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Restorative dentistry III.

Glassionomers

Glassionomers

Materials that have been developed by Wilson and Kent was a product of an acid-base reaction between basic fluoraluminosilicate glass powder and polycarboxylic acid.

Glassionomer cement is a water based materiál that hardens following the acid-base reaction between this glass and aqueous solution of polyacid.

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Glassionomers contain metals

Aluminium

- Calcium
- Strontium
- Zinc
- Sodium
- Potassium
- Lanthanum

Phosphates and fluorides

– Are used to decrease the melting temperature in the production process and are incorporated to the glass composition to modify the setting characteristics.

X-ray contrast - radioopacity

- Lanthanum oxide, strontium oxide (incororated into the glass)
- Baryum sulphate

Essential ingredients of the glass are aluminiumoxide and silicium dioxide

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Liquid of glassionomers

– Liquid is based on polycarboxylic acid:

Polyacrylic acid

Polymaleic acid

Acrylic acid- itaconic acid copolymer

Acrylic acid- maleic acid copolymer and others.

Water, tartaric acid (acelerator)

Acids can be a component of powder also

– Freeze dried powder

These cements are mixed with water or with the polycarboxylic acid.

Glassionomers

- Principle of setting – acid base reaction

1. Hydrogen ions of the acid attack the glass particles in the presence of water, releasing calcium, strontium and aluminíum ions
2. The metal ions react with the carboxylic acid groups to form the polyacidsalts matrix. The glass surface is changed to a silica hydrogel. Glass core remain intact.

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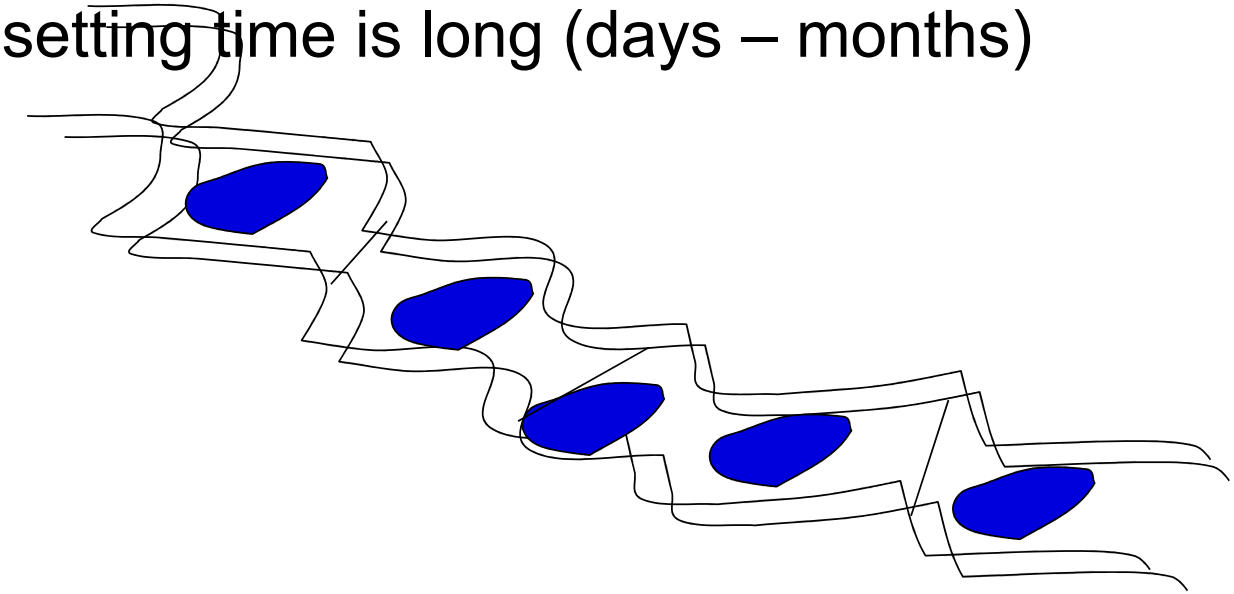
Glassionomers

The structure of the cement is a network of polyacid salts. Inside this network remain particles of glass (silica hydrogel on the surface). The setting time is long (days – months)



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Glassionomers - characteristics

- Chemical bonding to hard dental tissues (carboxy groups react with calcium in hard dental tissues)
- Thermal expansion similar to dentin
- Realease fluoride ions (cumulative releasing)

Mechanical not strong enough

Aesthetics acceptable

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Types of glassionomers

Conventional glassionomers

- Conventional glassionomers for direct restorations
- Metal reinforced glassionomers
- Highly viscous glassionomers Low viscosity glassionomers
- Base and liners
- Luting
- Sealers

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Types of glassionomers

Resin modified glassionomers

These cements were designed to produce favorable physical properties similar to composite materials.

The water solubile resin component has been added into an aqueous solutions of polyacrylic acid.

Liquid: polycarboxylic acid, water and 2-hydroxyethylmethacrylate (HEMA). In some materials pendant methacrylate groups are on polycarbocylic acid.

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Types of glassionomers

Resin modified glassionomers

Two setting reactions:

- acid-base reaction
- polymerization

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Types of glassionomers

Resin modified glassionomers - benefits

- Significantly less sensitivity to water
- Improved mechanical properties
- Higher translucency

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Types of glassionomers

Resin modified glassionomers

Restorative materials

Base and liners

Luting

Orthodontic cementing material

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Glassionomers acc to curing

- Acid – base reaction
- Dual cured glassionomers (resin modified)

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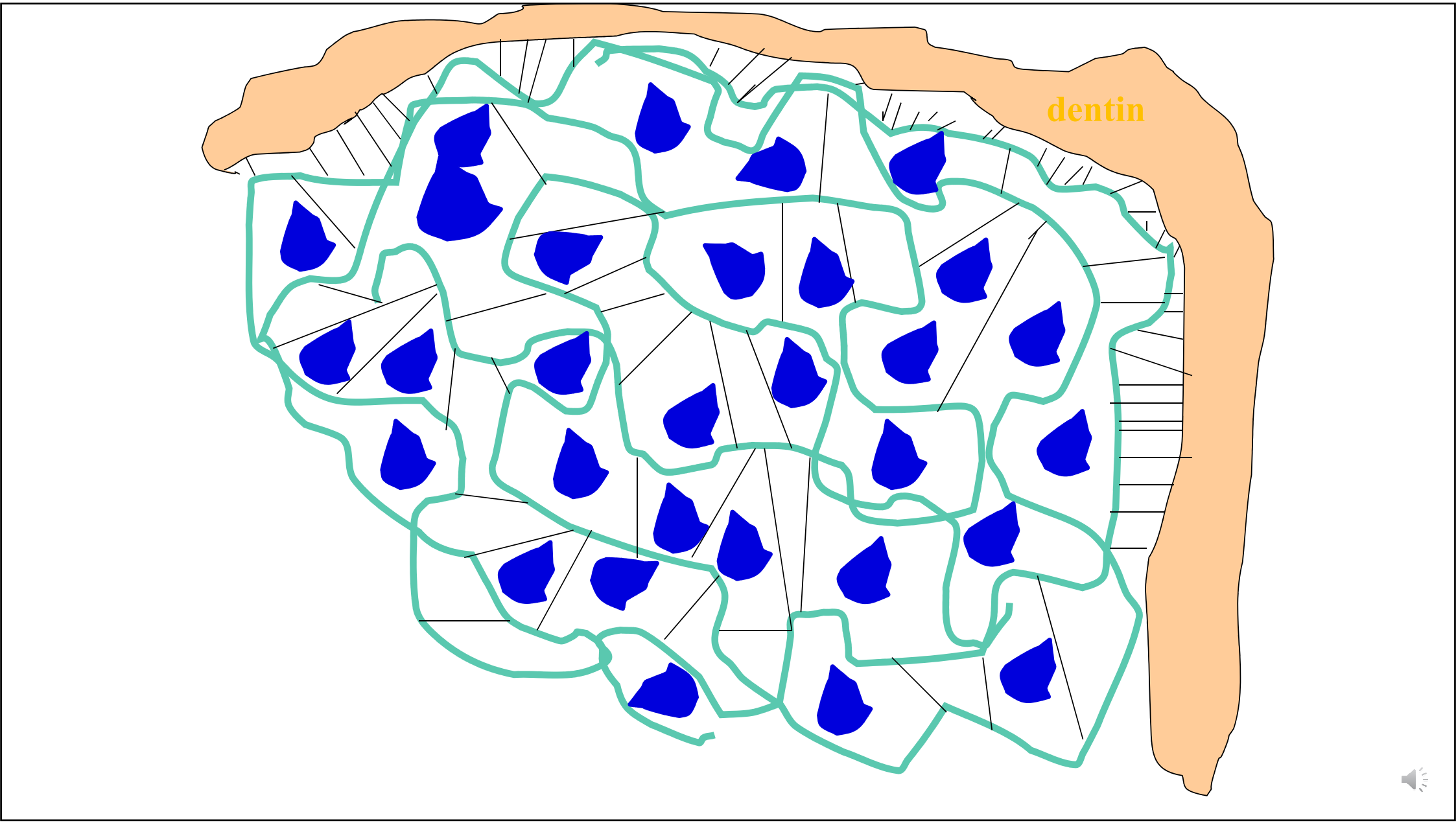
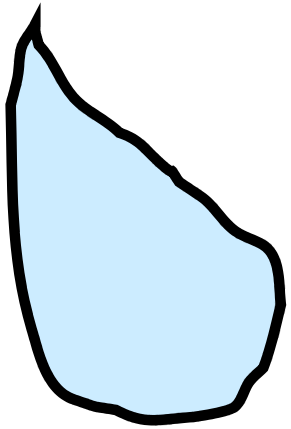
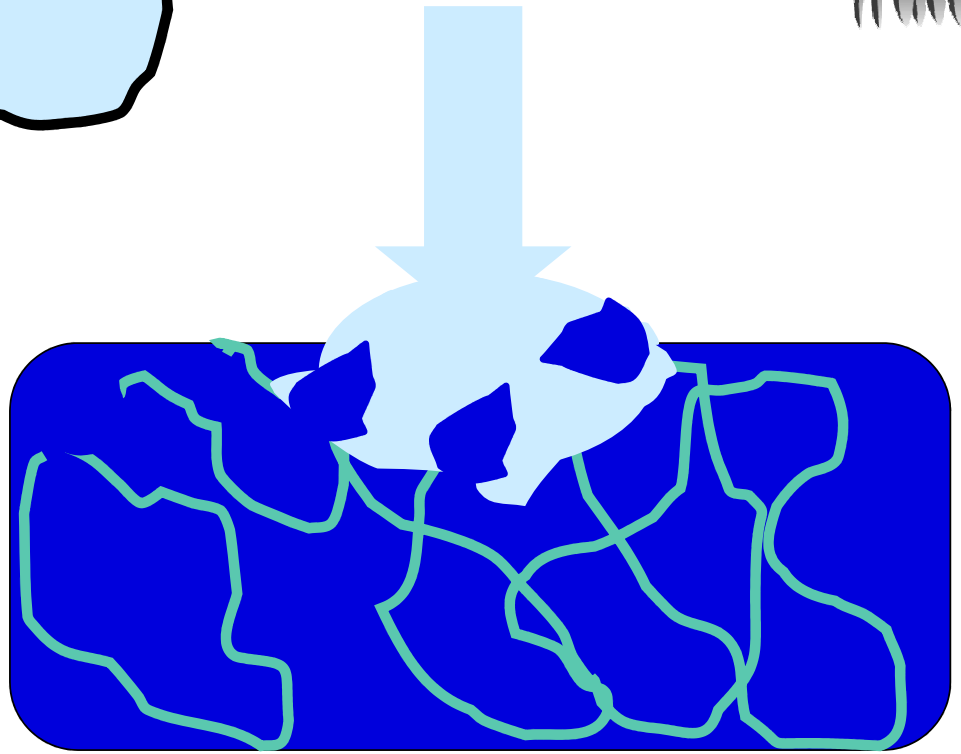
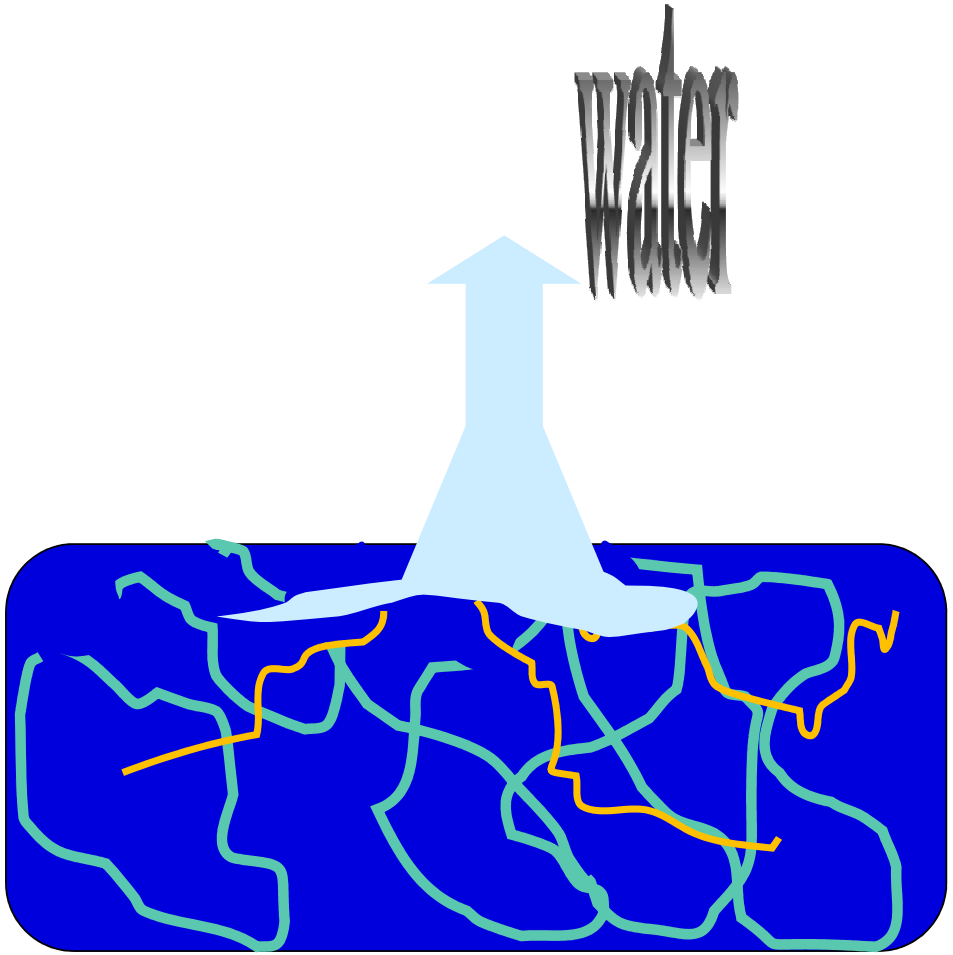
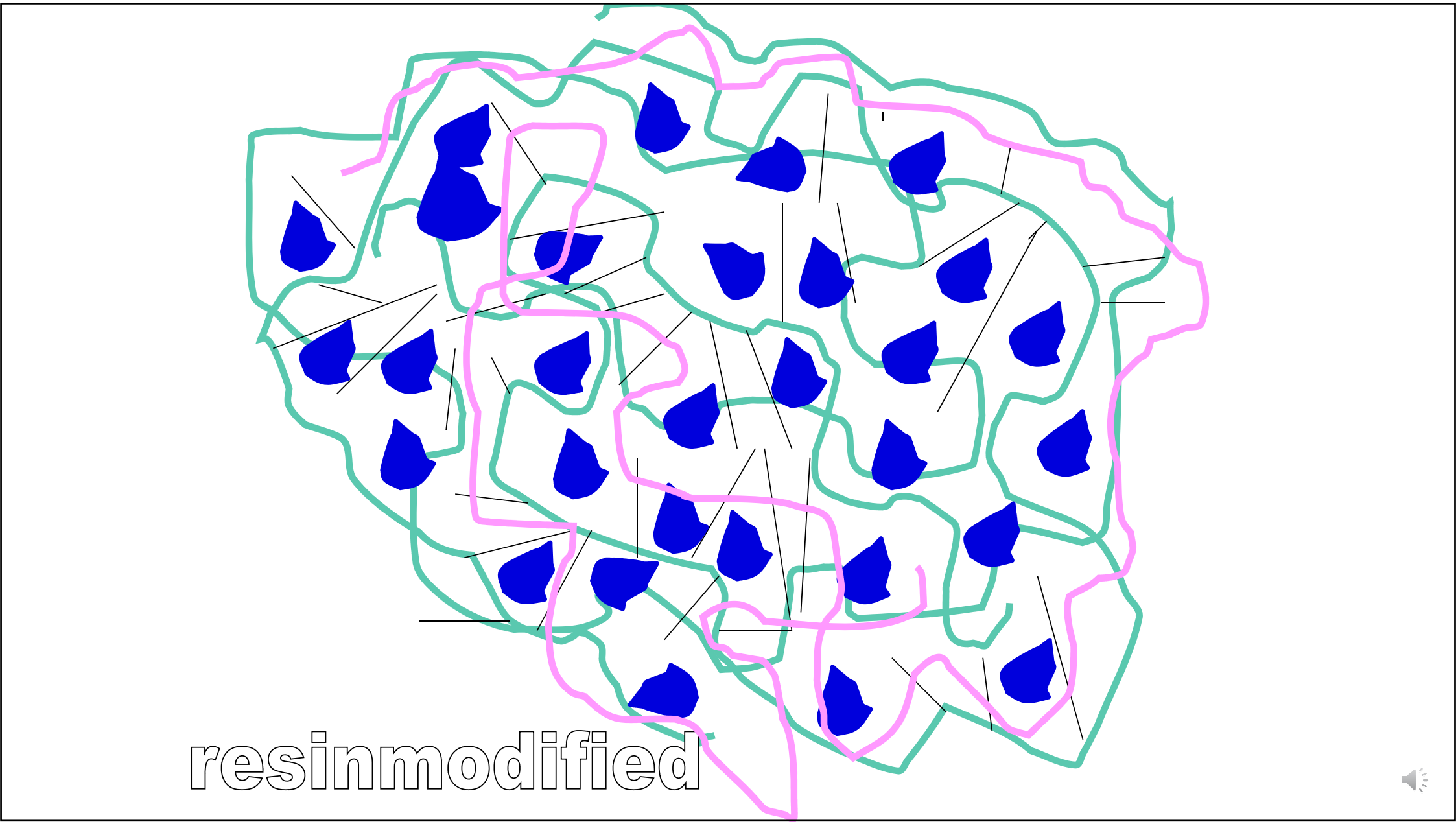

dentin

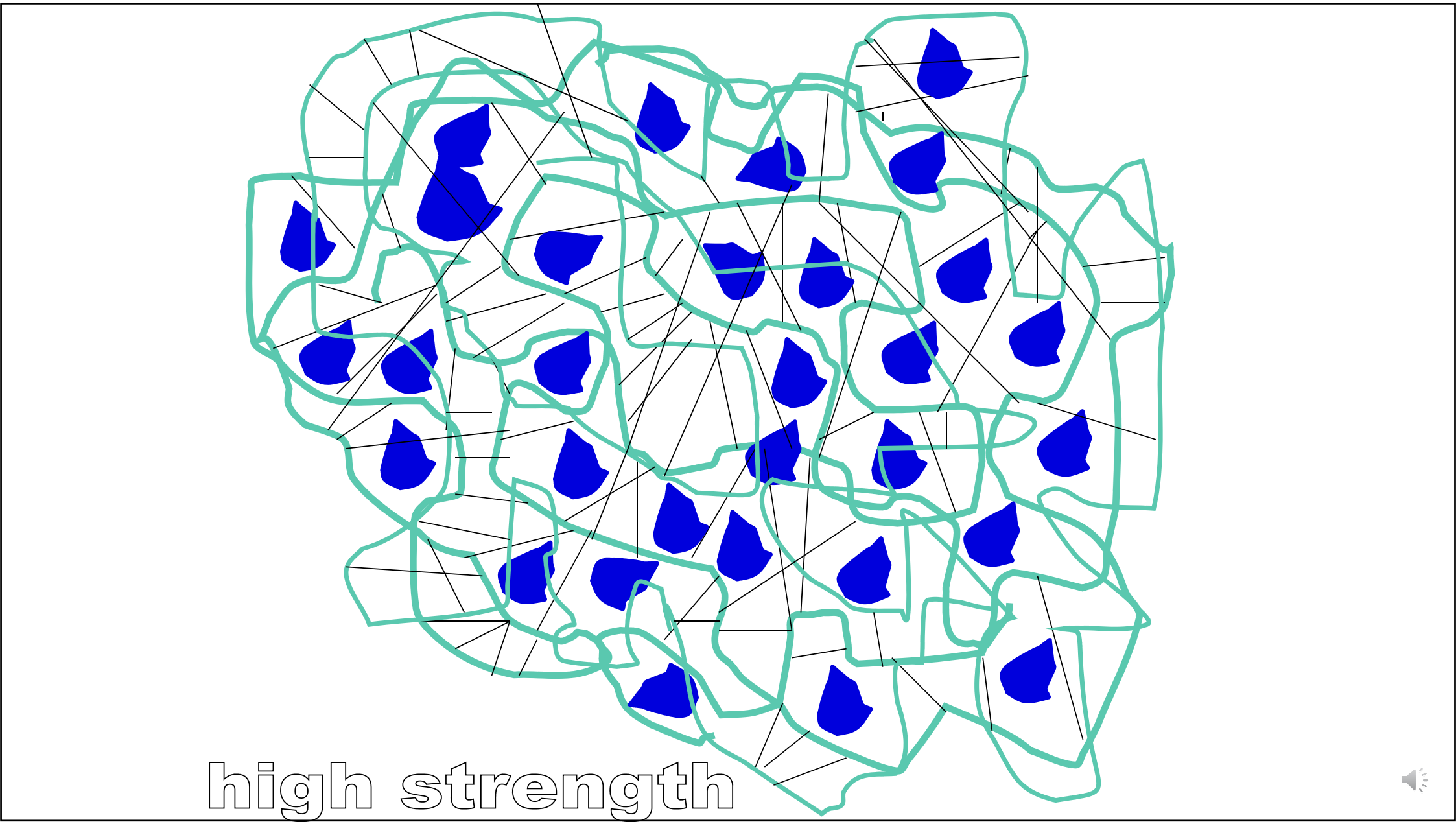


water




water


resinmodified


high strength

Glassionomers - indications

Fillings
Class V.
Class III.
Class I. and II. in primary dentition
Base – sandwich filling
Sealants
Surface protection
Internal mineralization

Other indications
Endodontic sealers
Luting materials

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Glassionomers - contraindications

Haevy occlusal stress:

Class I. and II. in permanent dentition

Class IV. Restoration

Caries pulape proxima or open dental pulp

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Mixing

Hand

Power driven – capsulated

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Hand and power driven mixing of the GIC

Forceps for activation and application

Mixing machine

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Making filling

- Preparation
- Smoth bordes
- Limited on caries lesion only
- Conditioning (25% polyacrylic acid 20s´)
- Washing
- Filling in one block
- Varnish after setting
- Polishing in next appointment

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