

# Health Advisory

## NICOTINE AND THE ESCALATING RISK OF ADDICTION FOR YOUTH

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Youth e-cigarette use has risen dramatically in Minnesota in the last three years, with an almost 50 percent increase in high school student e-cigarette use since 2014.<sup>1</sup> This is a major public health concern. Youth use of nicotine increases their risk of addiction, and can make them more susceptible to addiction to tobacco products and other substances in the future. The Minnesota Department of Health recommends immediate action requiring the participation of parents, educators, health care providers, and policy makers.

### **Nicotine primes the adolescent brain for addiction.**

Addiction is a form of learning, where the brain learns to connect a stimulus (for example, smoking a cigarette or e-cigarette) with a response (feelings of pleasure and calming of cravings).<sup>2</sup> Each time a new skill or memory is learned, stronger connections – or synapses – are built between brain cells. Young people build synapses faster than adults. Nicotine changes the way these synapses are formed. **Youth exposed to nicotine are at higher risk for addiction than are adults because youth brains are still forming and making permanent connections.**<sup>2,3,4,5</sup> Studies show that symptoms of nicotine addiction can appear among youth within only a few days or weeks after smoking initiation.<sup>6,7</sup> The use of nicotine in e-cigarettes—nearly all of which contain nicotine<sup>8,9,10</sup>—and other tobacco products primes the adolescent brain for addiction. This could have significant public health consequences, including potentially increasing the risk for youth of future addiction.<sup>2</sup>

### **Youth who are exposed to nicotine are more likely to use other substances.**

Receptors in the brain are stimulated by exposure to nicotine, which triggers a rewarding effect on the brain. These receptors respond to and enhance the effects of nicotine and other drugs. The more adolescents are exposed to nicotine, the greater the sense of enjoyment because the effects of nicotine and other drugs are made stronger by repeated exposure. This effect increases the likelihood that youth will develop a dependence on those drugs.<sup>3,4,11</sup> For example, studies have found that young adults who smoke cigarettes or who use e-cigarettes are much more likely to binge drink than non-smokers.<sup>11,12</sup> More recent studies have identified similar patterns between use of nicotine and use of other drugs, including marijuana, cocaine, and methamphetamines.<sup>13,14,15,16,17,18,19,20</sup>

### **New e-cigarette technologies pose greater risks for youth.**

Popular e-cigarettes like JUUL have developed new technologies utilizing nicotine salts that are absorbed into the body more effectively and come in record-high levels of nicotine. According to the