

Dual Energy CT and texture analysis/radiomics compared to 18-FDG PET/CT for evaluation of tumor, metastases and lymph nodes in lung cancer.

The purpose of this research project is to investigate if new advanced scanning techniques and image post processing can supplement or change the workup for lung cancer. Currently, it is often necessary with several different types of imaging modalities before a patient is ready for treatment.

Lung cancer remains the number one reason for cancer related deaths in Denmark. This despite an increased focus and improved survival. Improved imaging can help shorten the time to diagnosis, better guide where to biopsy and hopefully provide a more accurate staging.

Dual energy CT has theoretically been known since 1973, but has first within the recent years found its use in clinical radiology. The technique provides better visualization of contrast agents used in regular CT and gives radiologists the possibility to quantify how much iodine is within a tumor or metastases. Larger studies have shown that the technique increases the conspicuity of tumor changes in various organ systems. Dual Energy CT can also improve lesion characterization. Based on that more patients can get a definitive answer after one examination and supplemental examinations are often not necessary. This can help with removing fear from the patients experienced if unexplained lesions are found in a CT scan requiring additional imaging or biopsy.

Radiomics/texture analysis is a technology in rapid development and makes it possible to detect subtle differences in an image invisible to the human eye and extract the information quantitatively. The technique has over recent years seen a development where artificial intelligence is used to assess the various parameters and select the optimal models to predict either the prognosis for a diagnosed cancer, probability of metastases or if a lung lesion is malignant or benign.

In this study initially a retrospective study of 300 patients is performed. All data is available and approval from the ethical board have been granted. After that we will include all patients from several centers over a two-year period referred under suspicion for lung cancer. Those receiving both 18-FDG PET/CT and Dual Energy CT will be compared for the modalities ability to assess the primary tumors involvement, spread to mediastinal lymph nodes and extent of metastatic disease. This in combination with analysis results from radiomics.

If the new scan techniques can supplement and change the way we perform diagnostics of lung cancer patients today, the time to diagnoses can most likely be shortened and the patient can avoid the concern that is associated with supplemental examinations prior to initiating treatment.