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## The risk for problematic opioid use in chronic pain: What can we learn from studies of pain and reward?

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### Abstract

Problematic prescription opioid use is cited as a primary contributor to the current 'opioid epidemic' in the United States, which is characterized by recent rapid increases in individuals seeking treatment for opioid dependence and staggering rates of opioid overdose deaths. Individuals with chronic pain are commonly prescribed opioids to treat pain, and by this mere exposure are at increased risk for the development of problematic opioid use. However, the factors contributing to variation in risk across patients have only recently begun to be unraveled. In the present review, we describe the recent and expanding literature on interactions between pain and reward system function in an effort to inform our understanding of risk for problematic opioid use in chronic pain. To that end, we describe the limited experimental evidence regarding opioid abuse liability under conditions of pain, and offer suggestions for how to advance a research agenda that better informs clinicians about the factors contributing to opioid addiction risk in patients with chronic pain. We raise mechanistic hypotheses by highlighting the primary conclusions of several recent reviews on the neurobiology of pain and reward, with an emphasis on describing dopamine deficits in chronic pain, the role of the reward system in mediating the affective and motivational components of pain, and the role of opponent reward/anti-reward processes in the perpetuation of pain states and the development of problematic opioid use behaviors. Finally, we also argue that positive affect-which is directly regulated by the mesolimbic reward system-is a key pain inhibitory factor that, when deficient, may increase risk for problematic opioid use, and present a model that integrates the potential contributions of pain, reward system function, and positive affect to problematic opioid use risk.

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