

Project title: Retrospective motion compensation in diffusion-weighted imaging (DWI) MRI

Background:

With the clinical introduction of hybrid MRI-linac (MRL) systems, daily MR imaging allows for daily treatment plan adaptation based on anatomical changes observed on the MR images. In this research group, we would like to go one step further and adapt the treatment not only on anatomical changes but also on changes in biological tumor characteristics. Biological tumor characteristics can be measured with quantitative MRI techniques. Quantitative MRI techniques, such as diffusion-weighted MRI, have shown to reflect early response to treatment in several tumor sites. This creates the opportunity to adapt the treatment based on early response measurements.

Quantitative imaging is challenging in tumors that move during the acquisition, e.g. due to respiratory motion. Acquisition can be done in breath-hold for example, but this prolongs the scan time and thus the burden for the patient. Therefore, free breathing acquisitions are preferred. In this project, we focus on the improvement of diffusion-weighted MRI in moving organs, such as liver or lung. Diffusion is quantified by a fit through multiple images with different diffusion-weighting. For each diffusion-weighting multiple measurements are done which are averaged. However, due to the (respiratory) motion of the target organs, these diffusion-weighted images do not align properly, which results in artefacts (e.g. blurring) and less accurate estimation of the apparent diffusion coefficient. The aim of this project is to correct the free-breathing images with retrospective motion compensation. Pilot data for this project is available for more than 10 patients and data collection is ongoing.

What we offer:

Learn about (MRI-guided) radiotherapy and diffusion-weighted MR image processing in an international research group at the radiotherapy department of the Netherlands Cancer Institute.

What we are looking for:

- Experience or willing to learn python
- Affinity with image processing

For more information, feel free to contact:

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