studies
References
Preoperative breast radiation therapy: Indications and perspectives. Eur J Cancer. 2017 Sep;82:184-192. Preoperative radiation therapy: The 'new' targeted breast cancer treatment? Eur J Cancer. 2017 Jun;78:116-117.

Teaching Lecture: Standard of care in the treatment of bladder cancer

SP-0004 Standard of care in the treatment of bladder cancer

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Abstract text
Bladder preservation with tri-modality treatment has re-emerged in recent years as an excellent alternative to radical cystectomy for organ-confined muscle-invasive urothelial cancer. This talk will outline the evidence and current practice using radiotherapy and radiosensitisation to deliver optimal treatment. The role of biomarker stratification for bladder preservation will also be addressed.

Teaching Lecture: Brachytherapy improvement calls for improved imaging

SP-0005 Brachytherapy improvement calls for improved imaging

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Abstract not received

Teaching Lecture: Incorporating radiomic parameters into predictive models: methods for variable selection

SP-0006 Incorporating radiomic parameters into predictive models: methods for variable selection

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Abstract text
Quantitative analysis of tumor characteristics based on medical imaging is an emerging field of research. In recent years, quantitative imaging features derived from CT, PET and MR scans were shown to be of added value in the prediction of outcome parameters in oncology, in what is called the radiomics field.
A review of the current challenges, technical routines and protocols that are involved in quantitative imaging studies was conducted [1]. The first issue that should be overcome is the dependency of several features on the scan acquisition and image reconstruction parameters. Different settings can have an influence on the quality and reliability of the extracted radiomics features. Adopting consistent methods in the subsequent target segmentation step is evenly crucial. To further establish robust quantitative image analyses, standardization or at least calibration of imaging features based on different feature extraction settings is required, especially for texture and filter-based features. Several open-source and commercial software packages performing feature extraction are currently available, all with slightly different functionalities which makes benchmarking quite challenging.
The main emphasis of this lecture will be on the next step of selection of features to be incorporated in predictive models. As the number of imaging features calculated is typically larger than the sample size of patients studied, it is crucial to have proper feature selection and prediction model building routines to prevent overfitting.
Firstly, implications of different feature selection methods will be discussed. Dimensionality reduction is crucial to reduce the risk of overfitting by focusing the attention of subsequent classification efforts on a subset of relevant features. As most of the features, being based on the same matrix or quantities, will exhibit some correlation with each other, intelligent feature selection strategies are required. Filter-based selection techniques of the univariate and multivariate type and wrapper techniques will be discussed. Principal component analysis performs a transformation for dimensionality reduction and can highlight outliers. The dynamic range of feature values can also be an important selection criterion. Patient and clinical characteristics might be added to the input variable list as they potentially influence not only the outcome variable, but also the extracted radiomics features themselves.
Ultimately, the goal of most radiomics analyses is to obtain a prognostic or predictive model with a high accuracy and efficiency. Unsupervised machine learning (ML) analyses using heat maps or clustering, summarize feature data without involving an outcome variable. Supervised ML classifiers as generalized linear models, random forests, support vector machines and neural networks separate the data with respect to an outcome variable. Combination of classifier and variable selection techniques will be discussed in terms of final model performance variation. Finally, the understandability of classification models varies significantly and should be considered, together with qualitative reporting.
[1] Larue R, Defraene G, De Ruysscher D, Lambin P, van Elmpt W. Quantitative radiomics studies for tissue characterization; A review of technology and methodological procedures. Br J Radiol 2017; 90:1070.

Teaching Lecture: Dual energy CT in radiotherapy: principles and potential

SP-0007 Dual energy CT in radiotherapy: principles and potential

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Abstract text
Scanning patients with two different X-ray spectra was already considered in the early years of computed tomography as a method to extract tissue information beyond photon attenuation. The advent of clinical dual energy CT units approximately ten years ago also sparked interest again in their use in radiation therapy.
This lecture will first introduce the physical implications of using two (or more) X-ray spectra and the technical implementations available today. Subsequently, this will be helpful in understanding the benefits currently expected in the areas of pre-treatment imaging, dose calculation, or radiomics presented in the second part.