

3d bioprinting to develop neoplastic biological constructs for experimental boron neutron capture therapy (bnct) applications

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This study aims to use bioprinting to produce *in vitro* 3D osteosarcoma constructs as alternative models for Boron Neutron Capture Therapy (BNCT) related studies. BNCT is an experimental binary radiotherapy based on the irradiation with low energy neutrons of neoplastic cells previously enriched with ¹⁰-boron atoms. This alternative technique selectively destroys neoplastic cells able to uptake higher ¹⁰-boron levels with respect to the normal ones that are therefore spared. BNCT studies are performed on 2D *in vitro* models that are not able to reproduce pathological tumor tissue organization or on *in vivo* animal models that are expensive, time-consuming, and must follow the 3R's principles. Therefore the first part of the project aimed to develop a protocol to obtain a 3D bioprinted colonized osteosarcoma construct; the other one was to refine the method to quantify the intracellular boron uptake by the cells encapsulated in the bioprinted constructs. The method applied for BNCT studies on 2D and *in vivo* models is the neutron autoradiography therefore we need to assess whether it can be applied also in these alternative 3D model.