



Protective Buffer Capacity of Restorative Dental Materials *in Vitro*

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Aims of the study

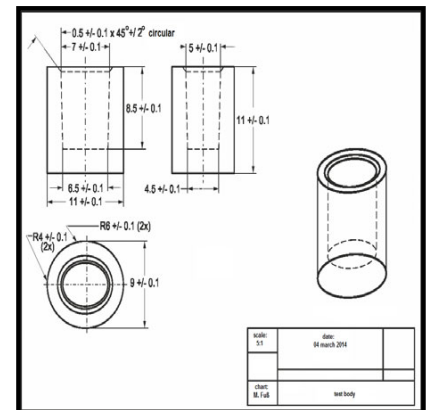
Restored teeth are exposed to acids in their oral environment.

The aim of the study was to determine the buffer capacity of typical and experimental dental materials during a simulated carious and intrinsic erosive attack.

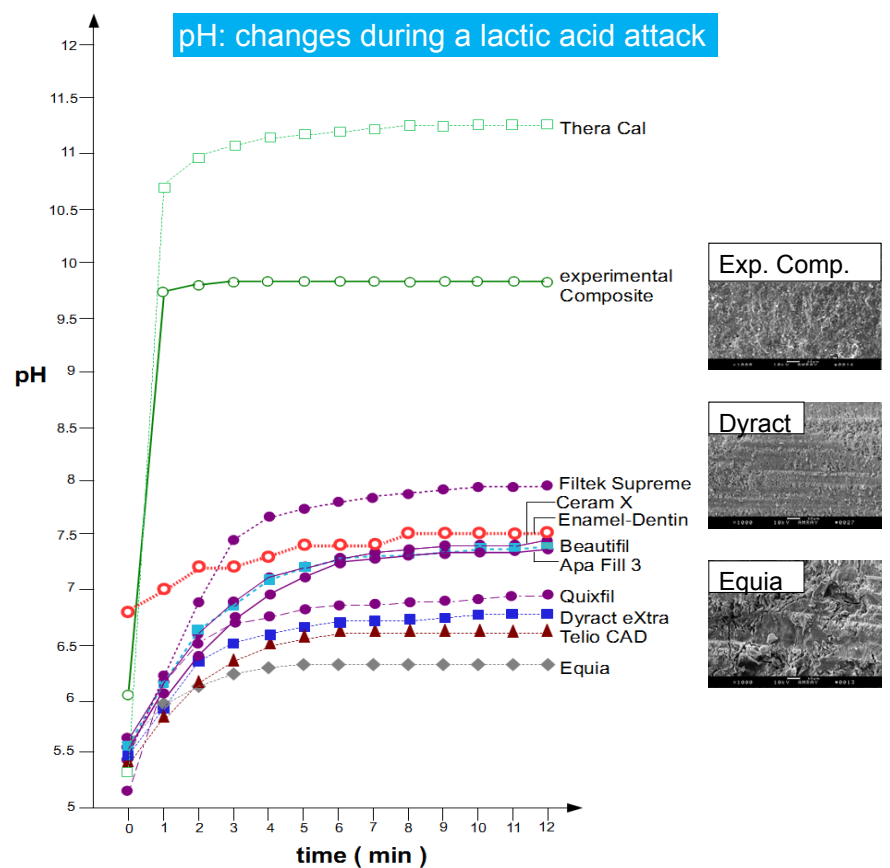
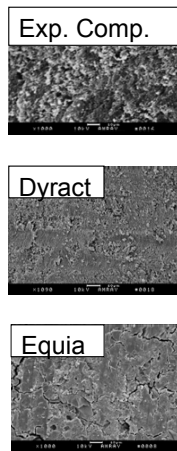
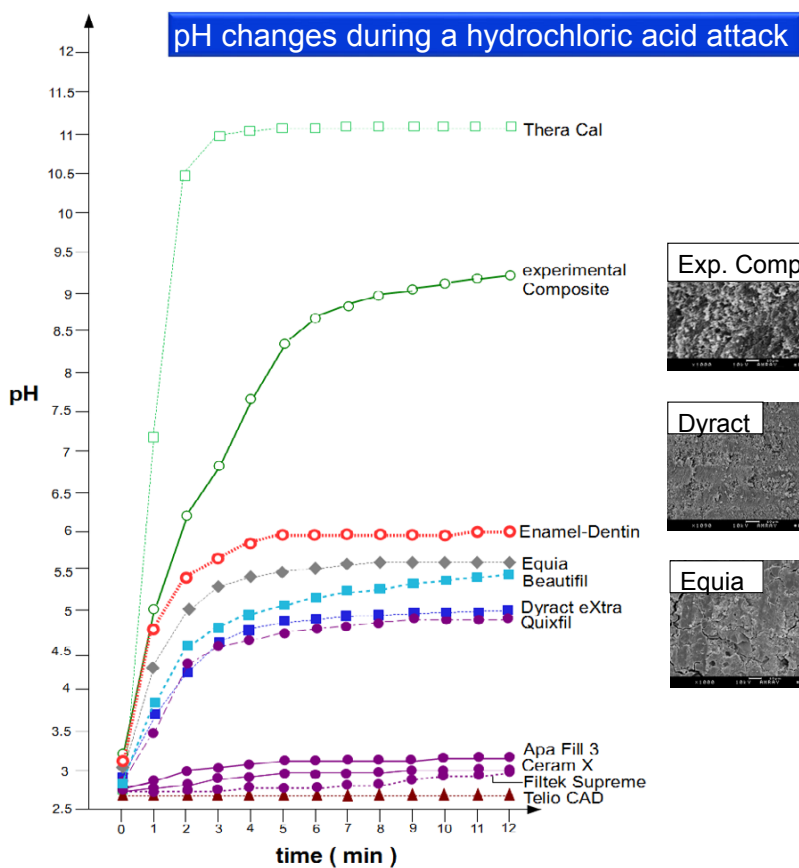


Materials and Methods

- Samples with a small cavity (130 µl) milled with CEREC MC XL (Sirona):
 - Composites:** Quixfil, Ceram X Mono¹, Filtek Supreme², Apa Fill 3³
 - Compomer:** Dyract eXtra¹
 - Giomer:** Beautifil flow⁴
 - Experimental composite containing bio glass⁵**
 - Pulp capping liner:** Thera Cal⁶ (control 1)
 - PMMA:** Telio CAD⁷ (control 2)
 - Enamel-Dentin-body**
 - Glas ionomer cement:** Equia Fil⁸
 - 80 µl acid attack: hydrochloric acid (pH 2.6) or lactic acid (pH 4.5)
 - pH changes: over 12 min with pH-electrode (In Lab nano, Mettler Toledo)
 - SEM images of surfaces
- ¹Dentsply, ² 3M ESPE, ³Cumdente, ⁴Shofu, ⁵smartodont, ⁶Bisco, ⁷Ivoclar, ⁸GC



Results



Conclusions

For the hydrochloric acid attack:

- All dental materials tested: weaker buffering capacity than enamel-dentin-body
- Bioactive glass-containing experimental composite and pulp capping liner: better clinically-relevant buffering capacity than enamel-dentin-body
- Some materials like Equia and Dyract eXtra: performed better during hydrochloric acid attack than during lactic acid attack.

For the lactic acid attack:

- Glass ionomer cement: weaker influence on the pH than all tested composites
- Dyract eXtra, Telio CAD and Equia Fill: could not raise the pH efficiently compared to enamel-dentin-body
- Beautifil, Ceram X Mono and ApaFill 3: buffer capacity comparable to enamel-dentin-body
- Filtek Supreme: stronger buffering effect than enamel-dentin-body
- Exp.composite and pulp capping liner: strongest influence on the pH