

ABSTRACT

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There are more aspects that have an important role in selection of material for production of single-use ultrasound brain phantom: kind of material, acoustic property, price of materials and their accessibility, simplicity in preparation and its storage requirements, time stability and further. Gelatine as a hydrogel is a proper material for imitation of biological tissues since human body is mostly formed by water what is a prerequisite for acoustic and mechanical quality. Besides that, this natural biopolymer can be available for low costs.

The goal was to find suitable combinations in proportion to gelatine, crosslinker, plasticiser, and preservatives in order to create material for ultrasound brain phantom with optimal time of solidification and similar acoustic property of brain in terminal stage. The emphasis was also put on temperature and microbiological stability requirements. For this purpose, there were arranged set of samples of 5%, 7,5% and 10% of gelatine with different proportion of glutaraldehyde (GTA) and glycerol on which time of solidification was measured. After determination of the optimal percentual composition of gelatine and GTA, the time of impact on amount of water loss on glycerol was observed for six working days at temperature of 37 °C. Next the experiments on temperature stability were conducted where the first part was focused on the effect of amount of glycerol and GTA on gelatine structure at higher temperatures. In the second part of the experiment there was mainly monitored impact of glycerol on gelatine gels character at temperature of 37 °C for 24 hours. Rheological evaluation confirmed observations from last experiments.

For a suitable solidification time and fulfilment of temperature requirements, microbiological stability and rheological qualities is optimal percentual composition of gel in ratio of: 7,5% gelatine, 0,1% of GTA, 60% of glycerol and 32,4% of canning water. Combination of glycerol and GTA for mutual benefit in its synergic effect on rigidity and

thermal stability is essential. Evaluation on acoustic properties on gelatine gel is going to be a subject in next research.

Keywords: gelatin, crosslinking, phantom