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Enhanced consumption of salient solutions following pedunculopontine tegmental lesions

D.A.A. MacLaren[a], T. Markovic[a], D. Daniels[b], S.D. Clark[a, b, c]

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Highlights

- Rats with lesions of the pedunculopontine tegmentum consume significantly more 20% sucrose than controls.
- Excitotoxic, but not selective cholinergic lesions, produced overconsumption.
- Using a contact lickometer system it was found that overconsumption is not due to perseveration.
- Overconsumption only occurs for salient solutions—both sucrose and saline are only overconsumed when salient.
- An intact PPTg is important for the normal behavioral response to salient stimuli.

Abstract

Rats with lesions of the pedunculopontine tegmental nucleus (PPTg) reliably overconsume high concentration sucrose solution. This effect is thought to be indicative of response-perseveration or loss of behavioral control in conditions of high excitement. While these theories have anatomical and behavioral support, they have never been explicitly tested. Here, we used a contact lickometer to examine the microstructure of drinking behavior to gain insight into the behavioral changes during overconsumption. Rats received either excitotoxic (ibotenic acid) damage to all PPTg neuronal subpopulations or selective depletion of the cholinergic neuronal sub-population (diphtheria toxin–urotensin II (Dtx–UII) lesions). We offered rats a variety of pleasant, neutral and aversive tastants to assess the generalizability and specificity of the overconsumption effect. Ibotenic-lesioned rats consumed significantly more 20% sucrose than sham controls, and did so through licking significantly more times. However, the behavioral microstructure during overconsumption was unaffected by the lesion and showed no indications of response-perseveration. Furthermore, the overconsumption effect did not generalize to highly consumed saccharin. In contrast,