FORMULA FOR EMBALMING OF CADAVERS FOR STUDENT DISSECTION AND THE MODIFICATION THEREOF FOR PLASTINATION

WF Pretorius.
Dept Anatomy and Cell Morphology
University of the Orange Free State.
Republic of South Africa.

The addition of plastination of biological material to the list of preservation techniques, has necessitated the development of revised fixation techniques, over and above those already known in our field.

A standardized formula for embalming is used at the UOFS for the embalming of those cadavers which are to be used by students for dissection. This formula has proven to be successful, as no fungal growth has appeared on our cadavers.

The recipe is as follows:

Recipe 1 96% Ethanol -12 L
Formalin Glycerin - 500 ml
Water - 750 ml
80% Liquid Phenol - -3.5L 500 ml

Modified Embalming Formula for Plastination and Serial Body Sections.

Recipe 2
96% Ethanol -28 L
Formalin -1.2 L
Glycerin -0.8L
Water -8L -
Phenol 1.2 L

This formula is injected into the radial artery under pressure of 1 -1.5 kilopascal, until the cadaver is filled (± 25L for a 60 kg cadaver). The blood flows into the veins and the arteries are therefore empty, allowing the subsequent red Latex-injection.

The injection of Latex should be done after a minimum of 5 weeks following embalming. By then the arteries have almost emptied of embalming fluid and as a result lower concentration of phenol, which causes congealment of Latex, is present. Before Latex can be injected, it should be preceded by an injection of 20ml of 25% ammonia solution, and then followed immediately by 750ml injection of Latex. The pH of these embalming formulae are acidic as Latex does not coagulate in an alkaline medium. A red colorant, Rubine Toner, at a ratio of 6-1 is used. With the advent of radiotomography and the requirement for material which had been plastinated, it became necessary to revise the formula. Cadavers were embalmed at a lower pressure of ± 1 pascal, using approximately 5 litres less embalming fluid and after injecting latex, it was allowed to congeal before proceeding with slicing or dissection.

This formula contains less glycerin, but has the benefit of making the tissue firmer. It is our opinion that the presence of glycerin and ethanol in the formula provides excellent retention of color, as well as providing the additional benefit of allowing the tissue to be frozen much harder for a more precise slicing process.

To prepare for slicing the cadaver is placed in a freezer and after +/- 3 days, dry ice is added for +/- 12 hours. Following this the slices can be cut. Pine oil, which was previously used in our formula, was excluded, as it left a residue in the acetone bath. It also had an adverse effect on the distillation process of acetone.

Wet specimens, cadavers and previously dissected sections can easily deteriorate into dried specimens if they are manhandled by students or inexperienced staff. Continuous and correct management of specimens with proper use of moistening solutions is essential.

As a result it is important to evaluate the specific properties of chemicals used in embalming or moistening solutions. When assessing embalming formulae it must be noted that they are comprised of a number of chemicals, each with its own function.

When a previously embalmed cadaver was being dissected and the tissue was exposed to air, a significant change in volume was noted in the tissue. It maybe surmised that the continued use of certain chemicals (humectants and bactericides) are essential, whereas the purpose of some of the fixatives (eg. alcohol, pine oil, and formalin) have been served during the embalming process, and these need not be supplemented or monitored for when working with exposed tissues. However, it is absolutely essential for wet specimens to be kept moist. Routinely, we cover these with cloth dipped in suitable wet fluid, after which they are covered with polyethylene bags and stored in a cooled room. When wet specimens are in use and are required to be uncovered for longer periods, they are moistened with fluid using an ordinary domestic spray can. Subsequent to such exposure, these specimens are dipped in suitable specimen wetting fluid.

The formula of the wetting solution which is used, is as follows:

glycerin - 250 ml
80% liquid phenol - 250 ml
make up with water to 1 litre.

This formula is standardized and not the only one used by people working in this field.

REFERENCES

Blaney, S.PA. et al. Techniques for reconstituting fixed cadaveric tissue. The Anatomical Record, 1989;224-550-1.

Dow Chemicals Co of USA. Datasheet on Dowicide A Antimicrobial.

Frolich, K.W. et al. Phenoxyethonol as a non toxic substitute for formaldehyde in long term preservation of human anatomical specimens for dissection and demonstration purposes. The Anatomical Record, 11984;208:271-8.

Richlins, C A et al. Improved fluids for anatomical embalming and storage. The Anatomical Record, 1963; 146:241-3.

Breaking News:

During the Italian Society of Anatomy meeting, October 4,1994, the Faculty and Staff at the three plastination laboratories in Italy were recognized as a specialty section. The purpose of the group is to spread plastination technology in Italy. Plastination laboratories are currently operating at the Universities of Florence, Padua and Rome. This plastination group met November 8, in Florence and elected Professor Enzo Brizzi as coordinator and Professor Ripani as secretary of the group.