

at the INFN-Torino Computer Centre.

The proposed approach implements data security by means of CT anonymisation and secure transfer protocol (<https>), and avoids all the issues related to the software deployment on a distributed environment. CT scans can be uploaded asynchronously by ICT staff in health facilities, while the M5L results are directly sent to the radiologist e-mail accounts in DICOM-compatible format (fig. 1).

Clinical validation on oncological patients undergoing staging or restaging has recently started at IRCCS Candiolo, Italy

The service is available to other institutions willing to join the M5L clinical validation protocol.

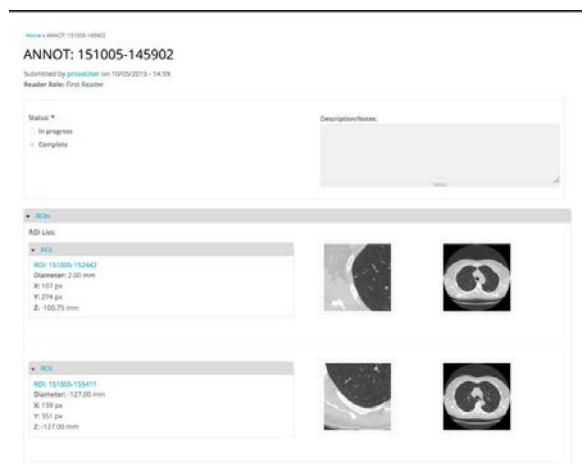


Figure 1: An example of the M5L CAD results as visualised by the radiologists on the M5L web interface.

Keywords: lung cancer, Computer-Assisted Detection, clinical validation

References:

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Measurements of Reactive Oxygen Species production induced by Gold Nanoparticles in Radiotherapy protocols.

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Metallic nanoparticles have shown radiosensitizing properties both in radio- and in hadron-therapy conditions. However, it is not demonstrated what the mechanisms that induce the extra damage are, although Reactive Oxygen Species (ROS) production, known to be crucial in radiotherapy, is a strong candidate.

Few direct measurements of ROS production are reported in the literature [1,2] and no studies were found in typical radiotherapy treatment conditions.

A protocol for measuring the OH^{*} radical production in Phosphate-buffered saline (PBS) solution, based on the fluorimetric properties of oxygen-quenched Terephthalic acid, was designed and validated. Correction factors associated to GNP-induced adsorption, absorption and diffusion at the fluorimetric excitation and emission wavelengths were carefully evaluated.

ROS production induced by photon beams at 6 and 15 MV was then measured in standard PBS solution as well as in the presence of Gold Nano Particles (GNPs) with a 5 nm and 20 nm diameters, at 5 μmol and 10 μmol concentrations.

A relevant ROS extra production was observed for GNP with 5 nm diameter, up to about 45% at 10 μmol and 25% at 5 μmol, as shown in fig. 1 as a function of the delivered dose.

Measurements with 20 nm diameter GNPs are consistent with a ROS production increase of the order of 10%. However, in that condition the experimental error would not allow the conclusion that ROS production was actually enhanced.

The ROS enhancement, expected to be linearly dependent on the GNP surface to volume ratio, is indeed consistent with the hypothesis, within the experimental errors.

Further measurements with 10 nm and 2 nm GNPs are planned, in order to verify the linear dependence on the inverse radius with higher precision.

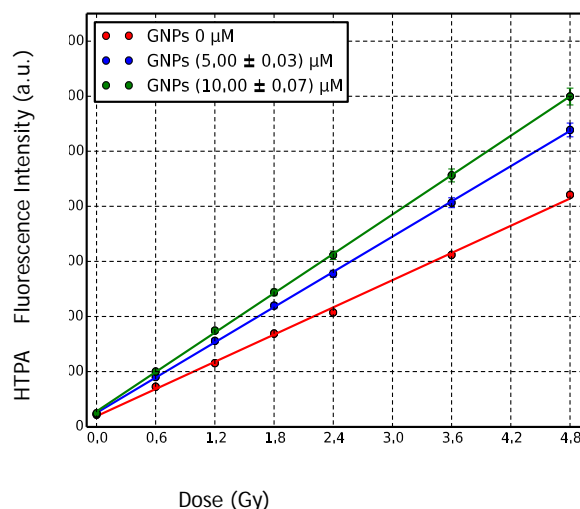


Fig. 1: Observed fluorescence intensity as a function of the delivered dose for the samples with 0 (red), 5 (blue) and 10 μmol (green) GNPs exposed to 15 MV photon beams.

Keywords: Radiotherapy, Gold Nanoparticles, Reactive Oxygen Species

References:

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