

The Brain's Reward System and Drug Addiction

Emotions are strongly influenced by a neuronal circuit in the brain called the reward system. The reward system provides motivation for activities that enhance survival and reproduction, such as eating in response to hunger, drinking when thirsty, and engaging in sexual activity when aroused. Inputs to the reward system are received by neurons in the ventral tegmental area (VTA), a region located within the midbrain. When activated, these neurons release the neurotransmitter dopamine from their synaptic terminals. Targets of this dopamine signaling include the nucleus accumbens and the prefrontal cortex.

The brain's reward system is dramatically affected by drug addiction, a disorder characterized by compulsive consumption of a drug and loss of control in limiting intake. Addictive drugs range from sedatives to stimulants and include alcohol, cocaine, and nicotine, as well as opioids, such as heroin, fentanyl and oxycodone. As addiction develops, there are also long-lasting changes in the reward circuitry. The result is a craving for the drug independent of any pleasure associated with consumption.

▼ **Figure 49.24 Effects of addictive drugs on the reward system of the mammalian brain.** Addictive drugs alter the transmission of signals in the pathway formed by neurons of the ventral tegmental area (VTA), a region located near the base of the brain.

