

# Abuse of painkillers can predispose adolescents to lifelong addiction

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No child aspires to a lifetime of addiction. But their brains might. In new research to appear online in the journal *Neuropsychopharmacology* this week, Rockefeller University researchers reveal that adolescent brains exposed to the painkiller Oxycontin can sustain lifelong and permanent changes in their reward system – changes that increase the drug's euphoric properties and make such adolescents more vulnerable to the drug's effects later in adulthood.

The research, led by Mary Jeanne Kreek, head of the Laboratory of the Biology of Addictive Diseases, is the first to directly compare levels of the chemical dopamine in adolescent and adult mice in response to increasing doses of the painkiller. Kreek, first author Yong Zhang, a research associate in the lab, and their colleagues found that adolescent mice self-administered Oxycontin less frequently than adults, suggesting that adolescents were more sensitive to its rewarding effects. These adolescent mice, when re-exposed to a low dose of the drug as adults, also had significantly higher dopamine levels in the brain's reward center compared to adult mice newly exposed to the drug.

"Together, these results suggest that adolescents who abuse prescription pain killers may be tuning their brain to a lifelong battle with opiate addiction if they re-exposed themselves to the drug as adults," says Kreek. "The neurobiological changes seem to sensitize the brain to the drug's powerfully rewarding properties."

During adolescence, the brain undergoes marked changes. For example,

the brain's reward pathway increases production of dopamine receptors until mid-adolescence and then either production declines or numbers of receptors decline. By abusing Oxycontin during this developmental period, adolescents may inadvertently trick the brain to keep more of those receptors than it really needs. If these receptors stick around and the adolescent is re-exposed to the drug as an adult, the rush of euphoria may be more addictive than the feeling experienced by adults who had never before tried the drug.

In contrast to illicit drug use among adolescents, the problem of nonmedical use of painkillers such as Oxycontin and Vicodin has escalated in recent years, with the onset of abuse occurring most frequently in adolescents and young adults. Recent studies by the National Institute on Drug Abuse and the Substance Abuse and Mental Health Services Administration have shown that 11 percent of persons 12 years old or older have used a prescription opiate illicitly. "Despite the early use of these drugs in young people, little is known about how they differentially affect adolescent brains undergoing developmental change," says Kreek. "These findings gives us a new perspective from which to develop better strategies for prevention and therapy."

Source: Rockefeller University

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