

PRINT ISSN 0913-1655 ONLINE ISSN 2185-9566



接着歯学	第41回 日本接着歯学会学術大会	
Adhes Dent	国際接着歯学会(IAD2022@Sapporo)	併催
	講演集 (2022年6月3·4·5日 札幌)	

一般社団法人日本接着歯学会 Japan Society for Adhesive Dentistry http://www.adhesive-dent.com/





(CAD/CAM 冠、CAD/CAM インレーといえばセラスマート)

	適用範囲	機能区分	色調	サイズ
	小口齿	CAD/CAM冠用材料	HT:A1HT、A2HT、A3HT、A3.5HT	12
セラスマート ノライム	小日圏	(I)	LT:A1LT、A2LT、A3LT、A3.5LT、A4LT	12,14
	+1774	CAD/CAM冠用材料	HT:A2HT,A3HT	12,14
セラスマート300	人日圏	(Ⅲ)	LT:A2LT、A3LT、A3.5LT	12、14、16
セラスマートレイヤー	前歯	CAD/CAM冠用材料 (Ⅳ)	A1EL、A2EL、A3EL、A3.5EL	12.14

セラスマートプライム、300 に 透明性の高い HT 色が追加されました

歯科切削加工用レジン材料 セラスマート 300 管理医療機器 228AABZX00116000 歯科切削加工用レジン材料 セラスマート ブライム 管理医療機器 302AKBZX00007000 歯科切削加工用レジン材料 セラスマート レイヤー 管理医療機器 231AKBZX00004000

7年経過後も審美性を保つセラスマート。

次世代シランコーティング「FSCテクノロジー」で高密度に充填 されたナノサイズフィラーにより、高い耐摩耗性をもち長期的に ツヤを保ちます。さらにベースレジンモノマーの改良により 吸水量を大幅に抑え、耐着色性にすぐれています。

歯科接着用レジンセメント 管理医療機器

ジーセム ONE 228AKBZX00104000





幅広い加工機に対応 Aodva® CEREC UNIVERSAL



※CEREC SYSTEM用については、デンツプライシロナ株式会社に お問い合わせください。

** UNIVERSAL対応の加工機については、各加工機メーカーに お問い合わせください。

※**UNIVERSAL用**はAadva CAD/CAM SYSTEM、PlanMill及び CEREC SYSTEMには、ご使用できません。

発売元 株式会社 ジーシー / 製造販売テ 東京都文京区本郷3丁目2番14号

/ 製造販売元株式会社 ジーシー 東京都板橋区蓮沼町76番1号 / 製造販売元株式会社 ジーシーデンタルプロダクツ 愛知県春日井市鳥居松町2丁目285番地

カスタマーサービスセンター お客様窓口 100 0120-416480 ^{受付時間 9:00a.m.~5:00p.m. (土曜日、田曜日、祝日を除く)} ※アフターサービスについては、最寄りの営業所へお願いします。 WWW.gcdental.co.jp/ 支店●東京 (03)3813-5751 ●大阪 (06)4790-7333 営業所 ●北海道 (011)729-2130 ●東北 (022)207-3370 ●名古屋 (052)757-5722 ●九州 (092)441-1286



滴下後30分間 使用可能



ボンディング前の 歯面乾燥、できていますか?

Prime&Bond Universal™ Universal Adhesive

製品名:プライム&ボンド ユニバーサル/一般的名称:歯科用象牙質接着材/認証番号:230AGBZX00043000/クラス分類:I

Prime&Bond® universal Universal Adhesive プライム&ボンド ユニバーサル

湿潤環境下にも強いボンディング材

当社開発によるアクティブガードテクノロジー

- 歯面の水分をコントロールし、接着阻害要因を除去
- 薄く均一でムラのないボンド層を実現し、テクニカルエラーを軽減

デンツプライシロナ株式会社

www.dentsplysirona.com

THE DENTAL SOLUTIONS COMPANY





Noritake

プライマー不要 シラン処理ができるレジンセメント

CAD/CAMレジン冠*にも金属冠にもMultiに高接着



・「SAルーティング」及び「MDP」は株式会社クラレの登録商標です。



モノブロック根管充填を可能にした 接着性レジン系根管充填用シーラー メタシールSoft ペースト

「接着」で封鎖性が高い!



●4-METAと親水性アミノ酸系重合開始剤に より良好な樹脂含浸層を形成 レジンなのに高湿潤環境でも硬化

> 歯科用根管充填シーラ メタシールSoft ペースト ベースペースト 2.5mL 標準価格 ¥9.300

キャタペースト 2.5mL



良好なX線造影性

SUN MEDICAL

MetaSEAL



歯科用根管充填シーラ メタシールSoft ペースト(管理医療機器) 医療機器認証番号 301AKBZX00045000 ■ご使用に探しては、必ず製品添付の「添付文書」をお読みの上、正しくお使いください。 ■製品の仕様、デザイン(こつきましては予告なく変更になることがあります。 ■掲載の色調は印刷のため実物とは異なります。 ■標準価格・表示記載は2020年07月21日現在のものです。価格に消費税は含まれておりません。



メタシールSoft ペーストの情報がご覧いただけます。 www.sunmedical.co.jp サンメディカル

スマートフォン 🔲 からのアクセス はコチラ



フリーダイヤル 0120-418-303 (FAX共通) 電話受付時間 月~金(祝日を除く) 午前9:00~午後5:30 524-0044 滋賀県守山市古高町 571-2 🕿 077(582)9980

株式会社モリタ

大阪本社/〒564-8650 大阪府欧田市垂水町3-33-18 206-6380-2525 東京本社/〒110-8513 東京都台東区上野2-11-15 203-3834-6161 お客様相談センター フリーコール 0800-222-8020 (医療従事者様専用)







eautiBon

審美修復に適した あらゆる材料に

> 1ボトル 1シリンジで対応

ResiCem

美しい透明性は そのままに

耐変色性が 向上

審美修復用接着性レジンセメント 松風ミキサーチップ(ショート)10個付 【色調】3色/クリア、アイボリー、オペーク

歯科用象牙質接着材

レジセム EX ペースト 5.0mL(9.2g)…¥8,000 ビューティボンド Xtreme 1セット…¥16,000 【内容】ビューティボンド Xtreme 5.0mL ディスポブラシ ファイン(ピンク)50 松風Vディッシュ 25

販売名	一般的名称	承認·認証·届出番号
レジセム EX	歯科用コンポジットレジンセメント	管理医療機器 医療機器認証番号 302AFBZX00112000
松風ミキシングセット	歯科用練成器具	一般医療機器 医療機器届出番号 26B1X00004000229
ビューティボンド Xtreme	 歯科用象牙質接着材 (歯科金属用接着材料)(歯科セラミックス用接着材料) (歯科用知覚過敏抑制材料)(歯科用シーリング・コーティング材)	管理医療機器 医療機器認証番号 302AKBZX00026000

価格は2022年5月現在の標準医院価格(消費税抜き)です。

製品の詳細はこちらまで…

松風 検索 www.shofu.co.jp



株式会社 松原 ●本社:〒605-0983京都市東山区福稲上高松町11 お客様サポート窓口(075)778-5482 受付時間8:30~12:00 12:45~17:00(土日祝除く) www.shofu.co.jp

●本社:〒605-0983京都市東山区福稲上高松町11 お客様サポート窓口(075)778-5482 受付時間8:30~12:00 12:45~17:00(土日祝除く) www.shofu.co.jp

● 本社:〒605-0983京都市東山区福稲上高松町11 お客様サポート窓口(075)778-5482 受付時間8:30~12:00 12:45~17:00(土日祝除く) www.shofu.co.jp





※併用材料が特定の前処理材・接着材を指定している場合を除きます。 ※硬化したアクリル系レジンには接着いたしません。

ボ
 標準
 歯科用
 歯科
 (管理

ボンドマー ライトレス 標準医院価格 ¥9,000/セット

歯科用象牙質接着材/ 歯科セラミックス用接着材料/歯科金属用接着材料 (管理医療機器)認証番号 228AABZX00104000 在庫管理もらくらく!!/

前処理材を共通化することにより



●札 幌TEL011-812-5690 ●仙 台TEL022-717-6444 ●東 京TEL03-3835-7201 ●名古屋TEL052-932-6851 ●大 阪TEL06-6386-0700 ●福 岡TEL092-412-3240

大会長挨拶

6月の札幌は,穏やかな日差しと新緑で最高の季節を迎えます.この度,第41回日本接着歯学会 学術大会と国際接着歯学会(IAD2022@Sapporo)を北海道大学学術交流会館で開催させていただく 運びとなりました.

世界的なコロナ禍の影響によって学会の開催もすっかりオンライン開催が定着しましたが,ようや く社会がポストコロナに少しずつ動き出しつつあります.一方,世界的にはコロナ感染者が増加して いる地域もあり,日本への渡航も困難な状況が続いています.本大会は国内演者については対面での 講演,海外の演者については対面あるいはオンラインでの講演を予定しております.

本大会のメインテーマを「接着歯学 2022 変革と挑戦」とさせていただきました.日本接着歯学 会は,研究者,臨床家,メーカーの方々などが一堂に会する大変ユニークな学会であり,学術的な変 革と挑戦は本学会の中心を成すものです.一方,今後の学会の発展を見据えた国際性や社会的な役割 においても変革と挑戦を続ける必要があります.

是非多くの皆様にご参加いただき、6月の札幌でお会いできますことを強く祈念しております.

第41回日本接着歯学会学術大会大会長 朝日大学歯学部口腔機能修復学講座 歯科保存学分野歯冠修復学 教授 二階堂 徹

国際接着歯学会(IAD2022@Sapporo)大会長 北海道大学大学院歯学研究院 歯科保存学教室 教授 佐野 英彦

Presidents' Greeting

The Joint Meeting of 41st Annual Meeting of the Japanese Society for Adhesive Dentistry and IAD2022@Sapporo will be held at the Hokkaido University Conference Hall, from Friday, June 3, to Sunday, June 5, 2022. Although we cannot predict how COVID-19 will shift and change in the near future, we are aiming to hold the meeting in a face-to-face manner, or a hybrid format with opportunities to welcome on-site and online. We are also going to take every possible measure to prevent the spread of the virus during the meeting.

The theme as translated from the original Japanese is "Adhesive Dentistry 2022 Innovation and Challenge". The concept is that the unique conference where researchers, clinicians, and manufacturers are put together seeks creative research results, which should be derived from the concept of "Innovation and Challenge", as well as the global contribution of scientific outcome of our society.

We are looking forward to meeting many of you in Sapporo in June 2022 in the "new normal" of scientific meetings in the "era of coexisting with the SARS-CoV-2".

Hidehiko Sano The International Congress on Adhesive Dentistry Congress President Department of Restorative Dentistry, Faculty of Dental Medicine, Hokkaido University

Toru Nikaido The 41st Annual meeting of Japan Society for Adhesive Dentistry Congress President Department of Opertive Dentistry, Division of Oral Functional Science and Rehabilitation, Asahi University School of Dentistry

The IAD2022@Sapporo and The 41st JSAD Time Schedule

1st Floor **1st Meeting room**

1st Floor **2nd Meeting room**

1st Floor **3rd Meeting room**

1st & 2nd Floor **Hall & Foyer**

Friday, June 3,	2022																					
会場名	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15	:00	16:00		17:00) L	18:0	00	ا 	9:00		20:00	<u></u>	2	21:00
1st Floor Entrance Lobby								Registrat	ion													
2nd Floor Auditorium						Opening Ceremony	II Le	nvited cture 1	Invited Lecture 2	Inv Lect	vited ture 3	I	IAD Internat meet) tional ing								
1st Floor Small Auditorium						Memorial Ceremony			Satellite	Venue	9											
1st Floor 1st Meeting room								F	Poster Pre	esentat	ion											
1st Floor 2nd Meeting room															Edi Bo	torial oard						
1st & 2nd Floor Hall & Foyer									Exhib	ition												
Saturday, June	Saturday, June 4, 2022																					
会場名	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15	:00	16:00	I	17:00	1	18:0	00	1	9:00	1	20:00	, 1	ĩ	21:00
1st Floor Entrance Lobby				Reg	gistration																	
2nd Floor Auditorium		Invited Lecture 4	Invited Lecture 5			Sr Leo	becial sture 1	Special Lecture 2	Special Certifica Worksh	list ation nop												
1st Floor Small Auditorium		Satelli	te Venue				Sat	ellite Ven	ue													
1st Floor 1st Meeting room					Poster F	Presentation																
1st & 2nd Floor Hall & Foyer					Ex	hibition																
Sunday, June 5,	Sunday, June 5, 2022																					
会場名	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:	:00	16:00	I	17:00	1	18:0	00	1	9:00	1	20:00	, 	î	21:00
1st Floor Entrance Lobby		Registration																				
2nd Floor Auditorium		Invited Lecture 6	Education Lecture	al		Closing Ceremony																
1st Floor Small Auditorium		Sate	llite Venue																			

Awards

Committee

Examination

····Japanese only available

Poster Presentation

Exhibition

Discussion

Map Access in Hokkaido University Conference Hall



Getting Here:

I'm at New Chitose Airport!

Train:

We strongly recommend catching the 40 minute JR Rapid Airport Line from the airport to Sapporo Station which runs every 15 minutes. Fare: Adult 1,070 yen/Child 530 yen

Bus:

An express bus, known as the Chuo Bus/Hokuto Kotsu Bus also departs from New Chitose Airport bound for Sapporo station and takes approximately 70 minutes. Fare: Adult 1,030 yen/Child 520 yen

I'm at Sapporo Station!

Walk (7 mins):

After arriving at Sapporo station, it is a short walk to the main gate of the campus. Upon disembarking the train, aim for the west ticket gates and then take the north exit out of the station. Walk down the stairs, cross the pedestrian crossing and veer to the right of the Sunkus Convenience Store. Walk straight, passing the North Pacific Bank on your left, and continue for 4 minutes until you reach an intersection with a Mos Burger on the right and a car park on your left. This is the North 9, West 3 intersection. Turn left here and walk straight to the Main Gate of the campus.

Taxi (5 mins):

If you have luggage or are due to arrive on a snowy or rainy day, we advise catching a taxi from the station to the university. A taxi fare usually starts at and should not be much more than around 700 yen due to the close proximity of the university.

Subway (5 mins + walk):

Take the Namboku Subway Line heading towards Asabu at Sapporo Station and get off at the next stop, Kita 12-jo. It's about a 10 minute walk from there to the university. Once you exit the station, follow the signs to the university. Subway fares are 200 yen for a single trip.



Hokkaido University Conference Hall



General Information

Date: June 3 – 5, 2022 Venue: Hokkaido University Conference Hall Address: 5-8-1, Kita 8 jonishi, KitaWard, Sapporo, Hokkaido 060-0808 JAPAN Tel: +81-11-706-2042 (011-706-2042)

Official Language

English.

D

(Only Japanese is used in the 41st JSAD program (Special Lecture 1~2, Educational Lecture (JSAD))

Registration and General Information Desk

Registration for the Congress will take place at the following time and places. Entrance Lobby of Hokkaido University Conference Hall on the 1st floor

June 3 Friday	12:30 - 17:00
June 4 Saturday	8:30 - 15:10
June 5 Sunday	8:30 - 10:00

rees	
Dentist / Others	30,000 JPY
Graduate Student	10,000 JPY

Information Board

information for all participants will be posted on this board which is located close to the registration desk. Participants are requested to check this board for important information.

Message Board for participants

A message board is available to allow participants to leave message for each other.

About the lifelong training of the Japan Dental Association

*Those who come to the venue

You will be given the QR code of the application form at the general reception.

*Those who participate online

We will post the QR code of the application form on the congress website.

Please access the application form from the QR code, fill in the information and apply.

About IAD Educational Lecture

Many lecture videos will be released in the IAD Educational Lecture.

Abstracts and lecture videos will be posted on the congress website.

Others

- * Cloakroom reception is available at the following locations and times.
 - 5th meeting room of Hokkaido University Conference Hall on the 1st floor

June 3 Friday	12:30 - 18:10
June 4 Saturday	8:30 - 16:20
June 5 Sunday	8:30 - 12:20

- * Video and photography inside the venue is prohibited.
- * If you have any questions, please follow the chair's instructions and use the designated microphone briefly.
- * Please refrain from eating and drinking in the auditorium and the 1st meeting room except for hydration.

Program	Venue program	Online program
 Invited Lecture 1 ~ 6 (IAD) Special Lecture 1 · 2 (JSAD, only in Japanese) Educational Lecture (JSAD, only in Japanese) 	0	O (Live streaming)
• Specialist Certification Workshop (JSAD, only in Japanese)	0	(Live streaming + On-demand delivery)
• Educational Lecture (IAD)	_	On-demand delivery)
• Poster Presentation (JSAD)	0	On-demand delivery)
• Poster Presentation (IAD)	_	Or-demand delivery)

Related Meeting

IAD International Meeting Date: June 3 Friday Time: 17:00 – 18:00 Place: Hokkaido University Conference Hall 2nd Floor Auditorium

Exhibition

The exhibition will open at the following hours at Hokkaido University Conference Hall 1st Floor Entrance Hall and 2nd Floor Foyer.

June 3 Friday	13:30 - 18:00
June 4 Saturday	9:00 - 16:10
June 5 Sunday	9:00 - 11:00

List of Exhibitors 3M Japan Limited Dentsply Sirona K.K. DENTAL ARROW Co., Ltd. GC Corporation J.MORITA Corporation Kuraray Noritake Dental Inc. MORIMURA DENTAL COMPANY SHOFU Inc. SUN MEDICAL Co., Ltd. Tokuyama Dental Corporation

Acknowledgement

The organizing Committee is very grateful to all contributors for their generous support.

GOLD SPONSOR

GC Corporation Kuraray Noritake Dental Inc. SHOFU Inc. SUN MEDICAL Co., Ltd. Tokuyama Dental Corporation

SILVER SPONSOR

MORIMURA DENTAL COMPANY

OTHER SPONSOR

3M Japan Limited Dentsply Sirona K.K. DENTAL ARROW Co., Ltd. J.MORITA Corporation

Guideline for Poster presentations

1) Presentation at "The 41st annual meeting of Japan Society for Adhesive Dentistry" Presentations will be given at the local venue and by e-poster. (PDF data will be submitted in advance)

[Poster posting / announcement at the local venue]

- · Please attach the poster after confirming the arrival at the poster presentation reception desk.
- Be sure to attach / remove the poster within the designated time.

[Poster Presentation Schedule]

JSAD Presenters

une 3 (Fri) 12:30 – 13:30 Conference Hall 1F 1st Meeting room
une 3 (Fri) 12:30 - 13:30
une 3 (Fri) 13:30 – 18:00 une 4 (Sat) 9:00 – 16:10 une 5 (Sun) 9:00 – 11:00
une 5 (Sun) 11:00 – 11:50
une 5 (Sun) 11:50 – 12:30

* Posters left after the removal time will be disposed of by the congress staff.

[Poster size]

 \cdot The board will be used vertically. Dimensions of the board are 86 cm (width) \times 176 cm (hight).

• Presentation number, you receive in advance will be posted in the top left corner of your poster.

• Please prepare your own push pins (with no use of double-sided tape).

[Poster discussion]

All delegates at the meeting have the opportunity to make comments, or ask questions during the discussion time. Poster presenters, please be sure to wait before the poster during the discussion time.



Scientific Program

Invited Lectures (IL) (招待講演)	37
Special Lectures (SL) (特別講演)	43
Educational Lecture (EL) (教育講演)	45
Specialist Certification Workshop (SCW) (専門医認定研修会)	46
JSAD Poster Presentations (JP)(日本接着歯学会 ポスター発表)	48
IAD Poster Presentations (IP) (国際接着歯学会 ポスター発表)	55

複写および転載される方に

「一般社団法人日本接着歯学会」は、一般社団法人学術著作権協会(学著協)に複写複製および転載複製 に関する権利委託していますので、本誌に掲載された著作物を複写あるいは転載したい方は、学著協が提供 している複製利用許諾システムもしくは転載許諾システムを通じて申請してください.

なお,本学会の会員(賛助会員も含む)が転載利用の申請をされる場合には,本学会事務局に直接お問い 合わせください.利用される際には予め申請いただくようお願い致します.

権利委託先:一般社団法人学術著作権協会 https://www.jaacc.org/

また、アメリカ合衆国において本書を複写したい場合は、次の団体に連絡して下さい.

Copyright Clearance Center, Inc. 222 Rosewood Drive, Danvers, MA 01923 USA Phone : 1-978-750-8400 Fax : 1-978-646-8600

Notice for photocopying and reusing

Japan Society for Adhesive Dentistry authorized Japan Academic Association for Copyright Clearance (JAC) to license our reproduction rights and reuse rights of copyrighted works.

If you wish to obtain permissions of these rights in the countries or regions outside Japan, please refer to the home page of JAC (http://www.jaacc.org/en/) and confirm appropriate organizations.

When you reuse the contents for non-commercial use, however, please contact us directly to obtain the permission for the reuse content in advance.

Users in USA

Copyright Clearance Center, Inc. 222 Rosewood Drive, Danvers, MA 01923 USA Phone : 1-978-750-8400 Fax : 1-978-646-8600

The 41st Annual Meeting of Japan Society for Adhesive Dentistry, The International Congress on Adhesive Dentistry (IAD2022@Sapporo) Program

Day 1 6/3 (Fri) Venue: 2nd floor Auditorium Satellite Venue: 1st floor Small Auditorium

$13:20\sim13:30$	Opening Ceremony:	President of the 41st JSAD	Toru Nikaido
		President of the IAD	Hidehiko Sano

13:30 \sim 13:50 Memorial Ceremony In memoriam: Nobuo Nakabayashi

14:00 ~ 14:45 Invited Lecture 1 Chair: Yasushi Shimada (Tokyo Medical and Dental University) [Creating a future of dentistry] Junji Tagami (Quartz Dental Clinic)

 $14:45 \sim 15:00$ Break Time

 $15:00 \sim 15:45$ Invited Lecture 2 Chair: Monica Yamauti (Hokkaido University) [Sustainable biomimetic approaches for restoration of vital vs devital teeth] Sema Belli (Selcuk University, Republic of Turkey)

 $15:45 \sim 16:00$ Break Time

 $16:45 \sim 17:00$ Break Time

 $17:00 \sim 18:00$ IAD International Meeting

 $13:30 \sim 18:00$ Poster Presentation

Venue: 1st f	loor 1st Meeting Room	
<u>*Only JSA</u>	D Poster Presentations can be viewed and discussed at the venue.	
Set-up Post	ers: 6/3 (Fri) 12:30 ~ 13:30	
Viewing Tim	ne: $6/3$ (Fri) $13:30 \sim 18:00$	
	$6/4$ (Sat) $9:00 \sim 16:10$	
	$6/5$ (Sun) $9:00 \sim 11:00$	
Discussion	Time: 6/5 (Sun) 11:00 \sim 11:50	
Remove Pos	sters: $6/5$ (Sun) $11:50 \sim 12:30$	
JSAD: You can viewed at the venue and online.		
J-1. Wet-dentin bonding state of recent all-in-one adhesive systems under in vitro		
	pressure conditions	
	Department of Adnesive Dentistry, School of Life Dentistry at Tokyo, The Nippon Dental	
	University	
	Komoto M, Sugiyama K, Maruyama C, Kosnida S, Nara Y	
J-∠.	Dentin bonding durability of four different sen-etch adnesives	
	School of Daptistry, Asshi University	
	² Division of Biomatorials, Prosthedentic Dentistry, Department, Faculty of Dentistry, King	
	Solmon International University, El Tur, South Sinci Egynt	
	Saman international Oniversity, El Tur, South Sinai, Egypt Kitabara S^{1} Takagali: T^{1} Shimigu S^{1} Okomura S^{1} Ita P^{1} Muramatau P^{1} Abdau A^{2}	
Kitahara S ⁴ , Takagaki T ⁴ , Shimizu S ⁴ , Okamura S ⁴ , Ito R ⁴ , Muramatsu R ⁴ , At		
1-3	Evaluation of the effects of HEMA and MDP formulation on 2-step bonding agent	
GC Corporation		
Shoii T. Yamashita M. Hirano K. Fuseiima F.		
J-4.	Effect of simulated pulp pressure on universal adhesives bond strength	
	Department of Restorative Dentistry, Faculty of Dental Medicine, Hokkaido University	
	Li Y. Liu Y. Sakata T. Alam A. Md Refat Readul Islam, Tanaka T. Ikeda T. Hoshika S.	
	Matsumoto M. Kawamoto C. Yamauti M. Sano H	
J-5.	Preliminary study for development of new micro tensile bond strength testing	
	Department of Restorative Dentistry, Faculty of Dental Medicine and Graduate School of	
	Dental Medicine, Hokkaido University, Sapporo, Japan	
	Yamashita K, Toida Y, Matsumoto M, Hoshika S, Kawamoto C, Ikeda T, Tanaka T, Yamauti M,	
	Sano H	
J-6.	Effect of various surface treatments on tensile bond strength to lithium disilicate glass	
	ceramics	
	¹⁾ Department of Operative Dentistry, Division of Oral Functional Science and Rehabilitation,	
	School of Dentistry, Asahi University	
	²⁾ Division of Biomaterials, Prosthodontic Dentistry Department, Faculty of Dentistry, King	
Salman International University, El Tur, South Sinai, Egypt		
	Shimizu S ¹⁾ , Takagaki T ¹⁾ , Kitahara S ¹⁾ , Kusakabe S ¹⁾ , Abdou A ²⁾ , Nikaido T ¹⁾	

- J-7. Alkali and acid treatments for removing salivary contamination on feldspar porcelain Division of Biomaterials, Kyushu Dental University Komagata Y, Ikeda H, Nagamatsu Y, Shimizu H
- J-8. Effects of ceramic primers on the bonding of resin cement to air-abraded zirconia with alumina or silica-coated alumina

¹⁾ Department of Applied Prosthodontics, Graduate School of Biomedical Sciences, Nagasaki University

²⁾ Clinic of Fixed Prosthodontics, Nagasaki University Hospital

Tsuda F¹⁾, Yoshida K²⁾

J-9. Effect of building direction on shear bond strength of additive manufacturing zirconia ¹⁾ Division of Fixed Prosthodontics, Department of Restorative & Biomaterials Sciences, Meikai University School of Dentistry

²⁾ Department of Dental Materials, The Nippon Dental University, School of Life Dentistry at Tokyo

Miura S¹, Shinya A², Miura D², Ishida Y², Fujisawa M¹

- J-10. Effects of primers on bond strength between titanium and self-adhesive resin cement Department of Dental Materials Science, Division of Oral Functional Sciences and Rehabilitation, Asahi University School of Dentistry Okuyama K, Tamaki Y
- J-11. Shear bond strength of resin cement to FDM-formed PEEK and the effect of fabrication direction

Dental Materials Science, School of Life Dentistry at Tokyo, The Nippon Dental University Miura D, Ishida Y, Aoki H, Shinya A

J-12. Evaluation of wear resistance of resin cements GC Corporation

Sato K, Hirano K, Fusejima F

J-13. Development and validation of new pressure variable chairside sandblaster

¹⁾ Department of Operative Dentistry, Division of Oral Functional Science and Rehabilitation, School of Dentistry, Asahi University

²⁾ Morita Tokyo Mfg. Co., Ltd. Third Technology Development Department

Okamura S¹), Takagaki T¹), Kitahara S¹), Shimizu S¹), Ito R¹), Idono T¹), Arakawa Y²), Nikaido T¹)

J-14. The effect of blood on the hardening of pulp capping agents

Department of Restorative Dentistry and Endodontology, Kagoshima University Graduate School of Medical and Dental Sciences

Hoshika T, Katsumata A, Nishitani Y

IAD: You can be viewed only online.

I-1.	Nondestructive observation of adhesively cemented interface between dentin and indirect composite resin disks using a novel terahertz pulsed imaging technique
	¹⁾ Department of Regenerative Dental Medicine, Tokushima University Graduate School of Biomedical Sciences
	²⁾ Institute of Post-LED Photonics, Tokushima University
	Yonekura K ¹⁾ , Ida Y ¹⁾ , Tokisane Y ²⁾ , Yano T ²⁾ , Iuchi T ¹⁾ , Yasui T ²⁾ , Hosaka K ¹⁾
I-2.	Clinical performance of mono-block direct composite crown restorations
	¹⁾ Tashiro Dental Clinic, ²⁾ Habara Dental Clinic, ³⁾ Quartz Dental Clinic
	⁴⁾ Department of Operative Dentistry, Division of Oral Functional Science and Rehabilitation, Asahi University School of Dentistry
	⁵⁾ Department of Regenerative Dental Medicine, Tokushima University Graduate School of Biomedical Sciences
	⁶⁾ Department of Cariology and Operative Dentistry, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University (TMDU)
	Tashiro H ¹⁾ , Miki H ²⁾ , Tagami J ^{3,6)} , Takagaki T ⁴⁾ , Hosaka K ⁵⁾ , Sato T ⁶⁾ , Hatayama T ⁶⁾ , Shimada Y ⁶⁾
I-3.	Effect of Silver Diammine fluoride on bond strength of new universal adhesives
	Department of Restorative Dentistry, Faculty of dental Medicine, Hokkaido University
	Papichaya I, Yuan Y, Ikeda T, Kawamoto C, Tanaka T, Hoshika S, Matsumoto M, Sano H
I-4.	Are HEMA and 10-MDP necessary in the bonding agent of a 2-SEA?
	¹⁾ Department of Regenerative Dental Medicine, Tokushima University Graduate School of Biomedical Sciences
	²⁾ Cariology and Operative Dentistry, Department of Restorative Sciences, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University
	³⁾ Department of Oral Prosthetic Engineering, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University
	⁴⁾ Department of Biomaterials and Bioengineering, Tokushima University Graduate School of Biomedical Sciences
	Iuchi T ¹⁾ , Yonekura K ¹⁾ , Ida Y ¹⁾ , Motoyama Y ²⁾ , Ikeda M ³⁾ , Hamada K ⁴⁾ , Nakajima M ²⁾ , Hosaka K ¹⁾
I-5.	Polymerization Behavior of Composites at Top/Bottom of Cavity using Different Light Cure
	¹⁾ Department of Cariology and Operative Dentistry, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University
	²⁾ Department of Restorative Dentistry, School of Dentistry, University of Washington Yoshikawa T ¹⁾ , Sadr A ²⁾ , Shimada Y ¹⁾
I-6.	Effect of new resin based dentin desensitizer on permeability for the treatment of dentin hypersensitivity
	Department of Operative Dentistry. Osaka Dental University
	Yasuo K, Morikawa Y, Iwasaki K, Ouchi S, Onda K, Suzuki K, Miyaji H, Hatsuoka Y.
	Iwata N, Yoshikawa K, Yamamoto K

I-7.	Bond strength of resin composite to novel octyl-type silane coupling agent
	¹⁾ Department of Clinical Biomaterials, Kanagawa Dental University
	²⁾ Materials & Surface Engineering Research Institute, Kanto Gakuin University
	Nihei T ^{1,2)} , Katayama Y ¹⁾ , Midono T ¹⁾ , Aoki K ¹⁾ , Yamaguchi H ¹⁾ , Ohashi K ¹⁾
I-8.	Shear bond strength to tooth structure of a new light-cured resin cement
	¹⁾ Department of Biomaterials, Okayama University Graduate School of Medicine, Dentistry and Pharmaceutical Sciences.
	²⁾ Occlusion and Removable Prosthodontics, Okayama University Hospital Irie M ¹⁾ Maruo Y ²⁾ Nishigawa G ²⁾ Matsumoto T ¹⁾
1-9	The effect of deproteinizing pretreatment on bonding performance and acid resistance to
	eroded dentin
	¹⁾ Department of Cariology and Operative Dentistry, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University, Japan
	²⁾ Department of Regenerative Dental Medicine, Graduate School of Biomedical Sciences, Tokushima University, Japan
	³⁾ Department of Oral Prosthetic Engineering, Graduate School of Medical and Dental
	Sciences, Tokyo Medical and Dental University, Japan
	Yi Yang ¹⁾ , Inoue G ¹⁾ , Hosaka K ²⁾ , Ikeda M ³⁾ , Shimada Y ¹⁾
I-10.	Mechanical properties of the newly-developed cavity lining/base material containing
	mineral trioxide aggregate
	¹⁾ Department of Operative Dentistry, Endodontology, and Periodontology, School of Dentistry, Matsumoto Dental University
	²⁾ Department of Oral Health Promotion, Graduate School of Oral Medicine, Matsumoto Dental University
	Nakamura K ¹⁾ , Wu Chia-Ying ^{1,2)} , Kobayashi A ^{1,2)} , Koike T ¹⁾ , Miyakuni A ¹⁾ , Kohda K ¹⁾ , Komatsu S ¹⁾ , Komachiya M ¹⁾ , Abo H ¹⁾ , Kameyama A ^{1,2)}
I-11.	Influence of nanochitosan self-etch primers on the dentin surface and in proteolytic activity ¹⁾ Department of Restorative Dentistry, School of Dentistry of Ribeirão Preto, University of São Paulo
	²⁾ Department of Pediatric Clinics, School of Dentistry of Ribeirão Preto, University of São Paulo
	Pâmella Coelho Dias ¹⁾ , Gabriela Migotto Goering ¹⁾ , Isabela Barbosa Quero ¹⁾ ,
	Juliana Jendiroba Faraoni ¹⁾ , Francisco Wanderley Garcia de Paula e Silva ²⁾ ,
	Regina Guenka Palma-Dibb ¹⁾
I-12.	Effect of operator experience on dentin bond strength of different adhesives
	¹⁾ Department of Restorative Dentistry, Graduate School of Dental Medicine, Hokkaido University, Sapporo, Japan
	²⁾ Faculty of Dental Medicine, Hokkaido University, Sapporo, Japan
	³⁾ Department of Stomatology, Beijing Tongren Hospital, Capital Medical University, Beijing, China
	Di Wu ¹⁾ , Kawamoto C ¹⁾ , Yamauti M ¹⁾ , Ito N ²⁾ , Okazaki T ²⁾ , Ye Yao ¹⁾ , Toyama A ¹⁾ ,
	Arefin Alam ¹⁾ , Fei Chen ³⁾ , Hoshika S ¹⁾ , Matsumoto M ¹⁾ , Tanaka T ¹⁾ , Sano H ¹⁾

I-13. Bonding performance of commercial and experimental self-adhesive resin composites to dentin

Department of Restorative Dentistry, Graduate School of Dental Medicine, Hokkaido University

Ye Yao, Di Wu, Tanaka T, Ikeda T, Hoshika S, Matsumoto M, Kawamoto C, Yamauti M, Sano H

I-14. Observation of the cavity adaptation of a newly developed self-adhesive resin composite by OCT

¹⁾ Department of Cariology and Operative Dentistry, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University (TMDU), Japan

²⁾ Center for Development of Advanced Medicine for Dental Diseases, National Center for Geriatrics and Gerontology, Japan

Inoue G¹⁾, Sumi Y²⁾, Shimada Y¹⁾

I-15. Shear Bond Strength of New Universal Bonding Agent with Bioactive Function Research & Development Department, Sun Medical, Moriyama, Shiga, Japan Takebe M, Inami C, Kamimoto Y

I-16. Effectiveness of silane coupling agent incorporated in universal adhesive

¹⁾ National Institute of Advanced Industrial Science and Technology (AIST), Health Research Institute, Ka-gawa, Japan; Okayama University, Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Department of Pathology & Experimental Medicine, Okayama, Japan

²⁾ Advanced Research Center for Oral and Craniofacial Sciences, Okayama University Dental School, Okayama, Japan

- ³⁾ Department of Prosthodontics, Okayama University Hospital
- ⁴⁾ Department of Biomaterials and Bioengineering, Faculty of Dental Medicine, Hokkaido University

Yoshihara K¹⁾, Nagaoka N²⁾, Maruo Y³⁾, Yoshida Y⁴⁾

I-17. Effect of mold enclosure and chisel design on fatigue bond strength of adhesive systems ¹⁾ Department of Restorative Dentistry, Oregon Health Science University School of Dentistry

²⁾ Department of General Dentistry, Creighton University School of Dentistry

³⁾ Department of Operative Dentistry, University of Iowa College of Dentistry Watapaba H¹⁾ Wayne W. Parkmeier²⁾ Kawashima S¹⁾ Mark A. Letta²⁾ Taujimat

Watanabe H¹, Wayne W. Barkmeier², Kawashima S¹, Mark A. Latta², Tsujimoto A³ I-18. Long-term bond durability of a newly developed 2-step universal adhesive in self-etch

mode

Department of Operative Dentistry, University of Iowa College of Dentistry Tsujimoto A, Amira Elgreatly, Nathalia Restorepo-Kennedy, Erica C. Teixeira

I-19.	9. Polychromatic composite and resin infiltration restorations in the esthetic zone: A 5 clinical report	
	¹⁾ Department of Restorative Dentistry, Oregon Health & Science University School of Dentistry	
	²⁾ Texas Tech University Health Sciences Center El Paso Woody L. Hunt School of Dental Medicine	
	³⁾ Department of Operative Dentistry, University of Iowa College of Dentistry	
	Kawashima S ¹⁾ , Watanabe H ¹⁾ , Carlos A. Jurado ²⁾ , Tsujimoto A ³⁾	
I-20.	Evaluation of bonding performance of universal adhesives to enamel utilizing a new technique	
	¹⁾ Department of Stomatology, Beijing Tongren Hospital,Capital Medical University, Beijing, China	
	²⁾ Department of Restorative Dentistry, Graduate School of Dental Medicine, Hokkaido University, Sapporo, Japan	
	Fei Chen ¹⁾ , Jiang Lin ¹⁾ , Di Wu ²⁾ , Arefin Alam ²⁾ , Yamauti M ²⁾ , Sano H ²⁾	
I-21.	Minimally invasive multidisciplinary approach to a single discolored anterior tooth	
	¹⁾ Department of Operative Dentistry, University of Iowa College of Dentistry	
	²⁾ Department of Periodontics, National University of Rosario School of Dentistry	
	³⁾ Texas Tech University Health Sciences Center El Paso Woody L. Hunt School of Dental Medicine	
	Natalia Restrepo-Kennedy ¹⁾ , Jose Villalobos-Tinoco ²⁾ , Carlos A. Jurado ³⁾ , Tsujimoto A ¹⁾	
I-22.	The potential of ZnO/CuO nanocomposite contain self-etching primer on bond dentin	
	bonding ability	
	¹⁾ Division of Clinical Cariology and Endodontology, Department of Oral Rehabilitation,	
	School of Dentistry, Health Sciences University of Hokkaido	
	²⁾ Department of Dental Materials Science, Asahi University School of Dentistry	
	³⁾ Department of Restorative Dentistry and Endodontology, Osaka University Graduate School of Dentistry	
	Matsuda Y ¹⁾ , Altankhishig Bayarchimeg ¹⁾ , Okuyama K ²⁾ , Yamamoto H ³⁾ , Saito T ¹⁾	
I-23.	Effect of antioxidant materials on enamel bond strength after bleaching	
	Department of Restorative Dentistry, Division of Oral Health Science, Hokkaido University	
	Graduate School of Dental Medicine	
	Yago R, Kawamoto C, Di Wu, Suzuki K, Hoshika S, Tanaka T, Yamauti M, Sano H	

I-24.	Comparison of the bond strength of CAD/CAM inlay restorations with a specific cement
	Sciences, Tokyo Medical and Dental University (TMDU), Japan
	²⁾ Oral Diagnosis and General Dentistry, Tokyo Medical and Dental University (TMDU)
	³⁾ Department of Gerodontology and Oral Rehabilitation, Graduate School of Medical and
	Dental Sciences, Tokyo Medical and Dental University (TMDU), Japan
	⁴⁾ Department of Operative Dentistry, Division of Oral Functional Science and Rehabilitation, School of Dentistry, Asahi University, Japan
	⁵⁾ Quartz Dental Clinic, Japan
	Takahashi R ¹⁾ , Uchiyama S ¹⁾ , Kanamori Y ²⁾ , Rozan S ¹⁾ , Oda Y ¹⁾ , Sato T ¹⁾ , Shinagawa J ¹⁾ , Inokoshi M ³⁾ , Nikaido T ⁴⁾ , Tagami J ^{1.5)} , Shimada Y ¹⁾
I-25.	Sintering distortion of FPDs milled from various zirconia disks: Influence of layered structure and vertical milling area
	Department of Fixed Prosthodontics, Tokyo Dental College
	Hirano M, Nomoto S, Kawasaki T, Sakai T, Yotsuya M, Sekine H
I-26.	Morphological analysis of femtosecond laser irradiated lithium disilicate glass-ceramics
	and highly translucent zirconia - A preliminary study
	¹⁾ Department of Gerodontology and Oral Rehabilitation, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University
	²⁾ National Institute of Advanced Industrial Science and Technology (AIST), Health
	Research Institute, Kagawa, Japan; Okayama University, Graduate School of Medicine,
	Dentistry and Pharmaceutical Sciences, Department of Pathology & Experimental Medicine
	³⁾ National Institute of Advanced Industrial Science and Technology (AIST), Research Institute for Advanced Electronics and Photonics
	⁴⁾ Advanced Research Center for Oral and Craniofacial Sciences, Okayama University Graduate School of Medicine, Dentistry and Pharmaceutical Sciences
	Inokoshi M ¹⁾ , Yoshihara K ²⁾ , Kakehata M ³⁾ , Yashiro H ³⁾ , Nagaoka N ⁴⁾ , Tonprasong W ¹⁾ , Xu K ¹⁾ , Minakuchi S ¹⁾
I-27.	Effects of alumina air-abrasion on the bond strength of ultraviolet polymerized resin to 3D
	printed denture base
	Division of Removable Prosthodontics, Department of Oral Rehabilitation, Fukuoka Dental
	College
	Tanaka A, Kawaguchi T, Tsuzuki T
I-28.	Tensile bond strengths of different resin cement systems to poly-ether-ether-ketone (PEEK)
	¹⁾ Division of Biomaterials, Department of Oral Functions, Kyushu Dental University
	²⁾ Division of Oral Reconstruction and Rehabilitation, Department of Oral Functions, Kyushu Dental University
	Hata K ^{1,2)} , Komagata Y ¹⁾ , Nagamatsu Y ¹⁾ , Masaki C ²⁾ , Hosokawa R ²⁾ , Ikeda H ¹⁾

I-29.	Efficacy of sandblast surface-treatment on the bonding-improvement of metal-free CAD/	
	CAM restoratives	
	University	
	Masoki T. Murata T. Nara V.	
1-30	Shear bond strength between highly translucent pre-sintered zirconia coated with	
1-00.	feldspathic porcelain and resin luting agent	
	¹⁾ Department of Fixed Prosthodontics, Nihon University School of Dentistry	
	²⁾ Division of Advanced Dental Treatment, Dental Research Center, Nihon University	
	School of Dentistry	
	Takata H ¹⁾ , Kubochi K ¹⁾ , Kimura F ¹⁾ , Matsushima K ¹⁾ , Matsumura H ¹⁾ , Komine F ^{1,2)}	
I-31.	Effect of the multi-purpose primer and airborne particle abrasion on bond durability for cast titanium and gold alloy	
	¹⁾ Department of Fixed Prosthodontics, Nihon University School of Dentistry	
	²⁾ Division of Advanced Dental Treatment, Dental Research Center, Nihon University	
	School of Dentistry	
	³⁾ Department of Dental Materials, Nihon University School of Dentistry	
	⁴⁾ Division of Biomaterials Science, Dental Research Center, Nihon University School of	
	Dentistry	
	Hiraba H ^{1,2)} , Koizumi H ^{3,4)} , Takehana K ¹⁾ , Mikami W ¹⁾ , Nogawa H ¹⁾ , Matsumura H ¹⁾	
I-32.	Adhesion and mechanical properties of PEEK block by CAD/CAM system	
	¹⁾ Department of Clinical Biomaterials, Kanagawa Dental University	
	²⁾ Department of Dental Biomaterials, Nihon University School of Dentistry at Matsudo	
	³⁾ Materials & Surface Engineering Research Institute, Kanto Gakuin University	
	Katayama Y ¹), Ohashi K ¹), Midono T ¹), Aoki K ¹), Yamaguchi H ¹), Nagata S ²), Tanimoto Y ²), Nihei T ^{1,3})	
I-33.	Clinical Effectiveness of direct composite vs. zirconia resin-bonded fixed dental prostheses	
	¹⁾ Department of Cariology and Operative Dentistry, Graduate School of Medical and Dental	
	Sciences, Tokyo Medical and Dental University (TMDU)	
	²⁾ Tashiro Dental Clinic, ³⁾ Habara Dental Clinic, ⁴⁾ Otani Dental Clinic, ⁵⁾ Suzuki Dental Clinic	
	⁶⁾ Total Dental Clinic Tokyo Aoi	
	⁷⁾ Department of Regenerative Dental Medicine, Tokushima University Graduate School of	
	Biomedical Sciences	
	⁸⁾ Quartz Dental Clinic	
	Sato T ¹), Tashiro H ^{1,2}), Miki H ³), Otani K ⁴), Nishimura M ^{1,5}), Takahashi M ^{1,6}), Hosaka K ^{1,7}),	
	Tagami J ^{1,8)} , Shimada Y ¹⁾	
I-34.	Study on adhesive durability the luting agents to zirconia	
	-Appropriate concentration of acidic monomer-	
	¹ Department of Fixed Prosthodontics, Kanagawa Dental University	
	²⁾ Department of Clinical Biomaterials, Kanagawa Dental University	
	Tsunoi S ¹ , Katayama Y ² , Ohashi K ² , Hoshi N ¹ , Kimoto K ¹ , Nihei T ²	

1-35	. Survival of the anterior mono-block direct composite crown
	¹⁾ Habara Dental Clinic, ²⁾ Tashiro Dental Clinic, ³⁾ Quartz Dental Clinic
	⁴⁾ Department of Operative Dentistry, Division of Oral Functional Science and Rehabilitation, Asahi University School of Dentistry
	⁵⁾ Department of Regenerative Dental Medicine, Tokushima University Graduate School of
	Biomedical Sciences
	^o Department of Carlology and Operative Dentistry, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University (TMDU)
	Miki H^{1} , Tashiro H^{2} , Tagami $I^{3,6)}$, Takagaki $T^{4)}$, Hosaka $K^{5)}$, Sato $T^{6)}$, Hatayama $T^{6)}$
	Shimada Y^{6}
1-36	. Monolithic ultra-translucent multi layered zirconia restorations in the esthetic zone
	¹⁾ Minnesota Dental Research Center for Biomaterials and Biomechanics, University of Minnesota School of Dentistry
	²⁾ Department of Prosthodontics, University of Iowa College of Dentistry
	³⁾ Texas Tech University Health Sciences Center El Paso Woody L. Hunt School of Dental Medicine
	⁴⁾ Department of Operative Dentistry, University of Iowa College of Dentistry
	Nicholas G. Fischer ¹⁾ , Ahmad M. Mahrous ²⁾ , Carlos A. Jurado ³⁾ , Tsujimoto A ⁴⁾
I-37	. Fracture Strength of Chair-side CAD/CAM Lithium Disilicate Crowns and Occlusal
	Veneers with and without Margin
	¹⁾ Texas Tech University Health Sciences Center El Paso Woody L. Hunt School of Dental Medicine, El Paso, Texas, USA.
	²⁾ The Ohio State University College of Dentistry, Columbus, Ohio, USA,
	³⁾ University of Iowa College of Dentistry. Iowa City, Iowa, USA.
	Carlos Alberto Jurado ¹⁾ , Damian Lee ²⁾ , Tsujimoto A ³⁾
1-38	. Diagnosis of occlusal and proximal caries using SS-OCT
	¹⁾ Minnesota Dental Research Center for Biomaterials and Biomechanics, University of
	Minnesota School of Dentistry
	²⁾ Department of Prosthodontics, University of Iowa College of Dentistry
	³⁾ Texas Tech University Health Sciences Center El Paso Woody L. Hunt School of Dental
	Medicine
	⁴⁾ Department of Operative Dentistry, University of Iowa College of Dentistry
	Shimada Y ¹⁾ , Nakagawa H ¹⁾ , Tabata T ¹⁾ , Sato T ¹⁾ , Sadr Alireza ²⁾ , Sumi Y ³⁾ , Tagami J ¹⁾

 $13:30 \sim 18:00$ $\,$ Exhibition (1st floor & 2nd floor Hall & Foyer) $\,$

Day 2 6/4 (Sat) Venue: 2nd floor Auditorium Satellite Venue: 1st floor Small Auditorium

9:00 ~ 9:45 Invited Lecture 4 Chair: Masahiro Yoshiyama (Okayama University) [Advantages, disadvantages and future direction of adhesive dentistry] Ricardo M. Carvalho (University of British Columbia, Canada)

 $9:45 \sim 10:00$ Break Time

10:00 ~ 10:45 Invited Lecture 5 Chair: Satoshi Imazato (Osaka University)
 [Clinical Aspects of Resin-Bonded Fixed Dental Prostheses (RBFDPs) with Ovate Pontic in the Esthetic Region]
 Hiroyuki Kibayashi (KIBAYASHI Dental Clinic)

 $10:45 \sim 13:00$ Break Time

13:00 ~ 14:00 Special Lecture 1 Chair: Yuji Tsubota (Vice president of the Japan Sciety for Adhesive Dentistry)
 * Japanese only available
 [The history of adhesive ~ In 40 years of clinical practice ~]
 Hideto Takahashi (President of Japan Dental Federation/Iogi Dental Clinic)

 $14:00 \sim 14:20$ Break Time

14:20 ~ 14:50 Special Lecture 2 Chair: Yoichiro Nara (President of the Japan Sciety for Adhesive Dentistry)
 **Japanese only available
 [Expected activities in building blocks for innovation]
 Masahito Sumitomo (President of Japanese Association for Dental Science)

 $14:50 \sim 15:10$ Break Time

 $15:10 \sim 16:10$ Specialist Certification Workshop Chair: Shoji Kato (Takanawa Dental Office) * Japanese only available

[Procedures of new and renewal applications for the specialist qualification] Shoji Kato (Takanawa Dental Office)

[On a training guideline for a specialist of Japan Society for Adhesive Dentistry] Naotake Akimoto (Akimoto Dental Clinic)

 $9:00 \sim 16:10$ Poster Viewing (1st floor 1st Meeting room)

 $9:00 \sim 16:10$ Exhibition (1st floor & 2nd floor Hall & Foyer)

Day 3 6/5 (Sun) Venue: 2nd floor Auditorium Satellite Venue: 1st floor Small Auditorium

9:00 ~ 9:45 Invited Lecture 6 Chair: Takatsugu Yamamoto (Turumi University) [Evidence for Polymerization Contraction Stress Effects on Resin-Tooth Bonding] Jack L. Ferracane (Oregon Health & Science University, USA)

 $9:45 \sim 10:00$ Break Time

$10:00 \sim 11:00$	Educational Lecture	Chair: Toru Nikaido (Congress president of The 41st JSAD/		
		Asahi University)		
X Japanese only available				
Benefits and problems of root canal filling and treatment of vertical root fracture by adhesion				
Tsutomu Sugaya (Department of Periodontology and Endodontology, Division of				
	Oral Health Science	ce, Hokkaido University Faculty of Dental Medicine)		

 $9:00 \sim 11:00$ Poster Viewing (1st floor 1st Meeting room)

 $9:00 \sim 11:00$ Exhibition (1st floor & 2nd floor Hall & Foyer)

 $11:00 \sim 11:50$ Poster Discussion (1st floor 1st Meeting room)

11:50 Closing Ceremony

IAD Program

Invited Lecture



Creating a future of dentistry

Junji Tagami Quartz Dental Clinic

In the past 40 years, adhesive dental materials had promoted innovative restorative treatment options. The so called minimally invasive caries treatment technique was developed utilizing the adhesive resin composite materials combined with the caries detecting dye solution, which enabled indicating dentin carious lesion to be removed before restoration. Adhesion bridge restoration was also one of the innovative restoration techniques. Because of the improvement of bonding performance and handling properties, as well as the clinical implication techniques, the adhesive restoration became to be applied to more extensively damaged teeth reconstructions. Recently, the so called direct bridge restoration and mono-block direct composite crown restoration are gradually accepted in the dental clinicians, being supported by the clinical evaluation reports with excellent performance.

The bond strength of the restorative materials is often evaluated and discussed, however, the sealing ability at the interface between the restoration and tooth substance is believed to be very important for the prevention of recurrent caries and protection of pulp tissue. As the result, the adhesive restoration is expected to extend the longevity of teeth of the patients. Even in the cases of endodontically treated teeth, the adhesive restorations with strong bonding and reliable sealing at the interface is expected to provide favorable clinical performance. Prevention of the coronal leakage is considered to be very effective to reduce the peri-apical inflammation of the endodontically treated teeth. As seen in the history of adhesive dentistry, it has a potential to develop new treatment options and preventive therapies.

(Curriculum Vitae)

- 1980 DDS, Faculty of Dentistry, Tokyo Medical and Dental University (TMDU)
- 1984 PhD, Graduate School, TMDU
- Assistant Professor, TMDU (-1994)
- 1987 Adjunct Assistant professor, Medical College of Georgia (-1988)
- 1994 Professor, Ou University (-1995)
- 1995 Professor, TMDU (-2021)
- 2021 Director, Advanced Dental Center, Quartz Dental Clinic

Adhes Dent Vol. 40 No. 2 2022



Sustainable biomimetic approaches for restoration of vital vs devital teeth

Sema Belli Selcuk University, Republic of Turkey

It has been reported in several studies that removal of the pulp followed by root canal treatment procedures are associated with irreversible changes in dentin structure and endodontically treated teeth subject to root fractures more often than vital teeth. Cumulative factors were listed as the cause of the possibility of the root canal treated tooth being weaker such as degradation after root canal treatment, loss of proprioception, changes on shear strength and toughness of tooth structure after endodontic treatment, the effects of medicaments, solvents, irrigation solutions, medicaments and several other factors which affect the root dentin. Increased stresses over the remaining sound tooth structure due to loss of tooth structure can be considered as the most important factor. Therefore, restoration of endodontically treated teeth require special care.

Recent publications and virtual social media posts have shown that natural-like restorations and techniques are attracting more and more attention. Furthermore, it has been inevitable recently that we follow the rules of sustainable dental practice. The number of clinicians who prefer biomimetic restorations and the number of the researchers evaluating this issue is increasing day by day. In 2017, 'The Protocols of Biomimetic Restorative Dentistry' have been published. By following the rules listed in this publication, a guideline for long term clinical success of biomimetic restorations could be provided. Thanks to adhesive dental techniques and materials. They provide creation of restorations without giving further damage to the remaining dental tissues. However, the clinicians should still have basic knowledge about planning a biomimetic restoration for vital and non-vital teeth. The aim of this conference is to give information about identifying restoration options for vital and non-vital teeth and to give information about how to build stress-reduced restorations for the sake of sustainable dental practice.

(Curriculum Vitae)

She graduated from Marmara University, Istanbul, Turkey with DDS, and received her PhD degree in Department of Operative Dentistry from Selçuk University, Konya, Turkey. Dr. Belli founded Department of Endodontics in Faculty of Dentistry, Selçuk University and worked as a chair for 10 years. She worked at Tokyo Medical and Dental University, Japan and Medical College of Georgia, US about adhesion of dental materials and bonding to the endodontic surfaces. She has published and lectured extensively on dental composites, adhesives, glass or polyethylene fiber-reinforcement restorations, conservative restoration of extensive cavities, restoration of endodontically treated teeth, post and core restorations, finite elemental stress analysis, bonding to the endodontic surfaces, biomimetic dentistry, stress reduced restorations of root-filled teeth and biocompatibility of dental materials. She worked as a board member for Continental European Division of IADR (CED-IADR) and Turkish Endodontic Society. Dr. Belli is currently full time professor in Faculty of Dentistry, Selçuk University, ERASMUS Coordinator of the Dental School, board member of Scientific Research Projects Center (BAP) of the University, board member of Advanced Technologies Center of Selçuk University (iLTEK).



Key features modern universal adhesives need for durable bonding

Bart Van Meerbeek KU Leuven, Belgium

Dental adhesive technology has evolved rapidly and today enables durable bonding to both enamel as dentin. The latest generation of UNIVERSAL ADHESIVES (UAs) combine the primer with the adhesive resin, enabling simplified clinical bonding procedures with (claimed) lower technique sensitivity. Most of todays UAs contain 10-MDP as the most efficient functional monomer. They nevertheless may still differ in bonding performance depending not only on the quality/concentration of the 10-MDP contained, but also on other adhesive ingredients and their hydrophilicity/hydrophobicity balance. 'UNIVERSAL' refers to application versatility, enabling UAs to be applied either in ETCH-AND-RINSE or SELF-ETCH bonding mode, while offering also (claimed) bonding potential to glass-rich (via silane) and glass-poor zirconia (via 10-MDP) ceramics. While performing favorably at short term, the UA's long-term bonding performance is still insufficiently proven. One UA shortcoming is their low film thickness, resulting in suboptimal polymerization to stabilize the adhesive interface, potentially also promoting water sorption, and reducing the adhesive layer's ability to absorb stress and act as shock absorber to counteract the high tensile forces imposed to the adhesive interface by the overlying resin composite during polymerization. With special focus on the neglected need of a hydrophobic and sufficiently thick adhesive-resin layer, the potential of innovative two-step UA technology will be presented.

(Curriculum Vitae)

Bart Van Meerbeek obtained his DDS (dentist) in 1988 and his PhD in 1993 at KU Leuven (University of Leuven) in Belgium. He continued his research activity abroad for one year at the University of Texas Health Science Center at San Antonio, Texas, and later also at the University of Missouri-Kansas City. In 1995, he became Assistant Professor ('Docent') at KU Leuven and since then teaches Dental Biomaterials Science. In 1998 and 2002, he was promoted respectively to Associate Professor ('Hoofddocent') and Professor ('Hoogleraar'), and in 2005 to Full Professor ('Gewoon Hoogleraar'). From August 2020, he serves as Chair of the Department of Oral Health Sciences ('Departementsvoorzitter') of KU Leuven for the next four years. He founded BIOMAT, the Biomaterials Research group, which focusses on diverse kinds of biomaterials with orofacial application, and encompasses fundamental material science and biological cell culture, micro-organism and animal research, as well as applied laboratory and clinical research. His primary research interest involves studies related to the broad field of Adhesive Dentistry, including fundamental as well as clinical research regarding dental adhesive technology in particular. Newer research lines deal with Dental Ceramics, Additive Manufacturing, Cariogenicity & Biocompatibility of Dental Materials, Bioactive Materials and Pulp-preservation Material Technology. His research work has been published in more

than 450 peer-reviewed journals, having resulted in an h-index of 81_{Web of Science}/117_{Google Scholar}. He has served as promoter/copromoter of 14/4 PhDs (+ 4 ongoing). He has been honoured with several awards such as the 1996 triennial Robert Stock Award for best PhD dissertation in Biomedical Sciences, the 1997 Albert Joachim Award, the 1998 Biomedical Sciences Award of the Research Council of KU Leuven, the 2000 IADR Young Investigator Award, the 2003 Academy of Operative Dentistry Buonocore Memorial Lecturer, the 2008 CED-IADR (Continental European Division of IADR) Robert Frank Lecturer, the 2014 IADR/AADR William J. Gies Award for the best 2014 JDR paper in the Biomaterials & Bioengineering Research category, the 2015 IADR Wilmer Souder Award (IADR Distinguished Scientist award for Dental Materials) and the 2022 IADR Distinguished Service Award. Since 2003, he has been appointed as holder of the Toshio Nakao Chair for Adhesive Dentistry. He was President of the Pan-European Federation of IADR in 2006-2007 and served as Secretary of CED-IADR for 12 years. In September 2019 (Madrid), he was elected as President Elect of CED-IADR and became CED-IADR president in September 2020 and organized the 2021 CED-IADR/NOF Oral Health congress in Brussels (September 16-18, 2021: https://ced-iadr2021.com/). Since 2004, he is Editor-in-Chief of the Journal of Adhesive Dentistry.



Advantages, disadvantages and future direction of adhesive dentistry

Ricardo M. Carvalho University of British Columbia, Canada

The introduction of adhesion in Dentistry has unequivocally brought significant advantages to clinical practice and opened an endless path for research in the field. Adhesion allowed for reduced waste of tooth structure and significantly improved simplicity and effectiveness of procedures. While disadvantages of adhesion are not readily perceived, research has shown that the quality of adhesion varies in strength and durability among dental structures and dental materials and that required deeper knowledge of materials science to support clinical procedures. This presentation will focus on how adhesion in Dentistry has benefit from research and what are the current directions of adhesive materials and techniques for the future.

(Curriculum Vitae)

Dr. Carvalho is Professor & Head in the Department of Oral Biological and Medical Sciences; and former Director of the Frontier Clinical Research Centre at the University of British Columbia - UBC. He has previously taught at the University of São Paulo, Brazil, University of Florida, USA, University of Hokkaido, Japan and served as Director of R&D of Bisco Inc., Chicago, IL. His research interests include: uncovering the mechanisms involved in degradation of adhesive joints to mineralized tissues and finding ways to prevent it; development of polymer composites from seashell fish with bioactivity and reinforcement capabilities; and development of chitin- and CNC-based composites for dental and medical applications. He serves on the Editorial Board of several journals, is a Board member and Secretary of the Academy of Dental Materials and is currently Senior Past-President of the Dental Materials Group (DMG) - IADR. He is a member of the executive committee and steering committee of NCOHR. He has published over 240 scientific articles in the field of dental materials and restorative dentistry and lectures worldwide to clinicians and researchers.


Clinical Aspects of Resin-Bonded Fixed Dental Prostheses (RBFDPs) with Ovate Pontic in the Esthetic Region

Hiroyuki Kibayashi KIBAYASHI Dental Clinic

The loss of maxillary central incisor represents an esthetically and functionally challenging situation. There are various methods available for esthetic restoration after tooth loss. The loss of anterior tooth can be restored with three different treatment methods: the first method is a fixed dental prostheses (FDPs) with two retainers or a cantilever single-retainer design; the second method is the implant-supported single crown (SCI); and the third method is the resin bonded fixed dental prostheses (RBFDPs) made with a cantilever single retainer design(RBFDPs-SR). The use of RBFDPs may be considered as a valid and minimally invasive therapy alternative to traditional FDPs or SCI in certain particular patient situations.

The survival and success rates of all-ceramic RBFDPs-SR are reported to be higher than the all ceramics FDPs of a cantilever single-retainer design. Meanwhile case selection is an important factor for successful RBFDPs-SR. The upper lateral and central incisor, the lower incisors, and the upper and lower bicuspids are suitable for RBFDPs pontic placement. Single-tooth loss and vitality of the abutment tooth are both desirable for RBFDPs. By using RBFDPs, the incidence of patient complications is generally low, especially biological complications, whereas debonding is the most technical complication in most cases.

The aim of this lecture is to show the three different ways to deal with a single tooth loss in the esthetic region and to compare the advantages and disadvantages of each so that we can discuss which treatment option is best for us.

This lecture illustrates the technics and considerations of all ceramic RBFDPs-SR in clinical aspects and shows how to manage gingival tissue with ovate pontic to obtain the optimal esthetic result.

The Author declares that there is no conflict of interest.

(Curriculum Vitae)

1981-1982: RDT, Osaka University Dental Technology Institute

^{1986-1992:} DDS, School of Dentistry, Osaka University

^{1988-2002:} PhD, Graduate School of Dentistry, Osaka University

^{2009:} Certified Prosthodontist, Japan Prosthodontic Society

^{2009:} Certified Dentist, Japan Academy of Esthetic Dentistry

^{2011:} Certified Periodontist, The Japanese Academy of Clinical Periodontology

²⁰¹⁸⁻Present: Clinical Professor, Department of Fixed Prosthodontics, Graduate School of Dentistry, Osaka University

²⁰¹⁹⁻Present: Visiting Clinical Professor, Department of Restorative Dentistry, Hokkaido University Hospital



Evidence for Polymerization Contraction Stress Effects on Resin-Tooth Bonding

Jack L. Ferracane Oregon Health & Science University, USA

The potential deleterious effects on the resin-tooth bonded interface created by the forces produced during the polymerization of dental resin composites was first described by Dr. Rafael Bowen in the 1960's. This discovery provided the basis for his quest to develop a resin system for achieving strong adhesion to dentin. The issue lay mostly dormant for nearly twenty years, before being brought to attention of researchers and manufacturers alike by Professors Davidson, DeGee and Feilzer from ACTA in the Netherlands, specifically with their description of the C-factor. Their work clearly showed how the constraint produced by a three-dimensional cavity preparation could produce significant stresses within the dental composite during curing, if the material was actually bonded to the cavity preparation walls. This understanding made it clear that there was a competition between the acquisition of adhesive forces to the tooth and the stress developing in the restorative material, which tended to pull the material away from the interface. Research has verified that these stresses can have deleterious effects on marginal integrity, as well as on the properties of the composite itself.

Many studies have been conducted to determine the multiple factors that affect these stresses, including the composite's rate of polymerization, the filler and monomer formulation, the overall degree of cure, and the constraints imposed by the geometry of the cavity preparation. Methods have been developed for studying these stresses and their effects on the tooth-restoration interface, including bond strength testing, microleakage and nanoleakage, assessment of stress directions, crack analysis and acoustic emission. Studies have shown reduced adhesion to cavity preparation walls in composites in which significant stress was generated during polymerization, as well as crack propagation in the bonding substrate near the interface.

Numerous strategies have been developed to reduce the stress produced in the dental composite, as well as its effects. Especially relating to the development of bulk-fill materials, the field has seen the development of new monomers, modifications of the photoinitiator system, and the inclusion of stress relieving components and low stress producing monomers. Clinically, modifications to the placement technique have included alteration in the light activation protocol, incremental placement and curing techniques, use of bulk filling materials, and the placement of resilient liners. This presentation will present a chronological view of this important issue in restorative dentistry, specifically as it relates to the critically important restorative material-tooth interface.

(Curriculum Vitae)

Jack Ferracane is Professor and Chair of Restorative Dentistry at Oregon Health & Science University, Portland, Oregon, He received a B.S. in Biology from the University of Illinois, and an M.S. and Ph.D. in Biological Materials from Northwestern University. He is a founding fellow and past-President of the Academy of Dental Materials. He is a past-President of the Dental Materials Group of the International Association for Dental Research. He is a past-President of the American Association for Dental Research (now American Association for Dental, Oral and Craniofacial Research). He is the recipient of the IADR Distinguished Scientist Wilmer Souder Award from the Dental Materials Group of the IADR, the Founders Award from the Academy of Dental Materials, and the Hollenback Award from the Academy of Operative Dentistry. He is an honorary member of the American College of Dentists and the Oregon Dental Association. He is a fellow of the American Institute of Medical and Biological Engineering. He serves on the editorial board of ten journals, and is Editor-in-chief of a new journal published by the ADA and Elsevier entitled, JADA Foundational Science. He is a past Associate Editor of the Journal of Dental Research and Odontology. He has served as a regular member of the Oral, Dental and Craniofacial Sciences Study Section [ODCS] of the NIH/NIDCR. He has authored a textbook entitled "Materials in Dentistry. Principles and Applications." He is co-editor of a textbook entitled "Craig's Restorative Dental Materials." Currently in its 14th edition. He is a co-editor of a textbook entitled "Summitt's Fundamentals of Operative Dentistry, A Contemporary Approach," now in its fourth edition. He has published and lectured extensively on dental materials, including dental composites, adhesives, amalgam, and practice-based dental research. He has provided continuing education at annual meetings of the ADA, British Dental Association, California Dental Association, Chicago Midwinter, Midwest Dental Conference, Oregon Dental Conference, Pacific NW Dental Conference, Southwest Dental Conference, Yankee Dental Congress, and to other professional dental organizations. His current research interests are in developing new monomers for enhanced dental composites, studying the factors that affect biofilm formation around dental composite restorations leading to the recurrence of caries lesions, and the use of bioactive glasses as potential antimicrobial and remineralizing agents in resin-based dental materials. His research is funded by the NIH/NIDCR as well as private industry. He also is actively involved in the establishment and operation of networks designed to conduct dental clinical research in the private practice setting, and most currently was involved in a large scale clinical study in the NIH-funded National Dental Practice-based Research Network (The Network) investigating the characteristics and progression of cracked teeth.



特別講演





JSAD Program

Special Lecture

Educational Lecture (JSAD)

Specialist Certification Workshop



接着臨床 40 年の軌跡

高橋英登 医療法人社団慧医会 井荻歯科医院

The history of adhesive \sim In 40 years of clinical practice \sim

Hideto Takahashi

Medical corporation association Eikai, Iogi dental clinic

信じられない事かもしれないが今から 40 年前,歯科診療の中には「接着」という概念は存在していなかった!! ブラックの窩洞の要件を満たすように窩洞形成を行い Gold インレーをリン酸セメント等の無機セメントで装着する. 当然の事ながら歯質と金属修復物の間の隙間をセメントで満たし嵌合力で脱離に抵抗する事で維持力を得る方法で施 術する事が Standard であった.

全部被覆冠も同様,支台歯と冠との間の隙間をセメントで埋める,言うなれば壁土と同じ能力の無機セメントでひっ かかって止める手法であったのだ!!

しかし、それでもある一定期間修復物は口腔内で存在し機能をはたしていた。それは高カラット Gold の展延性を活 用したマージンバーニッシュ等の「わざ」により辺縁の封鎖性を確保しセメント層の露出を減らしセメントの溶解を阻 止する職人わざによる点が修復物の長期耐久性に寄与しているからに他ならない。

またリン酸セメントで装着したバケツ冠がそこそこもっていたのは歯質の削除が極端に少なく,エナメル質が多く残存していたから,そして,鋳造冠の時代は技工分野での切磋琢磨による鋳造精度の向上がマージンフィットを向上させ,同じくセメント層の露出を防いでいたからだと推測される.

最近,まれなケースではあるが接着材を用いた修復物が脱離して来た症例と従来型の無機セメントを用いて装着された修復物の脱離症例を比べた時,二次カリエス等の発生頻度が全く違う事に気づかされる.これぞ,わが国が世界を リードし続けている歯質接着能を有する接着剤のデンティンボンディング能のおかげに他ならない

近年,一般臨床に供されている多機能型の歯科用接着材は,従前は夢であった歯質接着能を獲得しさらに非貴金属!!そして貴金属!!さらに焼成型セラミックスそしてセラミックス+高分子の複合材へまでも適応範囲が拡大し, ほぼマルチユースな接着材として臨床の中の拡大の一助となっている.

これからの歯冠修復はセラミック系素材を主としたメタルフリーの時代となる事は確実である.

そして、これらのセラミック修復の肝は「接着」である点は疑う余地がない.

「接着」を制す者が「臨床」を制す時代到来である.

本講演に於いては、世界の「歯質接着」をリードしてきたわが国の接着臨床の変遷!!そしてこれからの展望につい て語ってみたい.

/ 收 麻 \			
1977年	日本歯科大学歯学部 卒業	2007年	東京都杉並区歯科医師会 会長(2013年6月まで)
1988年	日本接着歯学会 編集委員(2000年まで)	2010年	日本接着歯学会 副会長(2014年3月まで)
1993年	日本補綴歯科学会指導医 認定	2011年	日本歯科大学生命歯学部 客員教授(現在に至る)
1995年	日本歯科医師会生涯研修講師(1995年~1996年度)	2015年	日本歯科医師連盟 会長(現在に至る)

Adhes Dent Vol. 40 No. 2 2022



イノベーションのための積み木で期待される活動

住友雅人

日本歯科医学会, 一般社団法人 日本歯科医学会連合

Expected activities in building blocks for innovation

Masahito Sumitomo

Japanese Association for Dental Science, Japanese Dental Science Federation

国際接着歯学会との併催大会の開催おめでとうございます.この大会がニューノーマルとして,分科会における国際 学術大会のモデルケースとなることに期待しています.

「接着歯学 2022 - 革新と挑戦—」という大会テーマにふさわしいお話になるかどうかは分かりませんが,改めて日本 歯科医学会(以下 学会)がこれまで取り組んできたこととそこを基盤として創設された法人格を有する日本歯科医学 会連合(以下 学会連合)と日本歯科専門医機構(以下 専門医機構)を含めて,貴会に期待する今後の方向性などにつ いてお話しさせていただきます.

学会はご存知のように,現在,公益社団法人日本歯科医師会の内部組織です.そこで,法人格を必要とする事業については,2016年4月に創設されました学会連合が担当するという仕分けがなされています.

現在,学会における重点的な事業は英文誌の発刊です.2006年から目指していたインパクトファクター (IF) が昨年に付与されました.5.093と高く,今後の投稿数の増加を見越して,今般,体制強化を図りました.貴会もこのレビュー誌への投稿を進めてください.

そして、2年ごとの診療報酬改定における医療技術評価提案書の提出です.各分科会からの提案書は、学会の歯科医療協議会で調整し、取りまとめて厚生労働省に提出しています.この権利は歯科医療において重要であり、それに伴って義務が生じます.新機能や新技術を提案して、国民が公的医療保険でカバーされる範囲を広げるとともに、医療の質の向上に貢献しなければなりません.学会の活動評価は収載件数や収載率に反映されます.貴会からの提案に期待します.

加えて,昨年の第24回日本歯科医学会学術大会で大々的に発出しました2040年に向けての歯科イノベーションロー ドマップに掲げた目標の具現化です.貴会からも提案していただきましたが,これはオープンイノベーションとして発 出していますので,目標には誰もが挑戦できます.具現化するためには目標をテーマとして多面的に討議する必要があ ります.そこから多くの新機能や新技術が見つかるでしょうし,次のステップに進めます.学術大会のメインテーマや シンポジウムテーマをこのロードマップの目標からピックアップするのも次の展開には良い考えです.

次に学会連合ですが、ここでは医療ニーズを提示し、多くの分野との共同事業に展開するマッチング会を開催してい ます.現在、全国から参加可能なオンライン開催を再検討中です.各会員団体に所属する方々が、気楽に参加できるよ うなシステムを目指しています.学会のホームページから医療ニーズの登録を常時受け付け、定期的に開催する計画で す.ここから新機能・新技術として公的医療保険に導入されることを期待しています.ぜひご参加ください.

貴会はその専門性の研究成果をすべての分野にわたる「接着」というキーワードで広範囲に貢献しています.専門医 機構の社員になっていますが、これまでに接着歯科専門医という名称が俎上に上がったことはありません.そこで専門 医機構における選択共通研修の担い手としての活躍が期待されます.なぜならば接着はすべての歯科医療の領域に必要 な技術だからです.

〈略歴〉

1969年3月 日本歯科大学卒業

- 1973年3月 日本歯科大学大学院歯学研究科(歯科理工学専攻) 修了
- 1996年5月 日本歯科大学歯学部共同利用研究所教授(歯科麻酔 学併任)
- 2001年4月 日本歯科大学歯学部附属病院長 2008年4月 日本歯科大学生命歯学部長 2013年4月 日本歯科大学名誉教授 2022年3月現在 日本歯科医学会会長
 - (一社) 日本歯科医学会連合理事長

Adhes Dent Vol. 40 No. 2 2022



接着による根管充填と垂直歯根破折治療の利点と課題

菅谷 勉 北海道大学大学院歯学研究院口腔健康科学分野歯周・歯内療法学教室

Benefits and problems of root canal filling and treatment of vertical root fracture by adhesion

Tsutomu Sugaya

Department of Periodontology and Endodontology, Division of Oral Health Science, Hokkaido University Faculty of Dental Medicine

接着歯学は多くの分野で臨床成績の向上に貢献しており、とくにレジン充填やクラウン・ブリッジでは MI や接着ブ リッジなどの発展に大きな成果をあげてきた.しかし、根尖部根管への接着については、広く臨床的に普及していると は言い難いのが現状であろう.

根管充填に接着を応用する利点として、歯冠側からの漏洩防止のほか、根尖孔が開大し加圧根充に適した根管形態に 形成できない症例の封鎖が可能になること、さらに破折抵抗性が向上することがあげられる。接着による根管の封鎖で あれば加圧は不要となり、根管充填時の加圧に抵抗する根管形態も不要となる。この場合に大きな課題となるのが接着 阻害因子である。根管充填では、根管洗浄剤や貼薬剤の残存が接着を阻害することに加え、乾燥が大きな問題となる。 ペーパーポイントで根管を乾燥するだけでは多量の水分が根管壁に残存しているが、根管内を強圧でエアーブローする ことは禁忌である。また、根尖狭窄部や側枝は水で満たされているため、シーラーが歯周組織に溢出した場合には、水 を多量に混入して重合阻害をおこし、炎症を誘発する危険性もある。したがって、根管充填に接着を応用するためには 多量に水分があっても、良好に重合し根管壁に接着する根管充填材でなければならない。これらの課題を克服した根管 充填材としてメタシール Soft ペーストがある。

また,垂直歯根破折の予防としては,ファイバーポストの接着やフェルールを確保した外側性歯冠補綴など,歯冠側 から根尖に向かって歯根が破折していく場合の対策などが実践されている.一方,垂直歯根破折は根尖側から歯冠側に 伸展していく場合も多く,この対策には接着による根管充填が有効と考えられる.しかし,象牙質と弾性率が高い根管 充填材を接着して一体化すると,根管充填材は除去できず再根管治療やポスト形成が困難になる.そこで,除去可能な 根管充填材としてガッタパーチャポイント,フレックスポイントにメタシール Soft,スーパーボンド混和ラジオペーク を接着性シーラーとして組み合わせ,根管充填後に破折抵抗性を検討した.その結果,スーパーボンドのみ,あるいは スーパーボンドとフレックスポイントの組み合わせで高い破折抵抗性が得られ,とくに歯面処理剤とグリーンとティー スプライマーを併用すると大きな効果がみられた.

さらに、垂直破折した歯根の接着による保存治療は、眞坂により提唱されてから40年が経過しようとしているが、 10年以上経過している症例もめずらしくなくなった.この治療は封鎖性、生体親和性に加えて接着強さが求められる が、再破折症例のほとんどが根管壁とレジンの界面で破断していることから、根管壁への接着強さの確保がまだ課題の 一つとしてあげられる.ティースプライマーを用いると組織が変性するが、歯周組織への影響は短期的と考えられるこ とから、根管内から接着する場合には、接着強さの長期的な向上を期待して表面処理材グリーンとの併用を行ってい る.本講演では、これらの根管壁への接着の利点と課題について解説する.

〈略 歴〉-

- 1985年 北海道大学歯学部 卒業
- 1985年 北海道大学歯学部附属病院第2保存科 医員
- 1988年 北海道大学歯学部附属病院第2保存科 助手
- 1998年 北海道大学歯学部附属病院第2保存科 講師
- 2002年 北海道大学大学院歯学研究科歯周・歯内療法学教室 助 教授

Adhes Dent Vol. 40 No. 2 2022

2019年 北海道大学大学院歯学研究院歯周・歯内療法学教室 教授

- 日本歯周病学会 専門医・指導医.
- 日本歯科保存学会 指導医・専門医.
- 日本外傷歯学会 指導医.



接着歯科治療専門医の新規申請および更新申請について

加藤正治 高輪歯科

Procedures of new and renewal applications for the specialist qualification

Shoji Kato Takanawa Dental Office

日本接着歯学会は、2020年10月4日、これまでの"認定医制度"に代わる新たな指標や規程に基づく"専門医制度" を施行しました.専門医の名称は、「接着歯科治療専門医」と定められました.現在は、経過措置として設けられた1 年間の暫定期間が終了し、新制度に則った新規申請が本格的にスタートしています.そこで本講演では、これから接着 歯科治療専門医の新規申請をお考えの会員や、更新申請の準備が必要な会員の方々がスムーズに申請を行えるよう、申 請手続きのポイントについて解説します.

本会専門医制度においては、①専門医認定研修施設における通算5年間の認定研修,ならびに②認定審査として症例 試験と面接試験からなる認定試験が課せられます.また、③専門医に求められる学識向上のために定期的に開催される 認定研修会への参加、④活動実績および業績(本会活動への参加や診療実績など)が研修単位として認定されます.以 上の4点が、これまでの"認定医制度"と大きく異なる点となります.

接着歯科治療専門医の資格を取得するためには、申請時に専門医制度施行細則に定められた所定の業績を含む認定研 修の修了と研修単位の取得要件を満たす必要があります。具体的な申請方法および申請書類等は**専門医認定研修実施要** 綱に記載しています。なお、資格取得後の更新は5年毎とし、研修単位の取得要件を満たしたうえで更新申請が必要と なります。ただし、認定医から専門医認定基準適合試験に合格して専門医となられた会員の場合は、初回の更新期限は 「認定医証」記載の期日となり、申請要件は旧認定医制度規則・施行細則を適用しますのでご留意下さい。

また、すでに認定研修に相当する研鑽を経て日々臨床に従事なさっている会員を対象に新規申請していただくための 特別措置を設けています.これから認定研修を経て申請なさる会員の申請手続きだけでなく、認定研修に値する研修歴 と業績ならびに臨床実績をすでにお持ちの会員が申請なさる場合の手続きについても詳しく解説しますので、本措置を 活用して申請いただければ幸いです.

 (略 歷)
 1990年 東北大学歯学部 卒業 柏田聰明先生(東京医科歯科大学臨床教授)師事 (~1998年)
 1991年 鶴見大学歯学部歯科理工学専攻
 1997年 学位(歯学博士)取得 鶴見大学歯学部歯科理工学講座 非常勤講師
 1998年 高輪歯科 開設

2015年 日本経済新聞社「健康セミナー 21」講師 (~ 2016年) モスクワ国立第一医科大学特別講師 2017年 日本経済新聞社「丸の内キャリア塾」講師(~2021年) 2020年 モリタTRIOSテクニカルインストラクター

【学会活動】

日本接着歯学会:理事,専門医認定委員会委員長,接着歯科治療 専門医,指導医,専門医認定研修施設指定 日本歯科理工学会:Dental Materials Senior Adviser (修復治療 関連器材,予防歯科関連器材)

ほか



〈略 歴〉

Adhes Dent Vol. 40 No. 2 2022

専門医認定研修ガイドラインについて

秋本尚武 秋本歯科診療所

On a training guideline for a specialist of Japan Society for Adhesive Dentistry

Naotake Akimoto Akimoto Dental Clinic

日本接着歯学会が認定する「接着歯科治療専門医(以下 専門医)」を取得するためには、専門医認定研修施設(以下 研修施設)における専門医認定研修(以下 研修)が必要になります. 各研修施設では研修を実施するにあたり,専門 医認定研修実施要綱に則り、専門医認定研修ガイドライン(以下 研修ガイドライン)に基づき、専門医認定研修カリ キュラム(以下 研修カリキュラム)を作成し、本会専門医認定委員会への提出が必要になります。そして研修を希望 する専門研修医は、各研修施設が作成する研修カリキュラムに沿って研修を行うことになります.

研修ガイドラインは、研修カリキュラム作成のための具体的な研修方法や研修施設について記載をしています、専門 研修医を受け入れる研修施設においては、本研修ガイドラインに基づき研修カリキュラムを作成していただくことにな りますが、専門医取得を目指す先生方においては研修施設においてどのような研修が行われるのか研修の目標を知るこ とができます.

日本接着歯学会の専門医制度が施行されるにあたり、本会研修検討委員会が作成した研修ガイドラインには、I. 接着 歯科治療専門医育成のための研修カリキュラム, II. 研修の目標, III. 研修の方法, IV. 研修の評価, について記載をし ています。本講演では、研修施設そして専門研修医を対象に、特に II. 研修の目標における「経験目標」、そして III. 研 修の方法における「具体的な研修方法」について解説を行う予定です.

	, ,		
1986年	鶴見大学歯学部 卒業	2014年	鶴見大学歯学部 非常勤講師(保存修復学講座)(~現
1986年	鶴見大学歯学部 助手 (第一歯科保存学教室)		在)
1995年	博士(歯学)取得(鶴見大学)	2014年	秋本歯科診療所 開設(~現在) 接着歯科治療専門医
1996年	米国アラバマ大学バーミングハム校歯学部 客員研究員		認定研修施設(2021年~)
	(~1997年)		
	(バイオマテリアル学講座 Charles F. Cox 教授 鈴木	学会活	動等:
	司郎教授に師事)	日本接续	着歯学会(理事,代議員,研修検討委員会委員長,接着歯
2004年	鶴見大学歯学部 講師(第一歯科保存学教室)	科治療	専門医, 指導医), 日本歯科保存学会, 日本歯科理工学会,
2013年	鶴見大学歯学部 学内教授 (保存修復学講座)	日本審	美歯科学会, IADR, JADR

JSAD Poster Presentation

IAD Poster Presentation

Wet-dentin bonding state of recent all-in-one adhesive systems under *in vitro* pulpal-pressure conditions

Komoto M, Sugiyama R, Maruyama C, Koshida S, Nara Y

Department of Adhesive Dentistry, School of Life Dentistry at Tokyo, The Nippon Dental University

Keywords: wet-dentin bonding state, pulpal pressure, micro-tensile bond strength, all-in-one adhesive system

Objectives: The aim of this study was to quantitatively examine the *in vitro* wet-dentin bonding under pulpal-pressure-conditions (PPC) with recent all-in-one adhesive systems.

Methods: Standardized horizontally flatten coronal-dentinsurface was prepared to 24 extracted human-sound-maxillary-molars. The specimens were divided into three PPC groups; N (none-PPC, control), 0 (0cm-H₂O-PPC), 15 (15cm-H₂O-PPC). Three recent all-in-one adhesive systems; CLEARFIL Universal Bond Quick (CU: Kuraray Noritake Dental), Prime&Bond Universal (PB: Dentsply Sirona) and Scotchbond Universal Plus (SU: 3M), and two-step self-etch adhesive system; CLEARFIL SE Bond 2 (SE: Kuraray Noritake Dental, control) were applied to the three PPC dentin-surfaces, and cylindrical resin-composite was bonded. Nine standardized beam-test pieces were trimmed from each specimen, and μ -TBS (n=18) were measured. The data were analyzed using one-way ANOVA and Tukey's *q*-test.

Results: The μ -TBS of CU and SU under 0 and 15 were similar to or significantly smaller than those under N. For PB and SE, there were no significant differences in the μ -TBS among N, 0 and 15. Regardless of PPC, the μ -TBS of CU, PB and SU were similar to or significantly greater than SE value.

Conclusion: Wet-dentin bonding state of recent all-in-one adhesive systems seemed to be weakened by the pulpal-pressure. However, the performance of the systems was similar to or better than SE.

* The use of extracted human teeth in this study was approved by the ethics committee of the NDU, School of Life Dentistry at Tokyo (#: NDU-T 2019-32). The authors declare no conflict of interest.

Dentin bonding durability of four different selfetch adhesives

Kitahara S¹⁾, Takagaki T¹⁾, Shimizu S¹⁾, Okamura S¹⁾, Ito R¹⁾, Muramatsu R¹⁾, Abdou A²⁾, Nikaido T¹⁾

- ¹⁾ Department of Operative Dentistry, Division of Oral Functional Science and Rehabilitation, School of Dentistry, Asahi University
- ²⁾ Division of Biomaterials, Prosthodontic Dentistry Department, Faculty of Dentistry, King Salman International University, El Tur, South Sinai, Egypt

Keywords: micro-tensile bond strength, self-etching adhesive, thermal cycle

Objectives: To investigate the dentin bonding durability of four different self-etch bonding systems.

Methods: The labial surfaces of bovine teeth were ground using #600 SiC paper to create flat dentin surfaces. Two 2 self-etch adhesives: Clearfil SE Bond 2 (SE2, Kuraray Noritake Dental) and G2-Bond Universal (G2B, GC), and two 1-step self-etch adhesives; Scotchbond Universal Plus Adhesive (SBU, 3M) and Clearfil Universal Bond Quick (UBQ, Kuraray Noritake Dental) were applied. A resin composite (Clearfil AP-X, A2 shade, Kuraray Noritake Dental) was used to build up a block of composite on the bonded surface incrementally, and light-activated for 20 s using a LED light curing unit (Pencure2000, Morita). All groups were subjected to thermal stress (TC) for 0 or 10,000 cycles followed by microtensile bond strength (μ TBS) testing. The μ TBS data were statistically analyzed via Weibull analysis, and failure mode were recorded.

Results: There were no statistical difference in μ TBS among the four adhesives before TC. However, G2B exhibited significantly higher bond strength after TC, than SBU (p<0.05). Weibull analysis indicated that 1-step self-etch adhesives tended to show lower β values than 2-step self-etch adhesives after TC.

Conclusion: The 2-step self-etching adhesives showed relatively stable bonding performance after TC. **Disclosure of COI**: None.

Evaluation of the effects of HEMA and MDP formulation on 2-step bonding agent

Shoji T, Yamashita M, Hirano K, Fusejima F GC Corporation

Keywords: 2-step bonding agent, HEMA, MDP, SBS, water sorption

Objective: The objective was to evaluate the effects on bonding strength of 2-step universal bonding agent with increasing amount of HEMA and MDP formulation in the bond which is second step liquid and consist bonding layer. **Methods**: 2-BOND (G2-BOND Universal, G2B) as a control (HEMA and MDP free), and HEMA/MDP formulated test materials which were prepared by substituting a portion of monomer in 2-BOND with HEMA and MDP for 10 to 30% of the total, were examined. Water sorption test (referred by ISO4049) and shear bond strength test (referred by ISO29022) were conducted, and results were statistically analyzed by one-way ANOVA (p>0.05).

Results: As increasing HEMA/MDP formulation in the bond, water sorption value was increased because of containing of hydrophilic monomer, and shear bond strength was decreased significantly. The degradation of shear bond strength may be attributed to absorb water in bonding layer and decrease of polymerization degree by containing acidic monomer such as MDP.

Conclusion: G2B showed higher strength and lower sorption, which has HEMA/MDP free composition. It is expected G2B has high durability of bonding layer, which may have clinical advantages.

The authors are company member of GC corporation, and they earn revenue from the company.

Effect of simulated pulp pressure on universal adhesives bond strength

Li Y, Liu Y, Sakata T, Alam A, Md Refat Readul Islam, Tanaka T, Ikeda T, Hoshika S, Matsumoto M, Kawamoto C, Yamauti M, Sano H Department of Restorative Dentistry, Faculty of Dental Medicine, Hokkaido University

Keywords: microtensile bond strength, simulated pulpal pressure, dentin, adhesives

Objective: This study evaluated the effect of simulated pulp pressure (SPP) with distilled water (DW) or fetal bovine serum (FBS) on the bond strength (μ TBS) of adhesives to dentin.

Methods: Human molars (Ethics Committee Approval#2018/9) were sectioned to exposed dentin surfaces and divided into 4 groups according to the adhesive systems: two-step selfetch [Clearfil Mega Bond 2 (MB2) and G2-Bond (G2B)], universal [Scotchbond Universal Plus (SBP) and Beautibond Xtreme Universal (BEX)]. Each group was further divided following the SPP (non-pressure; DW; FSB). Resin composite build-ups were made, teeth were stored in water (37°C, 24 h), sectioned into beams, and tested to determine the μ TBS. Data were analyzed using Kruskal-Wallistest and pairwise comparisons (a=0.05).

Results: CSE (57.32 MPa) and G2B (52.80 MPa) presented the highest mean values among non-pressure groups, and there was no statistical difference (p=0.513). The SPP significantly reduced the bond strength of all adhesives regardless of the solution (p<0.05). There was no significant difference between the μ TBS when SPP was performed with DW and FSB for each adhesive system (p>0.05).

Conclusion: MB2 presented the best bonding performance regardless of the use of SPP. The SPP using DW and FSB harmed the bonding performance of all adhesive systems. The authors have no financial conflicts of interest to disclose concerning the presentation.

Preliminary study for development of new micro tensile bond strength testing

Yamashita K, Toida Y, Matsumoto M, Hoshika S, Kawamoto C, Ikeda T, Tanaka T, Yamauti M, Sano H

Department of Restorative Dentistry, Faculty of Dental Medicine and Graduate School of Dental Medicine, Hokkaido University, Sapporo, Japan

Keywords: microtensile bond strength, CAD/CAM resin block, resin core, resin cement, bonding resin

Objectives: The purpose of this study is to develop a new microtensile bond strength (μ TBS) testing that creates beams before bonding and to compare μ TBS with the conventional μ TBS testing. As a control group, the adhesiveness of the bonding resin and the resin cement was compared.

Methods: Commercially available CAD/CAM resin block (ESTELITE P BLOCK, Tokuyama Dental), resin core (ESTECORE, Tokuyama Dental), resin cements (ESTECEM II, Tokuyama Dental) (Panavia V5, Kuraray Noritake Dental) and bonding resin (Crearfil Mega Bond2, Kuraray Noritake Dental) were used. In the conventional μ TBS testing, a beam with a cross-sectional area of 1 mm × 1 mm was prepared and then classified into the central and the peripheral part. In the new μ TBS testing, after preparing beams with a cross-sectional area of 2 mm × 2 mm, the bonding area was defined as 1 mm² with Teflon tape and bonded.

Results: The μ TBS in the new μ TBS testing was lower than that in the central part of the conventional μ TBS testing, but not significantly different from that in the peripheral part. The μ TBS of the bonding resin was higher than that of the resin cements.

Conclusion: In this study, the new μ TBS testing method has the problem of inhibiting resin cement polymerization when stored in water.

There are no conflicts of interest to disclose to all presenters in this presentation.

Effect of various surface treatments on tensile bond strength to lithium disilicate glass ceramics

Shimizu S¹⁾, Takagaki T¹⁾, Kitahara S¹⁾, Kusakabe S¹⁾, Abdou A²⁾, Nikaido T¹⁾

- ¹⁾ Department of Operative Dentistry, Division of Oral Functional Science and Rehabilitation, School of Dentistry, Asahi University
- ²⁾ Division of Biomaterials, Prosthodontic Dentistry Department, Faculty of Dentistry, King Salman International University, El Tur, South Sinai, Egypt

Keywords: lithium disilicate ceramics, universal bond, silane coupling, tensile bond strength

Objectives: To evaluate the bonding effectiveness of different surface treatments to lithium disilicate glass ceramics.

Methods: e.max CAD blocks were sintered and polished with 600-grit SiC paper. The specimens were assigned to 4 groups according to the cementing protocol: 1) Scotchbond Universal Plus Adhesive+Rely X universal (RX), 2) Beauti-Bond Xtreme+ResiCem EX (EX), 3) Clearfil Ceramic Primer Plus+Panavia V5 (CP) and 4) Monobond Etch & Prime+Panavia V5 (ME). Tensile bond strength (TBS) test was performed at 24 h or 5000 thermal cycle (TC) of 5–55°C. TBS data were statistically analyzed via Weibull analysis. Pre-testing failures and failure mode were recorded.

Results: RX and EX groups of 24 h showed significantly lower bond strength than ME and CP. All specimens of RX and EX after TC5000 failed adhesively before test. CP and ME showed significantly lower bond strength after TC5000. ME showed no pre-testing failure and exhibited highest bond strength among all groups.

Conclusion: To obtain stable bonding performance to lithium disilicate ceramics, not only chemical treatment but etching effect is essential.

Disclosure of COI: None.

Alkali and acid treatments for removing salivary contamination on feldspar porcelain

Komagata Y, Ikeda H, Nagamatsu Y, Shimizu H Division of Biomaterials, Kyushu Dental University

Keywords: glass-ceramics, feldspar porcelain, alkali, acid, shear bond strength

Objectives: This study investigated the cleaning effect of phosphoric acid or sodium hydroxide on feldspar porcelain for bonding pretreatment to resin cement.

Methods: CAD/CAM feldspar porcelain block (Vita blocs Mark II) was cut into 1 mm thickness and polished using emery papers. The polished samples were contaminated with human saliva and divided into two groups to clean with the agents; 37% phosphoric acid solution (acid) or 10% sodium hydroxide solution (alkali). A resin cement was bonded to each cleaned sample. Shear bond strength (SBS) tests were conducted for each sample. Each sample surface was examined by SEM observation and FT-IR analysis.

Results: The SBS for the alkali-cleaned sample was significantly higher than that for the acid-cleaned sample, and was comparable to that for the no-contaminated sample. The results of the SEM observation and FT-IR analysis suggested that alkali eliminates salivary contamination on the porcelain surface.

Conclusion: The sodium hydroxide solution is effective in cleaning saliva contamination for bonding pretreatment.

There are no companies or organizations that should disclose their COI about the presentation. This study was conducted with the approval of the Ethics Committee of Kyushu Dental University (No. 19-85).

Effects of ceramic primers on the bonding of resin cement to air-abraded zirconia with alumina or silica-coated alumina

Tsuda F¹⁾, Yoshida K²⁾

- ¹⁾ Department of Applied Prosthodontics, Graduate School of Biomedical Sciences, Nagasaki University
- ²⁾ Clinic of Fixed Prosthodontics, Nagasaki University Hospital

Objectives: The purpose of this study was to examine the effects of ceramic primers on the bond strength of resin cement to air-abraded zirconia with alumina or silica-coated alumina.

Methods: Highly translucent partially stabilized zirconia (Aadva zirconia NT) plates were abraded with 30 μ m silica-coated alumina (SCA, Rocatec Soft) at 0.28 MPa or 50 μ m alumina at 0.2 MPa (AB). SCA plates were unprimed or primed with RelyX Ceramic Primer (RCP), G-Multi Primer (GMP), or Metal Primer Z (MPZ). AB plates were primed with GMP or MPZ. Zirconia specimens were then bonded to stainless steel rods with a resin cement (G-CEM LinkForce) without adhesive functional monomers. The tensile bond strengths were measured after 24 hours (TC0) and after thermal cycling at 4–60°C (TC10,000). Data were statistically analyzed using 2-way ANOVA and Tukey-Kramer post-hoc tests (a=0.05).

Results: At TC0, there were no statistically significant differences among the groups of SCA/RCP, SCA/GMP, AB/GMP, and AB/MPZ (p>0.05). The bond strengths for all groups decreased at TC10,000.

Conclusion: The bonding of resin cement to zirconia is preferable to be abraded with SCA or AB and applied with GMP or MPZ, respectively.

COI disclosure statement: None.

Effect of building direction on shear bond strength of additive manufacturing zirconia

Miura S¹, Shinya A², Miura D², Ishida Y²,

Fujisawa M¹⁾

- ¹⁾ Division of Fixed Prosthodontics, Department of Restorative & Biomaterials Sciences, Meikai University School of Dentistry
- ²⁾ Department of Dental Materials, The Nippon Dental University, School of Life Dentistry at Tokyo

Keywords: additive manufacturing, Y-TZP, stereolithography, building direction

Objectives: The purpose of this study was to investigate the shear bond strength of adhesive resin cement to zirconia fabricated using additive manufacturing and the effect of building direction.

Methods: The specimens were fabricated using ZrO₂ paste (3DMix ZrO₂; 3DCeram) and vat photopolymerization method (CeraMaker 900; 3DCeram). Three different bonding surfaces were set as parallel, diagonal, and vertical to the building directions. They were embedded in epoxy resin and polished to #600 water-resistant abrasive paper (n=11). Two adhesive resin cements (Panavia V5, SA Luting Multi; Kuraray Noritake Dental) were used, and the surface pretreatments were set as alumina blasting and no blasting. The shear bond test was performed with Ultradent jig using a universal testing machine. The obtained shear bond strength data was statistically analyzed by one-way ANOVA followed by Turkey-Kramer multiple comparison tests.

Results: For both resin cements, no significant difference was found in the shear bond strength among different building directions. However, when the alumina blasting was performed, the shear strength was significantly higher than that of the no blasting.

Conclusion: For both resin cements, additive manufactured zirconia specimens were not affected by the difference in building direction on the shear bond strength.

The presenters declare that they have no conflicts of interest.

Effects of primers on bond strength between titanium and self-adhesive resin cement

Okuyama K, Tamaki Y

Department of Dental Materials Science, Division of Oral Functional Sciences and Rehabilitation, Asahi University School of Dentistry

Keywords: titanium, self-adhesive resin cement, metal primer, sandblasting

Objectives: To evaluate the effects of various primers on shear bond strength (SBS) between titanium plate and self-adhesive resin cement with or without sandblasting.

Methods: Titanium plates were polished with SiC paper (#1200) and then half of them were sandblasted (powder: 50 μ m Al₂O₃, pressure: 0.2 MPa, 10 sec). V-Primer (Sun Medical: for precious metal), Meta Fast (Sun Medical: for non-precious metal), or Metal Link (Shofu: for all kinds of metal) was applied to these titanium specimens. After then, a self-adhesive resin cement (G-Cem One EM (GC); GC or SA Luting Multi (SA); Kuraray Noritake) was bonded on the plate (diameter: 3 mm, thickness: 5 mm). Control group was no-priming group. Cementing specimens (n=10) were stored in water for 24 hours and then SBS was measured at crosshead speed by 1 mm/min. The data were analyzed using Games-Howell test (p=0.05).

Results: Sandblasting contributed to higher SBS than without blasting on all groups. For without sandblasting (both GC and SA), Meta Fast showed higher value than control. For sandblasting, Meta Fast showed higher value than V-primer.

Conclusion: A primer for non-precious metal might be contributed to high bond strength between titanium and self-adhesive resin cement on this limited condition.

The authors declare no conflicts of interest associated with this presentation.

Shear bond strength of resin cement to FDMformed PEEK and the effect of fabrication direction

Miura D, Ishida Y, Aoki H, Shinya A Dental Materials Science, School of Life Dentistry at Tokyo, The Nippon Dental University

Keywords: PEEK, FDM molding, shear bond strength

Objectives: The purpose of this study was to investigate the shear bond strength (SBS) of resin cement to FDM-formed PEEK and the effect of building direction.

Methods: The specimens were fabricated using a FDM printer (FUNMAT HT, INTAMSYS) with PEEK filament (PEEK Films, Intamsys). Bonded surfaces were prepared to be 0° , 45° , and 90° against the building direction.

Resin cement (PANAVIA V5, Kuraray Noritake Dental) was used, and surface treatment was performed with six different conditions; with/without alumina blasting, with/without silane treatment (Porcelain Primer, Bisco), and with/without ceramic primer treatment (CLEAFIL CERAMIC PRIMER PLUS, Kuraray Noritake Dental). This experiment was conducted in accordance with ISO 29022. SBS was measured using a universal testing machine. For the statistical analysis, analysis of variance and Tukey's multiple comparisons were performed.

Results: No difference in SBS due to building direction was observed in all conditions. Comparison of surface treatments showed that alumina blasting improved SBS in all building directions. In addition, it was significantly improved by ceramic primer treatment after alumina blasting.

Conclusion: The building direction did not affect to SBS. Ceramic primer treatment after alumina blasting showed greater improvement of SBS for all building directions of FDM-formed PEEK.

Evaluation of wear resistance of resin cements

Sato K, Hirano K, Fusejima F GC Corporation Keywords: wear, resin cement, cement layer

Objectives: Hybrid ceramic CAD/CAM Block has been used for such as an alternative to metal restorations since its esthetics, and the resin cement is typically applied to adhere it. Wear resistance of cement layer is important for esthetics because this may cause marginal chipping and discoloration, especially in inlay cases. In this study, we evaluated wear resistance of resin cements.

Methods: The three-body wear test was conducted for 3 resin cements, G-CEM ONE EM(GOE), Product A and B with a mixture of PMMA beads and glycerin (1:1 ratio) as abrasive medium (n=4, test load: 300 g, 100,000 cycles). Each cement was cured either in light-curing mode (LC) or self-curing mode (SC). Wear value was measured as height loss of specimens and data was analyzed by one-way ANOVA followed by Tukey-Kramer test (p<0.05).

Results: Wear value (mean (±SD)) of GOE, product A and B in LC were 15 (±5), 67 (±4) and 111 (±15) μ m, respectively. Wear value of GOE, product A and B in SC were 17 (±4), 62 (±9) and 142 (±31) μ m, respectively. GOE showed significantly lower wear value among products since its fine filler. **Conclusion**: It can be expected GOE has excellent wear resistance and may prevent marginal discoloration and chipping.

Disclosure of COI: The presenter of this presentation belongs to a company, and research expenses and salaries are paid by GC Corporation.

Development and validation of new pressure variable chairside sandblaster

Okamura S¹⁾, Takagaki T¹⁾, Kitahara S¹⁾, Shimizu S¹⁾, Ito R¹⁾, Idono T¹⁾, Arakawa Y²⁾, Nikaido T¹⁾

- ¹⁾ Department of Operative Dentistry, Division of Oral Functional
- Science and Rehabilitation, School of Dentistry, Asahi University
 ²⁾ Morita Tokyo Mfg. Co., Ltd. Third Technology Development Department

Keywords: sandblasting, alumina, blaster,

surface roughness, tensile bond strength

Objectives: Alumina-blasting immediately before cementing indirect CAD/CAM restorations is essential to obtain durable bonding performance. Despite the usefulness of chairside micro blaster, alumina blasting pressure depends on the supply level. The aim of this study was to develop and validate a new pressure variable chairside sandblaster.

Methods: A pressure variable chairside sandblaster (Adprep, Morita) was newly developed. A micro sandblaster (Miniblaster, Deldent) was used as a control with an air- pressure regulator. Validation tests were performed with different air-pressure onto 1) suction pressure value 2) surface roughness of PMMA plate 3) depth and diameter of blasting at 1 cm distance and 4) micro-tensile bond strength test with a CAD/CAM resin block (KATANA Avencia Block, Kuraray Noritake Dental) and a resin cement (Panavia V5, Kuraray Noritake Dental).

Results: Adprep showed equal/superior suction pressure and equal/smaller diameter of blasting comparing with Miniblaster. Surface roughness and micro-tensile bond strength at 0.2 MPa was significantly higher with Adprep.

Conclusion: A new pressure variable chairside sandblaster will be a useful device for preparation of adherend surface at chairside.

Disclosure of COI: None.

The effect of blood on the hardening of pulp capping agents

Hoshika T, Katsumata A, Nishitani Y

Department of Restorative Dentistry and Endodontology, Kagoshima University Graduate School of Medical and Dental Sciences

Keywords: pulp capping agent, mineral trioxide aggregate (MTA)

Objective: Pulp capping agents containing the portland cement or mineral trioxide aggregate (MTA) have been widely used clinically. It was not well-known the effect of the bleeding from the dental pulp, such as direct pulp capping or vital pulp amputation on the hardening of the pulp capping agents.

In this study, we investigated the effect of blood on the mechanical properties of adhesive pulp capping agents.

Method: Super MTA paste (SMTA; Sun Medical Co., Ltd., Shiga, Japan) was used as the pulp capping agent in this experiment. The samples were prepared by mixing bovine defibered blood or purified water with SMTA so as to have the weight ratio of 10% and 20%, and curing the mixture in the mold. SMTA specimens without blood and water were used as the control group.

Each specimens were placed in dry box for 24 hours or 1 week at 37 $^{\circ}\mathrm{C}$ prior to measure the 10% strain compressive strength.

Result: The initial compression strength results of the blood or water mixture groups are significantly higher than those of control groups.

Conclusion: It was suggested that blood or water affect the compression strength of the pulp capping agents.

I have no financial relationships to disclose.

Nondestructive observation of adhesively cemented interface between dentin and indirect composite resin disks using a novel terahertz pulsed imaging technique

Yonekura K¹⁾, Ida Y¹⁾, Tokisane Y²⁾, Yano T²⁾, Iuchi T¹⁾, Yasui T²⁾, Hosaka K¹⁾

¹⁾ Department of Regenerative Dental Medicine, Tokushima University Graduate School of Biomedical Sciences

²⁾ Institute of Post-LED Photonics, Tokushima University

Keywords: terahertz pulsed imaging, nondestructively observe

Objectives: This study aims to observe the indirectly cemented dentin-resin composite interface using a terahertz (THz) pulsed imaging technique.

Methods: A human dentin disk (2 mm thick) and indirect resin-composite disks (0.5 mm thick) were adhesively bonded using a luting resin cement (Panavia V5, Kuraray Noritake Dental. Inc.). After the generated THz beam was focused on the samples, the analyses of reflected THz pulses from samples in time and frequency domains were performed using a THz time-domain spectrometer (Tera Prospector, Nioppo Precision Co., Ltd.). In the time domain analyses, zones of different tooth structures and restorations statuses were identified based on changes in the THz peak amplitude in waveforms. In addition, THz power data were used in the frequency domain analyses to construct two-dimensional images of samples at specific frequency values.

Results: The adhesively cemented interface between dentin and the indirect composite resin disks could be nondestructively visualized.

Conclusion: The development potential for future clinical application of THz pulsed imaging methods in the field of dental restoration was found.

Ethical approval: The Ethics Review Board of Tokushima University (329-9).

Disclosure of Conflicts of Interest: None.

Clinical performance of mono-block direct composite crown restorations

Tashiro H¹, Miki H², Tagami J^{3,6}, Takagaki T⁴, Hosaka K⁵, Sato T⁶, Hatayama T⁶, Shimada Y⁶

¹⁾ Tashiro Dental Clinic

- ²⁾ Habara Dental Clinic
- ³⁾ Quartz Dental Clinic
- ⁴⁾ Department of Operative Dentistry, Division of Oral Functional Science and Rehabilitation, Asahi University School of Dentistry
- ⁵⁾ Department of Regenerative Dental Medicine, Tokushima University Graduate School of Biomedical Sciences
- ⁶⁾ Department of Cariology and Operative Dentistry, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University (TMDU)

Keywords: mono-block direct composite crown, long-term, survival rate, success rete

Objectives: To analyze the clinical performance of monoblock direct composite crown (MDCC) restoration technique *in vivo*.

Methods: The longevity of the MDCCs were evaluated with the correlations between tooth location, remaining tooth number, and occlusion pattern. The 71 cases of MDCC among the patients at Tashiro Dental Clinic were subjected in this study. All MDCCs were applied to the non-vital anterior teeth without supra-gingival tooth structure using 2-step self-etching adhesive. The post cavity was not prepared, and any post material was not used for the restoration. The whole crown structure was re-constructed with the direct composite resin build-up technique.

Results: The average survival period was 37.0 months. The success rate of the 71 MDCC was 92.9%, and the survival rate was 95.8%. Only 4.2% of the cases required a new treatment plan after removal of the MDCCs and 2.8% required the intraoral repair restoration of the fracture of the MDCCs such as partial or whole reconstruction of the crown. The numbers of remaining teeth and the occlusion pattern tended to influence the survival period of the MDCCs.

Conclusion: MDCC restoration technique is a promising treatment option for the severely damaged anterior teeth.

This study was reviewed and approved by the Ethics Committee of the Tokyo Medical and Dental University; D2020-026.

COI: ?

Effect of Silver Diammine fluoride on bond strength of new universal adhesives

Papichaya I, Yuan Y, Ikeda T, Kawamoto C,

Tanaka T, Hoshika S, Matsumoto M, Sano H

Department of Restorative Dentistry, Faculty of dental Medicine, Hokkaido University

Keywords: silver diammine fluoride, adhesive, microtensile bond strength, SEM

Objective: This study aim to evaluate the micro tensile bond strength (μ TBS) of Silver Diammine fluoride-treated sound dentin using new universal adhesives.

Methods: Twenty-four flat mid-coronal third molars (Ethics Committee Approval#2018/9) were randomly divided into two groups: Control and SDF group. Further divided into 4 subgroups under different approaches and adhesives following manufacturer's instructions: self-etch (SE) or etch and rinse (ER) modes of Scothbond Universal Plus Adhesive (SBUP, 3M ESPE) or G2-BOND Universal (G2, GC corporation). All specimens were restored with resin composite and were stored in distilled water 24 h prior the test. Data from the μ TBS test were analyzed using one-way ANOVA and Games-Howell post-hoc test. The surface morphology was evaluated by SEM.

Results: The μ TBS of SDF groups showed significantly lower for both adhesives in SE and ER modes (p<0.05). In SBUP groups, both Control and SDF subgroups with ER modes showed significantly higher μ TBS than SE modes (p<0.05). SEM images of SDF groups showed remaining of silver particles on the dentin surface and most of the fractures modes were occurred within the adhesive. ER groups showed fewer silver particles than SE groups.

Conclusion: SDF had adverse effect on universal adhesives in this study.

The authors have no financial conflicts of interest to disclose concerning the presentation.

Are HEMA and 10-MDP necessary in the bonding agent of a 2-SEA?

Iuchi T¹, Yonekura K¹, Ida Y¹, Motoyama Y²,

Ikeda M³⁾, Hamada K⁴⁾, Nakajima M²⁾, Hosaka K¹⁾

- ¹⁾ Department of Regenerative Dental Medicine, Tokushima University Graduate School of Biomedical Sciences
- ²⁾ Cariology and Operative Dentistry, Department of Restorative Sciences, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University
- ³⁾ Department of Oral Prosthetic Engineering, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University
- ⁴⁾ Department of Biomaterials and Bioengineering, Tokushima University Graduate School of Biomedical Sciences

Keywords: HEMA, 10-MDP, micro tensile bond strength, water sorption test

Objectives: This study aims to investigate the effect of HEMA and 10-MDP on microtensile bond strengths (μ TBSs), water sorption (Wsp) and elastic modulus in wet condition (E_{wet}) of a 2-SEA.

Methods: Clearfil SE Bond2 (SE2, Kuraray Noritake) was used. In addition, three experimental bonding agents which eliminate HEMA, 10-MDP, or both from SE2 original compositions were prepared as SE2_{-H}, SE2_{-M}, SE2_{-HM}. The SE2 self-etching primer followed by one of the bonding agents was applied to mid coronal flat dentin and Clearfil AP-X was built up. After 24-h water storage, μ TBSs were measured. Wsp and E_{wet} of polymerized bonding agents was also measured. The μ TBS and Wsp values were statistically analyzed using a t-test with Bonferroni correction at a significance level of 0.05.

Results: The highest μ TBS was observed in order of SE2>SE2_{-M}=SE2_{-H}>SE2_{-HM}. The highest Wsp and the lowest E_{wet} values were observed in the order of SE2>SE2_{-M}, SE2_{-H}>SE2_{-HM}.

Conclusion: Incorporation of HEMA and 10-MDP in the bonding agent increased the initial bond strength. However, from the result of Wsp and E_{wet} , it may suggest that HEMA negatively influence the bond durability.

Ethical approval: The Ethics Review Board of Tokushima University (329-9).

Disclosure of Conflicts of Interest: None.

Polymerization Behavior of Composites at Top/ Bottom of Cavity using Different Light Cure

Yoshikawa T¹⁾, Sadr A²⁾, Shimada Y¹⁾

- ¹⁾ Department of Cariology and Operative Dentistry, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University
- ²⁾ Department of Restorative Dentistry, School of Dentistry, University of Washington

Keywords: radiant exposure, hardness ratio, irradiance, Knoop hardness, resin composite

Objectives: We reported homogeneous polymerization of resin composite improved resin-cavity adaptation. Hardness ratio near 1 show degree of conversion at the bottom surface is near that of the top surface. The aim of this study was to evaluate microhardness and hardness ratio of various resin composites using different light irradiance.

Methods: Light-curing unit was an LED (blue+violet LED) light-curing unit (G-light Prima-II Plus, GC). The light-cured resin composites were hybrid type Clearfil AP-X(AP, shade A3, Kuraray Noritake Dental), structural color type OMNI-CHROMA(OC, Tokuyama Dental) and bulk-fill flowable type GRACEFIL BulkFlo(BF, shade U, GC). Composite specimens of 2 mm thickness were polymerized in Teflon molds using radiant exposure of 24 J/cm². Light irradiance were 1,100 $mW/cm^2 22 s$ and $600 mW/cm^2 40 s$ (light tip-resin distance: 7 mm). Just after light curing, Knoop hardness (KHN) was measured at the top and bottom surfaces. The hardness ratio=KHN of bottom surface/KHN of top surface was calculated. Data (n=6) were analyzed using Bonferroni/Dunn test. **Results**: Immediately after light curing, 1,100 mW/cm² 22 s showed significantly smaller hardness ratio compared with that of 600 mW/cm² 40 s for AP and BF resin composite (p<0.05).

Conclusion: When radiant exposure was the same, 600 mW/ cm² irradiance light led to homogeneous polymerization of resin composite. (This study was funded by Kuraray Noritake Dental and Tokuyama Dental.)

Effect of new resin based dentin desensitizer on permeability for the treatment of dentin hypersensitivity

Yasuo K, Morikawa Y, Iwasaki K, Ouchi S, Onda K, Suzuki K, Miyaji H, Hatsuoka Y, Iwata N, Yoshikawa K, Yamamoto K Department of Operative Dentistry, Osaka Dental University Keywords: dentin hypersensitivity, dentin permeability, model of hypersensitive dentin

Objectives: Considering the sealing of dentinal tubules with new resin based dentin desensitizers, we measured the permeability inhibition rate using a tooth model of hypersensitivity.

Methods: Two new resin based dentin desensitizers; G2-Bond Universal 1-primer (GBU) and Scotchbond Universal Plus Adhesive (SUP), and two conventional resin based desensitizers; G-Premio Bond (GPB), Scotchbond Universal Adhesive (SUA) were used.

The dentin discs were prepared from extracted human molars as hypersensitivity model specimens. The specimens were applied to a device produced by modifying that reported by Pashley, and the pulpal pressure was determined to be 25 mmHg. By the dentin permeability before and after application, the permeability inhibition rate was measured.

This study was conducted with the ethical review board of Osaka Dental University (approval number:110767).

Results: The permeability inhibition rates of GPB, GBU, SUA and SUP groups were 94.2 (\pm 2.3), 94.1 (\pm 2.5), 93.7 (\pm 2.8) and 92.5 (\pm 3.2) %. There was no significant difference in permeability inhibition rates of each group.

Conclusion: It is considered that the new resin based dentin desensitizers delivered a better sealing ability at the same level as conventional resin based desensitizers for dentinal tubules.

Bond strength of resin composite to novel octyltype silane coupling agent

Nihei T^{1,2)}, Katayama Y¹⁾, Midono T¹⁾, Aoki K¹⁾,

Yamaguchi H¹⁾, Ohashi K¹⁾

 ¹⁾ Department of Clinical Biomaterials, Kanagawa Dental University
 ²⁾ Materials & Surface Engineering Research Institute, Kanto Gakuin University

Keywords: silane coupling agent, glass plate, tensile bond strength

Objectives: The aim of this study is to evaluate the bond strength and the durability against hydrolysis of novel octyl-type silane coupling agent.

Methods: The used silane coupling agents were 3-methacryloyloxypropyltrimethoxysilane (3-MPS) and novel octyl-type trimethoxysilane (8-MOS). The glass plate surface was modified by each silane at 50 mmol, and then the plates were bonded to the Bis-GMA-type self-cured resin composite. The specimens were stored in water at 37°C until 180 days, and then tensile bond strength was measured with a universal mechanical testing at a cross-head speed of 1.0 mm/min. The collected data were analyzed statistically using ANOVE and Fisher PLSD.

Results: The glass plates modified with 3-MPS was showed significantly decrease of tensile bond strength after water immersion after 28 days (p<0.05). The tensile bond strengths of the specimens treated with 8-MOS was significantly higher than that of 3-MPS specimens (p<0.05), and was showed no significantly change after water immersion for 180 days (p>0.05).

Conclusion: From these results, it was suggested that the novel octyl-type silane coupling agent (8-MOS) showed excellent resistance against water immersion compared with 3-MPS.

We have no financial relationships to disclose.

Shear bond strength to tooth structure of a new light-cured resin cement

Irie M¹, Maruo Y², Nishigawa G², Matsumoto T¹) ¹ Department of Biomaterials, Okayama University Graduate

- School of Medicine, Dentistry and Pharmaceutical Sciences.
- ²⁾ Occlusion and Removable Prosthodontics, Okayama University Hospital

Keywords: light-cured resin cement, shear bond strength, to human tooth, composite CAD/CAM block, durability

Objectives: The purpose was to evaluate the shear bond strength (SBS) of four light-cured resin cement systems [HL-100C/PANAVIA V5 Tooth Primer: HL (Kuraray Noritake Dental Inc.: KND), HL-100C/CLEARFIL Universal Bond Quick: HC (KND), RelyX Veneer/Scotchbond Universal Plus Adhesive: 3M (3M), Variolink Esthetic LC/Adhese Universal: IV (Ivoclar Vivadent)] and one dual-cure resin cement system [PANAVIA V5/PANAVIA V5 Tooth Primer: KU (KND)]. The hypothesis to be tested was that values of HL and HC exist greater bond values compared those of other materials.

Methods: The enamel (etched with phosphoric acid) and dentin surfaces were pretreated as described above. SBSs between tooth substrates and KATANA AVENCIA Block (KND) were measured after one-day (1-D) and 20,000 thermocycles (TC). Statistical analyses were performed by t-Test (1-D versus TC, p=0.05, S: Significantly different, NS: Not significantly different). The study protocol was approved by the Ethics Committee of Okayama University Graduate School of Medicine, Dentistry and Pharmaceuticals Sciences, and Okayama University Hospital (No. 1901-036).

Results: Summary: Mean (S.D., n=10, MPa)

	HL	HC	3M	IV	KU
To I	Enamel				
1-D:	34.0 (4.3)	32.2 (3.0)	30.6 (5.0)	21.7 (4.2)	33.8 (4.1)
	S	S	S	NS	S
TC:	28.8 (3.0)	23.4 (2.6)	20.4 (3.6)	14.6 (1.5)	27.7 (4.5)
<u>To I</u>	Dentin				
1-D:	22.5 (4.5)	20.0 (3.3)	17.3 (3.4)	16.7 (3.9)	22.0 (3.8)
	NS	NS	NS	S	NS
TC:	21.1 (3.6)	18.8 (3.9)	16.6 (3.9)	10.7 (1.9)	20.2 (3.3)

Conclusion: The values of HL and HC were similar to these of KU after 1-D and TC and showed a greater value compared those of other luting materials. The test hypothesis was therefore accepted.

The authors declare to have no conflict of interest.

The effect of deproteinizing pretreatment on bonding performance and acid resistance to eroded dentin

Yi Yang¹, Inoue G¹, Hosaka K², Ikeda M³, Shimada Y¹⁾

- ¹⁾ Department of Cariology and Operative Dentistry, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University, Japan
- ²⁾ Department of Regenerative Dental Medicine, Graduate School of Biomedical Sciences, Tokushima University, Japan
- Department of Oral Prosthetic Engineering, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University, Japan

Keywords: eroded dentin, micro-tensile bond strength, acid-base resistance zone, thermal cycling, deproteinizing pretreatment

Objectives: This study evaluated the micro-tensile bond strengths (μ TBS) and acid-base resistant zones (ABRZs) of deproteinization solutions on eroded dentin.

Methods: Coronal dentin surfaces of sound human molars underwent an artificial erosion procedure except for uneroded control group(C). The eroded specimens were then assigned to groups according to treatments: without pretreatment(E), 6%NaOCl (EN), 6%NaOCl and DC Activator (END), 50 ppm HOCl (EH), 50 ppm HOCl and DC Activator (EHD). Clearfil SE Bond 2 (Kuraray) was used for adhesion. For μ TBS test, 6-8 beams were obtained from each specimen after 24-hour water storage. Half of the beams were tested immediately and the other half were subjected to 20,000 thermal cycles (TC). Data were analyzed using t-test in welch method with Bonferroni correction. ABRZ formation was evaluated using SEM.

Results: There's no significant difference between E, EH, EHD. C and END were not significantly affected by the aging. ABRZ was distinguished only in group C. Thick hybrid layer and voids were observed in eroded groups.

Conclusion: The use of 6%NaOCl and DC Activator could reverse the bonding performance, to a certain extent. 50 ppm HOCl was not as effective as 6%NaOCl on bonding to eroded dentin.

COI disclosure statement: Kuraray Noritake Dental.

Ethical protocol No. D2013-022 approved by Human Research Ethics Committee of Tokyo Medical and Dental University.

Mechanical properties of the newly-developed cavity lining/base material containing mineral trioxide aggregate

Nakamura K¹⁾, Wu Chia-Ying^{1,2)}, Kobayashi A^{1,2)}, Koike T¹), Miyakuni A¹), Kohda K¹), Komatsu S¹), Komachiya M¹⁾, Abo H¹⁾, Kameyama A^{1,2)}

- ¹⁾ Department of Operative Dentistry, Endodontology, and Periodontology, School of Dentistry, Matsumoto Dental University
- ²⁾ Department of Oral Health Promotion, Graduate School of Oral Medicine, Matsumoto Dental University

Keywords: lining/base material, micro-shear bond strength (μ SBS), compressive strength, depth of cure

Objectives: Cavity lining/base material containing trioxide aggregate was recently developed by Neo Dental Chemical Products. The aim of this study was to evaluate some properties assumed the cavity lining in indirect restoration and compare to the existing two commercially-available lining/ base materials.

Methods: Prototype cavity lining/base material (LA-T1, Neo Dental Chemical Products), Cavios (CAV, Neo Dental Chemical Products), and Bulk Base Hard (BBH, Sun Medical) were used as examined cavity lining/base materials. Depth of cure, micro-shear bond strength (µSBS) between the resin-based luting cement (Nexus Universal, Kerr), and compressive strength of these materials were investigated. Results: Depth of cure of LA-T1 was similar to that of CAV. BBH was over the limit of measurement. No significant difference could not be detected between the light-curing distance (0 mm and 4 mm) in each material. μ SBS between LA-T1 and Nexus Universal was slightly higher than that of CAV and similar to that of BBH. Although compressive strength of LA-T1 was similar to that of CAV, they were significantly less than BBH.

Conclusion: These results suggest that newly-developed prototype cavity lining/base material LA-T1 might be able to apply in the clinical situation as same as CAV.

Influence of nanochitosan self-etch primers on the dentin surface and in proteolytic activity

Pâmella Coelho Dias^{1*)}, Gabriela Migotto Goering¹⁾, Isabela Barbosa Quero¹⁾, Juliana Jendiroba Faraoni¹⁾, Francisco Wanderley Garcia de Paula e Silva²⁾.

Regina Guenka Palma-Dibb¹⁾

¹⁾ Department of Restorative Dentistry, School of Dentistry of Ribeirão Preto, University of São Paulo

²⁾ Department of Pediatric Clinics, School of Dentistry of Ribeirão Preto, University of São Paulo

Keywords: dentin, nanochitosan, primers

Objectives: Evaluate the proteolytic activity of experimental self-etch primers incorporated with nanochitosan gel (NCgel) and their influence on coronal and root dentin surface.

Methods: Standardized coronal and root bovine dentin sections (n=5) were treated with different primers: C-Clearfil, P1-without NCgel, P2-5%NCgel, and P3-10%NCgel and analyzed by SEM. Zymography evaluated the proteolytic activity, where the root segments (n=5) were divided into five groups: PA (phosphoric acid), C, P1, P2, and P3 and incubated in a gelatinous substrate to verify if the enzymatic activity was due to MMP enzymes. Gelatinase activity was evaluated in a standardized rectangular area, photographed under a fluorescence microscope, and analyzed by densitometry using the ImageJ software. The fluorescent spots were quantified and expressed as arbitrary fluorescence units/ mm². Data were analyzed by ANOVA and Tukey (p<0.05).

Results: P2 and P3 showed a similar demineralization pattern of the intertubular and peritubular coronal dentin and exposed the intertubular dentin and collagen fibrils at root dentin. Clearfil expressed more proteolytic activity than experimental primers (p<0.05), and there was no statistical difference between P1, P2, and P3 (p>0.05).

Conclusion: The incorporation of NCgel positively affected the primers' behavior and did not increase the activation of MMPs.

FAPESP (2019/20997-6).

Effect of operator experience on dentin bond strength of different adhesives

Di Wu¹⁾, Kawamoto C¹⁾, Yamauti M¹⁾, Ito N²⁾,

Okazaki T²⁾, Ye Yao¹⁾, Toyama A¹⁾, Arefin Alam¹⁾,

Fei Chen³⁾, Hoshika S¹⁾, Matsumoto M¹⁾, Tanaka T¹⁾, Sano H¹⁾

- ¹⁾ Department of Restorative Dentistry, Graduate School of Dental Medicine, Hokkaido University, Sapporo, Japan
- ²⁾ Faculty of Dental Medicine, Hokkaido University, Sapporo, Japan
- ³⁾ Department of Stomatology, Beijing Tongren Hospital, Capital Medical University, Beijing, China

Keywords: dentin bonding, adhesives, bond strength, operator

Objectives: To evaluate the effect of operator experience on dentin microtensile bond strength (MTBS) using universal and two-step self-etch adhesives.

Methods: Flat dentin surfaces were exposed from extracted human sound molars (Hokkaido University Faculty of Dentistry Ethics Committee (2018-9)). Bonding agents (Clearfil Megabond 2 and Beautibond Xtreme) were applied and resin composite build-ups were made as per the manufactures' instruction (n=3). Three operators of different experience levels (a PhD student-OP1/3-year experience, and 2 undergraduate students-OP2 and OP3/15-day training) independently performed the sample preparation for the MTBS test. Samples were stored in distilled water (37°C, 24 h) and submitted to MTBS test. Fracture mode was analyzed with stereoscope and SEM. Two-Way ANOVA and Tukey test were performed.

Results: MTBS to dentin was significantly affected by material (p<0.001), operator (p=0.003) and their interaction (p=0.048). Clearfil Megabond 2 showed the highest results when OP1 and OP3 performed the bonding procedure. MTBS of both materials was not significantly different when Operator 2 bonded the teeth. The fracture mode was predominantly adhesive.

Conclusion: The operator experience is a relevant factor affecting the outcomes of MTBS test for different materials. **Disclosure**: The authors have no financial conflicts of interest concerning the presentation.

Bonding performance of commercial and experimental self-adhesive resin composites to dentin

Ye Yao, Di Wu, Tanaka T, Ikeda T, Hoshika S, Matsumoto M, Kawamoto C, Yamauti M, Sano H Department of Restorative Dentistry, Graduate School of Dental Medicine, Hokkaido University

Keywords: self-adhesive, resin composite, dentin, microtensile bond strength

Objectives: Self-adhesive resins were developed to simplify the restorative procedures by eliminating the technique-sensitivity of bonding procedures. This evaluated the bonding performance of commercial and experimental self-adhesive resin composites to dentin.

Methods: Sound human third molars were sectioned to remove enamel and expose mid-dentin surfaces (Hokkaido University Faculty of Dentistry Ethics Committee (2018-9)). Smear layers were standardized using 600-grit-SiC paper (1-min) under irrigation. Three self-adhesive resin composites (FIT SA, Shofu; Experimental, Shofu; Vertise Flow, Kerr) were applied to dentin and light-cured according to the manufacturers' instructions. The specimens were stored in distilled water (37°C; 24 h) and prepared for microtensile bond strength test (n=4). Tooth was used as a statistical unit. Fracture mode was observed using stereoscope and SEM. Data followed normal and homogeneous distributions and were analyzed using One-Way ANOVA.

Results: FIT SA, Experimental, and Vertise Flow groups showed statistically similar microtensile bond strengths $(15.89 \pm 3.45; 21.49 \pm 2.18; 15.99 \pm 2.87 \text{ MPa}; p=0.053)$. The fracture mode was 100% adhesive.

Conclusion: Within the study's limitations, all three self-adhesive resin composites presented similar microtensile bonding performance to dentin after 24 hours of storage.

Disclosure: The authors have no financial conflicts of interest concerning the presentation.

Observation of the cavity adaptation of a newly developed self-adhesive resin composite by OCT

Inoue G¹⁾, Sumi Y²⁾, Shimada Y¹⁾

- ¹⁾ Department of Cariology and Operative Dentistry, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University (TMDU), Japan
- ²⁾ Center for Development of Advanced Medicine for Dental Diseases, National Center for Geriatrics and Gerontology, Japan

Keywords: self-adhesive resin composite, gap formation, thermal cycling, optical coherent tomography

Objective: This study evaluated the gap formation of a newly developed self-adhesive resin composite (SA-100R) using an Optical Coherent Tomography (OCT).

Methods: Dish-shaped cavities (n=24) with a diameter of 3 mm and a depth of 1.5 mm on bovine teeth were prepared. Each cavity was filled with each of the following materials; SA-100R (Kuraray Noritake Dental), Vertise Flow (VF, Kerr), and 1step-bond system and flowable resin composite (Cont). The gap formation of each specimen was observed by OCT, and performed 10,000 thermal cycles (TC). After aging, the gaps were assessed by OCT again. The gap distance was measured from the obtained OCT image using a software (Image J) and the percentages of the gap formation were calculated. Data was analyzed using t-test with Bonferroni correction.

Results: Immediately after filling, SA-100R showed lower gap formation percentage (GF%) than VF, but higher than Cont statistically. However, after TC, there were no statistical differences among the three groups on GF%.

Conclusion: SA-100R showed better cavity adaptation than VF. Thermal stress increased the gap formation in all groups.

COI disclosure statement: Kuraray Noritake Dental

Shear Bond Strength of New Universal Bonding Agent with Bioactive Function

Takebe M, Inami C, Kamimoto Y

Research & Development Department, Sun Medical, Moriyama, Shiga, Japan

Keywords: universal bonding agent, bioactive dental

materials, bioactivity, shear bond strength, functional brush

Objectives: Presently, single-bottle universal bonding agents, which can bond various alloys and ceramics in addition to enamel and dentin, are gaining increasing popularity for their simplicity in clinical practice. This time, we are developing a revolutionary bonding agent; it comes with a single-bottle universal liquid with a functional brush for bioactive and dual-cure features. In this presentation, we will introduce the concept of such bonding agent, "bioactive (BA) bond" as we named it, along its bonding performance in comparison to the conventional counterparts. The effect of the functional brush on the bonding strength will also be discussed.

Methods: Based on ISO 29022, the shear bond strengths to bovine enamel and dentin, zirconia, and lithium disilicate were evaluated for an experimental BA bond (universal liquid and functional brush), Brush&Bond from Parkell (liquid and activator brush), and Bulk Base Liner from Sun Medical (liquid and activator sponge) with or without the dedicated brush/sponge. The bond strengths were measured before and after heat-cycling at 5-55°C for 5,000 times. Results & Conclusions: In comparison to the conventional bonding agents, the experimental BA bond exhibited statistically superior adhesion strengths to both zirconia and lithium disilicate, whilst maintaining the similar level of adhesion to enamel and dentin. In addition, the disuse of the dedicated brush/sponge was found not to impact the adhesion performance of the experimental BA bond to bovine tooth but degraded it critically in the case of conventional adhesives.

Effectiveness of silane coupling agent incorporated in universal adhesive

Yoshihara K¹, Nagaoka N², Maruo Y³, Yoshida Y⁴

- ¹⁾ National Institute of Advanced Industrial Science and Technology (AIST), Health Research Institute, Kagawa, Japan; Okayama University, Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Department of Pathology & Experimental Medicine, Okayama, Japan
- ²⁾ Advanced Research Center for Oral and Craniofacial Sciences, Okayama University Dental School, Okayama, Japan
- Department of Prosthodontics, Okayama University Hospital
- ⁴⁾ Department of Biomaterials and Bioengineering, Faculty of Dental Medicine, Hokkaido University

Objectives: 'Universal' adhesives can be employed following the adhesive procedure of preference ('etch-and-rinse'; 'selfetch') and for both direct and indirect indications. Regarding its indirect application, Scocthbond universal plus (3M), Beautibond xtreme (Shofu) and BONDMER Lightless (Tokuyama Dental) incorporates a silane coupling agent in order to chemically bond to glass-rich ceramics without the use of a separate ceramic primer. Silane bifunctional monomers are known to be sensitive to hydrolysis and dehydration condensation. We investigated the effectiveness of the silane coupling function of universal adhesive using a shear bondstrength test protocol.

Methods: Silica glass plates were treated three universal adhesives (Scotchbond Universal plus, Beautibond xtreme and BONDMER Lightless) and Clearfil ceramic primer plus (Kuraray Noritake) as control. Zirconia blocks were bonded using the composite cement Panavia V5 (Kuraray Noritake) to the treated glass plates. Half number of specimens were thermo- cycle prior to being subjected to a shear bondstrength test.

Results: The bond strength of Scotchbond universal Plus, Beautibond xtream significantly dropped after thermo cycle. **Conclusion**: BONDMER Lightless which is divided into silane and acid revealed durable bond strength. This may be related to silane coupling monomer being sensitive within the adhesive to hydrolysis and dehydration condensation.

Effect of mold enclosure and chisel design on fatigue bond strength of adhesive systems

Watanabe H¹), Wayne W. Barkmeier²), Kawashima S¹), Mark A. Latta²), Tsujimoto A³)

- ¹⁾ Department of Restorative Dentistry, Oregon Health Science University School of Dentistry
- ²⁾ Department of General Dentistry, Creighton University School of Dentistry
- ³⁾ Department of Operative Dentistry, University of Iowa College of Dentistry

Keywords: light-curing of dental adhesives, dental debonding, dental restoration failure

Objectives: The purpose of this study is to examine the effect of mold enclosure and chisel design on fatigue bond strengths of adhesive systems.

Methods: Fatigue bond strength testing was conducted with two commercially available dental adhesive systems, Optibond eXTRa (Kerr, Orange, CA, USA) and Scotchbond Universal (3M Oral Care, St. Paul, MN, USA), for bonding a resin composite (Filtek Supreme Ultra, 3M Oral Care) to both enamel and dentin using mold enclosure and non-mold enclosure with a knife-edge and two sized notched-edge chisel assemblies for loading. As a loading reference for the fatigue testing, shear bond strengths of the adhesive systems to enamel and dentin were conducted using mold enclosure and a knife-edge chisel assembly.

This study, using non-identified human molars, was reviewed by the Biomedical Institutional Review Board at Creighton University (No. 760765-1) and it was determined that IRB approval was not required.

Results: The bond strengths with mold enclosure using knife edge chisel assembly did not exhibit a significant difference between the adhesive systems for either enamel or dentin. The fatigue bond strengths of bonded specimens demonstrated significant differences when comparing mold enclosure and non-mold enclosure, but not between knifeedge and notched-edge chisel assemblies.

Conclusion: Fatigue bond strengths of adhesive systems demonstrated significantly higher values when using mold enclosed bonded specimens than non-mold enclosure, regardless of type of chisel assembly.

Long-term bond durability of a newly developed 2-step universal adhesive in self-etch mode

Tsujimoto A, Amira Elgreatly,

Nathalia Restorepo-Kennedy, Erica C. Teixeira Department of Operative Dentistry, University of Iowa College of Dentistry

Keywords: bond durability, 2-step, universal adhesive, self-etch

Objective: The aim of this study is to evaluate the long-term bond durability to enamel and dentin of a newly developed 2-step universal adhesive, G2-Bond Universal (GC, Tokyo, Japan), in comparison with other types of adhesives in selfetch mode.

Methods: Two 2-step self-etch adhesives, Clearfil SE Bond 2 (Kuraray Noritake Dental, Tokyo, Japan) and Optibond eXtra (Kerr, Orange, CA, USA), and a universal adhesive, ScotchBond Universal Plus (3M Oral Care, St. Paul, MN, USA) were used for comparison. All adhesives were used to bond a resin-based composite (Filtek Supreme Ultra, 3M Oral Care) to polished enamel and dentin surfaces. The longterm bond durability was measured using fatigue bond strength testing. This study was conducted with the ethical review board of University of Iowa (202203013).

Results: G2-Bond Universal showed higher values than the other adhesives. The fatigue bond strength of G2-Bond Universal to enamel was 21.3 MPa, compared to 13.6–20.2 MPa for the other adhesives. The fatigue bond strength of G2 Bond Universal to dentin was 27.3 MPa, compared to 20.4–23.5 MPa for the other adhesives.

Conclusion: These results suggest that G2-Bond Universal may offer superior long-term bond durability to current adhesive systems which can be used in self-etch mode, regardless of tooth substrate.

Kawashima S¹⁾, Watanabe H¹⁾, Carlos A. Jurado²⁾, Tsujimoto A³⁾

- ¹⁾ Department of Restorative Dentistry, Oregon Health & Science University School of Dentistry
- ²⁾ Texas Tech University Health Sciences Center El Paso Woody L. Hunt School of Dental Medicine
- ³⁾ Department of Operative Dentistry, University of Iowa College of Dentistry

Keywords: polychromatic composite, resin infiltration, esthetic

Case summary: This case report describes the combined use of polychromatic composite and resin infiltration restorations over 5 years.

Treatment policy: The patient's primary complaint was a desire to replace an existing stained resin composite on the facial and mesial surfaces of the maxillary left central incisor, and a white spot on the facial surface of the maxillary right central incisor. Removal of the previous composite restoration was completed and layered dentin, enamel and translucent composites were placed. Finishing and polishing procedures were performed. The maxillary right central incisor was treated with resin infiltration in order to remove the white spot on the facial surface.

Progress or Consideration: The patient was pleased with the contours, shape and shade of the polychromatic composite and with the resin infiltration restoration. The 5-year follow-up evaluation showed that the restorations were still in good condition.

Conclusion: Polychromatic composite and resin infiltration restorations to replace stained composite and remove white spot can achieve the desired results in the esthetic zone and maintain them for over 5 years.

Evaluation of bonding performance of universal adhesives to enamel utilizing a new technique

Fei Chen¹⁾, Jiang Lin¹⁾, Di Wu²⁾, Arefin Alam²⁾, Yamauti M²⁾, Sano H²⁾

- ¹⁾ Department of Stomatology, Beijing Tongren Hospital, Capital Medical University, Beijing, China
- ²⁾ Department of Restorative Dentistry, Graduate School of Dental Medicine, Hokkaido University, Sapporo, Japan

Keywords: microtensile bond test, double-sided microtensile bond strength test, enamel, universal adhesive, etching mode

Objectives: Scotchbond Universal Plus (SBP) adhesive, the successon of Scotchbond Universal (SB), claims a better bonding strength than its predecessor. Conventional microtensile bond strength test (μ TBS) of adhesives sometimes failed to differentiate the bonding performances of enamel. This study evaluated the μ TBS of SBP and SB using Etch-and-rinse(ER) and Self-etch(SE) employing a novel double-sided microtensile bond strength test (D μ TBS). Methods: Twelve human third molars (Ethics Committee Approval#2018/9) were buccaly and lingually sectioned parallel to the long axis to obtain dentin-enamel discs (buccal and lingual surfaces). The dentin-side of discs were bonded with Clearfil SE Bond 2. Each enamel sides of the bonded discs received either of the two following combinations: SBP/ER, SBP/SE, SB/ER, SB/SE modes. After 24h-storage, samples were sectioned into beams and subjected to $D \mu TBS$. Data were analyzed by Kaplan-Meier survival analysis, followed by Log Rank pairwise comparison a=0.05.

Results: The survival analysis and the Log Rank pairwise comparisons depicted a higher survival probability of SBP/ER among all groups, followed by SB/ER, SBP/SE, and SB/SE (p<0.05).

Conclusion: The new D μ TBS demonstrated the superiority of Scotchbond Universal Plus over its predecessor. Applying Scotchbond Universal Plus with etch-and-rinse mode showed better bonding survival rate.

Disclosure: The authors have no financial conflicts of interest concerning the presentation.

Minimally invasive multidisciplinary approach to a single discolored anterior tooth

Natalia Restrepo-Kennedy¹⁾, Jose Villalobos-Tinoco²⁾, Carlos A. Jurado³⁾, Tsujimoto A¹⁾

- ¹⁾ Department of Operative Dentistry, University of Iowa College of Dentistry
- ²⁾ Department of Periodontics, National University of Rosario School of Dentistry
 ³⁾ Torse Lasing Conter El Dese Woody L
- ³⁾ Texas Tech University Health Sciences Center El Paso Woody L. Hunt School of Dental Medicine

Keywords: bleaching, digital dentistry, veneer

Case summary: This case report describes a minimally invasive multidisciplinary approach to a single discolored anterior tooth, with internal bleaching using Washi, a gingivoplasty with a 3-dimensional (3D) printed surgical guide, and ultra-thin feldspathic porcelain veneers.

**This study was conducted in accordance with all the provisions of the human subjects oversight committee guidelines and policies of the Human Research Ethic Office of Centro de Estudios Odontologicos de Queretaro. The approval code issued for this study is DENT/0031-06152015.

Treatment policy: The patient's primary concern was improving her smile. Internal tooth whitening was accomplished with sodium perborate mixed with 30% hydrogen peroxide impregnated in Washi and sealed in the root canal with glass ionomer. Once the tooth bleaching was completed, the 3D printed surgical guide was placed in the patient's maxillary anterior region and used to guide soft tissue re-contouring. After six months, ultrathin feldspathic porcelain veneers were placed.

Progress or Consideration: The patient approved the color, shape and size of the final restorations, and the treatment fulfilled her esthetic requirements. At the 4-year follow-up, she was highly pleased with the clinical outcome, including the closure of black triangles

Conclusion: Well-planned restorative procedures combining internal tooth bleaching using Washi, gingivoplasty performed with electro-surgery using a 3D printed surgical guide, and ultra-thin feldspathic porcelain veneers can achieve the desired results in the esthetic zone and remain successful for 4 years.

The potential of ZnO/CuO nanocomposite contain self-etching primer on bond dentin bonding ability

Matsuda Y¹⁾, Altankhishig Bayarchimeg¹⁾,

Okuvama K²⁾. Yamamoto H³⁾. Saito T¹⁾

- ¹⁾ Division of Clinical Cariology and Endodontology, Department of Oral Rehabilitation, School of Dentistry, Health Sciences University of Hokkaido
- ² Department of Dental Materials Science, Asahi University School of Dentistry
- ³⁾ Department of Restorative Dentistry and Endodontology, Osaka University Graduate School of Dentistry

Keywords: nanocomposite, treace element

Introduction: We developed the Fluoride containing Zinc oxide (ZnO) and copper oxide (CuO) nanocomposite (ZCF) with antibacterial effects. This study aimed to evaluate the effect of ZnO and CuO nanoparticles on the dentin bond strength using a microshear bond strength (μ SBS) test. Materials and Methods

The ZCF was prepared according to the previous study¹⁾. Twelve bovine teeth were used in the μ SBS test. A self-etch adhesive (Clearfil SE bond, Kuraray) was prepared and applied self-etching primer with two different concentrations (1% and 5%) of ZCF and without (control), respectively, according to the manufacturer's instructions. After restorations with Tygon tubes, samples were stored in water at 37°C for 24 hours. The samples were then tested by μ SBS at a 1.0 mm/min crosshead speed using an EZ-Test Machine (Shimadzu). All data were analyzed using one-way analysis of variance followed by Tukey's test (p<0.05).

Results and Discussion: There was no significant difference between the material and control groups in μ SBS. These results suggest that ZCF nanoparticles do not affect dentin bond strength in a concentration-dependent manner.

Conclusion: Fluoride-containing zinc and copper nanocomposites did not influence the strength of the self-etching bond. Furthermore, we should also detect a suitable concentration of ZCF that may not affect the bond strength and show an antibacterial effect.

 Matsuda et. al.: Antibacterial effect of a fluoride-containing ZnO/CuO nanocomposite. NUCL INSTRUM METHODS PHYS RES B 456(1): 184-188, 2019.

Effect of antioxidant materials on enamel bond strength after bleaching

Yago R, Kawamoto C, Di Wu, Suzuki K, Hoshika S, Tanaka T, Yamauti M, Sano H

Department of Restorative Dentistry, Division of Oral Health Science, Hokkaido University Graduate School of Dental Medicine Keywords: Bleaching, Enamel, Micro-tensile bond strength,

Colloidal Platinum Nanoparticles, Aromatic Sulfonic Acid

Objectives: Several articles reported that 35% hydrogen peroxide decrease bond strength between resin composite with enamel.

The aim of this study was to improve the adhesive strength of enamel after bleaching. For antioxidant effect, Aromatic sulfonic acid (Accel) or Colloidal Platinum Nanoparticles (CPN) were used.

Methods: Shofu Hi-lite was used for bleaching treatment.

A total of 13 human extracted anterior teeth were used. A flat enamel surface was obtained with 600-grit SiC paper. The teeth were then randomly distributed into 4 groups: Group 1: No bleaching; Group 2: Bleached only; Group 3: Bleached and then applied Accel; Group 4: Bleached and then applied CPN. Clearfil Megabond 2 was used as the bonding agent and Clearfil AP-X was built up. Samples were stored in distilled water (37°C, 24 h) and submitted to microtensile bond strength (MTBS) test. One-way analysis of variance and Tukey HSD test were used for statistical analysis.

Results: The results MPa were: Group 1: 28.17 ± 10.8, Group 2: 12.79 ± 6.1, Group 3: 18.19 ± 7.8, Group 4: 26.39 ± 9.9.

Conclusion: This study reveals that the MTBS reduced after enamel bleaching. Group 4 showed higher MTBS compared with Group 2. Bond strength was improved after bleaching possibly because of CPN's antioxidant effect.

Comparison of the bond strength of CAD/CAM inlay restorations with a specific cement

Takahashi R¹, Uchiyama S¹, Kanamori Y², Rozan S¹, Oda Y¹, Sato T¹, Shinagawa J¹, Inokoshi M³,

Nikaido T⁴⁾, Tagami I^{1,5)}, Shimada Y¹⁾

- ¹⁾ Department of Cariology and Operative Dentistry, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University (TMDU), Japan
- ²⁾ Oral Diagnosis and General Dentistry, Tokyo Medical and Dental University (TMDU) Hospital, Japan
- ³⁾ Department of Gerodontology and Oral Rehabilitation, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University (TMDU), Japan
- ⁴⁾ Department of Operative Dentistry, Division of Oral Functional Science and Rehabilitation, School of Dentistry, Asahi University, Japan
- ⁵⁾ Quartz Dental Clinic, Japan

Keywords: resin coating, ceramic primer, bond strength

Objectives: This study aimed to compare the bond strength of CAD/CAM restorations using Panavia V5 with different strategies to dentin.

Methods: Thirty flat human dentin surfaces were divided into the following three groups;

Group-1) The dentin was left uncoated. After 1-week water storage, the dentin surface was applied Panavia V5 Tooth Primer (TP).

Group-2) The dentin surface was resin-coated with a dentin bonding system and a flowable composite resin. After 1-week water storage, the resin-coated dentin surface was applied TP.

Group-3) The resin-coated dentin surface was ground. After 1-week water storage, the resin-coated dentin surface was applied Ceramic Primer.

All specimens were bonded to CAD/CAM resin block with Panavia V5. Then they were subdivided into two groups; thermocycled for 0 and 10,000 cycles. All specimens were subjected to microtensile bond strength (μ TBS) test.

Results: Two-way ANOVA revealed that strategies to dentin and thermal cycling influenced the μ TBS. The order of μ TBSs was Group-2>Group-1>Group-3 both in thermocycled for 0 and 10,000 cycles.

Conclusion: Resin-coated and preliminary treated with TP were beneficial for the bonding performance of CAD/CAM inlay restorations.

Ethical approval: The Ethics Review Board of Tokyo Medical and Dental University (D2013-022).

Disclosure of Conflicts of Interest: Kuraray Noritake Dental.

Sintering distortion of FPDs milled from various zirconia disks: Influence of layered structure and vertical milling area

Hirano M, Nomoto S, Kawasaki T, Sakai T, Yotsuya M, Sekine H Department of Fixed Prosthodontics, Tokyo Dental College

Keywords: monolithic zirconia FPDs, sintering distortion, layered structure, milling area

Objectives: Recently, zirconia with excellent color reproduction has been developed. We have investigated single composition layered zirconia and reported that the layered structure affects the sintering distortion. In the present study, we investigated mixed composition layered zirconia. **Methods:** An experimental FPDs was designed to simulate a four-unit monolithic zirconia FPDs. The materials were four types of zirconia disks: single-composition [SC], single-composition-layered(A3)[SCL],mixed-composition-layered [MCL-n], and mixed-composition-layered (A3) [MCL-c]. Three vertical milling areas were set according to their positions relative to the disk thickness. The sintering distortions were measured digitally.

Results: The degree of sintering distortions in each area was different from each other. And sintering distortions in the same direction were observed in most of the areas, while distortions in the opposite direction were observed in the center area of MCL-n and MCL-c.

Conclusion: In MCL, the aspect of sintering distortion differed depending on the milling area.

It was suggested that the choice of layered structure and vertical milling area in zirconia disks affect the sintering distortion of monolithic zirconia FPDs.

COI?

Morphological analysis of femtosecond laser irradiated lithium disilicate glass-ceramics and highly translucent zirconia - A preliminary study

Inokoshi M¹, Yoshihara K², Kakehata M³, Yashiro H³, Nagaoka N⁴, Tonprasong W¹, Xu K¹, Minakuchi S¹

- ¹⁾ Department of Gerodontology and Oral Rehabilitation, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University
- ²⁾ National Institute of Advanced Industrial Science and Technology (AIST), Health Research Institute, Kagawa, Japan; Okayama University, Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Department of Pathology & Experimental Medicine
- ³⁾ National Institute of Advanced Industrial Science and Technology (AIST), Research Institute for Advanced Electronics and Photonics
- ⁴⁾ Advanced Research Center for Oral and Craniofacial Sciences, Okayama University Graduate School of Medicine, Dentistry and Pharmaceutical Sciences

Keywords: lithium disilicate, highly translucent zirconia, surface roughness, femtosecond laser

Objective: This study aimed to determine the optimal femtosecond laser treatment settings for lithium disilicate glass-ceramics or highly translucent zirconia ceramics in terms of surface morphology.

Methods: We investigated the following two ceramics: lithium disilicate ceramics (IPS e.max CAD HT, Ivoclar Vivadent: KATANA UTML. Kurarav Noritake Dental). Fully-sintered square-shaped specimens were prepared for each ceramic grade. The following surface conditions were investigated: 1) as-sintered (negative control); 2) Al₂O₃ sandblasted (positive control); 3) femtosecond laser-treated (dot pattern with 14 μ m, 20 μ m, and 40 μ m line distance). 4) femtosecond laser-treated (crossed-line pattern with 20 µm and 40 μ m line distance). Surface roughness was measured using a three-dimensional (3D) confocal laser microscopy (LEXT OLS4100, Olympus) at 50 × magnification. We calculated the surface roughness parameters (Sa and Ra) using ProfilmOnline software (Filmetrics) at a cutoff value of 80 μ m. Microstructural analysis was conducted using scanning electron microscopy (SEM).

Results: Both surface-treated lithium disilicate glass-ceramics and highly translucent zirconia presented similar surface morphology for each surface treatment condition. Conclusion: We choose femtosecond laser irradiation of dot or crossed-line patterns with 20 μ m and 40 μ m distance as potential candidates for further investigations. The authors declare no conflict of interest.

Effects of alumina air-abrasion on the bond strength of ultraviolet polymerized resin to 3D printed denture base

Tanaka A, Kawaguchi T, Tsuzuki T Division of Removable Prosthodontics, Department of Oral Rehabilitation, Fukuoka Dental College

Keywords: alumina air-abrasion, shear bond strength, ultraviolet polymerized resin, 3D printed denture, tribochemical silica coating

Objectives: The present study aimed to evaluate the effects of alumina air-abrasion on the shear bond strength (SBS) of ultraviolet polymerized resin to 3D printed denture base.

Methods: Specimens were printed by a digital light processing 3D printer (cara Print, Kulzer Japan) using a denture base material (dima Print denture, Kulzer Japan). The specimens were divided into three groups based on different surface treatments: 50 μ m alumina air-abrasion, 110 μ m alumina air-abrasion, tribochemical silica coating. After treatments, the same 3D printing denture base material was filled into the hole of the specimens. Polymerization was performed using a light curing device (HiLite power 3D, Kulzer Japan). The SBS was determined by a universal testing machine.

Results: The effects of surface treatments on the SBS showed statistically differences by an analysis of variance and post-hoc multiple comparisons (p<0.05). The SBS values of 110 μ m alumina air-abrasion and tribochemical silica coating were statistically higher than those of 50 μ m alumina air-abrasion (p<0.05).

Conclusion: Surface treatments with 110 μ m alumina air-abrasion and tribochemical silica coating were found to be effective for enhancement of the bonding between 3D printed denture base and ultraviolet polymerized resin.

(The authors have no conflicts of interest to disclose concerning this study.)

Tensile bond strengths of different resin cement systems to poly-ether-ether-ketone (PEEK)

Hata K^{1,2)}, Komagata Y¹⁾, Nagamatsu Y¹⁾, Masaki C²⁾, Hosokawa R²⁾, Ikeda H¹⁾

- ¹⁾ Division of Biomaterials, Department of Oral Functions, Kyushu Dental University
- ²⁾ Division of Oral Reconstruction and Rehabilitation, Department of Oral Functions, Kyushu Dental University

Keywords: bond strength, PEEK, MMA-based resin cement, composite-based resin cement

Objectives: A poly-ether-ether-ketone (PEEK) has excellent mechanical properties while poor bonding to a resin cement. This study aims to clarify a suitable resin cement system for bonding the PEEK.

Methods: Six brands of resin cement were used with appropriate primers; Super-Bond (Sunmedical), MULTIBOND II (Tokuyama dental), RelyX Universal Resin Cement (3M), G-CEM LinkForce (GC), Panavia V5 (Kuraray Noritake dental), Multilink Automix (Ivoclar Vivadent). Each cement was bonded to a sand-blasted PEEK (Shofu) according to the manufacturer's instruction. After immersing the samples in water at 37°C for 24 h, each tensile bond strength (TBS) was measured using a universal testing machine. The obtained TBSs were statistically compared by ANOVA followed by Tukey's post-hoc test (n=5, p<0.05).

Results: TBSs of the composite-based resin cements (RelyX, G-CEM, Panavia, and Multilink) were less than 1 MPa. Meanwhile, TBSs of the MMA-based resin cements (12.9 MPa for Super-Bonds and 9.8 MPa for MULTIBOND) were significantly higher than those of the composite-based resin cement systems.

Conclusion: It was found that the MMA-based resin cements well bond to PEEK rather than the composite-based resin cements.

COI: The authors declare no conflicts of interest.

Efficacy of sandblast surface-treatment on the bonding-improvement of metal-free CAD/CAM restoratives

Maseki T, Murata T, Nara Y Department of Adhesive Dentistry, School of Life Dentistry at Tokyo, The Nippon Dental University

Keywords: sandblasting, metal-free CAD/CAM restoratives, tensile bond strength

Objectives: The purpose of this study was to examine the efficacy of sandblast surface-treatment on the bonding-improvement of metal-free CAD/CAM restoratives.

Methods: A dental sandblaster (Hi-blaster3, Shofu) and four types of metal-free CAD/CAM restoratives, feldspathic ceramic (F; VITABLOCS Mark II, VITA), lithium-disilicate ceramic (L; IPS e.max CAD, Ivoclar vivadent), zirconium oxide (Z; Lava Esthetic, 3M), and resin-composite (R; Cerasmart 300, GC) were used. Each restorative was ground with a series of SiC paper up to 600 grit (as control; Pol) and then sandblasted with two kinds of particle-size of aluminum-powder; 27 microns (B27) or 50 microns (B50). Cylindrical resin-composite was bonded to the surfaces with a self-adhesive resin-cement (PANAVIA SA Cement Universal, Kuraray Noritake Dental). Tensile bond strengths (TBS) were measured after the storage in water at 37°C for 24 hours (n=6). The data were analyzed using with ANOVA and q-test.

Results: The mean TBS (Pol/B27/B50) in MPa were F: 8.5/15.9/15.1, L: 7.5/10.3/16.1, Z: 9.2/20.4/16.1 and R: 6.3/9.4/13.7. The TBS of B27 and B50 were significantly greater than Pol-value and the values of blasted restoratives increased in order R<L<F<Z.

Conclusion: Sandblasting was effective surface-treatment to improve the bonding of metal-free CAD/CAM restoratives. The efficacy of sandblast-treatment with different particle-sizes did vary with the restoratives. (The authors declare no conflict of interest.)

Shear bond strength between highly translucent pre-sintered zirconia coated with feldspathic porcelain and resin luting agent

Takata H¹⁾, Kubochi K¹⁾, Kimura F¹⁾, Matsushima K¹⁾, Matsumura H¹⁾, Komine F^{1,2)}

¹⁾ Department of Fixed Prosthodontics, Nihon University School of Dentistry

²⁾ Division of Advanced Dental Treatment, Dental Research Center, Nihon University School of Dentistry

Keywords: bond strength, coating, feldspathic porcelain, zirconia

Objective: The purpose of this study was to evaluate the influence of surface treatments on bond strength of highly translucent pre-sintered zirconia coated with porcelain to resin luting agent.

Methods: Zirconia disks were treated as follows; coating with feldspathic porcelain before zirconia sintering (PZR), coating with feldspathic porcelain after zirconia sintering (SZR). The following surface treatments were performed to the zirconia specimens; no treatment (NT), 9.5% HF etching (HF), and airborne-particle abrasion (AB). The zirconia specimens were silanized and bonded with a resin luting agent. The specimens were stored in distilled water (37°C, TC 0), and half of the specimens were subjected to 5,000 thermal cycles (between 5°C and 55°C). Shear bond strength was then determined.

Results: The HF and AB groups showed significantly higher pre-thermocycling shear bond strength than the NT group. After thermocycling, the AB group exhibited significantly higher shear bond strength than the other surface treatment groups in the PZR specimen.

Conclusion: Airborne-particle abrasion enhanced the shear bond strength between the pre-sintered zirconia coated with feldspathic porcelain and resin luting agent.

The authors declare no conflict of interest.

Effect of the multi-purpose primer and airborne particle abrasion on bond durability for cast titanium and gold alloy

Hiraba H^{1.2)}, Koizumi H^{3.4)}, Takehana K¹⁾, Mikami W¹⁾, Nogawa H¹⁾. Matsumura H¹⁾

- ¹⁾ Department of Fixed Prosthodontics, Nihon University School of Dentistry
- ²⁾ Division of Advanced Dental Treatment, Dental Research Center, Nihon University School of Dentistry
- ³⁾ Department of Dental Materials, Nihon University School of Dentistry
- ⁴⁾ Division of Biomaterials Science, Dental Research Center, Nihon University School of Dentistry

Keywords: bond durability, cast titanium, gold alloy, shear bond strength, XPS

Objectives: This study investigated the effect of a multi-purpose primer for the bond durability of an acrylic resin to cast titanium (Ti; CP Titanium JIS2) and a gold alloy (IV; Casting Gold M.C. Type IV) after airborne-particle abrasion with alumina.

Methods: Disk-shaped specimens of Ti and IV were cast employing the lost-wax technique. A two-liquid primer (MC; M&C primer) and two single-liquid primers (AP; Alloy primer and VP; V-Primer) were used as surface-treatment agents. The shear bond strength was measured at pre-/ post- thermocycling to evaluate the adhesive durability, and statistical analysis was performed using a non-parametric method to compare the results. The effect of the airborne-particle abrasion with alumina on the surface of the titanium was analyzed by X-ray photoelectron spectroscopy (XPS).

Results: The results of the shear bond strength were measured pre-/post- thermocycling, and there was no significant difference in conditions other than VP, which was significantly lower. The results of XPS showed that the airborne-particle abrasion provided hydrophilic properties to Ti.

Conclusion: The multi-purpose primer could be used without any problems when bonded to Ti and IV, and that should be used in combination with the airborne-particle abrasion with alumina.

Adhesion and mechanical properties of PEEK block by CAD/CAM system

Katayama Y¹⁾, Ohashi K¹⁾, Midono T¹⁾, Aoki K¹⁾,

- Yamaguchi H¹, Nagata S², Tanimoto Y², Nihei T^{1,3}
- ¹⁾ Department of Clinical Biomaterials, Kanagawa Dental University
- ²⁾ Department of Dental Biomaterials, Nihon University School of Dentistry at Matsudo
- ³ Materials & Surface Engineering Research Institute, Kanto Gakuin University

Keywords: PEEK, CAD/CAM block, tensile bond strength, flexural strength, dynamic hardness

Objectives: The study aimed to evaluate adhesion to luting agents and mechanical properties of CAD/CAM blocks by dynamic hardness test and 3-point bending test.

Methods: CAD/CAM blocks used in this study were SHOFU PEEK (SHOFU), SHOFU BLOCK HC SUPER HARD (SHOFU), CERASMART (GC), and RESIN BLOCK (YAMAHACHI), were measured with dynamic hardness test and 3-point bending test. We evaluated adhesion to luting agents by tensile bonding test carried out with resin luting cement of each manufacturer. The collected data were statistically analyzed with two-way and one-way ANOVA and Bonferroni's multiple comparison tests.

Results: As a result, it was significant differences in bond strength and mechanical properties of each block. Furthermore, positive correlations were observed between the tests for the values of bond strength, dynamic hardness, flexural strength, and flexural modulus (p<0.05).

Conclusion: It was suggested that the adhesion to the luting agent of PEEK blocks might be equal or inferior to resin blocks, and the mechanical properties of PEEK blocks might be inferior to that of resin blocks.

The authors declare no conflicts of interest associated with this abstract.

Clinical Effectiveness of direct composite vs. zirconia resin-bonded fixed dental prostheses

Sato T¹⁾, Tashiro H^{1,2)}, Miki H³⁾, Otani K⁴⁾,

Nishimura M^{1.5)}, Takahashi M^{1,6)}, Hosaka K^{1,7)},

Tagami J^{1,8)}. Shimada Y¹⁾

- ¹⁾ Department of Cariology and Operative Dentistry, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University (TMDU)
- ²⁾ Tashiro Dental Clinic
- ³⁾ Habara Dental Clinic
- ⁴⁾ Otani Dental Clinic
- ⁵⁾ Suzuki Dental Clinic
- ⁶⁾ Total Dental Clinic Tokyo Aoi
- ⁷ Department of Regenerative Dental Medicine, Tokushima University Graduate School of Biomedical Sciences

⁸⁾ Quartz Dental Clinic

Keywords: direct composite bridge restoration, zirconia resin-bonded fixed dental prostheses, Kaplan-Meier method

Objectives: This multicenter clinical study evaluated the clinical effectiveness of the direct composite vs. zirconia resin-bonded fixed dental prostheses (RBFDP).

Methods: This study was performed at 6 dental clinics from 2008 to 2020. Two hundred fifty-four missing single teeth were treated with direct composite RBFDP (N=219) or zirconia RBFDP (N=35). The prognosis of each case was defined two criteria as "Success"; without debonding and any crack, and "Survival"; without debonding. A survival curve for each treatment was created by using the Kaplan-Meier method. A Cox proportional hazards model was estimated to compare clinical longevity between the two treatment methods.

Results: There was no significant difference between the two treatment methods (Survival model p=0.09, Success model p=0.81). However, in the direct composite RBFDP, the trend of the survival curve seemed different between the success model and survival model.

Conclusion: For replacement of a missing single tooth, there was no significant difference in "success rate" and "survival rate" between the direct composite RBFDP and the zirconia RBFDP.

Ethical approval: The Ethics Review Board of Tokyo Medical and Dental University (D2020-026).

Disclosure of Conflicts of Interest: None.

Study on adhesive durability the luting agents to zirconia

-Appropriate concentration of acidic monomer-

Tsunoi S¹⁾, Katayama Y²⁾, Ohashi K²⁾, Hoshi N¹⁾, Kimoto K¹⁾, Nihei T²⁾

Department of Fixed Prosthodontics, Kanagawa Dental University
 Department of Clinical Biomaterials, Kanagawa Dental University

Keywords: zirconia, MDP-containing primer, tensile bond test

Objective: The purpose of this study was investigated the adhesive to zirconia surface treated with each concentration of acid primer containing MDP or 4-META.

Methods: The primers used in this experiment were consisted of 12 primers with different concentrations of MDP or 4-MEAT: 1% (10P-1A)~15% (10P-15A), or 1% (4M-1A)~15% (4M-15A), and control primer (0A). The zirconia surface was divided into two groups: polished (polishing group) and sandblasted (SB group). After each primer treatment, the zirconia surface was bonded with resin luting agent, and then stored in room temperature at 23°C for 1 day. The specimens were conducted at a crosshead speed of 1.0 mm/min at tensile bond test. The number of specimens in each group was 10. The results obtained were statistically analyzed with oneway ANOVA, Tukey's and Bonferroni's test using SPSS.

Results: In the polishing group, the specimens of 10P-2A were showed significantly higher bond strength compared with that of 0A (p<0.05). In the SB group, the specimens of 10P-1A and 10P-2A were showed significantly higher adhesive strength than that of 0A (p<0.05).

Conclusion: It was suggested that the primer containing MDP at 2% was effective for zirconia surface treatment on bond strength.

We have no financial relationships to disclose.

Survival of the anterior mono-block direct composite crown

Miki H¹⁾, Tashiro H²⁾, Tagami J^{3,6)}, Takagaki T⁴⁾, Hosaka K⁵⁾, Sato T⁶⁾, Hatayama T⁶⁾, Shimada Y⁶⁾

- ²⁾ Tashiro Dental Clinic
- ³⁾ Quartz Dental Clinic
- ⁴⁾ Department of Operative Dentistry, Division of Oral Functional Science and Rehabilitation, Asahi University School of Dentistry
- Department of Regenerative Dental Medicine, Tokushima University Graduate School of Biomedical Sciences
- Department of Cariology and Operative Dentistry, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University (TMDU)

Keywords: mono-block direct composite crown, survival analysis

Objectives: In clinical practice, it is not uncommon to encounter situations where attempts are made to save a tooth that has suffered from repeated debonding of the endodontically treated tooth restoration, habitual fracture, or secondary caries expansion. Therefore, mono-block direct composite resin crown (MDDCs) restoration must be a treatment option for restorative teeth that have lost the ferrule effect.

Methods: We conducted a clinical analysis using collected data, including adhesive restorative materials and other baseline clinical characteristics such as the number of remaining teeth, occlusal status, ferrule effect, periodontal status, bruxism.

Results: Overall 98 cases of MDDCs have been observed from May 2011 to February 2022. Of these, 44 anterior maxillary restorations (mean age: 55 years, mean number of remaining teeth: 25) with loss of ferrule and without post were included in the analysis. The estimated 3.7-year success rate was 84.0%, and the survival rate, including repair bonded cases, was 93.2%.

Conclusion: The challenge of direct crown restorations with loss of ferrules, mono-block restoration concept provided by the best adhesive technology to preserve the tooth could be proposed.

Ethical approval: The Ethics Review Board of Tokyo Medical and Dental University (D2020-026).

Disclosure of Conflicts of Interest: None.

Monolithic ultra-translucent multi lavered zirconia restorations in the esthetic zone

Nicholas G. Fischer¹⁾, Ahmad M. Mahrous²⁾,

Carlos A. Jurado³⁾, Tsujimoto A⁴⁾

- ¹⁾ Minnesota Dental Research Center for Biomaterials and Biomechanics, University of Minnesota School of Dentistry
- ²⁾ Department of Prosthodontics, University of Iowa College of Dentistry
- ³⁾ Texas Tech University Health Sciences Center El Paso Woody L. Hunt School of Dental Medicine
- ⁴⁾ Department of Operative Dentistry, University of Iowa College of Dentistry

Keywords: zirconia, digital dentistry, prosthodontics

Case summary: The aim of this case report is to evaluate clinical results of monolithic ultra-translucent multi layered zirconia restorations in the esthetic zone. The patient described was fully informed on the method and the purpose. Written consent was obtained by the patient and is available upon request.

Treatment policy: A patient presented with the complaint of disliking her anterior crowns. Isolation was provided with rubber dam, old restorations removed, and provisional restorations were placed. At the following appointment an impression was taken. The master cast was scanned and monolithic zirconia restorations were digitally designed. Monolithic ultra-translucent multi layered zirconia restorations (KATANA Zirconia UTML) were digitally oriented within the zirconia disc to have the incisal zone with the highest translucency, the transition zone in the middle and the lowest translucency area in the gingival third, and then were milled out, glazed and sintered. Restorations were adhesively bonded according to the manufacturer's instruction under rubber dam.

Progress or Consideration: High esthetic results for the zirconia restorations can be achieved through the procedures described above.

Conclusion: Monolithic ultra-translucent multi layered zirconia restorations in the anterior zone may provide high esthetic results similar to glass ceramic restorations.

¹⁾ Habara Dental Clinic

Fracture Strength of Chair-side CAD/CAM Lithium Disilicate Crowns and Occlusal Veneers with and without Margin

Carlos Alberto Jurado¹⁾, Damian Lee²⁾, Tsujimoto A³⁾ ¹⁾ Texas Tech University Health Sciences Center El Paso Woody L.

- Hunt School of Dental Medicine. El Paso, Texas, USA. The Ohio State University College of Dentistry. Columbus, Ohio,
- USA ³⁾ University of Iowa College of Dentistry. Iowa City, Iowa, USA.

Keywords: crowns, occlusal veneers, CAD/CAM, Lithium disilicate

Objectives: To determine the fracture resistance of chairside CAD/CAM lithium disilicate full crowns and occlusal veneers with and without margin for premolars.

Methods: Sixty CAD/CAM lithium disilicate restorations (20 specimens/group) were designed and fabricated with a chairside CAD/CAM system. The restorations were divided into 3 groups: (1) full coverage crown with margin at the gingival level; (2) occlusal veneer without margin; and (3) occlusal veneer with chamfer margin. Restorations were cemented using conventional resin luting cement with primer system to resin printed dies, load cycled (5,000,000 load cycles) and then finally loaded with a steel indenter until fracture. Load at break (LB) and peak load (PL) until fracture were recorded. SEM images of the fractured restorations on the printed dies were obtained.

Results: Fracture resistance was different depending on the design of the restoration. Occlusal veneer without margin displayed the highest fracture resistance (LB: 1149.25 N; PL 1219.05 N) followed by occlusal veneers with margin (LB: 1132.45 N; PL: 1143.30 N). Full coverage crowns showed the lowest fracture resistance (LB: 936.26 N, PL: 976.42 N).

Conclusion: Occlusal veneers with and without margin displayed higher fracture resistance than conventional full coverage crowns.

Diagnosis of occlusal and proximal caries using SS-OCT

Shimada Y¹⁾, Nakagawa H¹⁾, Tabata T¹⁾, Sato T¹⁾, Sadr Alireza²⁾, Sumi Y³⁾, Tagami J¹⁾

- ¹⁾ Department of Cariology and Operative Dentistry, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University, Tokyo, Japan
- ²⁾ Restorative Dentistry, University of Washington School of Dentistry, Seattle, USA
- ³⁾ Department for Advanced Dental Research, Center of Advanced Medicine for Dental and Oral Diseases. National Center for Geriatrics and Gerontology, Obu, Japan

Keywords: caries, SS-OCT, diagnosis, sensitivity, specificity

Objective: Dental caries is a dynamic process of demineralization and remineralization of the tooth, of which the disruption results in tooth demineralization and substantial breakdown. In early stage, caries can be prevented or arrested by simple and cost-effective interventions using remineralization therapy or adhesive materials. This study aimed to investigate the diagnostic accuracy of SS-OCT for proximal and occlusal caries.

Methods: Extracted human molars with and without caries up to dentin caries at occlusal or proximal surfaces were used in this study. The usage of extracted teeth was approved by the Institutional Review Board of Tokyo Medical and Dental University (approval number 725). The presence and extent of caries were evaluated using SS-OCT and digital dental radiography with visual inspection. Sensitivity and specificity of SS-OCT and dental radiography with visual inspection for caries were calculated and compared at significance level of p=0.05.

Results: SS-OCT showed significantly higher sensitivity for both occlusal and proximal surfaces. Sensitivity of SS-OCT at the occlusal surfaces for enamel and dentin caries was significantly lower than that at the proximal surfaces.

Conclusion: SS-OCT is capable of imaging dental caries for both occlusal and proximal surfaces in vitro. Diagnostic accuracy of SS-OCT was influenced by the caries location and projection geometry.



接 着 嶣 学 Vol. 40 No. 2 2022

発行日:2022年5月15日

桂(神歯大・バイオマテリアル)

-リアル)		际间又自相90	光门了尼日
甩丁)	1号	2月 1日	4月 15日
	2号	(抄録号)	5月 15日
Į)	3号	7月 1日	9月 15日
そ 着)	4号	10月 1日	12月 15日
Ê)			
Ξ)	ht	tp://www.adhesi	ive-dent.com/
÷ 1			

編集委員会(2022 年度定時社員総会締結まで)					
編集担当 . 理 事	二瓶智	了太郎	(神歯大・バイオマテリアル)		
編集委員:	新谷	明一	(日歯大・生命歯・理工)		
	田上	直美	(長大・歯・小児)		
	辻本	暁正	(日大・歯・保存修復)		
	柵木	寿男	(日歯大・生命歯・接着)		
	三浦	賞子	(明海大・歯・冠補綴)		
	南	弘之	(鹿大・院・冠補綴)		
	山本	雄嗣	(鶴大・歯・保存修復)		

2022 年度原稿受付締切日・発行予定日					
	原稿受付締切	発行予定日			
1号	2月 1日	4月 15日			
2号	(抄録号)	5月 15日			
3号	7月 1日	9月 15日			
4号	10月 1日	12月 15日			

幹

事:大橋