
Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

81 Gy) but some texture features seem to better predict the tumor response (HGZE: AUC 0.72, HGRE: AUC 0.68, skewness and kurtosis 0.67) in these preliminary results.
**Conclusions:** Lesion dosimetry and texture-analysis in metastatic thyroid $^{131}$I treatment are effective tools for patient management. The standardization of the dose calculation was achieved and verified with the software. This allowed to share the dosimetric protocol to other nuclear medicine unit to the aim of dose comparisons. Preliminary dose-response correlation investigated both for dose and texture features needs further investigations with a larger dataset.
**Keywords:** thyroid tumour, radioiodine, dosimetry, lesions

## OL95
## CT-based radiomics as a tool to recognize COVID-19 positive patients

G. Benetti[1], N. Cardobi[1], G. Cardano[1], C. Arena[1], C. Micheletto[1], S. Guariglia[1], S. Montemezzi[1], C. Cavedon[1]

[1]*Azienda Ospedaliera Universitaria Integrata – Verona, P.le Stefani 1, 37126 Verona, Italy*

**Purpose:** To classify COVID-19, COVID-19-like and non-COVID-19 interstitial pneumonia using lung CT radiomic features.
**Materials and Method:** CT data of 115 patients with respiratory symptoms suspected for COVID-19 disease were retrospectively analyzed. Based on the results of nasopharyngeal swab, patients were divided in two main groups, COVID-19 positive (C+) and COVID-19 negative (C-), respectively. C- patients, however presented with interstitial lung involvement. A subgroup of C-, COVID-19-like (CL) patients were considered as highly suggestive of COVID pneumonia at CT. Lungs were automatically contoured though a convolutional neural network U-net(R231). Radiomic features were extracted from the whole lungs. A dual machine learning (ML) model approach was used. The first one excluded CL patients from the training set, eventually included on the test set. The second model included the CL patients also in the training set. For both the models, a statistically robust 2000x repeated test-train splitting and an internal 100x repeated 10-fold cross validation were performed during the training process.
**Results:** The first model classified C+ and C- pneumonias with AUC of 0.83. CL median response (0.80) was more similar to C+ (0.92) compared to C- (0.17). Radiomic footprints of CL were similar to the C+ ones (possibly false negative swab test). The second model, however, merging C+ with CL patients in the training set, showed a slight decrease in classification performance (AUC=0.81).
**Conclusions:** Whole lung ML models can classify C+ and C- interstitial pneumonia. CL pneumonia was similar to C+ pneumonia, albeit with slightly different radiomic footprints. The high statistical robustness of the machine learning methods is of crucial relevance in radiomic-based models, minimizing the chance of false-discovery.
**Keywords:** COVID-19, radiomic classification model, machine learning and artificial intelligence, CT, LASSO.

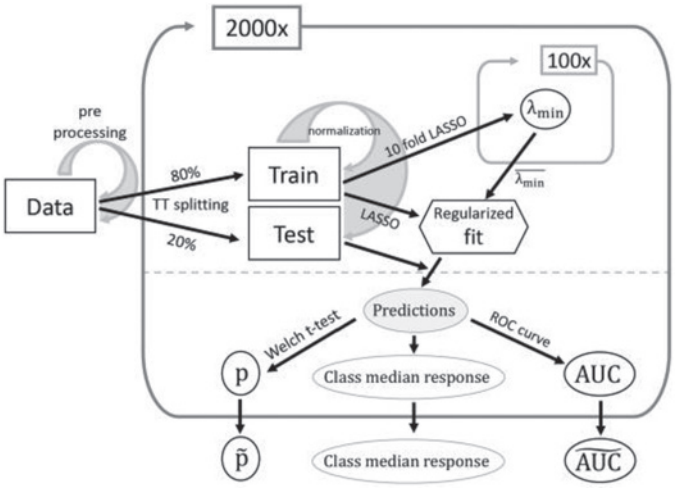


**Fig. 1** (abstract OL95).

## OL96
## First dosimetric assessment of proton minibeam arc radiation therapy

R. Ortiz[1], L. De Marzi[2,3], Y. Prezado[1]

[1]*Institut Curie, Centre de Recherche d'Orsay, France*
[2]*Institut Curie, Centre de Protonthérapie d'Orsay, France*
[3]*Institut Curie, University Paris Saclay, PSL Research University, Inserm LITO, Orsay, France*

**Purpose:** Proton Minibeam Radiation Therapy (pMBRT) (Prezado et al, 2013) and Arc therapy (Ding et al, 2016) are two radiotherapeutic approaches that, individually, have shown an enhancement of the normal tissue sparing potential. In this work, dose distributions resulting from the combination of these two techniques are assessed and compared with a single-field pMBRT treatment plan, which has been proven beneficial in previous animal in vivo studies (Prezado et al, 2018).
**Materials and Method:** A CT of an adult male human diagnosed with a human glioblastoma at the centre of the brain was selected for this study. The multi-field pMBRT (i.e., combination of pMBRT and Arc therapy) treatment plan involved 13 equally-spaced fields forming a 120-degree arc around the occipital region of the patient head in the longitudinal axis. The single-field pMBRT plan consists of one beam in the coronal direction. The collimator utilized in both cases comprises 400 μm width slits separated by 2.8 mm centre-to-centre distance. The energies and weights of the spots conforming both PBS plans were calculated by the ECLIPSE treatment planning system and dose distributions were computed using the TOPAS toolkit.
**Results:** The combination of pMBRT and Arc therapy leads to a 30-90 % reduction of both peak and valley doses to healthy tissues in comparison with the single-field pMBRT approach. Furthermore, the addition of different treatment fields does not modify the peak-to-valley dose ratios nor create hot spots in normal tissues.
**Conclusions:** The combination of Arc therapy and spatially fractionated radiation therapy does not reduce the dosimetrical benefits of pMBRT but increases its potential of tissue sparing by reducing the dose delivered to non-tumour volumes.
**Keywords:** spatially-fractionated radiotherapy, proton therapy, arc therapy, treatment planning.

## OL97
## Real-time positron emission imaging for range verification in helium beam radiotherapy

P. Dendooven[1], I.S. Ozoemelam[1], E.R. van der Graaf[1], M.-J. van Goethem[1], M. Kapusta[2], N. Zhang[2], S. Brandenburg[1]

[1]*University Medical Center Groningen, University of Groningen, The Netherlands*
[2]*Siemens Medical Solutions USA, USA*

**Purpose:** A renewed interest in helium ion beam radiotherapy is driven by advantages over protons and carbon ions: smaller lateral