

## The role of bioburden in the determination dose of $\gamma$ irradiation

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Bone graft treatment is one of the treatments in dentistry that aims to prepare the condition of the alveolar bone before implant placement. Statistical data showed that more than two million procedures were carried out the bone grafts procedure. The bioburden method is used to determine the correct dose of  $\gamma$ -ray irradiation because the weakness of  $\gamma$ -ray irradiation can cause changes in mechanical properties, thereby reducing bone graft efficacy. The purpose of writing a review article was to discuss the determination of the irradiation dose using  $\gamma$ -rays based on the ISO 11137 standard and the *sterility assurance level* (SAL). All articles showed that determining the amount of initial contamination (bioburden) is important in determining the dose of  $\gamma$ -ray irradiation based on the SAL value. The first SAL value used was SAL  $10^{-2}$  (verification dose) because from the verification dose obtained, it can be stated whether the irradiation dose using  $\gamma$ -rays is acceptable or not. SAL  $10^{-2}$  is out of a hundred irradiated samples using  $\gamma$ -rays, only a maximum of 2 samples that are not sterile. If the SAL  $10^{-2}$  value is accepted, the dose of  $\gamma$ -ray irradiation based on the SAL  $10^{-6}$  value is accepted, but if it is not accepted, bone grafting must be done again. SAL  $10^{-6}$  is the sterilization dose used when the product comes in contact with tissue or blood. The initial determination of the irradiation dose using  $\gamma$ -rays is finished by determining the amount of initial contamination (bioburden) so that the appropriate dose of  $\gamma$ -ray irradiation is obtained. The lower the bioburden level, the lower the dose of  $\gamma$ -ray irradiation used. The lower the dose of  $\gamma$ -ray irradiation, the lower the detrimental effects caused by  $\gamma$ -ray irradiation.

**Keywords:** Bone graft, sterility assurance level,  $\gamma$ -ray irradiation, patient satisfaction, bone graft efficacy.