

The category of stimulant drugs is a heterogenous group of substances which benefit-to-harm ratio varies widely. This work attempts to use a systemic approach in order to characterize the underlying basis of the physiological effects of their selected representatives in brain. A brief pharmacological description of caffeine, nicotine, cocaine, amphetamine and methamphetamine is followed by an identification of main molecular targets of these drugs in the context of respective neurotransmitter systems. Major attention is given to both acute and chronic molecular mechanisms of action of the selected stimulant drugs up to the level of selected relevant neural circuits. In the next section stimulant drugs are presented as Trojan horses that attack the motivational system of the brain. Initially, a theoretical analysis of reward together with a neuroanatomical dissection of reward-related circuitry serves as a basis for the formulation of contemporary theories of drug addiction. Finally, an effort is made to synthesize common molecular events with specific aspects of reward in order to draw a picture of the neurobiological view of addiction.