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https://www.100test.com/kao_ti2020/206/2021_2022_GMAT_E6_9C_BA_E8_80_83_c89_206600.htm Caffeine, the stimulant in coffee, has been called "the most widely used psychoactive substance on Earth." Snyder, Daly and Bruns have recently proposed that caffeine affects behavior by countering the activity in (5) the human brain of a naturally occurring chemical called adenosine. Adenosine normally depresses neuron firing in many areas of the brain. It apparently does this by inhibiting the release of neurotransmitters, chemicals that carry nerve impulses from one neuron to the next. (10) Like many other agents that affect neuron firing, adenosine must first bind to specific receptors on neuronal membranes. There are at least two classes of these receptors, which have been designated A1 and A2. Snyder et al propose that caffeine, which is struc-(15) turally similar to adenosine, is able to bind to both types of receptors, which prevents adenosine from attaching there and allows the neurons to fire more readily than they otherwise would. For many years, caffeine's effects have been attri-(20) buted to its inhibition of the production of phosphodi-esterase, an enzyme that breaks down the chemical called cyclic AMP. A number of neurotransmitters exert their effects by first increasing cyclic AMP concentra-tions in target neurons. Therefore, prolonged periods at the elevated concentrations, as might be brought about by a phosphodiesterase inhibitor, could lead to a greater amount of neuron firing and, consequently, to behav-ioral stimulation. But Snyder et al point out that the caffeine

concentrations needed to inhibit the production(30) of phosphodiesterase in the brain are much higher than those that produce stimulation. Moreover, other compounds that block phosphodiesterase's activity are not stimulants. To buttress their case that caffeine acts instead by pre-(35)venting adenosine binding, Snyder et al compared the stimulatory effects of a series of caffeine derivatives with their ability to dislodge adenosine from its receptors in the brains of mice. "In general," they reported, "the ability of the compounds to compete at the receptors(40) correlates with their ability to stimulate locomotion in the mouse. i.e., the higher their capacity to bind at the receptors, the higher their ability to stimulate locomotion." Theophylline, a close structural relative of caffeine and the major stimulant in tea, was one of the most(45) effective compounds in both regards. There were some apparent exceptions to the general correlation observed between adenosine-receptor binding and stimulation. One of these was a compound called 3-isobutyl-1-methylxanthine(IBM), which bound very(50) well but actually depressed mouse locomotion. Snyder et al suggest that this is not a major stumbling block to their hypothesis. The problem is that the compound has mixed effects in the brain, a not unusual occurrence with psychoactive drugs. Even caffeine, which is generally(55) known only for its stimulatory effects, displays this property, depressing mouse locomotion at very low concentrations and stimulating it at higher ones.1. The primary purpose of the passage is to (A) discuss a plan for investigation of a phenomenon that is not yet fully understood(B) present two explanations of a

phenomenon and reconcile the differences between them(C)
summarize two theories and suggest a third theory that overcomes
the problems encountered in the first two(D) describe an alternative
hypothesis and provide evidence and arguments that support it(E)
challenge the validity of a theory by exposing the inconsistencies and
contradictions in it². Which of the following, if true, would most
weaken the theory proposed by Snyder et al?(A) At very low
concentrations in the human brain, both caffeine and theophylline
tend to have depressive rather than stimulatory effects on human
behavior.(B) The ability of caffeine derivatives at very low
concentrations to dislodge adenosine from its receptors in mouse
brains correlates well with their ability to stimulate mouse
locomotion at these low concentrations(C) The concentration of
cyclic AMP in target neurons in the human brain that leads to
increased neuron firing can be produced by several different
phosphodiesterase inhibitors in addition to caffeine.(D) The
concentration of caffeine required to dislodge adenosine from its
receptors in the human brain is much greater than the concentration
that produces behavioral stimulation in humans.(E) The
concentration of IBMX required to dislodge adenosine from its
receptors in mouse brains is much smaller than the concentration
that stimulates locomotion in the mouse.

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