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THE ROLE OF DOSE MAPPING IN ENSURING THE SAFETY OF TISSUE GRAFT BY VARIETY LOCATION OF DOSIMETERS

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SUMMARY

Dose mapping is to be performed in order to identify minimum and maximum dose distribution within the product load using a predetermined loading pattern. Gamma irradiation as a terminal sterilization for heat-sensitive tissue products has been used in Malaysia since 1990. Tissues including bone, skin, amniotic membrane and bovine pericardium are normally irradiated at 25 kGy. Other tissues such as tendon and ligament allografts are irradiated at 15 kGy. Our aim was to determine and ensuring the safety of tissue graft by the variety location of dosimeters in dose mapping activities. We conducted dose mapping for three carton boxes of product containing dummy products of air dried amnion, freeze dried bones and freeze dried bovine pericardium, glycerol preserved amnion and frozen tendon and ligament. Ceric-cerrous dosimeters were placed at the middle plane and the side plane according to the geometry of the containers. Dummy materials with equivalent density of the real products were used. The container was exposed to cobalt-60 gamma irradiation at predetermined doses in the tote irradiation box with specified loading patterns. The ratio between the D_{max} or D_{min} and the dose at the monitoring position were determined in accordance to ISO 11137. From the study, we concluded that the D_{min} was identified at the middle plane while the D_{max} at the side plane. The dose references (D_{rm}) were appointed at the dosimeter number 27 for each tote. The dose uniformity (DUR) were calculated and the average as 1.46 and 1.22 for the carton box respectively. In this study, the DUR were found to be affected by the density of the box. The results from this validated dose mapping will be used to optimize the positioning of the dosimeters in the routine sterilization.