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Introduction:
The aim of the study was to investigate into the molecular mechanisms of neuroprotection with 50 vol% xenon in an in vivo model experiments.

Methods:
Eight rats were anesthetized (Combi-Vet machine; induction chloralhydrate 300 mg/kg intraabdominally; then 30 mins of 50 vol% xenon inhalation (95% O2 0.5 l/min, 100% xenon 0.5 l/min; O2 50%, Xe 50%); 8 rats were in the control group (Combi-Vet anesthesia machine; induction chloralhydrate 300 mg/kg intraabdominally; then 30 mins of 95% O2 0.5 l/min). Rats were eutanized and brain homogenates were made. Content of the phosphorylated (inactivated form) of the GSK-3 beta enzyme and key antioxidant enzymes (hemoxygenase, superoxide dismutase, catalase) in rat brain homogenates was assessed by western-immunoblotting. Statistica 6.0, parametric methods were used for data analysis.

Results:
The research results showed that xenon inhalation anesthesia resulted in a 2-fold increase of the phosphorylated (inactivated form) of the GSK-3 beta enzyme (p<0.05); increased the content of the key antioxidant enzymes (hemoxygenase (by 50%, p<0.05), superoxide dismutase (by 60%, p<0.05), catalase (by 20%, p>0.05) in rat brain homogenates compared to the controls.

Conclusion:
An increase of the phosphorylated GSK-3 beta enzyme and pool of antioxidant enzymes (hemoxygenase, superoxide dismutase, catalase) in the brain under the xenon anesthesia was proved which suggests a new molecular mechanism for the realization of its neuroprotective properties and has a great clinical outlook.