

Category : **Respiratory: ARDS**

**A106 - Mitigation of neuroinflammation by diaphragm neurostimulation, and correlation between neuroinflammatory biomarkers in a moderate-ARDS preclinical model**

T Bassi<sup>1</sup>; E Rohrs<sup>2</sup>; K Fernandez<sup>2</sup>; M Nicholas<sup>2</sup>; J Wittmann<sup>2</sup>; M Ornowska<sup>3</sup>; M Gani<sup>1</sup>; D Evans<sup>1</sup>; S Reynolds<sup>2</sup>

<sup>1</sup>Lungpacer Medical Inc., Burnaby, Canada, <sup>2</sup>Fraser Health Authority, New Westminster, Canada, <sup>3</sup>Simon Fraser University, Burnaby, Canada

**Introduction:**

Correlation between microglia and astrocytes in ARDS subjects undergoing mechanical ventilation (MV) has not previously been demonstrated. We investigated correlation between these cells in subjects with various degrees of ventilation-induced neuroinflammation.

**Methods:**

Juvenile pigs were assigned to four groups (n=6 per group): lung injury (LI) with MV only (LI-MV), LI with MV plus temporary transvenous diaphragmatic neurostimulation (TTDN) every other breath (LI-TTDN50%+MV), LI with MV plus TTDN every breath (LI-TTDN100%+MV), and never ventilated (NV). Subjects undergoing MV (volume control, PEEP 5 cmH<sub>2</sub>O, tidal volume 8 ml/kg) had oleic acid injected into the pulmonary artery via Swan-Ganz catheter to achieve moderate ARDS (PaO<sub>2</sub>/FiO<sub>2</sub> between 100 and 200). TTDN was delivered via a central line catheter embedded with electrodes, targeting a 15-20% reduction in ventilator pressure-time product. Hippocampus was harvested at study end, and ionizing binding adaptor molecule-1 (IBA-1) and glial fibrillary acid protein (GFAP) assays were used to stain microglia and astrocyte cells respectively. Positive-stained hippocampal cell percentages were determined using machine-learning software (ImageJ). Spearman test was run to investigate association between IBA-1 and GFAP hippocampal percentages. P-values <0.05 are considered statistically significant.

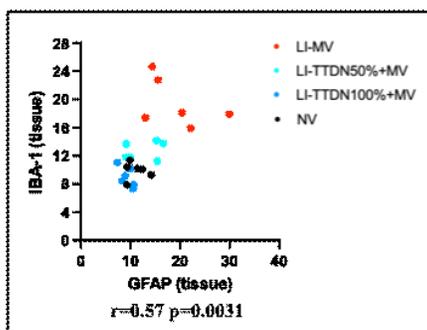
**Results:**

IBA-1- and GFAP-positive cell percentages found were [median (interquartile range)]: 18 (17-32) and 18 (14-24) for LI-MV, 12 (11-13) and 12 (9-15) for LI-TTDN50%+MV, 8 (7-10) and 9 (8-10) for LI-TTDN100%+MV, and 10 (8-10) and 10 (9-11) for NV. Spearman correlation test showed positive, linear, and moderate correlation between hippocampal IBA-1 and GFAP percentages, r=0.57, p=0.0031 (Figure1).

**Conclusion:**

We found a moderate correlation between the percentages of hippocampal microglia and astrocytes after 12 hours of MV with moderate ARDS, and that TTDN mitigated neuroinflammation in our injured-lung model.

**Image :**



Correlation between GFAP-positive cells and IBA-1-positive cells