Introduction:
We hypothesize that hippocampal inflammation occurs as a result of mechanical ventilation (MV). Preclinical studies evaluating neuroinflammation in normal-lung MV models have not been reported. Microglia and reactive astrocytes take part in neuroinflammation and are important targets of investigation. They are responsible for modulating neuronal connections, assisting in establishing stronger synaptic connections and maintaining tissue homeostasis.

Methods:
Our study investigated the percentage of iba-1-positive cells (microglia), and the percentage of GFAP-positive cells (astrocytes) in the total number of cells counted (positive and negative cells per marker) in the hippocampal tissue of human-size pigs with non-injured lungs after 50 hours of lung-protective MV (MV group), compared with never-ventilated (NV) pigs. The cells were counted by machine learning software IMAGEJ. Lung-protective MV was defined as: driving pressure less than 15 cmH₂O, tidal volume of 6ml/kg and peak pressure less than 30 cmH₂O.

Results:
Six NV and six MV pigs were used in this study. The percentages of iba-1-positive cells in the hippocampus were 7% (42705 iba-1-positive cells/589888 total cells) and 32% (65655 iba-1-positive cells/205006 total cells) respectively in the NV and MV groups (p<0.01). The percentages of GFAP-positive cells were 9% (35941 GFAP-positive cells/406235 total cells) and 18% (91156 GFAP-positive cells/502195 total cells) respectively in the NV and MV groups (p<0.01). When comparing the percentage of iba-1-positive cells to that of GFAP-positive cells we calculated the ratios of approximately 0.78 (7/9) and 1.78 (32/18) in the NV and MV groups respectively (p<0.01).

Conclusion:
Our study demonstrated neuroinflammation in pigs after lung-protective MV. A higher presence of microglia and astrocytes in the MV group indicate an inflammatory hippocampal process as a consequence of lung-protective MV.