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“Materials science in orthopedic dentistry”
Module 1.
Lecture 1.

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lecture plan

1 Classification of materials used in orthopedic dentistry;
2 Characteristics of auxiliary materials;
- Impression materials;
- Modeling materials;
- Refractory alloys;
- Solders;
- Fluxes;
- Bleach;

3 Characteristics of basic materials.

auxiliary materials

- Impression materials;
- Modeling materials;
- Refractory alloys;
- Molding and refractory materials;
- Fluxes and bleaches;
- Solders;
- Abrasive materials;
- Separating varnishes;
- Dental cements.

Requirements for impression materials:
1. To give an exact impression of a relief of a mucous membrane of a cavity mouth and teeth;
2. To be harmless and not to have unpleasant taste and smell;
3. Do not stick to the tissues of the prosthetic bed;
4. Do not dissolve in saliva;
5. Have a weak antiseptic effect;
6. Soften at t, which does not threaten to burn the mucosa shells;
7. Easily injected and excreted from the mouth;
8. Do not procrastinate;
9. Do not break and do not shrink (not more than 0.1%);
10. Do not deform at room temperature for a long time;
11. Allow reuse of material after sterilization;
12. Easy to pack and dispense, be cheap and convenient for storage and transportation

Classification Doinikova AI,
Sinitsyna VD

By physical condition:

- Solid crystal;
- Elastic;
- Thermoplastic;
- Polymerization.

By chemical nature:

- Gypsum;
- Zinc oxide deugenol;
- Alginate;
- Silicone;
- Thiocol;
- Epoxy.

By field of application:

- To correct the base of the prosthesis;
- To know the prints;
- For the manufacture of laboratory models.

Impression is a negative (reverse) reflection of any organ of the dentomaxillar system: teeth, alveolar sprout or part, palate, nose,
ear and others like that.

Impression is a negative (reverse) reflection of hard and soft tissues, placed in the area of dental prosthesis and it's borders which
Is being taken by means of the special impression materials

Impression Materials

- Non-elastic
- Elastic
  - Aqueous hydrocolloids
    - Agar
    - Alginate
  - Non-aqueous elastomers
    - Polysulfide
    - Silicones
      - Condensation
      - Addition
    - Polyether

Elastomeric Impression Materials

- Viscoelastic
  - physical properties vary
    - rate of loading
- Rapidly remove
  - decreases permanent deformation
    - chains recoil from a recoverable distanc
  - increases tear strength

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Aqueous Hydrocolloids

- Colloidal suspensions
  - chains align to form fibrils
  - traps water in interstices
- Two forms
  - sol
    - viscous liquid
  - gel
    - elastic solid
- Placed intra-orally as sol
  - converts to gel
    - thermal or chemical process

Advantages

- Dimensionally accurate
- Hydrophilic
  - displaces moisture, blood, fluids
- Inexpensive
  - after initial equipment
- No custom tray or adhesives
- Pleasant flavor
- No mixing required

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Disadvantages

- Initial expense
  - special equipment
- Material must be prepared in advanced
- Tears easily
- Dimensionally unstable
  - Must be poured immediately
  - Can only be used for a single cast
- Difficult to disinfect

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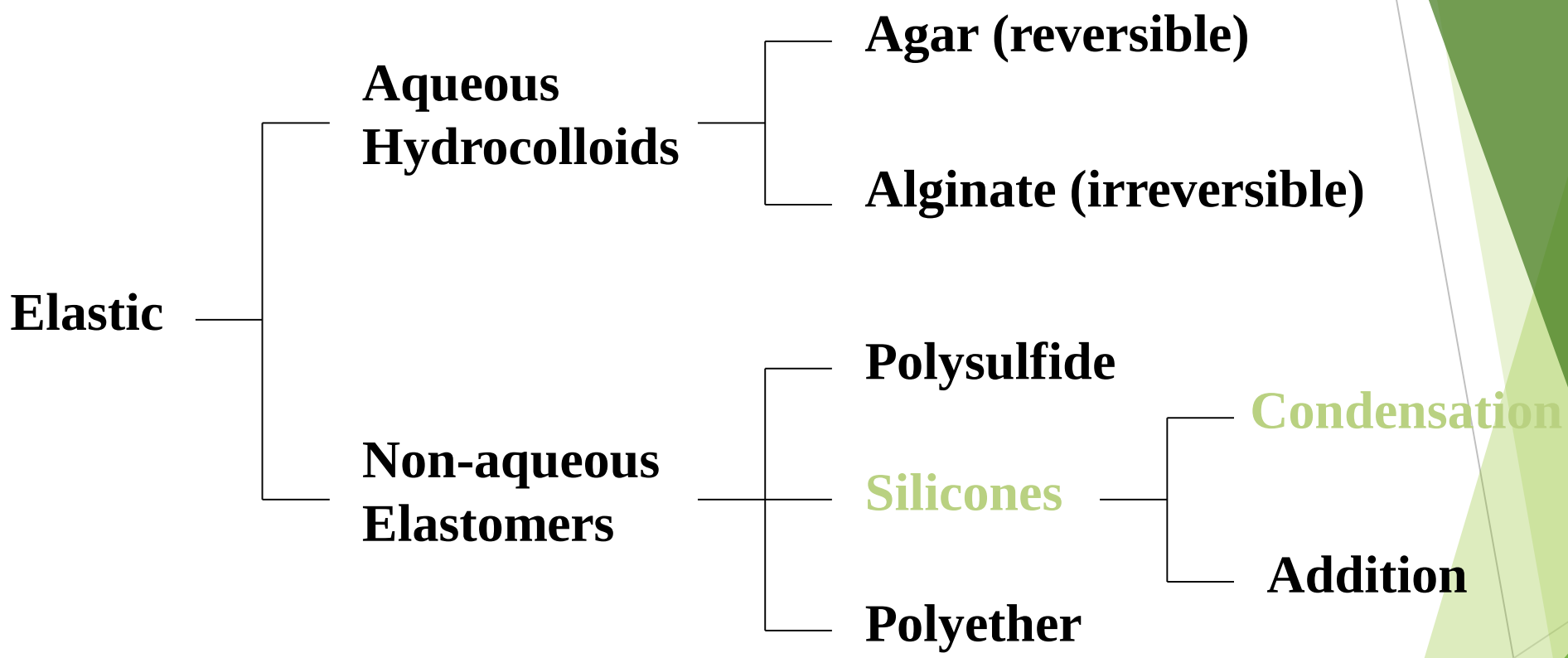
Irreversible Hydrocolloid (Alginate)

- Most widely used impression material
- Indications
  - study models
  - removable fixed partial dentures
    - framework
- Examples
  - Jeltrate (Dentsply/Caulk)
  - Coe Alginate (GC America)

Polysulfide

- First dental elastomers
- Indications
  - complete denture
  - removable fixed partial denture
    - tissue
  - crown and bridge
- Examples
  - Permlastic (Kerr)
  - Omni-Flex (GC America)


Elastic
Aqueous Hydrocolloids
Agar (reversible)
Alginate (irreversible)
Non-aqueous Elastomers
Polysulfide
Silicones
Condensation
Addition
Polyether

Addition Silicones

- AKA: Vinyl polysiloxane
- Indications
  - crown and bridge
  - denture
  - bite registration
- Examples
  - Extrude (Kerr)
  - Express (3M/ESPE)
  - Aquasil (Dentsply Caulk)
  - Genie (Sultan Chemists)
  - Virtual (Ivoclar Vivadent)

Medical plaster. Gypsum properties

In the treatment of fractures, a plaster cast is most often used, which is applied by an average medical professional alone or together with a doctor.

Medical gypsum is obtained from gypsum stone (sulphate lime) by calcining it in special furnaces at a temperature not exceeding 130 ° C. As a result, gypsum stone loses water, becomes brittle and is easily ground into a fine white powder. The quality of the gypsum depends on a number of conditions, in particular on the residence time in the furnace, the calcination temperature, the size of the sieve mesh. You need to store gypsum in a dry place, since the degree of its moisture depends on this.

Medical plaster must be white, finely ground, soft to the touch, free of lumps, must quickly harden and be durable in products.

- Waxes and wax compositions
- Wax for bases;
- Modeling wax for bridges;
- Modeling wax for arches prostheses;
- Modeling wax for tabs;
- Profile wax;
- Milling wax;
- The wax is sticky.


WAX
BASE PLATE – 02

They have a silvery-white color on the fracture line granular structure, have sufficient hardness for stamping crowns.t Sq. up to 115 ° C.

1. Fusibility, which facilitates casting individual stamps and models;
2. Separation of stamps from models;
3. Relative hardness, which provides stability
stamp during stamping;
4. At hardening, after molding not to give shrinkage;
5. Do not be fragile;
The composition includes: tin, lead, bismuth,
cadmium, antimony and rarely zinc and copper.

Solder is a metal or alloy that fills a gap between parts when soldering. At the point of impact parts and solder is the diffusion of one metal in another.

Requirements:

1. t pl. lower by 50-100 ° C than the base metals;
2. To be thin-flowing;
3. Diffuse well;
4. Resistant to acids and alkalis;
5. Match the color to the base metals;
6. Resistant to corrosion in the mouth;
7. By physical and mechanical properties approach the base metals;
8. Do not shrink and sink during curing.

Basic materials

The main materials are those
from which dentures are made.
These are metals, plastics, ceramic masses.
Requirements for basic materials:
1. Harmless, chemically inert in the mouth;
2. Mechanically strong with the necessary elastic properties;
4. Have good technological properties (at stamping, casting, soldering);
6. Do not have taste and smell;
7. Metals are resistant to corrosion.

Gold - a light yellow metal with characteristic metallic luster. Density 19.3 g / cm3
1064 ° C, t 2550 ° C, shrinkage 1.2%, hardness Brinell 18.5 kgf / mm
In orthopedics use gold alloys:
-916
-900
-750

STAINLESS STEEL.

Steel is an alloy of iron and carbon. Have a high strength, good physical qualities: hardness, ductility, viscosity, elasticity
STEEL OF BRAND 1X18H9- is used
for the manufacture of fixed prostheses

▫ STEEL 20X18N9T
are manufactured in the factory:
• standard sleeves for stamped crowns;
• clamp wire of round section;
• elastic corrosion-proof matrices for contours
seals.
STEEL 25X18H102C
are manufactured in the factory:
• artificial teeth for soldered bridges;
• steel frames for bridges with
further facing;
• wire with a diameter of 0.6 to 2.0 mm

PLASTICS

▫ Classification by purpose:

1) for bases;
2) for soft base substrates;
3) for relocation and repair of removable prostheses;
4) self-hardening materials for orthodontic appliances and maxillofacial orthopedics.


Белакрил - М ГО
Белакрил - М ГО

REQUIREMENTS:
1) Have sufficient strength and hardness when
chewing pressure on the prosthesis;
2) Firmly connect with artificial teeth;
3) Do not deform and do not change the volume in the process
prosthesis manufacturing;
4) do not dissolve in saliva;
5) Maintain a constant volume when the temperature changes
oral cavity;
6) Well sanded and polished, keep smooth
surface;
7) Do not change color under the influence of factors
external environment;
8) To be repaired in case of breakage;
9) Do not irritate the mucous membrane of the oral cavity;
10) Do not have taste and smell;
11) Match the color of the mucous membrane
oral cavity

At present, the industry produces a variety
by chemical composition and dental properties
plastics, metal alloys and ceramic masses. These
materials have their positive and negative properties,
allowing the doctor to have a choice in applying them to
different clinical cases. It is known that it cannot be
material suitable for all types of orthopedic
structures. Therefore, having
a wide range of basic materials for, necessary
know their composition and properties to choose the ones that
are
best meet the objectives
orthopedic treatment. From this, to a large extent, will be
depend on the results of prosthetics.

Thank you for the attention