**Note:** the Dr literally didn’t say anything other than general topics and didn’t explain much so, I used last year’s sheets because it has more information to study and anything extra the Dr mentioned”which is not that important :P” is underlined.

* **Biological considerations:**

Materials undergo toxicity and allergy tests either they are done subcutaneously or on the skin.

* **Toxicity test:**

It is done by putting the materials in tubes with living cells to check the cells degenerations by using a specific enzymes; these enzymes give indications about the degeneration, if they increase so the toxicity increases too.

* When they invent any material they tell us it's biologically compatible, but when they invent a newer material they tell us it's more compatible.
* Risks ( biological considerations) include:
1. Allergy.
2. Toxicity.
* Risks (allergy or toxicity) of dental materials depend on:
1. The patient.
2. The dentist.
3. The assistant.
4. The technician.
* Risks on patients:
1. Many materials have allergic components for the patient called Allergens, such as; eugenol, colophony, polyether, gold, palladium and methacrylate.

Gold in japan is called kin , some patient has gold allergy so they said to be having kin allergy and those patient we use for them titanium for crowns and now all ceramics is available so it replaces titanium because it is hard at molding and casting and sometimes mistakes happen ,also its expensive.

1. Materials have local toxic reactions:

most of the materials have it like bonding agent , if it touches the mucosa it causes burning and laceration.

1. Restorative materials.
2. Impression materials.
3. Anesthesia.
4. Materials have systemic toxic reactions.
5. Carcinogens.
* Risks on occupational (dentist, assistant, technician):
1. Latex gloves: make allergy from sulfur or corn flour powders.
2. methacrylate: makes allergy from its smell.
3. Disinfection materials: sterillium.
4. Cobalt, chromium, nickel: especially for the technician.
5. Polyether and eugenol.
6. Toxic substances: methylmethacryalte, mercury vapor.
7. Carcinogens:
8. Formaldehyde (endodontics).
9. Cadmium.
10. Beryllium (casting alloys).

How did they know that these materials are carcinogens?

They did studies on group of people who had cancer and make researches about them: number of amalgam restorations, times of dentist visits, who works in a dental clinic.so they listed all of the material that they think cause cancer but most of them maybe not right. Females has more allergies in general than males.

Amalgam is the dirtiest material in dentistry in the dr opinion because if you want to make a crown for a tooth with amalgam restoration the amalgam debris will attach to the gum and soft tissues and when you take an impression after finishing the preparation the rubber supposed to hold the amalgam and take it out but it can’t do that, and if you leave it behind the patient will come back with an amalgam tattoo, so the Dr makes a gingivectomy using burs to remove this debris.

* **Gold and alloys in Nobel metals:**

Nobel metals are more tolerated than others.

Gold makes allergy (to check the contact allergy on hands or feets, also by patch test (putting a specific patch on the skin).or by gold salts

* **Palladium**

People have sensitivity to it (males and females).affects the technician more because they do the finishing for it.In Japan they use palladium with silver, so its concentration is less and its molding is easier because more metal make it more flowable and its molded using casting machine or centrifuge and not expensive.

* **Nickel**

Females are more allergic to Ni; it makes black areas on gingiva. On the other hand Ni free has less sensitivity than Ni. Always who has nickel allergy has palladium allergy or the opposite.

* **Base metal casting alloys**: we have an article about them.
* **Beryllium:** a carcinogen. More toxic than nickel because nickel is confined for female mostly.

Note: Ni and Br are more toxic for technician.

 Ni makes contact dermatitis and more allergic for females.

* **Ni free material**: available, base metal alloy (Co-Cr).
* **Ti and vanadium** are most biocompatible between alloys.
* **Dentures:**
1. Sensitivity: we have to put dentures in water for a period of time to remove the monomers. So denture stomatitis won’t happen.
2. Colonization of organisms.

Note: denture base monomers make:

1. Water absorption.
2. Colonization. (candida)
3. Minority have allergy for resin.
4. Irritation.
5. Stomatitis : it caused from high monomer levels.

\*\* the monomer level should be 2.2%.

* **Lining materials**

Soft liners should be for short term, otherwise they cause allergic reaction or colonization. Candida and stomatitis could happen.

* **Dental amalgam risks:**

The amalgam is more toxic during: mixing, application and removal. When it sets there will be no risk. And hand mixing is more toxic.

1. Mercury compounds affect the CNS.
2. High doses in placing, contouring and removal of amalgam filling.
3. Lower doses from ingestion of remaining amalgam, corrosion products.
4. Abortion.
5. Allergic reaction.
6. Parkinson.
7. Epilepsy
8. Alzheimer’s
* **Resin base filling materials:**
* Biocompatible (we have an article about them); like composite resin that contains crystalline silica that is carcinogen.
* Cytotoxicity: as we said checked by cell growth or cell death (by enzymes); and each cell affected by toxins will be dead and release an enzyme. Each composite material has a relative cell growth (number of cells).
* Dehydrogenase: measured according to the cell death; if it (dehydrogenase) increases the cell growth decreases; such as succinate dehydrogenase.
* **Temporary crown and bridge resin:** like acrylic base (methacrylate: causes allergy or toxicity from its monomer either chemically or thermally). Also, bisacryl.
* **Cement based materials:** on phosphoric acid
* Zinc phosphate used only for non-vital teeth because it has short chains affect the dentinal tubules, and acidic pH that irritates the pulp.
* Polycarboxylate has long chains that don't enter the dentinal tubules and less acidity, so less effect on pulp.
* **Glass ionomer**

Better for vital teeth than polycarboxylate.