EFFECTS OF VITAMIN D PRETREATMENT ON THE NOX2, REDOX BALANCE AND NEURONAL MORPHOLOGY IN GERBILS EXPOSED TO TRANSIENT GLOBAL BRAIN ISCHEMIA

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Introduction: Cerebral ischemia and reperfusion (I/R) are followed by the production of free radicals. The source could be NADPH oxidase isoform NOX2. Vitamin D is known to be neuroprotective.

The aim: Investigation of the effects of vitamin D pretreatment on the superoxide anion ($O_2^{\cdot-}$) production, superoxide dismutase (SOD) activity, expression of NOX2 and NeuN and morphology of neurons in the hippocampus of gerbils exposed to transient global brain ischemia.

Material and methods: Gerbils were divided into seven groups: control, groups I/R1, I/R3 and I/R7 subjected to 10 minutes ischemia (ligation of both common carotid arteries) and reperfusion for 1, 3 or 7 days respectively, and groups vitD+I/R1, vitD+I/R3 and vitD+I/R7 that were pretreated with vitamin D seven days prior to corresponding I/R. Content of $O_2^{\cdot-}$ and SOD activity were determined by spectrophotometry. NOX2 and NeuN expression were determined by Western blot and immunohistochemistry and neuron morphology by transmission electron microscopy (TEM).

Conclusion: Vitamin D regulates production of $O_2^{\cdot-}$ and SOD activity after I/R and ameliorates effects on the expression of NOX2. Vitamin D protects cell structure in early phases of I/R injury.

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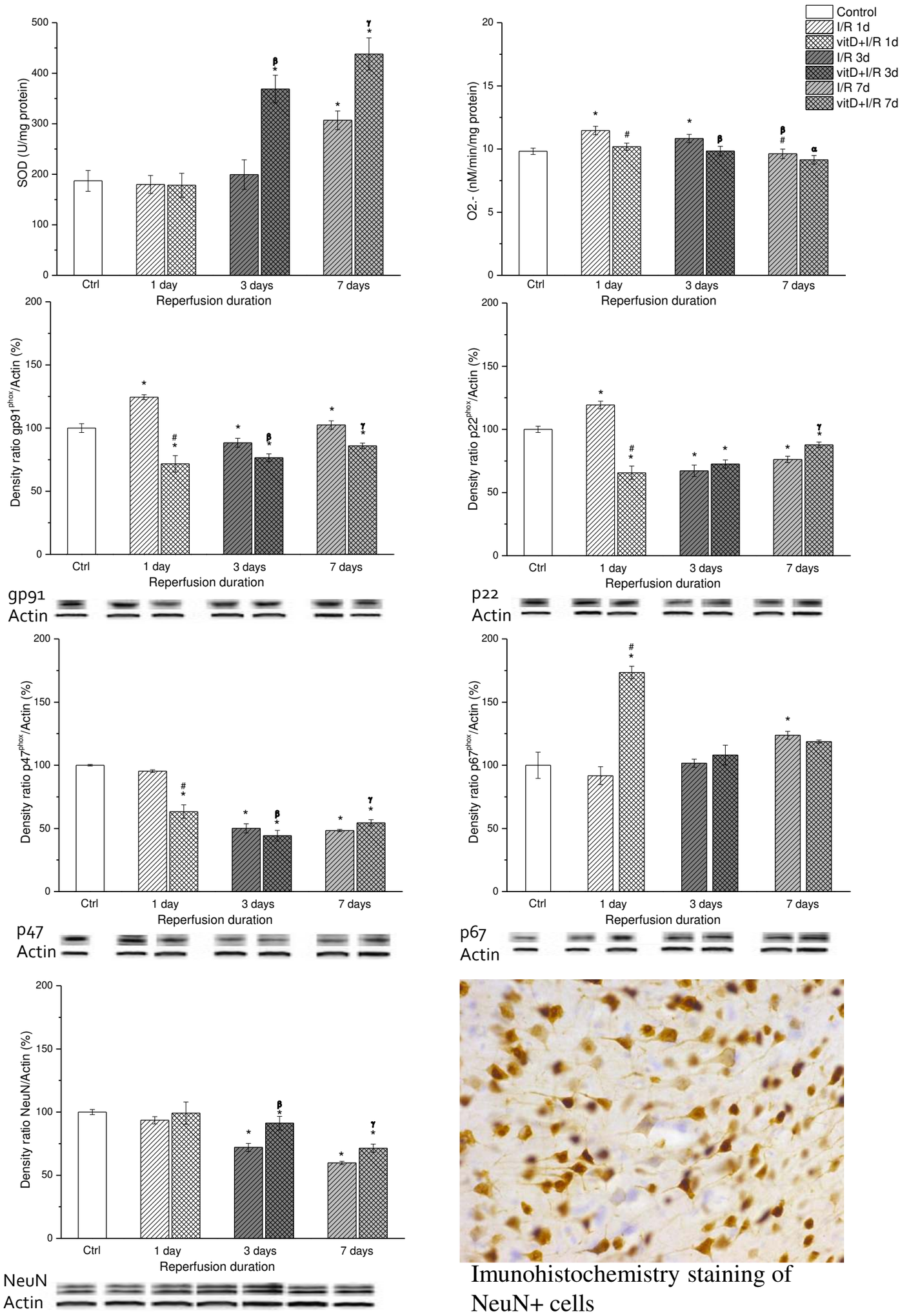
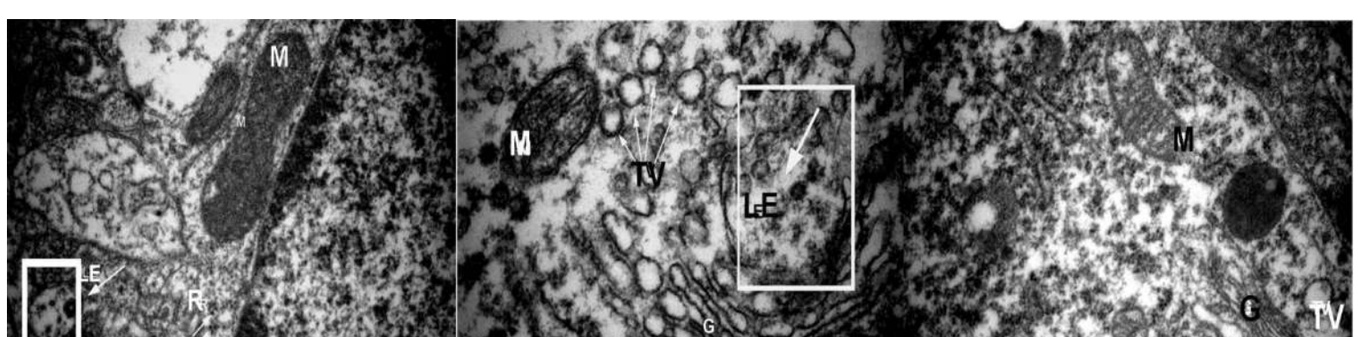
No potential conflict of interest

Results



Imunohistochemistry staining of NeuN+ cells

* p<0,05 compare to control group # p<0,05 compare to I/R 1d group
β p<0,05 compare to I/R 3d group γ p<0,05 compare to I/R 7d group



The TEM analysis of neurons. (A) Neuronal cell from control group shows late endosomes (LE) with intack membrane, ribosomes (R) and mitochondria (M) (bar = 1μm). (B) A Neuron after I/R showing late endosome with membrane rupture, accumulation of transport vesicules (TV) and more ribosomes (Bar = 0.5μm). (C) Neuron cell after vitD+I/R procedure showing intacked endosome, some vesicules, Goldgi apparatus (G) and rough endoplasmic reticulum (ER) (Bar = 1μm).