Pharmacologically induced hypothermia with the cannabinoid receptor agonist WIN55, 212-2 improves microcirculation in a rat model of cardiac arrest

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Results

An inadequately perfused state was observed in all animals following resuscitation. In both WH and MH groups, there were significant improvements in the Perfusion Vessel Density (PVD) and Microcirculation Flow Index (MFI) compared with N (Fig. 1). A significantly better PVD and MFI was observed in WH treated animals at PR4H when compared with MH treated animals.

Conclusions

The cannabinoid receptor agonist WIN improves MF after cardiopulmonary resuscitation compared to both N and MH at PR4H by increasing PVD and MFI.

References


Disclosure

None

Background

We previously demonstrated that the cannabinoid receptor agonist WIN55, 212-2 (WIN) improves post-resuscitation neurological function. The mechanism of benefit is unclear. One mechanism by which traditional mechanical hypothermia (MH) results in improved neurological outcomes is by preserving microcirculatory flow (MF). We now investigate the effects of WIN on the microcirculation compared to MH and normothermia (N) in a rat model of cardiac arrest (CA). We hypothesized that the cannabinoid receptor agonist WIN improves MF after resuscitation when compared to MH or N.

Methods

Animal Model

Ventricular fibrillation (VF) was induced in 18 Sprague-Dawley rats weighing between 450 and 550g. VF was untreated for 6 min followed by 8 min of CPR. Resuscitation was then attempted with defibrillation.

Experimental Protocol

Animals were randomized into 3 groups five min after resuscitation: N, MH, WIN hypothermia (WH). N and hypothermia (H) were respectively defined as 37°C and 33°C. For the WH group, WIN was administered and for the MH and N groups a Vehicle (2% Tween-80 in 0.9% NaCl) solution was administered, both at 1.4ml/kg/h for 4 hours. H in the MH group was produced with ice packs. Buccal microcirculation was measured at baseline, one, and four hours after ROSC with a sidestream dark-field imaging device with an on-screen magnification of 276x.