The behavioral and neurochemical effects of cocaine are well established, and it is one of the most widely abused illicit drugs. Illicit cocaine is often adulterated with levamisole, which is an anthelmintic that was withdrawn from the US market in 2000. It has been hypothesized that levamisole, unlike other common adulterants which are added as simple bulking agents, has effects of its own which may be responsible for its use as an adulterant. Although these effects are speculative, the addition of levamisole to cocaine has become an increasing public health concern, as serious adverse effects (e.g., vasculitis, neutropenia) of levamisole-adulterated cocaine have been observed in drug users.

The present experiments were intended to provide further information about effects of levamisole that may help to explain its use as an adulterant.
The aim of the first experiment was to determine if adding levamisole alters cocaine self-administration in rats. To this end, the response patterns of rats trained to self-administer cocaine were examined to determine whether they were altered by pretreatment with two doses of levamisole (1 and 10 mg/kg). Although response patterns were generally unaffected, animals consistently consumed less cocaine at all doses tested under both pretreatment conditions. This decrease in responding suggests that levamisole is not added to directly increase per bout cocaine intake.

The aim of the second experiment was to examine how adding levamisole affected the discriminative stimulus properties of cocaine. Rats were trained to discriminate between cocaine and saline injections to earn food in a classic drug discrimination procedure. Various doses of cocaine, levamisole, and cocaine-levamisole combinations were then tested to yield cross-generalization profiles. Levamisole alone failed to produce cocaine-appropriate responding in the majority of animals, but did so in a dose-dependent manner for a small minority. Cocaine-levamisole combinations consistently produced dose-dependent cocaine-appropriate responding, and did so to a greater extent than did the constituent cocaine or levamisole dose alone (i.e., supra-additivity).

The results of these studies are consistent with the popular notion that levamisole is added to cocaine to alter its effects, rather than simply as a bulking agent. Furthermore, these results indicate that a supra-additive interaction between cocaine and levamisole exists with regard to their discriminative stimulus effects. Further research into the behavioral and neurochemical mechanisms of action of cocaine-levamisole combinations is warranted.