Dental Material

Dr. Hiba Jassim Rassol
Ph.D.

Lecture 6

Base metal alloy

Base metal alloy

Nickel chromium alloy

Cobalt chromium alloy

Titanium and titanium alloys

Nickel chromium alloys

They are used for metal ceramic crown and bridge.
Cannot use with nickel sensitive patients

Cobalt chromium alloys

They are also called satellite because of their shiny – star like

appearance have high strength, excellent corrosion resistance &

hard used for:

1. Denture base.

2. Cast removable partial denture framework.

3. Crown and bridge.

NICKEL–CHROMIUM ALLOYS

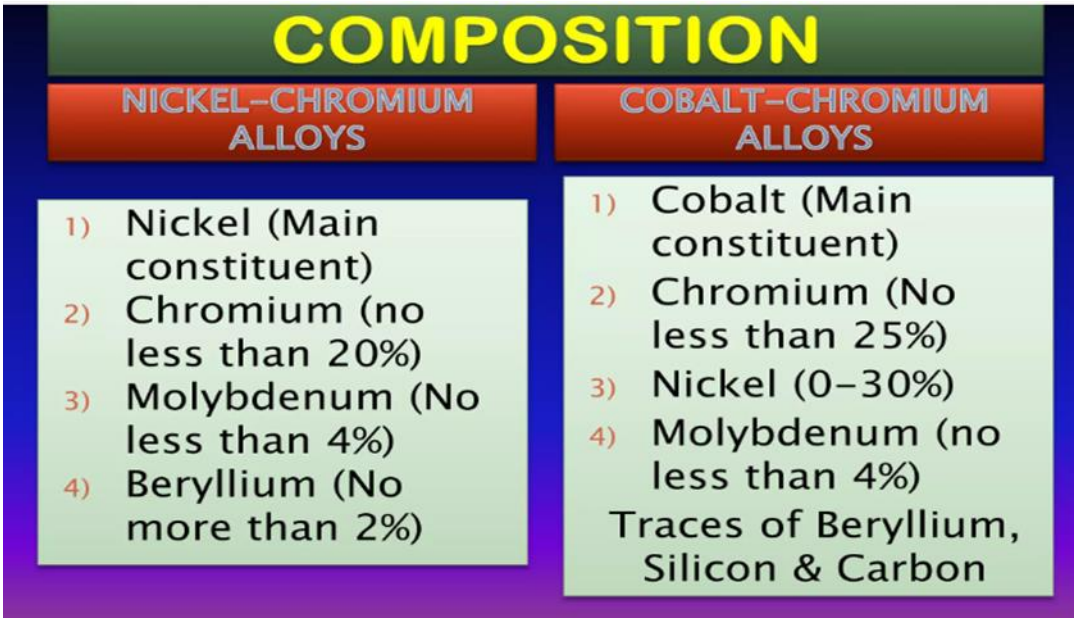
COBALT–CHROMIUM ALLOYS

NICKEL–CHROMIUM ALLOYS

Used for crown & bridge casting including porcelain fused to metal (PFM) restorations.

COBALT–CHROMIUM ALLOYS

Used for partial denture framework castings.



Titanium and titanium alloys

Titanium and its alloys are now used in metal – ceramic and for removable partial denture frames and implants. It has excellent biocompatibility, light weight, good strength and ability to passivity

FUNCTION OF VARIOUS ALLOYING ELEMENTS

- **Chromium** is responsible for the tarnish and corrosion resistance of these alloys. When the chromium content of an alloy is higher than 30%, the alloy is more difficult to cast. Therefore, cast base-metal dental alloys should not contain more than 28% or 29% chromium.
- **Cobalt** increases the alloy's elastic modulus, strength, and hardness more than nickel.
- **Carbon:** One of the most effective ways of increasing the hardness of cobalt-based alloys is by increasing their carbon content.
- **Aluminum:** in Ni-Cr alloy, it forms a compound of Ni and Al (Ni3 Al). This compound increases the ultimate tensile strength and yield strength of the alloy. The addition of 1% to 2% beryllium to Ni-base alloys lowers the fusion range by about 100C°. Such concentration may adversely affect ductility.
- **Silicon and Manganese** are added to increase the alloy’s fluidity and cast ability.
- **Nitrogen** contributes to the brittle quality of the cast alloy.
- **Molybdenum** The presence of 3% to 6% contributes to the strength of the alloys. The addition of beryllium to base metal alloys improves its cast ability by lowering the alloy’s melting temperature and surface tension.