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Abstract Title:	**Respiratory Dialysis Via Extracorporeal CO2 Removal Reduced Histological End-organ Injury In Swine With Smoke- And Burn-Induced ARDS**
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Objective:	1) Describe the utility for "respiratory dialysis" in treating patients suffering from ARDS due to smoke inhalation and burns. 2) Discuss the potential benefit of "respiratory dialysis" in reducing ARDS mortality.
Abstract:	**Background:** Acute respiratory distress syndrome (ARDS) is the most severe form of acute lung injury. It is characterized by acute onset of hypoxemia, bilateral radiographic pulmonary infiltrates without cardiogenic pulmonary edema, and leads to multi-organ failure (MOF). Various adjunct treatments have been explored to attenuate ARDS severity. Our purpose here was to determine the histopathological evidence for the efficacy of “respiratory dialysis” a form of low-flow extracorporeal life support (ECLS) focusing primarily on CO2 removal and reduction in ventilator settings. We hypothesized that extracorporeal CO2 removal or ECCO2R leads to a decrease in histological end-organ damage in a model of smoke inhalation and 40% TBSA burns. **Methods:** Female Yorkshire swine (weight: 47.4 ± 1.2 kg) were anesthetized and received tracheostomy, mechanical ventilation (MV), arterial and venous catheters, fluids and vasopressors as needed and were followed in the ICU till 72 hours after injury or death. The animals were randomized to one of two groups both of which received a severe smoke inhalation injury combined with 40% TBSA burns: ICTR (injured, untreated, n = 10), and ECCO2R group using the Maquet pediatric circuit HLA 2.8, Maquet Cardiovascular, USA, n = 10). Lung, kidney, ventricle, jejunum and liver tissue samples were collected at the end of experiments. Lungs were evaluated for diffuse alveolar damage scores (DAD). Kidneys were evaluated for glomerular injury (GI), proximal convoluted tubule damage (PCT), distal convoluted tubule damage (DCT) and granulated protein deposition (PD). Liver samples were evaluated for congestion, thrombosis, apoptosis, degeneration, and inflammation. Left ventricle samples were evaluated for edema, degeneration,

	inflammation, congestion and hemorrhage. Jejunum samples were evaluated for edema, congestion, hemorrhage, villous damage and mucosal damage. In addition to the above individual scores, the sum of all component scores was calculated as a total injury score for each organ. Statistics by SAS Cary, NC, v. 9.4. Statistical significance was established at $p < 0.05$; data are represented as mean ± SEM. Results: Significantly lower DAD scores were observed in ECCO2R treated animals (16.4 ± 1.3) vs. ICTR (ICTR, 46.8 ± 2.1). In all metrics of kidney injury score, ECCO2R animals had lower scores (2.7 ± 0.5) vs. ICTR (8.4 ± 0.9). In ECCO2R animals' liver damage was lower than ICTR animals (4.2 ± 1.0 vs. 9.0 ± 0.9). Similar trends were observed for left ventricle injury score ECCO2R- 4.0 ± 0.5 vs. ICTR 10.1 ± 1.1 and jejunum damage ECCO2R 4.0 ± 0.5 vs. ICTR 10.9 ± 1. **Conclusion:** ARDS and MOF were confirmed in both groups by DAD - a definitive signature of ARDS. Therapy with ECCO2R was effective in mitigating ARDS and MOF severity vs untreated controls in this model most likely due to reductions in ventilator settings and so minimization of VILI.