Caffeine

National Cancer Institute

Source

National Cancer Institute. Caffeine. NCI Thesaurus. Code C328.

A methylxanthine alkaloid found in the seeds, nuts, or leaves of a number of plants native to South America and East Asia that is structurally related to adenosine and acts primarily as an adenosine receptor antagonist with psychotropic and anti-inflammatory activities. Upon ingestion, caffeine binds to adenosine receptors in the central nervous system (CNS), which inhibits adenosine binding. This inhibits the adenosine-mediated downregulation of CNS activity; thus, stimulating the activity of the medullary, vagal, vasomotor, and respiratory centers in the brain. This agent also promotes neurotransmitter release that further stimulates the CNS. The anti-inflammatory effects of caffeine are due the nonselective competitive inhibition of phosphodiesterases (PDEs). Inhibition of PDEs raises the intracellular concentration of cyclic AMP (cAMP), activates protein kinase A, and inhibits leukotriene synthesis, which leads to reduced inflammation and innate immunity.