

Dental metals and their alloys

Metals are the oldest material used in prosthetics. Especially for their strength, hardness and durability, they have a wide range of uses. The disadvantage of some alloys is their reduced biocompatibility, and metals extending into the visible part of the dentition do not always meet the requirements of aesthetic dentistry. Of the pure metals, only titanium, galvanoplastically gold, silver and copper are processed in prosthetics. In other cases, these are alloys.

An alloy is a material that consists of two or more metals or non-metals.

Mechanical properties of alloys

- **yield strength** – characterized as a stress causing permanent deformation of an alloy of a given size;
- **hardness (measured by Vickers or Brinell)** – we press in either a pyramid-shaped diamond or a ball;
- **modulus of elasticity** – relationship between strain and stress.

The risk of using metallic materials in the oral cavity is their corrosion, which causes both the release of metal into the body and the color change. A significant issue is the biocompatibility of the alloy - it should not be toxic and cause allergies.

Metalworking

- casting - hot casting
- milling - cold
- wrought alloys - sheets, wires
- Solder
- galvanofarming

According to the chemical composition, we divide dental metals into:

1. Dental alloys of precious metals
2. Base metal alloys

Dental alloys of precious metals

Dental alloys of precious metals contain at least 75% Au and metals from the platinum group (Ag, Cu, Pt, Pd and Ir).

- They are based on Au, Ag, Pd.
- Pure gold is the most stable of all, corrosion resistant, but very soft.
- Alloys of precious metals are supplied in the form of cast iron, wire or sheet metal.
- They are divided by color into yellow and white.

Dental alloys made of noble metals are divided into:

1. **Alloys with high gold and platinum group metals according to ISO 1562** (platinum, palladium, iridium).
 - Alloys of type I with high softness (22k) – I: low stress inlays.
 - Alloys of type II with medium strength (20k) – I: large inlays, single crowns, small bridges.
 - High strength type III alloys (18k) – I: heavily stressed inlays, bridges.
 - Alloys IV type extra hard (16k) – I: suitable for bridges, stirrups, plug-in joints.
2. **Alloys with reduced content of gold and platinum group metals according to ISO 8891:1995** – their advantage is hardness.
 - Dental alloys of gold-platinum.
 - Gold palladium dental alloys.
 - Gold solders – used to join gold alloys.
3. **Semi-noble alloys of dental metals** – alloys containing silver and palladium.
 - Silver dental alloys – we divide into low-melting and high-melting.

Base metal alloys

Alloys for the bearing parts of metal-ceramic dentures – are composed of 60% palladium and also contain silver, tin, indium, gallium and trace amounts of other elements – gold, zinc. The meaning of a rather complex composition is to set the necessary properties of the alloy.

Chromium-cobalt (ISO 6871-1)

- Co above 60%
- hard, corrosion resistant
- construction of bridges and partially removable dentures
- metal-ceramics

- splints, screws
- allergy to Cr and Be

Chrome-nickel

- hard, corrosion resistant
- Allergy to Ni

Chromium-cobalt-nickel (ISO 6871-2)

Stainless steel

- Fe,Cr,Ni alloy
- wires - clips, orthodontics

Titanium

- highly resistant to corrosion - covered on the surface with a layer of oxides = passivation layer
- mechanically resistant
- use - pure or alloy (with Va, Al)
- crowns, bridges, abutments, root inlays, anchor elements (orthodontic wires), implantology, traumatology
- allergy only exceptionally

Aluminium bronzes

- Metal of yellow color - "cheaper gold"
- high susceptibility to corrosion
- poor biocompatibility, not recommended!

Solder

- Serves to join 2 different metals

Links

Related Articles

- Plasty v protetice

Bibliography

-

Kategorie:Zubní lékařství Kategorie:Preklinické zubní lékařství