PLASTINATION - A TEACHING AND RESEARCH TOOL

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Plastination is a unique technique of tissue preservation developed by Dr. Gunther von Hagens in Heidelberg, Germany in 1978. In this process, water and lipids in biological tissues are replaced by curable polymers (silicone, epoxy, polyester) which are subsequently hardened, resulting in dry, odorless and durable specimens. Silicone is used for whole specimens and thick body and organ slices to obtain a natural look. Epoxy resins are used for thin, transparent body and organ slices. Polyester is used for brain slices to gain an excellent distinction of gray and white matter.

The technique consists of four main steps: 1. Fixation 2. Dehydration 3. Forced Impregnation and 4. Curing/Hardening. Fixation can be done by almost all conventional fixatives. Dehydration is achieved mainly by acetone because acetone also serves as the intermediary solvent during impregnation. Forced impregnation is the central step in plastination: vacuum forces the acetone out of and the polymer into the specimen. Finally the impregnated specimen is hardened by exposing it to a gaseous hardener (silicone), or by UVA-light and heat (polyester, epoxy).

Plastinated specimens are perfect for teaching, particularly for neuroanatomy. Silicone plastinated brains are useful because they can be grasped literally and they are almost everlasting. Polyester plastination of brain slices provides an excellent distinction of gray and white matter and thus better orientation.

The plastination techniques for brain (polyester) and body slices (epoxy) are also used in research, particularly in comparison with CT-and MRI-images.

PLASTINATION OF BRAIN SLICES

Brain slices may be produced by both the S-10 standard plastination technique and the P-35 technique.

The S-10 standard technique is mainly used for plastinating whole brains. These plastinated brains can be sliced after final curing. This results in smooth surfaces of the slices and thus slices are exactly adjacent to each other. Moreover, these slices show good differentiation between gray and white matter, due to freezing and thawing during the S-10 standard procedure. This technique allows the production of brain slices from 0.5 mm up to several centimeters. Therefore slicing S-10 plastinated brains is much better than plastinating pre-sliced brain slices.

For the S-10 technique I recommend adding the following steps to the standard procedure. Before starting the forced impregnation start with an immersion period. During this immersion-step the brains are immersed in the S10/S3 mixture for several days at -20YC. The longer the immersion time, the shorter the impregnation time will be. Moreover, this will also minimize the shrinkage of the brains. After curing is completed, the brains are cut into slices of desired thickness.

P-35 plastinated brain slices provide an excellent tool for teaching and research, because the differentiation between gray and white matter is superior to all other techniques. The thickness of the P-35 slices can vary between 4-8 mm.

The P-35 technique consists of the following steps: Fixation - Slicing - Flushing - Dehydration - 1. Immersion - 2. Immersion - Forced impregnation - Casting - Light Curing - Heat Curing. Light curing may be omitted if light-curing equipment is lacking.