

Purpose: Among different kinds of oral cavity cancers, the frequency of tongue cancer occurrence is more significant. Brachytherapy is the most common method to cure tongue cancers. The objective of this study is to assess the dose distribution around long sources which use in tongue brachytherapy, comparing different radioisotopes as brachytherapy sources, measuring the homogeneity of delivered dose to treatment volume and also comparing mandible dose and dose of tongue in the regions near the mandible with and without using shield.

Methods: The Monte Carlo code MCNP4C was used for simulation. Tongue, mandible, sources like Ir-192, Cs-137, Ra-226, Au-198, In-111, Ba-131, guide gutters and lead shield were simulated. The accuracy of simulation was verified by comparing the results with experimental data. The position of sources was determined by Paris system. Dose distribution around sources assessed by surfer software and compared with each other.

Results: The percentages of mandible dose reduction with use of 2 mm Pb shield for Ir-192, Cs-137, Ra-226, Au-198, In-111, Ba-131 were: 35.4%, 20.1%, 86.6%, 32.24%, 75.6%, and 36.8%. The tongue dose near the mandible with use of shield did not change significantly. The dose homogeneity from the most to least was obtained from these sources: Cs-137, Au-198, Ir-192, Ba-131, In-111 and Ra-226.

Conclusions: According to results of this study Ir-192 and Cs-137 were the best sources for tongue brachytherapy because of homogenous dose distribution in target volume and less time they required for delivering prescribed dose. Au-198 and Ba-131 had the same performance by Ir-192 but they required more time to deliver the prescribed dose. Ra-226 and In-111 had the most reduction of mandible dose but they required much more time to deliver prescribed dose and they had more dose inhomogeneity in target volume so that they were not suitable sources for tongue brachy therapy.