group, 1 yr-LRF was 17% for pts who did not receive PORT (n=210); two (of 4) pts who received PORT had LRF (P=0.56); Figures 1B and 1C.

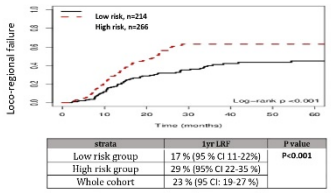
Table (1): Univariable Analysis and Multivariable Analysis models for predictors of Loco-regional failure.

| | Univariable analysis | | | Multivariable analysis | | | Risk score model |
|---|---|---|---|---|---|---|---|
| | HR (95% CI) | | p-value | HR ( 95% CI) | | p-value | Risk score model Coefficient** |
| **Tumor subsite (neck/head/Uncinate)** | 1.59 | (1.01, 2.25) | **0.047** | | | | |
| **Lymphovascular invasion (Yes)** | 1.52 | (1.08, 2.15) | **0.017** | | | | |
| **Perineural invasion (Yes)** | 1.44 | (0.73, 2.82) | 0.29 | | | | |
| **pT3-4** | 1.74 | (1.14,2.65) | **0.01** | 1.31 | (1,1.7) | **0.046** | 0.3 |
| **pN+** | 2.17 | (1.5, 3.15) | **<0.001** | 1.71 | (1.36, 2.14) | **<0.001** | 0.5 |
| **Grade 2-3** | 1.79 | (1.15,2.78) | **0.01** | 1.45 | (1.14,1.86) | **<0.01** | 0.4 |
| **Positive or close (≤1mm) surgical margins** | 1.64 | (1.2,2.26) | **<0.01** | 1.39 | (1.14,1.7) | **<0.01** | 0.3 |

**The risk score model coefficients are listed in the final column of the table.
Patients with a cumulative score greater than 1.2 are considered high risk for LRF.

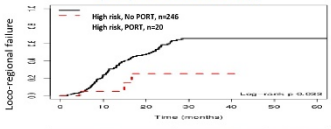
HR: Hazard ratio
CI: confidence interval

Figure 1A- Loco regional failure in high risk group vs. low risk group



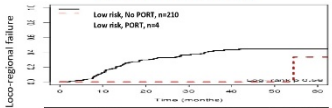

| strata | 1yr LRF | P value |
|---|---|---|
| Low risk group | 17 % (95 % CI 11-22%) | P<0.001 |
| High risk group | 29 % (95% CI 22-35 %) | |
| Whole cohort | 23 % (95 CI: 19-27 %) | |

Figure 1B- locoregional failure in the high risk group patients who received versus who did not receive postoperative radiation therapy




| strata | 1yr LRF | P value |
|---|---|---|
| High risk group who received No PORT | 31 % (95 % CI 23-37%) | P=0.03 |
| High risk group who received PORT | 5.3 % (95 % CI 0-15 %) | |

Figure 1C- locoregional failure in the low risk group patients who received versus who did not receive postoperative radiation therapy




| strata | 1yr LRF | P value |
|---|---|---|
| Low risk group who received No PORT | 17 % (95 % CI 11-23%) | P =0.56 |
| Low risk group who received PORT | 0 % (95 % CI 0-0%) ** | |

LRF: loco regional failure
PORT: post-operative radiation therapy
** Among the low risk group who received PORT, two patients failed after 12 months

**Conclusion**

The high risk features (pT3-4, pN+, Grade 2-3, and involved or close margins) identified within this risk group classification could be used to identify PA patients with higher risk of LRF who may benefit from PORT. However, external validation and prospective evaluation is warranted.

**PD-0424 Prognostic performance of inflammatory markers in patients with HCC treated with SBRT**

C. Lo[1], C. Hsiang[2], P. Shen[1], C. Lin[1], W. Chang[2], J. Yang[1], Y. Dai[1], W. Huang[1]

*[1]Tri-Service General Hospital- National Defense Medical Center, Department of Radiation Oncology, Taipei, Taiwan ; [2]Tri-Service General Hospital- National Defense Medical Center, Department of Radiology, Taipei, Taiwan*

**Purpose or Objective**

Several inflammatory markers have been proposed as predictive of survival in patients with hepatocellular carcinoma (HCC). This study aimed to evaluate the prognostic performance of these markers in patients with HCC treated with stereotactic body radiotherapy (SBRT).

**Material and Methods**

This retrospective study evaluated patients with HCC treated with SABR between December 2007 and August 2018. We collected pretreatment neutrophil-lymphocyte ratio (NLR), platelet-lymphocyte ratio, monocyte-lymphocyte ratio, and systemic immune-inflammation index values and compared their prognostic performance using the area under the receiver operating characteristics curve (AUROC). Cox proportional analysis was performed to identify the variables associated with overall survival (OS) and progression-free survival (PFS).

**Results**

A total of 153 patients were included. Median follow-up was 13 months (range, 1–132 months). The NLR had a higher AUROC value of 0.762 in predicting 1-year survival than other inflammatory markers. Multivariable analysis demonstrated that NLR was significantly associated with OS, both as a continuous (HR, 1.01; 95% confidence interval [CI]: 1.00–1.02; $p$ = 0.006) and binary variable (NLR cut-off 2.4; HR, 1.89; 95% CI: 1.22–2.93; $p$ = 0.005), apart from tumor number, extrahepatic spread, and albumin-bilirubin score. Elevated NLR was an independent predictor of inferior PFS ($p$ = 0.016) and predictive of higher disease burden.

**Conclusion**

NLR is an objective and ubiquitous inflammatory marker predicting OS and PFS in patients with HCC undergoing SBRT. These data support NLR as a prognostic biomarker for patient stratification and therapeutic decision making. Further investigation is warranted.

**Poster discussion: PH: Radiobiological and predictive modelling, and radiomics 1**

**PD-0425 Radiomics for selection of patients treated with immuno-radiotherapy: pooled analysis from 6 studies**

R. Sun[1,2,3,4], N. Sundahl[5], M. Hecht[6], F. Putz[6], A. Lancia[7], M. Milic[3], A. Carré[2,3], M. Lerousseau[2,3,4], E. Theo[2,3,4], E. Battistella[2,3,4], E. Alvarez Andres[2,3,4,8], G. Louvel[1], J. Durand-Labrunie[1], S. Bockel[1], R. Bahleda[9], C. Robert[2,3], C. Boutros[10], M. Vakalopoulou[4], N. Paragios[8], B. Frey[6], C. Massard[11], R. Fietkau[6], P. Ost[5], U. Gaipl[6], E. Deutsch[1,3]

*[1]Gustave Roussy - Paris-Saclay University, Department of Radiation Oncology, Villejuif, France ; [2]Gustave Roussy - Paris-Saclay University, Department of Medical Physics, Villejuif, France ; [3]Paris-Sud University - Gustave Roussy - Inserm - Paris-Saclay University, U1030 Molecular Radiotherapy, Villejuif, France ; [4]CentraleSupélec - Paris-Saclay University, Mathématiques et Informatique pour la Complexité et les Systèmes, Gif-sur-Yvette, France ; [5]Ghent university hopital, Department of Radiation Oncology and Experimental Cancer Research, Gent, Belgium ; [6]Universitätsklinikum Erlangen-Friedrich-Alexander-Universität Erlangen-Nürnberg, Department of Radiation Oncology, Erlangen, Germany ;*

[7]*Fondazione IRCCS- Policlinico San Matteo, Department of Radiation Oncology, Pavia, Italy ;* [8]*TheraPanacea, Radiotherapy, Paris, France ;* [9]*Gustave Roussy - Paris Saclay University, Drug Development Department, Villejuif, France ;* [10]*Gustave Roussy - Paris Saclay University, Department of Medicine, Villejuif, France ;* [11]*Gustave Roussy, Drug Development Department, Villejuif, France*

**Purpose or Objective**

Combining radiotherapy (RT) to immunotherapy (IO) may enhance IO-induced antitumor response. However, observation of "abscopal" tumor regression outside of the irradiated field does not appear sufficient to evaluate the RT contribution to an effective IO, underlying the need for new criteria. We aimed to describe clinical outcomes, response patterns of irradiated and non-irradiated lesions, and to assess whether a CD8 radiomics signature (Sun, Lancet Oncol 2018) could help to improve patient selection for IO-RT combinations.

**Material and Methods**

Patients from clinical studies of IO-RT combinations with advanced solid tumors in three institutions were analyzed. IO consisted in 4 different drugs. The main RT regimen was hypofractionated conformal RT or stereotactic RT of one tumor lesion. Irradiated lesions and a sample of non-irradiated lesions were delineated from baseline (E0) and the first evaluation (E1) CTs. A responding lesion was defined by a decrease of lesion size of 30%. Mixed response was defined as the presence of both progressive and responding lesions (*vs.* uniform progression (PD), stable disease (SD), or response). "Inverse response" was defined as a greater decrease of non-irradiated lesions than irradiated lesions. Radiomics features were extracted and the published CD8 radiomics signature was applied.

**Results**

A total of 94 patients and 574 lesions were analyzed:100 irradiated lesions and 187 non-irradiated lesions at E0 and E1. Median time between E0 and E1 was 2.8 mo. (IQR: 2.0 – 3.4). Median follow-up was 14.8 mo (IQR 8.4-20.8). Median OS was 25.2 mo. Best overall responses (BOR) (RECIST1.1) were CR=6.4%, PR=23.4%, SD=25.5%, PD=44.7% (FIGURE 1). OS of patients with mixed response was not different from the patients with uniform PD (p=0.84), but lower than the patients with SD (p=0.031) or uniform response (p=0.0056). 24% of the patients presented an "abscopal" non-irradiated responding lesion. An "inverse response" was seen in 35% of the patients. This pattern was associated with abscopal response (OR=10, p<0.001) and BOR (p=0.016). Patients presenting both "inverse" and abscopal response tended to have better PFS (HR=0.26, p<0.001) and OS (HR=0.44, p=0.059) than the rest of the cohort (FIGURE 1,2). For these patients, the mean CD8 radiomics score at E0 tended to be higher (p=0.06) than the rest of the population, especially the CD8 score of the non-irradiated lesions (p=0.02). The level and the distribution of the CD8 radiomic score showed several significant associations with PFS at E0 and E1, especially entropy of all the lesions (p=0.040 and 0.011 respectively) and minimal value of non-irradiated lesions (p=0.014 and 0.038 respectively).

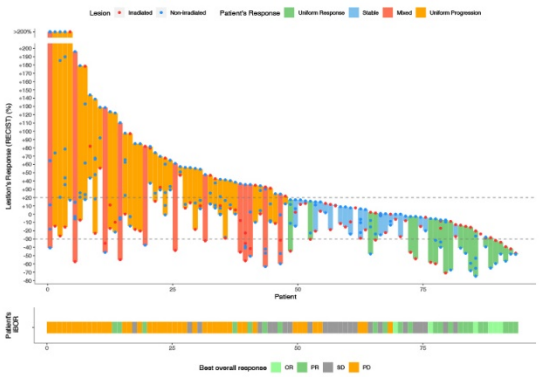



Figure 1. Response kinetics curve depicting individual lesion responses (as dots) on a patient-to-patient basis.
Red dot: irradiated lesion, blue dot: non-irradiated lesion.
CR: complete response, PR: partial response, SD: stable disease, PD: progressive disease.

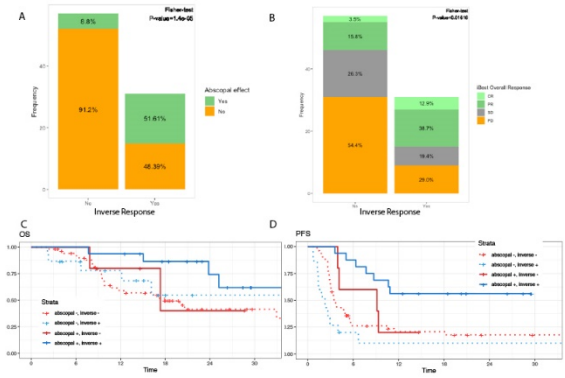



Figure 2. Association between inverse response and (A) abscopal effect, and (B) best overall response.
C-D: Overall survival and Progression free survival according to abscopal response and inverse response.

**Conclusion**

Our data suggest that a predominant response of non-irradiated lesions compared to irradiated ones was associated with clinical outcomes, the radiomic score of CD8 cells and abscopal effect. These data may have an implication in the selection of patients benefiting from IO-RT combinations.

**PD-0426 NTCP model for radiation-induced liver disease: Integration of clinical and dosimetric factors**

A. Songthong[1], Y.M. Ito[2], N. Katoh[3], M. Tamura[4], Y. Dekura[5], C. Toramatsu[6], N. Srimaneekarn[7], A. Haytor[8], C. Khorprasert[1], N. Amornwichet[1], P. Alisanant[1], Y. Hirata[9], H. Shirato[10], S. Shimizu[11], K. Kobashi[11]

[1]*Chulalongkorn University, Therapeutic radiation and oncology, Bangkok, Thailand ;* [2]*The Institute of Statistical Mathematics, 2Department of Statistical Data Science, Tokyo, Japan ;* [3]*Hokkaido University Hospital, Department of Radiation Oncology, Hokkaido, Japan ;* [4]*Hokkaido University Hospital, Department of Medical Physics, Hokkaido, Japan ;* [5]*Hokkaido University, Department of Radiation Oncology, Hokkaido, Japan ;* [6]*Tokyo Women's Medical University, Department of Radiation Oncology, Tokyo, Japan ;* [7]*Mahidol University, Department of Anatomy, bangkok, Thailand ;* [8]*University of Denver, Department of Business Information and Analytics, Colorado, USA ;* [9]*Hokkaido University, Central Institute of Isotope Science, Hokkaido, Japan ;* [10]*Hokkaido University, Graduate School of Biomedical Science and Engineering, Hokkaido, Japan ;* [11]*Hokkaido University Graduate School of Medicine, Department of Radiation Medical Science and Engineering, Hokkaido, Japan*