

# New street drug 'bath salts' packs double punch, mimics effects of two powerful narcotics

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The street drug commonly referred to as "bath salts" is one of a growing list of synthetic and unevenly regulated narcotics that are found across the United States and on the Internet. New research on this potent drug paints an alarming picture, revealing that bath salts pack a powerful double punch, producing combined effects similar to both methamphetamine (METH) and cocaine.

"This combination of effects is particularly novel and unexpected," said Louis J. De Felice of Virginia Commonwealth University's School of Medicine in Richmond. "[Methamphetamine](#) and [cocaine](#) operate in the brain in completely opposite ways. It would be atypical that both drugs would be taken together, but that's the effect that occurs with bath salts."

De Felice and his colleagues will present their research at the 56th Annual Meeting of the Biophysical Society (BPS), held Feb. 25-29 in San Diego, Calif.

The team's research reveals that bath salts contain two structurally similar chemicals that produce quite dissimilar effects on the brain's [dopamine transport system](#). Dopamine is a [neurotransmitter](#) that plays an important role in the brain's pleasure and reward centers. Though bath salts' chemicals are structurally similar, both acting as potent psycho-stimulants, they use completely opposite mechanisms in the brain.

The first component is a dopamine-releasing agent known as mephedrone (MEPH), which – like METH – causes the brain to release more dopamine. The other [chemical](#) is methylenedioxypropylamphetamine (MDPV), which – like cocaine – is a dopamine reuptake inhibitor. Both compounds increase dopamine availability to receptors, and both – through different mechanisms – produce feelings of euphoria.

The surprising finding is that rather than canceling each other out, as would be anticipated, the chemicals combine to enhance the effects of the other. "The two drugs have different kinetics, so rather than cancel each other they exacerbate the effect of either [drug](#) applied alone," said De Felice.

The researchers began this particular project as part of a larger study on how amphetamine and METH affect the human dopamine transporter molecule. They made the novel finding that both chemicals create long-lasting effects that endure 30 minutes or more after the drugs are removed. This initial research continued with cathinone (CATH), which is a naturally occurring compound found in the khat shrub (*Catha edulis*). The drugs found in bath salts (MEPH and MDPV) are synthetic derivatives of CATH.

"The stimulant and blocker features of these drugs have been studied previously," said De Felice, "but the evidence for long-lasting stimulation by MEPH and inhibition by MDPV is novel. It also is in some sense unexpected that two structurally similar agents could act oppositely at the dopamine transporter."

The researchers do not yet know why these drugs have a persistent effect. They also don't understand the fundamental reason why two structurally similar drugs act oppositely on the dopamine transporter.

"There also are many questions on the meaning of these findings for the

dozens of other illicit synthetic drugs that have found their way to the street," concludes De Felice. "We do suspect, however, that the combination that is found in bath salts could be behind its powerful physiological and neurological effect on users."

According to the American Association of Poison Control Centers, there were more than 6,000 calls to poison control centers pertaining to [bath salts](#) in 2011, more than ten times the number in 2010. Reported symptoms of exposure include increased blood pressure, increased heart rate, agitation, hallucinations, extreme paranoia, and delusions.

**More information:** The presentation, "'Bath Salts': A synthetic cathinone whose two major components act similar to methamphetamine and cocaine on the human dopamine transporter," is at 9:15 a.m. on Monday, Feb. 27, 2012, in the San Diego Convention Center, Room 24ABC. ABSTRACT: [tinyurl.com/7qppna8](http://tinyurl.com/7qppna8)

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