

A vaccine against cocaine abuse

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NEWS

As of now, there is no vaccine (FDA-approved) for any drug addiction. “Researchers have produced a lasting anti-cocaine immunity in mice by giving them a safe vaccine that combines bits of the common cold virus with a particle that mimics cocaine.....”^[1]

(RE)VIEW

Principle

Vaccination promises to be a novel approach, wherein the elicited specific antibodies against a habituating drug (e.g., cocaine) block its access to the brain. The mechanism appears to result from the binding of the drug with the elicited circulating IgG antibodies, making the complex impermeable to the blood–brain barrier so that the drug stays in the periphery, leaving the subject deprived of the “high” (euphoria).

Evidence

Adenovirus (Ad) gene transfer vectors are potent immunogens. By covalently linking cocaine to the capsid proteins of Ad vector, a novel vaccine platform was developed. This vaccine evoked a high-titer anticocaine antibody in mice that completely and persistently reversed the hyperlocomotor activity of cocaine.^[2]

TA-CD is an active cocaine vaccine coupled to recombinant

cholera toxin B, developed by Xenova, a UK-based biopharmaceutical company.^[3] Two doses of TA-CD (82 mcg; 360 mcg) at weeks 1, 3, 5 and 9 were administered to 10 cocaine-dependent men not seeking drug treatment and the effects of cocaine (0 mg, 25 mg, 50 mg) were determined before vaccine and weekly thereafter. Those with higher antibody production had an immediate (within 4 min of cocaine smoking) 55–81% reduction in ratings of good drug effect and substantially decreased the intoxicating effects of cocaine. Self-reported cocaine use tended to decrease as a function of antibody titer.^[4]

Related points to ponder

Unlike opiates, there are no effective drugs to manage cocaine dependence. It is mainly managed by behavioral therapy, although with low success rates.^[5]

Cocaine abuse is widespread around the world, and the allergic reactions must be rare compared with other substances of abuse, like opiates.^[6,7]

Specific antibodies when bound to methamphetamine^[8] or morphine^[9] significantly prolong the $t_{1/2}$ of the respective drug in circulation while for cocaine, experimental evidences show that there is no change in $t_{1/2}$. Hence, it is suggested that cocaine is an ideal target for a vaccine as the elicited antibodies might bind subsequent active drug once the previous dose of the drug is cleared.^[10]

Antibodies to cocaine persisted for at least 6 months in the dependent subjects in a Phase IIa study involving a 14-week trial.^[11]

Take home message

The vaccine will be of use only for motivated abusers to quit as the effects of the vaccine can be overcome by increasing the amount of cocaine used, as indicated by quantitative urine tests for benzoylecgonine (cocaine metabolite).^[10]

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News and views

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