

## EFFECT AND SUSCEPTIBILITY BIOMARKERS OF COMBINED POISONING BY NITRATES AND PESTICIDES

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**Abstract:**

Pesticides as well as nitrates are one of the most prevalent and dangerous environmental pollutants. Obvious, high risk of a joint influence of those compounds exists. Organophosphorous pesticides (dimethoat) are one of the most often reason of worldwide poisoning accidents. The last years more and more widely-used became neonicotinoids (imidacloprid). So, the purposes of the study were to evaluate in vivo the association of N-acetyltransferase activity with susceptibility to combined poisoning by dimethoat and sodium nitrate as well as imidacloprid and sodium nitrates; to identify type and mode of its combined exposure; to detect the indices, which could be used as the effect biomarkers of this intoxications. Exposure was modeled in 56 white male rats, which were divided into animals with high and low (the "rapid" and the "slow" acetylation type) activity of N-acetyltransferase using the loading test with amidopyrine. The rats received toxicants in threshold doses over a period of 28 days. Results were assessed using more than 20 integral and biochemical indices. "Rapid" acetylation type rats were more susceptible to both intoxications. Specifically they had bigger changes of the integral indices (behavioral responses, body weight) and methemoglobin level. We also observed the signs of oxidative stress development as inhibition of the antioxidant protective enzymes and increasing of products level of lipid and proteins peroxidation in blood and hepar of rats with "rapid" type of acetylation. In contrast, in rats with "slow" acetylation type the activity of antioxidative enzymes increased, while the level of peroxidation products did not change. We appraised it as adaptive response. Type of combined action of dimethoat and sodium nitrate was independent or antagonistic according to majority of assessed indices. Imidacloprid and sodium nitrates exposure caused additive change of the most indices and potentiation of methemoglobinemia. So, the "rapid" type of acetylation is a susceptibility biomarker of poisoning by dimethoat and sodium nitrate as well as imidacloprid and sodium nitrates. Imidacloprid exposure potentiates methemoglobinemia effect of sodium nitrates. Increasing the methemoglobin level in blood and the oxidative stress development can serve as the effect biomarkers of those intoxication.

**Keywords:** combined poisoning, susceptibility biomarkers, organophosphorous pesticides, nitrates, neonicotinoids

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