Introduction:
Despite renal function replacement techniques (CRRT), a patient who develops acute renal failure (AKI) in intensive care unit (ICU) has a mortality rate of 5-80%. This risk is partly due to the adverse effect of AKI on other organs than the kidney. Respiratory complications are frequently associated with the development of AKI. New machines combining CRRT with a carbon dioxide removal membrane (ECCO2R) allows the setting up of an ultra-protective ventilation (4 ml/kg of predicted body weight (PBW)) to reduce any lung damage from mechanical ventilation (MV). The reduction in tidal volume (Vt) is associated with a decrease in lung damage partly triggered by AKI. We evaluated the efficacy of a combined system CRRT+ECCO2R to reduce the Vt to ultraprotective values in patients with acute respiratory failure and AKI.

Methods:
Five patients with acute respiratory failure invasively mechanically ventilated for at least 48 that develop AKI needing CRRT were recruited in our ICU. CRRT + ECCO2R was performed with OMNI system® (B.Braun Avitum, Melsungen, Germany). The Vt was progressively reduced to 4 ml/kg/PBW according to a predefined ventilation protocol and therapy was set as follows: CVVHDF, blood flow up to 400 ml/min, dialysis dose 25-35 ml/kg/h, sweep gas:10 L/min. Haemodynamic, respiratory and biochemical clinical parameters were recorded: before the start of treatment (T0) and at the end of each 12-hour interval. Adverse events during treatment have been reported.

Results:
Within an hour, patients treated with CRRT+ECCO2R have achieved and maintained an ultra-protective ventilation protocol. The pH and PaCO2 values did not show statistically significant differences from T0 throughout the treatment. In treated patients no complications were recorded.

Conclusion:
The combined system CRRT+ECCO2R was safe and effective in allowing a reduction of the Vt up to 4 ml/kg of PBW. Further studies are needed to extend the result of our pilot study.