ONLINE SUPPLEMENT: ***Results for lung lymph flow, protein balance, bronchoalveolar lavage fluid bacterial and neutrophil counts***

Lung lymph flow and protein balance. Lymph flow cannulas were functional throughout the 24-hour experiment in 6 of 8 control sheep, 6 of 7 lower dose hMSC-treated sheep, and 4 of 4 higher dose hMSC-treated sheep. Lung vascular permeability was assessed by measuring lung lymph flow, lymph/plasma ratio, and lymph protein flux (**Figures s1a, s1b, s1c**). Lymph flow and lymph protein flux increased in all groups but there were no statistical differences among the groups. Plasma protein concentrations were numerically higher in the higher dose hMSC group, but this difference did not reach significance (**Figure s1d**).

Bronchoalveolar lavage fluid bacterial and neutrophil counts. There were no differences in the median number of bacteria in control sheep or in the number of neutrophils. The median number of bacteria were 3.3×10^5 CFU/uL (IQR: $3.4 \times 10^4 – 1.8 \times 10^6$ in the control sheep, 2.4×10^5 (IQR: $3.0 \times 10^4 – 4.4 \times 10^5$) in the lower dose hMSC-treated sheep, and 3.8×10^5 ($1.2 \times 10^5 – 4.4 \times 10^5$) in the higher dose hMSC-treated sheep. The neutrophil counts in the BAL fluid were 1.4 cells/uL (IQR: 0.3 – 3.0 cells/uL) in the control group, 0.5 cells/uL (IQR: 0.3 – 1.2 cells/ uL) in the lower dose hMSC group, and 0.4 cells/uL (0.3 – 1.8 cells/ uL) in the higher dose hMSC group. These differences were not significant.

ONLINE SUPPLEMENT: Figure Legends

Figure s1a. **Lung Lymph Flow**. Lung lymph flow levels over 24 hours in the pneumonia/sepsis-induced sheep treated with Plasmalyte A alone (control) (T0: n=6; T24: n=5), lower dose hMSCs (5 x 10^6 cells/kg) (T0: n=6; T24: n=4), and higher dose hMSCs (10 x 10^6 cells/kg) (T0: n=4; T24: n=3). There were no differences among the three groups at the 24 hour time point by ANCOVA or during the 24-hour period by the GEE. Data are expressed as mean ± SEM.

Figure s1b. **Lymph/Plasma Protein Ratio**. Lymph/plasma protein ratios in the pneumonia/sepsis-induced sheep treated with Plasmalyte A alone (control) (T0: n=6; T24: n=5), lower dose hMSCs (5 x 10^6 cells/kg) (T0: n=6; T24: n=4), and higher dose hMSCs (10 x 10^6 cells/kg) (T0: n=4; T24: n=3). There were no differences among the three groups at 24 hours by ANCOVA. $^{\$}$P=0.04 in the lower dose hMSC group vs. the control group during the 24 hour period by the GEE. There was no significant difference between the higher dose hMSC group and the control group by the GEE. Data are expressed as mean ± SEM.

Figure s1c. **Lymph Protein Flux.** Lymph protein flux in the pneumonia/sepsis-induced sheep treated with Plasmalyte A alone (control) (T0: n=6; T24: n=5), lower dose hMSCs (5 x 10^6 cells/kg) (T0: n=6; T24: n=4), and higher dose hMSCs (10 x 10^6 cells/kg) (T0: n=4; T24: n=3). There were no differences among the three groups at 24 hours by ANCOVA or during the 24-hour period by the GEE. Data are expressed as mean ± SEM.

Figure s1d. **Plasma Protein Levels.** Plasma protein levels in the pneumonia/sepsis-induced sheep treated with Plasmalyte A alone (control) (T0: n=8; T24: n=6), lower dose hMSCs (5 x 10^6 cells/kg) (T0: n=7; T24: n=6), and higher dose hMSCs (10 x 10^6

cells/kg) (T0: n=4; T24: n=3). There were no differences among the three groups at 24 hours by ANCOVA or during the 24 hour period by the GEE. Data are expressed as mean ± SEM.