

Nitric oxide: Experimental analysis of its role in brain tissue in simulated ischemia

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A joint study conducted by scientists at the National Academy of Sciences in Belarus and Kazan Federal University in Russia, looks at the role of nitric oxide (NO) in brain tissue in simulated ischemia in rats.

In 1988, Robert F. Furchgott, Louis J. Ignarro and Ferid Murad received a Nobel Prize for their discoveries concerning [nitric oxide](#) (NO) as a signaling molecule in cardiovascular, reproductive, nervous and other systems. At that time, the discovery brought hope to many patients with hypoxia, especially the ones suffering from impotence.

But despite the good news, NO appeared to have other functional properties. Gas NO molecule sometimes acted cunningly causing side effects instead of correction of disordered functions. Since then, this "two-facedness" of NO triggered activity of scientists who wanted to understand the complex mechanisms of its action.

In this new study, the team of scientists conducted experimental analysis of NO role in brain tissue in simulated ischemia in rats.

The authors of the study apply complex methods for NO identification, including electron paramagnetic resonance (EPR) aiming at recording NO content in hippocampal tissue of intact rats and the ones after simulation of ischemic and hemorrhagic stroke.

Direct NO measurements using EPR spectroscopy showed that NO formation in hippocampal area decreases up to 2-3 times in 5 hours after appearance of both ischemic and hemorrhagic strokes' signs, and this decrease lasts for 24 and 72 hours.

Results demonstrate that systemic character of NO production lowering during simulation of ischemic events in brain reflects the consequences of

central dysregulation of whole organism's functions. This should be taken into account during further studies on correction of vital functions in patients with stroke.

Finally, analysis of literature and results of conducted experiments demonstrated that comprehensive approach and application of precision methods of NO level measurement in [brain tissue](#) contributed to real data acquisition on the complex dynamics of NO production in [nerve tissue](#) in health and disease.

"The development of brain ischemia is often commonly referred to not only by physicians, but also other "specialists" as James Bond." according to Vladimir Kulchitsky, National Academy of Sciences, Belarus.

"My reference points to an episode from the famous fiction movie where substance with "NO" abbreviation was developed." clarifies the author to further explain this association. "James Bond overcame long underground corridors filled with water with no signs of hypoxia and ended up in hall with female figure throwing a 'Yes'-shaped shadow. He wound his arms around it to immobilize the possible opponent and asked: 'Why 'Yes'? I expected traditional 'No' from a woman'. A loudspeaker replied: 'Stop strangling the young scientist! He is co-author of the article shedding light on ambiguous NO substance'.

More information: Khalil L. Gainutdinov et al, Participation of NO-synthase in Control of Nitric Oxide Level in Rat Hippocampus after Modelling of Ischaemic and Haemorrhagic Insult, *BioDiscovery* (2017). [DOI: 10.3897/biodiscovery.20.e14810](https://doi.org/10.3897/biodiscovery.20.e14810)

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