

Radio-Guided Surgery with β - Radiation: Test on Ex-Vivo Specimens

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Abstract : A Radio-Guided Surgery technique exploiting β - emitting radio-tracers has been suggested to overcome the impact of the large penetration of γ radiation. The detection of electrons in low radiation background provides a clearer delineation of the margins of lesioned tissues. As a start, the clinical cases were selected between the tumors known to express receptors to a β - emitting radio-tracer: ^{90}Y -labelled DOTATOC. The results of tests on ex-vivo specimens of meningioma brain tumor and abdominal neuroendocrine tumors are presented. Voluntary patients were enrolled according to the standard uptake value ($\text{SUV} > 2 \text{ g/ml}$) and the expected tumor-to-non-tumor ratios ($\text{TNR} \sim 10$) estimated from PET images after administration of ^{68}Ga -DOTATOC. All these tests validated this technique yielding a significant signal on the bulk tumor and a negligible background from the nearby healthy tissue. Even injecting as low as 1.4 MBq/kg of radiotracer, tumor remnants of 0.1 ml would be detectable. The negligible medical staff exposure was confirmed and among the biological wastes only urine had a significant activity.

Keywords : ex-vivo test, meningioma, neuroendocrine tumor, radio-guided surgery

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