Expression analysis following argon treatment in an in vivo model of transient middle cerebral artery occlusion in rats.

Argon treatment following experimental neurotrauma has been found neuroprotective in an array of in vivo and in vitro models. The inherent cellular and molecular mechanisms are still unknown. We sought to shed light on these processes by examining the cellular distribution and the expression of inflammatory markers and growth factors in argon treated brain tissue. Male adult Sprague-Dawley rats were randomly assigned to one of the study groups: sham surgery + placebo, sham surgery + argon, tMCAO + placebo, and tMCAO + argon. Animals underwent 2 h-transient middle cerebral artery occlusion (tMCAO) using the endoluminal thread model or sham surgery without tMCAO. After the first hour of tMCAO or sham surgery a 1 h inhalative argon (50% argon/50% O2) or placebo (50% N2/50% O2) treatment was performed. Brains were removed and evaluated after 24 h. RealTime-PCR was performed from biopsies of the penumbra and contralateral corresponding regions. Paraffin sections were immunostained with antibodies against GFAP, NeuN, and Iba1. Cell counts of astrocytes, neurons and microglia in different cortical regions were performed in a double-blinded manner. Fifteen animals per tMCAO group and twelve sham + placebo respectively eleven...
sham + argon animals completed the interventional procedure. We identified several genes (IL-1?, IL-6, iNOS, TGF-?, and NGF) whose transcription was elevated 24 h after the study intervention, and whose expression levels significantly differed between argon treatment and placebo following tMCAO. Except for the core region of ischemia, cell numbers were comparable between different treatment groups. In our study, we found an elevated expression of several inflammatory markers and growth factors following tMCAO + argon compared to tMCAO + placebo. Although conflicting the previously described neuroprotective effects of argon following experimental ischemia, these findings might still be associated with each other. Further studies will have to evaluate their relevance and potential relationship.

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