136P Evaluation of a radiomic signature of CD8 cells in patients treated with immunotherapy-radiotherapy in three clinical trials

R. Sun[1], A. Lancia[2], N.L. Sundahl[3], M. Milic[4], A. Carre[1], M. Lerousseau[1], T. Estienne[1], E. Battistella[1], G. Klausner[1], R. Bahleda[5], E. Alvarez-Andres[1], C. Robert[1], C. Boutros[6], M. Vakalopoulou[1], N. Paragios[1], P. Ost[7], C. Massard[5], E. Deutsch[1]

[1]Radiation Oncology, Gustave Roussy-Centrale Supélec-TheraPanacea Center of Artificial Intelligence in Radiation Therapy and Oncology, Villejuif, France, [2]Radiation Oncology, Policlinico Tor Vergata, Rome, Italy, [3]Radiation Oncology, Gent University Hospital, Gent, Belgium, [4]Radiotherapie Moléculaire, INSERM U1030, Villejuif, France, [5]DITEP, Gustave Roussy - Cancer Campus, Villejuif, France, [6]Department of Medicine, Institut Gustave Roussy, Villejuif, France, [7]Radiation Oncology, UZ Gent, Ghent, Belgium

Background: Several studies have suggested that combining radiotherapy (RT) to immunotherapy (IO) may be synergistic but many questions are still pending regarding the radiation modalities to optimize this combination, such as the choice of the lesion to irradiate. Radiomics consists in the analysis of quantitative data extracted from standard medical imaging to generate imaging biomarkers. A previous study published in The Lancet Oncology has shown that a radiomic signature could predict the CD8 cells infiltration, which is associated with the activity of anti-PD-1/PD-L1. We aimed to assess whether this biomarker could help to guide IO-RT combinations.

Methods: Patients from three clinical studies of IO-RT combinations with advanced solid tumors in two institutions were screened. Patients with available baseline (E0) and first evaluation (E1) CTs were included. Immunotherapy consisted in 4 different drugs. Hypofractionated conformal RT or stereotactic RT of one tumor lesion was delivered after the start of IO for most of the patients. The irradiated lesion and a sample of non-irradiated lesions were delineated from E0 and E1 CTs. Radiomics features were extracted and the published radiomic signature was applied to estimate the CD8 cells.

Results: 84 patients were included. 244 tumor lesions were delineated on the E0 CT, including the 84 lesions which were selected for irradiation. Median time between IO and RT start was 21 days (IQR: 9-24), and 2.4 mo between E0 and E1 (IQR: 1.3 - 3). 80 irradiated lesions and 152 non irradiated lesions remained at E1. At baseline, the volume and the radiomic score of TIL (RS) were not different between the two groups (irradiation or no) ($p = 0.94$ and 0.50). While the mean volume of the analyzed lesions was not different from E1 to E0 ($p = 0.15$), irradiated lesions were significantly smaller at E1 ($p = 0.03$). A high RS in the irradiated lesion at E1 (compared to the median value) was associated with PFS (HR = 0.57, IC95%: 0.345-0.95, $p = 0.031$) irrespective of the volume in multivariate analysis but was not significantly associated with OS.

Conclusions: Radiomic score of the irradiated lesion was associated with PFS. Such biomarker may help to guide the selection of the lesion to irradiate in IO-RT combinations.

Legal entity responsible for the study: Gustave Roussy Cancer Campus.

Funding: Fondation pour la Recherche Médicale, SIRIC-SOCRATE 2.0, Fondation ARC, Amazon.

Disclosure: R. Sun: Travel / Accommodation / Expenses: AstraZeneca. N.L. Sundahl: Travel / Accommodation / Expenses: Merck Sharpe & Dohme; Travel / Accommodation / Expenses: Astellas; Travel / Accommodation / Expenses: Bayer; Travel / Accommodation / Expenses: Bristol-Myers Squibb. P. Ost: Research grant / Funding (institution): Merck Sharpe & Dohme; Research grant / Funding (institution): Astellas; Research grant / Funding (institution): Janssen; Travel / Accommodation / Expenses: Ipsen; Honoraria (self), Travel / Accommodation / Expenses: Ferring Pharmaceuticals; Honoraria (self): Bayer. C. Massard: Advisory / Consultancy: Amgen; Advisory / Consultancy: AstraZeneca; Advisory / Consultancy: Bayer; Advisory / Consultancy: Celgene; Advisory / Consultancy: Genentech; Advisory / Consultancy: Ipsen; Advisory / Consultancy: Jansen; Advisory / Consultancy: Lilly; Advisory / Consultancy: Novartis; Advisory / Consultancy: Pfizer; Advisory / Consultancy: Roche; Advisory / Consultancy: Sanofi; Advisory / Consultancy: Orion. E. Deutsch: Advisory / Consultancy, Research grant / Funding (institution): Roche Genentech; Advisory / Consultancy, Research grant / Funding (institution): Merck Serono; Research grant / Funding (institution): AstraZeneca; Research grant / Funding (institution): BMS; Research grant / Funding (institution): MSD. All other authors have declared no conflicts of interest.