

ESTRO MOBILITY GRANT (TTG) REPORT

Title of the report: Radiomic analysis of patients undergoing stereotactic radiotherapy

HOST INSTITUTE:

Netherlands Cancer Institute, Plesmanlaan 121, 1066 CX, Amsterdam, Netherlands

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I am an Australian trained radiation oncologist who recently completed a clinical fellowship at the Royal Marsden and planning to undertake a PhD on radiomics and SBRT in Peter MacCallum Cancer Centre. The aim of my visit to the NKI was to develop a better understanding of the various stages of the radiomics workflow, and gain insight into the advantages, disadvantages, applications, and limitations of radiomics in the field of stereotactic body radiotherapy. Radiomics is a relatively new field of study which involves quantitative analysis of imaging features. Radiomics workflow can be divided into imaging, segmentation, feature extraction and analysis. There are various strategies that can be applied to approach every stage, each of which have inherent advantages and limitations. I therefore hoped to improve my knowledge of the complexities of each of these stages, and the potential applications of radiomics to improve our understanding of cancer biology, and response to stereotactic body radiotherapy (SBRT).

In particular I aimed to observe the following radiomics workflow processes:

- 1) Imaging and segmentation - tumour segmentation methods of available imaging datasets (CT, MRI, and/or PET) including manual and automated segmentation using available departmental software.
- 2) Feature extraction – learn about the process of feature extraction of segmented regions using available software within the host department.
- 3) Analysis:
 - a. Observe and understand the methodologies used for feature selection.
 - b. Observe and understand the techniques and software used to develop gene signatures and develop models to predict for response to SBRT including machine learning techniques.

During my time at the NKI, I was able to meet with radiation oncologists, medical oncologists, radiologists and nuclear medicine specialists, as well as physicists and radiation therapists, involved in research on lung cancer, stereotactic radiotherapy, image analysis and radiomics. I was also able to attend the weekly research meeting, the multidisciplinary meeting, daily radiation indication meetings, outpatient clinic and planning sessions, to learn about current oncology practices in the Netherlands, as well as learn about the current research taking place.

I very much appreciated the opportunity provided by the ESTRO grant to visit NKI, as I believe this experience provided a unique opportunity to gain knowledge and insights into my PhD topic, as well as form networks that will pave the way for research collaborations in the future.