PRODUCTION OF ^{142}PR REAS GLASS SEEDS FOR TREATMENT OF SOFT TISSUE CANCER (PROSTATE CANCER) BY SOL GEL METHOD

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The conventional treatment method for prostate cancer is to implant many tens of ^{125}I or ^{103}Pd seeds into the prostate. A beta-emitting glass seed was proposed for the brachytherapy treatment of prostate cancer. Criteria for seed design were derived and several beta-emitting nuclides were examined for suitability. ^{142}Pr was selected as the isotope of choice. Seeds 0.08 cm in diameter and 0.9 cm long were manufactured for testing.

^{142}Pr REAS glass seeds have several advantages over conventional seeds. The Pr seed is economical; it costs less than 15 dollars per seed including materials and neutron activation costs. Due to the short range of beta particles, the dose to adjacent organs can be minimized with optimized implantation positions of the seeds. Because of the short half-life of ^{142}Pr, and associated high dose rate, distortion of the prostate during irradiation is less than with ^{125}I, for example, that has a D90 of 204 days. Pr seeds can have very high dose rates, if desired, and give doses up to thousands of Gy to tumors near seeds. Because of high density and high atomic number of Pr glass, a radio-opaque marker is not necessary. Cladding or encapsulation is not required because the seed is unreactive in water or tissue. Variable sizes and shapes of glass seeds can be made and the seed is not easily broken. The seed is reusable after a high dose rate (HDR) treatment by reactivation.

The sol gel method is used to production of ^{142}Pr REAS glass seeds.