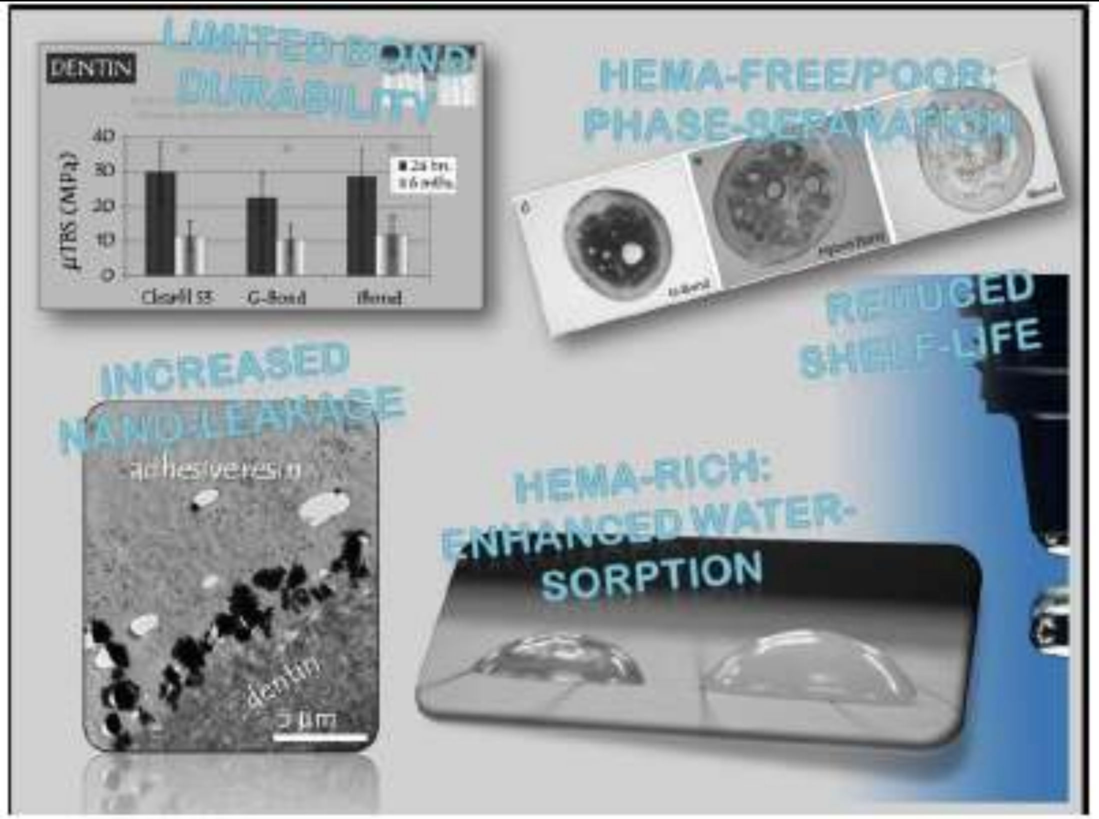
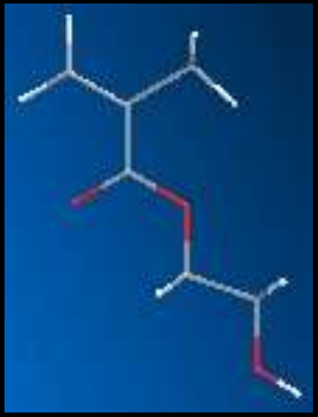


Fig. 2 – The major shortcomings of current one-step adhesives.



J Conserv Dent. 2010 Oct;13(4):173-83.

Clinical effectiveness of contemporary dentin bonding agents.

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Abstract

AIM: The purpose of this paper is to review the literature on the **clinical effectiveness** of **contemporary** resin-based dentin bonding agents primarily focussing on the longevity of restoration.

MATERIALS AND METHODS: The literature published from June 2004 up to September 2010 was reviewed for **clinical** trials that tested the **effectiveness** of dentin bonding agents in the longevity of noncarious class V restoration. Results of each study reported using the USPHS criteria for **clinical** assessment of restoration were included and tabulated. The American Dental Association guidelines for dentin and enamel **adhesives** were used as a reference to compare the performance of individual bonding agents. Kruskal-Wallis followed by Mann-Whitney U was done to compare the mean Alfa score percentage for the three categories of bonding systems [etch-and-rinse (ER), self-etch primer (SEP), and self-etch-adhesive (SEA)].

RESULTS: A comparison of the mean Alfa score percentages revealed no difference between the ER, SEP, and SEA categories of bonding systems except for marginal adaptation where ER was found to be superior to SEA.

CONCLUSION: The **clinical effectiveness** of resin-based bonding agents is comparable among the three categories.

PMID: 21217944 [PubMed] PMCID: PMC3010021 **Free PMC Article**

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J Adhes Dent. 2009 Jun;11(3):175-90.

Are one-step adhesives easier to use and better performing? Multifactorial assessment of contemporary one-step self-etching adhesives.

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Abstract

PURPOSE: The objective of this study was to examine whether one-step self-etching adhesives (1-SEAs) really have an advantage over multistep systems.

MATERIALS AND METHODS: Nine one-step self-etching adhesives (Absolute, Adper Prompt L-Pop, Clearfil S3 Bond, G-Bond, Hybrid Bond, iBond, One-up Bond F Plus, Optibond All-in-one and Xeno III) were included in this study. One two-step self-etching adhesive (Clearfil SE Bond) and one three-step etch-and-rinse adhesive (Optibond FL) served as controls. Their microtensile bond strength to bur-cut enamel and dentin was determined using a standardized protocol and the respective adhesive/dentin interface of these adhesives was characterized by transmission electron microscopy. Statistical analysis was performed with the Kruskal-Wallis nonparametric test.

RESULTS: Regarding bond strength, the control adhesives tended to perform superior to the one-step adhesives. However, a significant difference between the control adhesives and some one-step adhesives could not always be demonstrated, partly due to the statistical setup of this study. Interface analysis by electron microscopy showed wide variation among the one-step adhesives, depending on their composition and their acidity. 1-SEAs also exhibited two different kinds of droplets, depending on their hydrophilicity. Hydrophobic HEMA-free 1-SEAs such as G-Bond were prone to phase separation, while especially HEMA-containing hydrophilic 1-SEAs, such as Clearfil S3 Bond and Xeno III were predisposed to forming osmosis-induced droplets. Hybrid bond, Absolute, and iBond featured both phase separation as well as osmosis. Optibond All-in-one exhibited a clustering reaction of the filler particles upon solvent evaporation. All adhesives including the control adhesives showed signs of nanoleakage, indicating that all adhesives are to some extent permeable to water. A definitive conclusion with regard to quantitative assessment of nanoleakage was much hindered by inconsistencies in the silver deposition. The application procedure of some 1-SEAs sometimes proved as elaborate and time consuming as those of the two-step adhesive Clearfil SE Bond.

CONCLUSION: Considering bond strength and application procedure, 1-SEAs are not always a better alternative to multistep adhesives.

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J Esthet Restor Dent. 2010 Aug;22(4):270-5.

PMID: 19603581 [PubMed - indexed for MEDLINE]

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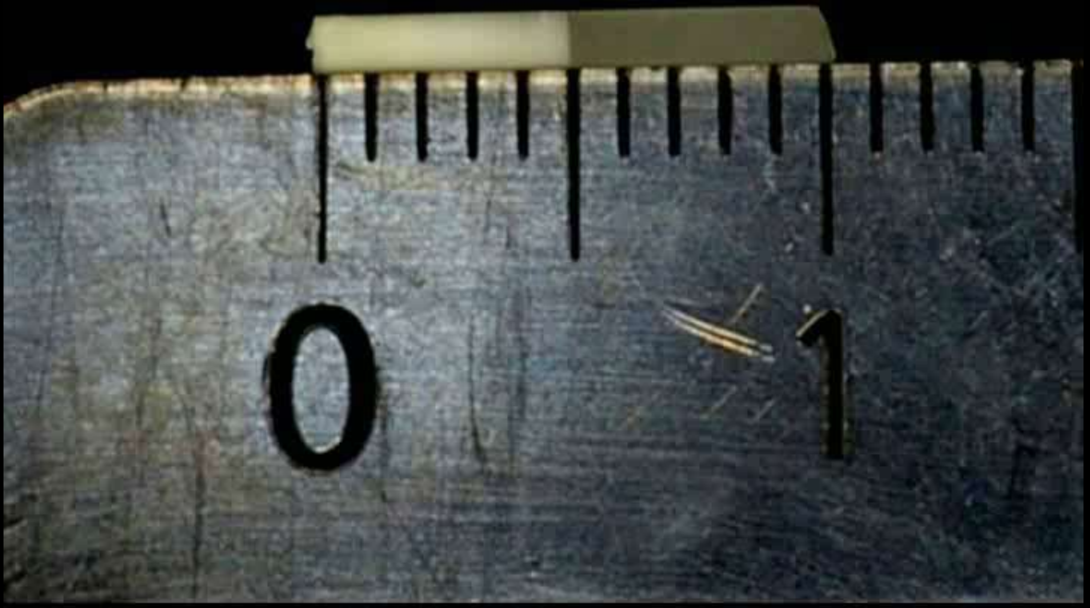

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