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Comparison of Co-60 and Ir-192 in brachytherapy treatment planning

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Many radionuclides have a history as a source for brachytherapy, but today only a few are commonly used. They are characterized by the rate at which their strength decays (half-life), by how much radioactivity can be obtained for a given mass of the radioactive source (specific activity) and by the energies and types of the radiation particles that are emitted from the source (energy spectrum) [1]. This paper compares the isotopes Co-60 and Ir-192 as radiation sources for high-dose-rate (HDR) afterloading brachytherapy. The smaller size of Ir-192 sources made it the preferred radionuclide for temporary brachytherapy treatments.

Recently also Co-60 sources have been made available with identical geometrical dimensions. This paper compares the characteristics of both nuclides in different fields of brachytherapy based on scientific literature. In an additional part of this paper reports from medical physicists of several radiation therapy institutes are discussed. The purpose of this work is to investigate the advantages or disadvantages of both isotopes for HDR brachytherapy in the treatment plan system. The motivation is to provide useful information to support patient treatment procedures by using a more cost-effective resource while maintaining the quality of their treatment. The results of this work show that no advantages or disadvantages exist for Co-60 sources compared to Ir-192 sources with regard to clinical aspects. The advantage lies in the potential logistical issues of Co-60 resources due to the longer half-life (5.3 years versus 74 days), making it an interesting alternative, especially in developing countries or countries with limited economic resources.

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