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What is Plastination?
Principles of Silicone Plastination

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What is Plastination?

- The main goal of the plastination is to replace intra and extracellular fluids in the tissue with a reactive polymer (silicone, epoxy, polyester).
- Samples can be obtained from humans, animals or plants.
- Invented by Gunter von Hagens in 1977 at the University of Heidelberg's Institute of Anatomy.
- China (1996), Kyrgyzstan and finally USA (2004).
- Odorless, non hazardous, very durable and quite similar to the natural shape of anatomical structures.
- Still question marks on plastination. Ethical concerns especially on human plastination. Micheal Jackson project.

- Still question marks on plastination. Ethical concerns especially on human plastination.
- Prisoners sentenced to death.
- Body donation legislations.
- Micheal Jackson project.

Main Principles

- To prevent decomposition.
- To remove the tissue fluids, even fat and to replace it with a curable polymer which can stop decomposition.
- Very strong hydrophilic chemicals are essential to replace these fluids with polymers.
- Acetone, ethanol, xylol, methylene chloride etc.
- In a very low temperature and negative pressure (vacuum effect).

Basic Plastination Methods

1. Silicone plastination
2. Epoxy plastination
3. Polyester plastination

} Sheet plastination

Chemical Based Classification

1. The Silicone S10 Standard Procedure (*S 10 for opaque and flexible specimens)*
2. The COR-TECH - Room Temperature Procedure
3. *The North Carolina Technique*
4. *The Dow – Corcoran Technique*
5. The Epoxy E 12 Procedure (*E 12 for thin, transparent, and firm body and organ slices)*
6. The Polyester P35/P40 Procedure (*P 35/P 40 for semitransparent and firm organ slices)*

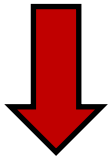
Advantages / Disadvantages of Plastination

- Durable, non-toxic teaching specimens for class room or clinical setting.
- Similar to natural anatomic position, size and even colour.
- Can be used for comparative or exotic anatomy
- Also beneficial for teaching of pathology, zoology, parasitology etc.

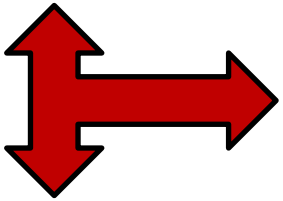
- Chemicals and equipments are quite expensive even for small size specimens
- Takes a long period of time
- Needs staff and labour to follow up the protocols daily
- Safety is very important
- Toxic chemicals during preparation process.

Procedure in S10 Standard Silicone Plastination

Stage 1 → Fixation

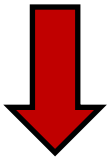


Stage 2 → Dehydration



Defatting (optional)

Stage 3 → Forced Impregnation



Stage 4 → Gas Curing – Hardening

Stage 1 ➔ Fixation

- Specimen should be planned before starting
- Proceed with dissection to carry out the plan
- Fixation is desirable but not essential
- 10% of formalin with no additives is the best
- Once the specimen is fixated it will be hard to change the shape

Stage 2 ➔ Dehydration

- Dehydration replaces tissue fluids with an organic solvent
- This solvent should be volatile intermediary for the impregnation stage
- Pure (99.5%) acetone is the best
- 2-3 times of acetone bath at -25°C (7 days for each bath)
- Read the purity of acetone with acetonometer
- Till the acetone purity become constant in 99% (nearly pure)

Defatting or Degreasing (Optional)

- Defatting is the removal of excess fat/lipid from the specimen
- Nervous tissue shouldn’t be defatted (myelin sheath)
- Acetone bath in room temperature for several days to weeks
- Lipid cahnge acetone’s color from transparent to yellow
- Repeat defatting procedure until the fat color turns from white to opaque.

Stage 3 ➔ Forced Impregnation

- This is the replacement of volatile solvent (acetone) in the specimen with a curable polymer
- Biodur S10 silicone polymer. Liquid but viscous silicone
- Impregnation mixture ➔ S10 / S3 ➔ 100/1 ratio
- To replace the acetone with silicone, a negative force (vacuum) is needed.

- A vacuum chamber and vacuum pump.
- Practically follow the acetone bubbles going out from specimen.

Stage 4 → Gas Curing - Hardening

- Before gas curing, specimens should remain in RT for few days for chain extention.
- For a firm 3D meshwork of silicone molecules in the tissue the S6 chemical can be used (cross-linking)
- S6 is more reactive in gaseous state
- Gas chamber and an air blowing pump
- Vaporized S6 diffuses onto surface of the impregnated specimen.
- Once the surface is hard and dry, the specimen may be used.

Thank you...

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