



H111 2,4-Dinitrophenol Toxicity: A Cause of Death That Is Making a Comeback

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Learning Overview: After attending this presentation, attendees will better understand the toxic effects of 2,4-Dinitrophenol (DNP), as well as the antemortem and postmortem evidence associated with its use.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by raising awareness of DNP toxicity and its re-emergence in a culture with increased access to the internet and heightened concerns for body weight and self-image.

DNP is a synthetic chemical that has been used in the production of pesticides, wood preservers, dyes, photographic developers, and explosives.^{2-5,7} It acts by uncoupling oxidative phosphorylation, causing the inefficient production of Adenosine Triphosphate (ATP) and increased metabolism of carbohydrates and lipids.^{5,7} Because of this, it was introduced into medical practice as a weight-reduction drug in the 1930s, but was later banned due to its potent toxicity and adverse side effects.^{2,3,6,7} Despite legislation and warnings of harm associated with its use, reports of deaths due to the use of DNP have increased in the past few years.² This may be due to the fact that DNP is readily available online, sold by unregulated vendors and promoted aggressively among the body-building community.⁵ There is also increasing concern of usage within vulnerable groups, such as those with eating disorders or young and naïve users who are not fully informed about the drug.¹ The resurgence of DNP-related fatalities could pose a problem for emergency room physicians and medical examiners, as there is no antidote for the compound, and proper diagnosis of DNP poisoning becomes challenging without knowledge of its use.^{3,5}

A 47-year-old White male with a past medical history of hypertension was found unresponsive in the bed of his residence by his roommate. The prior night, he experienced fever, labored breathing, and excess sweating. Emergency medical services were contacted, but resuscitative measures were not initiated once postmortem changes were observed. Scene examination revealed a substantial number of stray pills throughout the bedroom and neighboring bathroom. Several prescription medications were located, in addition to vitamins, an empty vial of testosterone, and a used syringe. The decedent had an interest in weightlifting and had a muscular build. Approximately a month after the death, a call was received from the decedent's roommate stating he found evidence to suggest the decedent may have been taking a dietary supplement called DNP at the time of his death. The roommate found email correspondence on the decedent's computer in which he was attempting to purchase the supplement online.

Autopsy findings were significant for moderate pulmonary congestion, focal hemorrhagic gastritis with pill residue in the gastric contents, slight yellow discoloration to the skin of the right arm, and intensely yellow-colored urine. Initial toxicological analysis revealed non-toxic levels of alprazolam, temazepam, oxazepam, lamotrigine, sertraline, and venlafaxine metabolites. After learning of the decedent's potential use of DNP, additional samples were sent to the Center for Forensic Science Research and Education for DNP testing. The samples came back positive for the compound. The cause of death was certified as "2,4-Dinitrophenol Toxicity," with the manner of death being certified as accident.

Given that making a diagnosis of DNP toxicity requires a high index of suspicion and does not present itself in routine toxicological analyses, it is important to understand the factors that may affect an individual's willingness to take this drug, as well as the toxidrome of DNP.⁵ This case is presented as an example of how investigative information, autopsy findings, and toxicological analysis must be combined to diagnose DNP toxicity in a deceased individual.

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2,4-Dinitrophenol, DNP, Toxicity