**PV-0043 Histology as predictor for outcome following SBRT in NSCLC patients with lung oligo-metastases**

J. Hörner-Rieber[1], N. Abbasi-Senger[2], O. Blanck[3], J. Boda-Heggemann[4], M. Duma[5], M.J. Eble[6], H.T. Eich[7], M. Flentje[8], S. Gerum[9], P. Haas[10], C. Henkenberens[11], G. Hildebrandt[12], D. Imhoff[13], H. Kahl[14], N.D. Klass[15], R. Krempien[16], F. Lohaus[17], C. Petersen[18], I. Sackerer[19], E. Schrade[20], L. Uhlmann[21], A. Wittig[22], M. Guckenberger[23]

*[1]University Hospital Heidelberg, Department of Radiation Oncology, Heidelberg, Germany*
*[2]University Hospital Jena- Germany, Department of Radiation Oncology, Jena, Germany*
*[3]UKSH Universitätsklinikum Schleswig-Holstein, Department of Radiation Oncology, Kiel, Germany*
*[4]University Medical Center Mannheim- University of Heidelberg, Department of Radiation Oncology, Mannheim, Germany*
*[5]Technical University Munich, Department of Radiation Oncology, Munich, Germany*
*[6]University Hospital Aachen, Department of Radiation Oncology, Aachen, Germany*
*[7]University Hospital Muenster, Department of Radiation Oncology, Muenster, Germany*
*[8]University Hospital Wuerzburg, Department of Radiation Oncology, Wuerzburg, Germany*
*[9]Ludwig Maximilians University Munich, Department of Radiation Oncology, Munich, Germany*
*[10]University Hospital Magdeburg, Department of Radiation Oncology, Magdeburg, Germany*
*[11]Medical School Hannover, Department of Radiotherapy and Special Oncology, Hannover, Germany*
*[12]University of Rostock, Department of Radiation Oncology, Rostock, Germany*
*[13]University Hospital Frankfurt, Department of Radiation Oncology, Frankfurt, Germany*
*[14]Hospital Augsburg, Department of Radiation Oncology, Augsburg, Germany*
*[15]Bern University Hospital, Department of Radiation Oncology, Bern, Switzerland*
*[16]Helios Klinikum Berlin Buch, Department of Radiation Oncology, Berlin, Germany*
*[17]Medical Faculty and University Hospital C.G. Carus, Department of Radiation Oncology, Dresden, Germany*
*[18]University Hospital Hamburg, Department of Radiation Oncology, Hamburg, Germany*
*[19]Radiation Oncology- Freising, Radiation Oncology, Freising, Germany*
*[20]Hospital Heidenheim, Department of Radiation Oncology, Heidenheim, Germany*
*[21]University of Heidelberg, Institute of Medical Biometry and Informatics, Heidelberg, Germany*
*[22]Philipps-University Marburg- University Hospital Giessen and Marburg, Department of Radiotherapy and Radiation Oncology, Marburg, Germany*
*[23]University Hospital Zurich- University of Zurich, Department of Radiation Oncology, Zurich, Switzerland*

**Purpose or Objective**

Outcome following stereotactic body radiotherapy (SBRT) for primary non-small lung cancer (NSCLC) is known to be primarily dependent on radiotherapy with sufficient high biological effective dose (BED). However, this paradigm has been challanged by recent reports suggesting that histological NSCLC subtype is also highly predictive for local control (LC) following SBRT for primary NSCLC. By now, it remains unclear, whether pulmonary NSCLC metastases resemble their primary counterparts, and outcome following SBRT for pulmonary NSCLC metastases is also dependent on histological subtype.

**Material and Methods**

This analysis is based on a multicenter database of 164 oligo-metastatic NSCLC patients treated with SBRT for 186 lung metastases. Pulmonary SBRT was performed at 20 German and Swiss hospitals between 1997 and 2016. Lung metastases were treated with median single doses of 19.2 Gy at PTV isocenter (range 5.0 - 38.4 Gy) in a median number of 3 fractions (range 1-12) leading to a median BED at PTV isocenter ($BED_{ISO}$) of 137.6 Gy (range 60.0-288.3 Gy). Tumor characteristics, treatment details, and follow-up data including survival (OS), local control (LC), distant metastases and toxicity were evaluated.

**Results**

Median follow-up time was 18.4 months resulting in 1-year and 2-year LC rates of 94.2% and 77.5%, with corresponding 1-year and 3-year OS of 78.9% and 56.7%, respectively. Multivariate analysis identified $BED_{ISO}$ as well as histological NSCLC subtype as independent prognostic factors for LC (HR 0.979, $p<0.001$; HR 0.390 $p=0.042$). In detail, LC was significantly superior with 2-year LC of 89.4% for adenocarcinoma compared to 2-year LC of only 64.0% for squamous cell carcinoma patients (HR 0.396; $p=0.044$). Notably, SBRT with $BED_{ISO} > 165.0$ Gy led to no detectable significant difference in LC for histological NSCLC subtypes (HR=0.210; $p=0.559$) demonstrating that dose escalation might be needed for optimal LC following SBRT of squamous cell NSCLC tumors. OS was most significantly influenced by maximum metastasis diameter as well as number of metastases but not by histological NSCLC subtype (HR 1.508; $p=0.001$; HR 0.585, $p=0.035$; HR 0.820, $p=0.355$). The admission of chemotherapy before or after SBRT did not significantly affect LC or OS. Radiation-induced pneumonitis grade 2 or higher was observed in 6.1% of patients.

**Conclusion**
SBRT to pulmonary metastases of oligo-metastatic NSCLC patients resulted in favorable LC and promising OS. This is the first study showing that histological NSCLC subtype is also an important predictor for LC in SBRT for pulmonary metastases and not only for primary NSCLC tumors. Further prospective studies are needed for evaluating whether treatment paradigms and irradiation doses might have to be adapted depending on different histological subtypes.