

QUANTIFICATION OF OXYGENATION BY DCE MRI AND RELATIONSHIP BETWEEN FUNCTIONAL IMAGES OF HEAD AN NECK CANCER



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Motivation of the work:

This work is part of research project: "Adaptive Radiation and prediction of tumor response based on functional studies of MRI and PET / CT in head and neck cancer," funded by a FIS (IP: PI11/02035) scholarship. The overall objective of the project is to establish an integrated information network from which they can develop predictive models of tumor response and effects to critical organs for patients with head and neck tumors based on functional data in vivo. Our research focuses in part to quantify tissue oxygenation

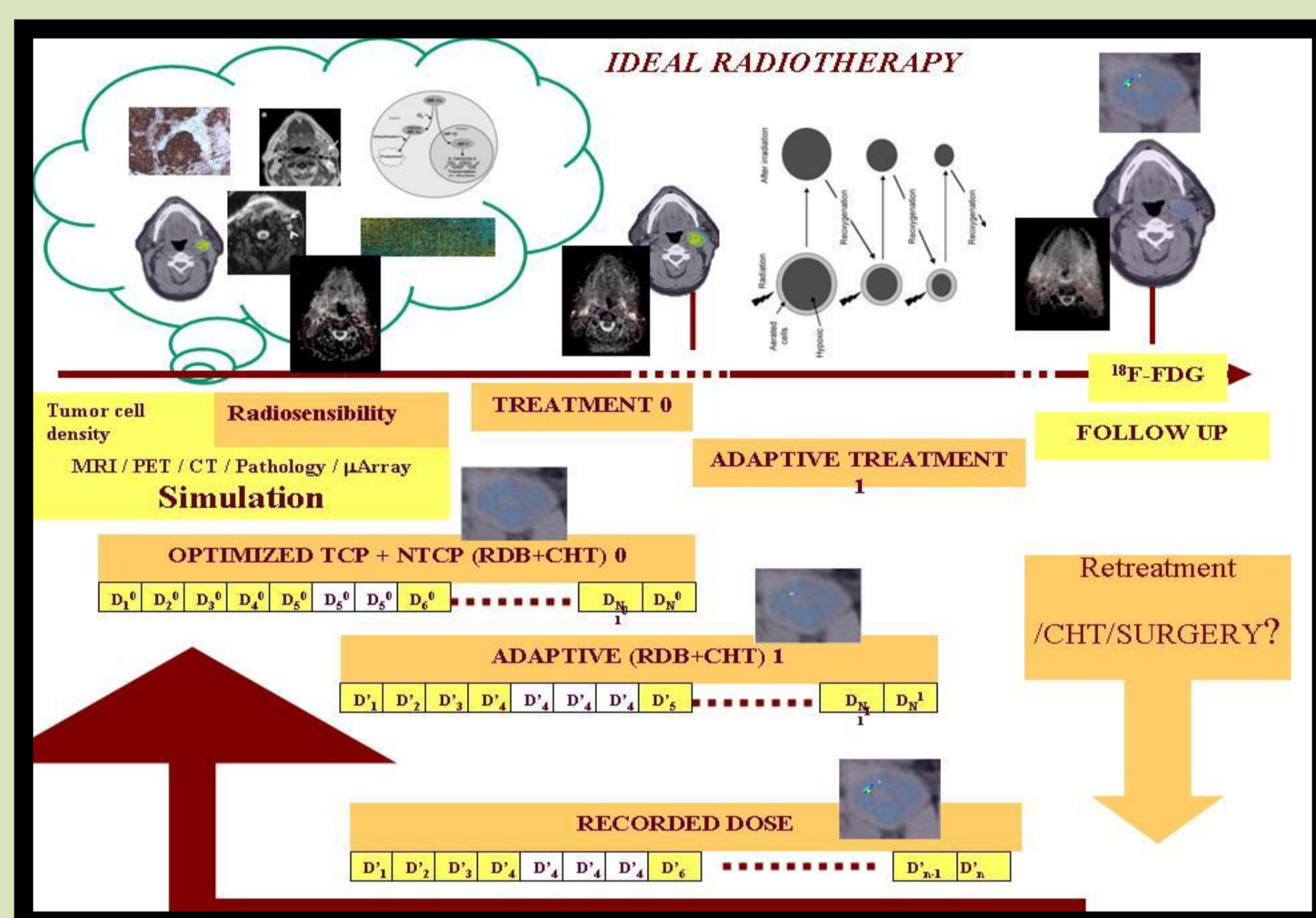


Fig. 1. Ideal Radiation: The radiation treatment should be tailored to the individual patient's response to treatment based on functional images.

Research Plan:

For this study we select patients with 'oropharynx T3 and T4'. All of them are treated with IMRT (66 Gy prescribed to the PTV). The imaging protocol is as follows:

- Pre-treatment: MRI study (DCEMRI – Dynamic Contrast Enhanced Magnetic Resonance Imaging, ADC –Apparent Diffusion Coefficient) and PET/CT study (18F-FDG).
- First control (10 - 30 Gy): MRI study (DCEMRI + ADC).
- Second control (30 Gy – 60 Gy): MRI study (DCEMRI + ADC).
- Three months after treatment: PET/CT and MRI study (DCEMRI + ADC).

For all these studies the patient is positioned using the RT immobilization devices. The geometrical distortion on MRI images and registration process (rigid registration and flexible registration) were checked by an MRI phantom.

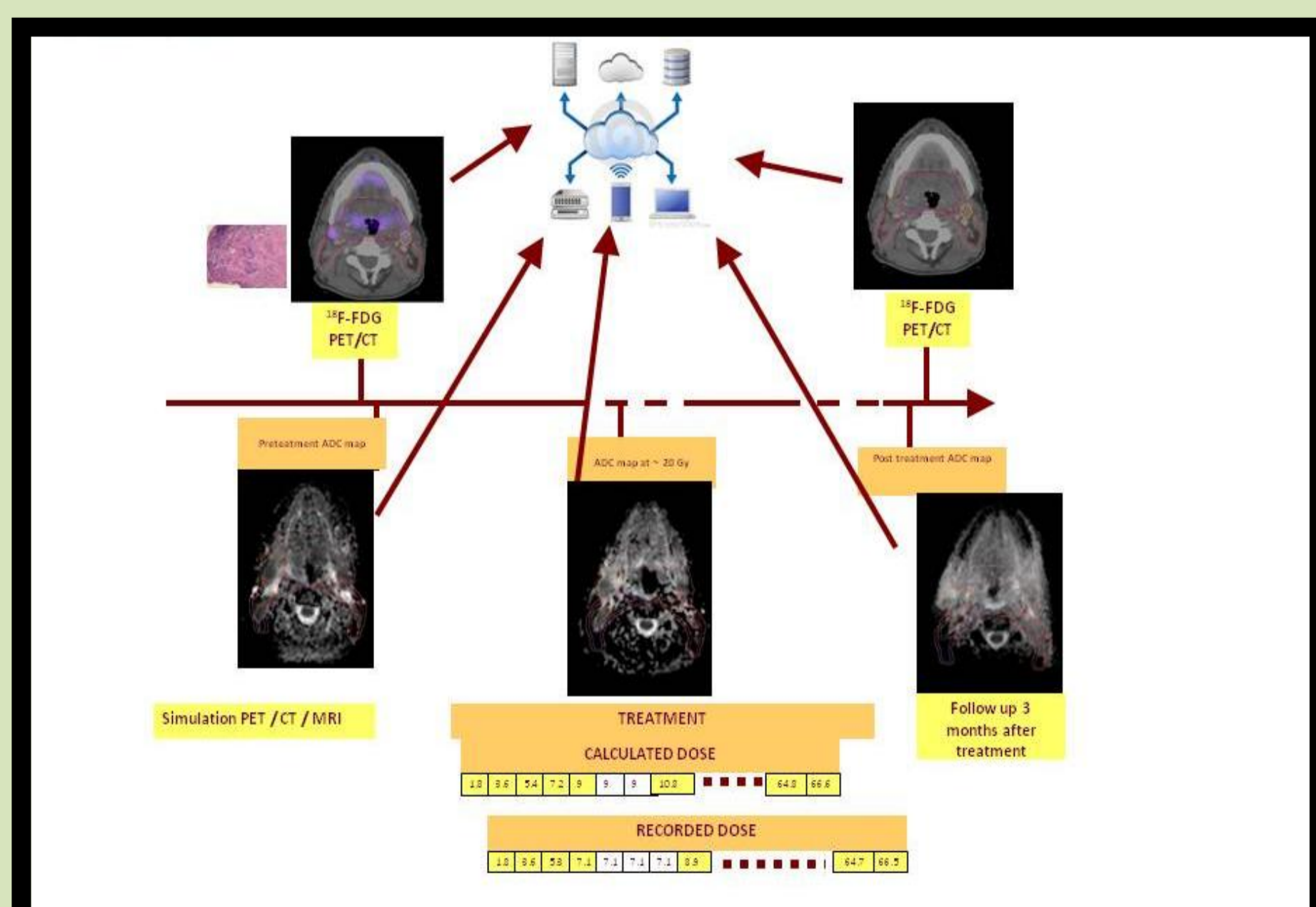


Fig. 2 Scheme first patient ARTFIBIO.

Results:

Dynamic Contrast Enhance MRI has been proposed for several authors for treatment monitoring and for measurement of oxygenation distribution. This method makes use of a contrast agent which is blocked by the regular brain-blood-barrier but is not blocked in the blood vessels generated by the tumor. In this method the images taken are MRI T1-weighted after an intravenous injection of the contrast agent. Adjusting this model we take the parameters

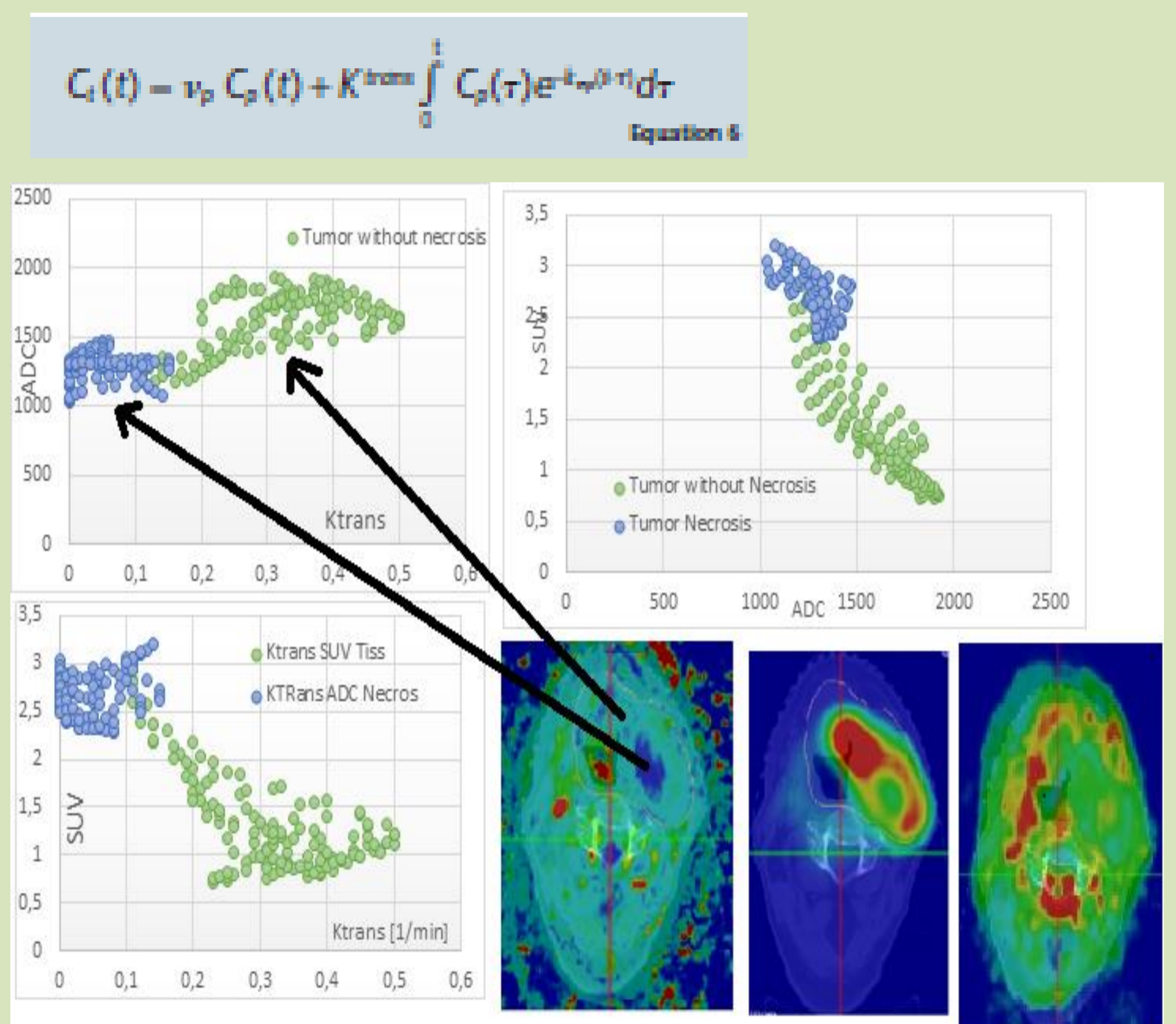


Fig.3 Relationship between Functional Images

Next Year Planning:

Next year we hope to present a paper on the relationship between images and we make a validation of deformable registration software. Also implemented in this software analysis tools of DCE MRI