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Behavioral effects of acetaldehyde in mice and rats: from reinforcement to amnesia

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Whereas human studies keep reporting evidence that acetaldehyde accumulation prevents alcohol drinking and alcoholism, animal studies support a rewarding rather than aversive role for acetaldehyde. In recent years, the reinforcing properties of acetaldehyde were demonstrated in various rodent strains and using different experimental methods. These results led to the hypothesis that acetaldehyde might be involved in the addictive properties of alcohol. In addition to its possible role in the reinforcing properties of alcohol, there is also evidence that acetaldehyde is involved in many other behavioral effects of ethanol. Using various behavioral procedures with both mice and rats, we have studied the behavioral effects of direct acetaldehyde injections. Additionally, in independent experiments we have compared the effects of ethanol in mice with or without a pre-treatment with the aldehyde dehydrogenase inhibitor cyanamide, which produces acetaldehyde accumulation. The results of these studies show that acetaldehyde produces a wide spectrum of behavioral effects, including reinforcement, aversion, sedation, ataxia and amnesia. These effects were mainly dependent upon acetaldehyde doses, with some of them showing an inverted U shape dose-response curve. These results also suggest that acetaldehyde might mediate or contribute to many of the behavioral effects of ethanol and especially to alcohol abuse and alcoholism.