Post-resuscitation treatment with inhaled argon improves outcome after a prolonged untreated cardiac arrest in a porcine model.

Dott.ssa FRANCESCA FUMAGALLI (1), Dott. DAVIDE OLIVARI (1), Dott.ssa ROBERTA AFFATATO (1), Dott.ssa DARIA DE GIORGIO (1), Dott.ssa LIDIA STASZEWSKY (1), Dott. DAVIDE ZANI (2), Prof. EUGENIO SCANZIANI (2), Dott. ROBERTO LATINI (1), Prof. GIUSEPPE RISTAGNO (2)

(1) Istituto di Ricerche Farmacologiche Mario Negri IRCCS, Italia.
(2) Università degli Studi di Milano, Italia.

Argomento: Trauma e arresto cardiaco

Treatment of post cardiac arrest (CA) syndrome represents a clinical priority. Argon represents an attractive therapeutic option. The purpose of this study was to determine efficacy, safety and the most effective dose of Argon in a porcine model of high-severity CA and cardiopulmonary resuscitation (CPR).

Left anterior descending coronary artery was occluded in 36 pigs, and ventricular fibrillation was induced and left untreated for 12 min. CPR was then performed for 5 min prior to defibrillation. Following successful resuscitation, animals were subjected to 4 hr ventilation with (a) 70% argon - 30% O_2 (n=10); (b) 50% argon - 50% O_2 (n=10); (c) 70% N_2 - 30% O_2 (n=10). Hemodynamic parameters were monitored and serial blood samples were obtained for blood gas analysis. Animals were observed up to 96 h for assessment of survival and neurological recovery.

Ten animals of 12 were successfully resuscitated in each group. After resuscitation, animals treated with Argon 70% showed higher systolic, mean and diastolic arterial pressure compared to controls and to the Argon 50% treated animals (p<0.05). Ventilation with argon did not have any detrimental effects on respiratory gas exchange during the 4 hr ventilation. There was no statistically significant difference in the number of the resuscitated animals survived up to 96 hrs. However, 6 (60 %) and 8 (80 %) resuscitated animals in the Argon 50% and Argon 70% groups respectively achieved a complete neurological recovery (Overall Performance Categories, OPC=1 or 2), whereas only 3 (30%) animals survived up to 96 hours with a complete neurological recovery in the control group (p<0.0001).

Argon prevented post CA brain injury in swine model of severe CA, without detrimental effects on hemodynamics and respiratory gas exchanges. Beneficial effects was higher at a concentration of 70% than of 50%.

96 hrs Survival with OPC

$p < 0.0001$