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UNIVERSITÄT WÜRZBURG

Pretreatment of restoration surfaces for adhesive luting or for intra-oral repair

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Pretreatment of restoration surfaces

Work flow intra-oral repair

Work flow adhesive luting

Luting materials

Universal Primer vs. Universal Adhesive

Basics in adhesive retention

Overview of restorative materials

Providing rough substrate surfaces

Providing wettable substrate surfaces

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Basic principles of adhesive retention
Bonding between restoration and tooth substrate

Requirements:

- rough surface
- high wettability
- low viscosity

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Basic principles of adhesive retention
Terminology

Adhesive insertion Luting composite resin Resin cement	<i>Flowable composite resin in combination with a primer for the restoration surface and an adhesive for the toothsubstrate, curing by polymerisation</i>
Self-adhesive cements	<i>Combination of glass ionomer cement (acid-base reaction) and monomers (polymerisation)</i>
Luting cement Cementation	<i>Classical cement, mixing of powder and liquid curing by acid-base reaction</i>

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Overview of restorative materials

- Ceramics**
Glass-based
Zirconia
- Hybrid ceramic**
Enamic™
- CAD-CAM composite resin blocks**
- Composite resin (direct application)**
- Amalgam**
- Precious and non-precious metals**

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Providing rough substrate surfaces

Summary

- Glass ceramic:** hydrofluoric acid 3 - 5 % 60 s, LiSi₂: from 20 s
apply actively up to the restoration margins
clean effectively (best: ultrasonic cleaner)
- Zirconia:** sandblasting with Al₂O₃ or SCAP (CoJet)
silicate-coated aluminum oxide particles
- CAD-CAM composite:** sandblasting with Al₂O₃
- Metal:** sandblasting with SCAP (CoJet)

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Hydrofluoric acid on glass-based ceramic

Summary

- prior cleaning with phosphoric acid
- 3 to 5 % hydrofluoric acid (HF)
- for 60 s on lithium-disilicate (e.g. e.max) from 20 s
- application up to preparation border
- effective cleaning from precipitates
 - ⇒ strong rinsing
 - ⇒ ultrasonic cleaner

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Hydrofluoric acid on glass-based ceramic

Summary for intra-oral application

- only for glass-based ceramics
- no application adjacent to gingiva
- no application on enamel and dentin
- prior cleaning with phosphoric acid

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Sandblasting

Summary

intra-oral pretreatment of restorative materials

LiSi ₂	Al ₂ O ₃
Zirconia	Al ₂ O ₃ < SCAP (CoJet)
Composite	Al ₂ O ₃ = SCAP (CoJet)
Amalgam	SCAP = Al ₂ O ₃
Metal	SCAP > Al ₂ O ₃


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Sandblasting

Summary

intra-oral pretreatment of restorative materials

all restorative materials	Al ₂ O ₃
metal surfaces	SCAP (CoJet)



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Providing wettable substrate surfaces

Summary

- Glass ceramic: silane ⇒ chemical bonding ⇒ wettability
- Primer increases wettability of substrate surfaces
- Universal Primer
 - effective bonding to metal, glass ceramic, zirconia and composite
- Universal Adhesive
 - effective bonding to zirconia
 - not recommended for silanization
- when using Universal Primers or Universal Adhesives on metal or zirconia: **no contamination with phosphoric acid**

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Universal Adhesive	vs.	Universal Primers
+ bonding to enamel and dentin		- no bonding to enamel and dentin
+ effective in E&R technique and in SE mode		+ no interference with bonding to enamel and dentin
+ bonding to zirconia		+ bonding to zirconia
- no bonding to glass-ceramic (with one exception)		+ bonding to glass-ceramic
+ bonding to CAD-CAM composites		+ bonding to CAD-CAM composites
? bonding to non-precious metal		+ bonding to non-precious metal
? bonding to precious metal		+ bonding to precious metal
- no contamination with phosphoric acid prior to bonding to zirconia and metal		- no contamination with phosphoric acid prior to bonding to zirconia and metal

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Luting materials Summary

- **Luting composites**
 - light-curing: dependent on translucency of the ceramic layer
 - dual-curing: possible interference with acid primers
 - bonding to restoration surfaces after pretreatment with:
 - glass-ceramic hydrofluoric acid
 - zirconia Al_2O_3
 - metal SCAP (CoJet) } + universal primer
- **Self-adhesive resin cements**
 - effective bonding to dentin - inferior bonding to enamel
 - 10-MDP containing products: effective bonding to zirconia after Al_2O_3 pretreatment

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Work flow adhesive luting

Restorative material	Pretreatment
ceramic glass-based	hydrofluoric acid (LiSi ₂ from 20 s) + silane or universal primer
zirconia	SCAP CoJet (3M) / SilJet (Danville) + universal primer or Al_2O_3 (50 µm, 2.5 bar) + universal primer or + universal adhesive

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Work flow adhesive luting

Restorative material	Pretreatment
metal	SCAP CoJet (3M) / SilJet (Danville) + universal primer or Al_2O_3 (50 µm, 2.5 bar) + universal primer or + universal adhesive
CAD-CAM composite	Al_2O_3 (50 µm, 2.5 bar) + universal primer or + universal adhesive

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Intra-oral repair glass-based ceramic

- sandblasting with Al_2O_3 (or HF-etching)
Attention: no hydrofluoric acid on enamel and dentin
- rinsing with waterspray and drying
- cleaning with phosphoric acid
- application of universal primer or silane
- application of adhesive system
- application of composite resin



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Intra-oral repair of zirconia restorations

- sandblasting with Al_2O_3 or SCAP
Attention: if SCAP on dentin: E&R adhesive system
- rinsing with waterspray and drying
- phosphoric acid only on enamel and dentin
Attention: no application on zirconia

Alternative:

- first: application of adhesive system + flowable on enamel and dentin
- sandblasting with Al_2O_3 or SCAP

- application of universal primer or universal adhesive
- application of composite resin

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Intra-oral repair of metal restorations

- sandblasting with SCAP or Al_2O_3
Attention: if SCAP on dentin use E&R adhesive system
- rinsing with waterspray and drying
- phosphoric acid only on enamel and dentin
Attention: no application on non-precious metal

Alternative:

- first: application of adhesive system + flowable on enamel and dentin
- sandblasting with SCAP or Al_2O_3

- application of universal primer or universal adhesive
- application of composite resin



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Intra-oral repair of composite resin restorations

- preparation with a finishing diamond
- sandblasting with Al_2O_3
- application of phosphoric acid on enamel and composite
- rinsing with waterspray and drying
- application of phosphoric acid
- application of universal primer + E&R adhesive or application of universal adhesive
- application of composite resin



Intra-oral repair of composite resin restorations

- preparation of a self-retentive approximal box
- sandblasting with Al_2O_3 (optional)
- application of phosphoric acid on enamel and composite
- rinsing with waterspray and drying
- application of phosphoric acid
- application of universal primer + E&R adhesive or application of universal adhesive
- application of composite resin

