Kinetics of Nitric Oxide Release in Neonatal and Mature Rat Brain During Endotoxemia, as Studied by Diethyldithiocarbamate Spin Trapping.
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Nitric oxide belongs to the most important biochemical factors affecting functions of brain and its response to pathological processes. In the beginning of the postnatal development brain reveals a unique plasticity, which is lost during maturation. This ability may influence the response of this organ to endotoxemia, and the related generation of nitric oxide. Using ferrous-diethyldithio-carbamate (Fe(DETC)₂) chelate, a lipophilic spin trap for NO detection by electron paramagnetic resonance (EPR) spectroscopy we investigated the kinetics of NO production in brain and liver during endotoxemia induced by lipopolysaccharide (E. coli, i.p. 10 mg/kg) in 6- and 30-days-old Wistar rats. The NOFe(DETC)₂ complex was found to give the characteristic signal, and the amplitude of the 3-rd (high-field) component of its hyperfine splitting was used to quantify the level of NO. The neonatal brains produced NO with a delay, as compared to the mature organs, and the maximal intensity of the process was found 12 hours after LPS injection, i.e. twice as late as in the case of the mature organs. In the both groups of the animals, livers revealed similar kinetics to brains, which betray a systemic character of the phenomenon. Nevertheless, NO generation in the untreated brain varied during the neonatal period, which was, however, not confirmed for the liver. Our results indicate a strong dependence of the dynamics of the rat brain response to LPS on the progress of the postnatal development.