lung specific antigens (TTF1 and Napsin) besides EMA, P40, CK7, Synaptophysin, Chromogranin A, CD56, Calretinin, PD-L1, ALK (D5F3) by immunocytochemistry (ICC). EGFR mutations, ALK, RET and ROS1 fusions were evaluated from plasma by NGS. **Results:** C-TACs (EPCAM and CK positive) could be obtained from 458 samples out of 498 (92.0 %). Among the 95 samples that were characterised by staining for organ specific antigens, 100 % samples were positive for Napsin whilst 67.0 % samples were TTF1 positive. Classification of lung cancer subtypes of adenocarcinoma, adenosquamous carcinoma, squamous cell carcinoma and neuroendocrine tumors was possible in 94 out of 95 samples (98.9 %). ctDNA was obtained from 332 samples. EGFR mutations were detected in 110 (33.1 %) samples, which had concordance with tissue EGFR status in 89 % of 124 EGFR positive samples. ALK fusion was detected in 2 (0.6 %) samples which had concordance of 100 % with tissue ALK status. None of the tissue evaluated carried RET or ROS1 fusion and none were detected in any plasma sample. **Conclusion:** Our results show that ICC based characterization of C-TACs can provide necessary diagnostic information non-invasively to substitute conventional procedures dependent on tissue extraction. Additionally, ctDNA based detection of molecular characteristics completes most clinical decision-making requirements in lung cancer.

PD01.11
Artificial Intelligence Can Detect Lung Cancer From High Resolution Microscopic Images of Conditioned Peripheral Blood

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Background: Lung cancer is a leading cause of death worldwide with about 2.1 million new cases and 1.8 million deaths expected during 2019. Screening for lung cancer however remains challenging. Low Dose Computed Tomography (LDCT) the approved screening test has low specificity and carries the risk of radiation. A non-invasive, specific and sensitive screening test is an urgent unmet public health imperative. Considering that pulmonary embolism is a significant risk in lung cancer, we hypothesized that detection of circulating emboli in peripheral blood using deep learning microscopy would be a credible approach to detect lung cancer. **Method:** We processed peripheral blood from 3977 asymptomatic individuals who underwent routine scans and multiple CA marker evaluation (1475 males [37 %], 2502 females [63%]), 89 patients of lung cancer (61 males [69 %] and 28 females [31%]) of whom 37 had detectable disease, 49 were on therapy and 3 had no radiological evidence of disease. Mono-nucleated cells obtained after centrifugation of blood samples were processed with CellWizard^{TM}, a paradoxically cytotoxic cell media. Apoptosis resistant cells in the milieu are unaffected while cells with responsive cell death mechanism are killed. The process leaves behind Circulating Tumor Cells and Circulating Ensembles of Tumor Associated Cells (C-ETACs). High resolution images of the media wells holding the samples were then obtained on the 5th day. A deep machine learning algorithm was deployed with a training set of images from 44 samples each of asymptomatic individuals with category 1 and known cases of lung cancer respectively. **Results:** Among the 37 cases of lung cancer, the AI algorithm detected C-ETACs in 31 cases (84% sensitivity); 40 out of 49 (82%) patients with ongoing treatment could be detected. Patients with no evaluable disease were not classified as positive. Out of 3977 asymptomatic individuals, 2278 individuals were negative for all scans and CA markers; from whom 82 individuals (4%) were predicted by AI to be positive for lung cancer. AI evaluation of conditioned peripheral blood had sensitivity of 84% in detecting lung cancers, specificity of 96% in predicting patients negative for lung cancer with overall accuracy of 96%. The 82 individuals detected by AI as being positive for malignancy may have cancer other than that of the lung and are being monitored prospectively. **Conclusion:** High resolution microscopic images of conditioned peripheral blood coupled with an artificial intelligence algorithm is a cost-effective, non-invasive method to screen asymptomatic individuals for lung cancer without the risk of radiation.

PD01.13
Stereotactic Modulating Radiation Therapy (SMRT) For Oligo-Metastatic Non-Small Cell Lung Cancer

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Background: Patients with oligometastatic non-small cell lung cancer (PD1>50%) are now treated with a PD1 inhibitor as single agent therapy. Patients with (PD1<50%) are now treated with platinum doublet chemotherapy concurrent with a PD1 inhibitor. Stereotactic body radiotherapy (SBRT) has improved outcomes in oligometastatic non-small cell lung cancer with two recent randomized clinical trials showing improvement in progression free survival and overall survival. As a result, immunotherapy combined with SBRT or chemo-immuno-SBRT is emerging as a new standard of care for select patients with oligometastatic non-small cell lung cancer. High doses of stereotactic ablative radiotherapy (SABR) are safe and effective and are commonly used to treat lung cancer. At moderate doses, radiation can increase interferon expression resulting in an increase in Th1 T-Helper cell differentiation with a resulting increase in CD8+ anti-tumor cytotoxic T- Lymphocytes (CTL). We propose the term stereotactic modulating radiation therapy (SMRT) to describe the moderate doses of SBRT. We hypothesize that moderate dose SMRT therapy will improve outcomes in oligometastatic lung cancer compared to higher dose SABR therapy. We have initiated a phase II clinical trial to test SABR and SMRT radiotherapy in combination with immunotherapy or chemo-immunotherapy. **Method:** Oligometastatic NSCLCa (< 5 sites of disease) are treated with three cycles of systemic therapy. Tumors with PDL1>50% receive immunotherapy. Patients with PDL1<50% receive platinum doublet chemotherapy with immunotherapy. After three cycles patients are evaluated for response and randomized to SMRT or SABR. SMRT cohort 6-8Gy x 3-5 = 24-30Gy. SABR cohort 10-24G x 1-5 = 24-60Gy. Patients with tumor > 5cm or residual adenopathy after cycle 3 receive hypofractionated radiation (2.5Gy x 20 = 50Gy) concurrent with cycle 4 and then randomize to SMRT or SABR. All patients receive maintenance therapy. **Results:** The primary end point is toxicity of immunotherapy or chemo-immunotherapy with SMRT or SABR by CTCAE v 4.03. Secondary endpoints are response rate by RECIST v 1.1 and iRECIST, patient reported quality or life, DFS, and OS. Exploratory endpoints investigate the immune response and cytokine levels in tumor microenvironment and peripheral blood prior to systemic therapy, after cycle 3, and after SBRT. **Conclusion:** The widespread adoption of immunotherapy and chemo-immunotherapy makes it crucial to understand the interaction between radiation therapy and PD1 inhibitors. This study investigates high dose stereotactic ablative radiotherapy (SABR) compared to moderate dose stereotactic modulating radiotherapy (SMRT) in an effort to identify patients most likely to benefit from this combination. **Keywords:** Oligometastatic Non-Small Cell Lung Cancer, Chemo-immunotherapy, Stereotactic Body Radiotherapy SBRT, Immunotherapy

PD01.14
Targeting the Chemoradiation Resistance of Lung Cancers with KRAS/TP53 Co-Mutations

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