

SUMMARY OF CLINICAL STUDIES

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Caffeine to Enhance Cognitive Performance

Caffeine supplements may enhance cognitive performance, according to these clinical studies on humans.

- <u>Caffeine enhances sustained attention among adolescents.</u> In 2021, this study found that "caffeine acutely and dose-dependently improves sustained attention."
- Effect of single caffeine intake on neuropsychological functions in healthy volunteers: A double-blind placebo-controlled study. In 2018, this study found that "participants in the caffeine group had more correct responses than participants in the placebo group on the SAT and made fewer errors [and] participants in the caffeine group exhibited shorter times in the Harsh-braking test."
- Effects of diurnal variation and caffeine consumption on Test of Variables of <u>Attention (TOVA) performance in healthy young adults.</u> In 2011, this study found that "Caffeine consumption led to significantly faster response times, but only for participants who typically consumed relatively little caffeine."
- Effects of caffeine and glucose, alone and combined, on cognitive performance. In 2010, this study found that "Caffeine only showed improvement in simple reaction time [and] caffeine and glucose can benefit sustained attention and

verbal memory."

Caffeine to Enhance Energy

Caffeine supplements may enhance energy, according to these clinical studies on humans:

- <u>Acute caffeine ingestion's increase of voluntarily chosen resistance-training load</u> <u>after limited sleep.</u> In 2012, this study found that "Caffeine increased voluntary workload in professional athletes, even more so under conditions of self-reported limited sleep."
- <u>Caffeine ingestion reverses the circadian rhythm effects on neuromuscular</u> performance in highly resistance-trained men. In 2012, this study found that "caffeine increases neuromuscular performance."
- Induced alkalosis and caffeine supplementation: effects on 2,000-m rowing performance. In 2011, this study found that "rowers' performance in 2,000-m efforts can improve by ... caffeine supplementation."
- <u>Caffeine and opening the eyes have additive effects on resting arousal</u> <u>measures.</u> In 2011, this study found that "Caffeine and opening the eyes have additive effects on two measures of arousal."
- Effects of caffeine on repeated sprint ability, reactive agility time, sleep and next day performance. In 2010, this study found that "Caffeine improved [repeated sprint ability], including next day performance."
- Effect of two doses of caffeine on muscular function during isokinetic exercise. In 2010, this study found that "relatively high but not low caffeine dose is ergogenic for maximal knee extension/flexion exercise."
- <u>Caffeine supplementation and multiple sprint running performance</u>. In 2008, this study found that "caffeine has ergogenic properties with the potential to benefit performance in both single and multiple sprint sports."

- Influence of caffeine on perception of effort, metabolism and exercise performance following a high-fat meal. In 2006, this study found that "while a number of metabolic responses were increased during exercise after caffeine ingestion, perception of effort was reduced and this may be attributed to the direct stimulatory effect of caffeine on the central nervous system."
- Effects of caffeine on prolonged intermittent-sprint ability in team-sport athletes. In 2006, this study found that "acute caffeine ingestion can significantly enhance performance of prolonged, intermittent-sprint ability in competitive, male, team-sport athletes."
- <u>Subjective</u>, <u>behavioral</u>, <u>and physiological effects of acute caffeine in light</u>, <u>nondependent caffeine users</u>. In 2006, this study found that "acute doses of caffeine, at levels typically found in a cup of coffee, produce stimulant-like subjective effects and enhance performance in light, nondependent caffeine users."

This clinical study shows that the energy promotion benefits of caffeine supplements decrease with chronic supplementation. It may be most effective to cycle caffeine supplements, avoiding daily use.

<u>Time course of tolerance to the performance benefits of caffeine.</u> In 2019, this study found that "the magnitude of the ergogenic effect of caffeine vs. placebo was higher on the first day of ingestion and then progressively decreased." Eleven participants used approximately 200 mg caffeine or placebo daily for 20 days.

Ginseng to Enhance Focus

Ginseng supplements may enhance focus, according to these clinical studies on humans:

• Panax ginseng (G115) improves aspects of working memory performance and subjective ratings of calmness in healthy young adults. In 2010, this study found

that Ginseng "improved calmness and improved mental arithmetic." Participants with the best results used 400 mg of 4% ginsenoside extract (16 mg ginsenoside) daily. Supplementation was effective on the first day and remained effective on the eighth day.

- Effects of Panax ginseng, consumed with and without glucose, on blood glucose levels and cognitive performance during sustained 'mentally demanding' tasks. In 2006, this study found that Ginseng "can enhance cognitive performance." Participants used 200 mg of 4% ginsenoside extract (8 mg ginsenoside). Supplementation was effective on the first day.
- <u>Single doses of Panax ginseng (G115) reduce blood glucose levels and improve cognitive performance during sustained mental activity.</u> In 2005, this study found that Ginseng "can improve performance and subjective feelings of mental fatigue during sustained mental activity." Participants with the best results used 200 mg of 4% ginsenoside extract (8 mg ginsenoside). Supplementation was effective on the first day.
- Effects of Panax ginseng on quality of life. In 2002, this study found that Ginseng "improves aspects of mental health and social functioning." Participants used 200 mg daily. Supplementation was effective at one month and less effective at two months.

This clinical study review indicates that Ginseng extract from leaves and stems may be as effective and more sustainable than Ginseng extract from roots:

• <u>Ginseng leaf-stem: bioactive constituents and pharmacological functions.</u> In 2009, this review observed that "extracts from ginseng root and leaf-stem have similar multifaceted pharmacological activities ... in terms of costs and source availability, however, ginseng leaf-stem has advantages over its root."

Ginseng and Caffeine to Enhance Energy

The combination of Ginseng and Caffeine supplements may enhance energy, according to this clinical study on humans:

• Effects of acute supplementation of caffeine and Panax ginseng on endurance running performance in a hot and humid environment. In 2011, this study found that "combined and acute supplementation of caffeine and PG in the said doses improved the endurance running performance of the heat-adapted male recreational runners." Participants used 200 mg of Ginseng. Supplementation was effective on the first day.

L Theanine to Enhance Relaxation

L Theanine supplements may enhance relaxation without sedation, according to these clinical studies on humans:

- Anti-stress effect of theanine on students during pharmacy practice: positive correlation among salivary α-amylase activity, trait anxiety and subjective stress. In 2013, this study found that L-Theanine "intake suppressed initial stress response of students assigned for a long-term commitment of pharmacy practice."
- Effects of I-theanine on attention and reaction time response. In 2011, this study found that L-Theanine "clearly has a pronounced effect on attention performance and reaction time response in normal healthy subjects prone to have high anxiety."
- <u>L-Theanine reduces psychological and physiological stress responses.</u> In 2007, this study found that "oral intake of [L-Theanine] could cause anti-stress effects via the inhibition of cortical neuron excitation."
- <u>The acute effects of L-theanine in comparison with alprazolam on anticipatory</u> <u>anxiety in humans.</u> In 2004, this study found that L-Theanine "may have some relaxing effects under resting conditions."
- Effects of Theanine on the Release of Brain Alpha Wave in Adult Males. In 2003, this study found that L-Theanine "containing tablets promote the release of alpha waves related to mental relaxation and concentration in young adult males."

L Theanine and Caffeine to Enhance Focus

The combination of L Theanine and Caffeine supplements may enhance focus, according to these clinical studies on humans:

- <u>Effects of a Multi-Ingredient Energy Supplement on Cognitive Performance and</u> <u>Cerebral-Cortical Activation.</u> In 2019, this study found that a supplement containing L Theanine and Caffeine "can increase cerebral-cortical activation and RT during task performance while increasing sensitivity to target stimuli."
- I-Theanine and caffeine improve target-specific attention to visual stimuli by decreasing mind wandering: a human functional magnetic resonance imaging study. In 2018, this study found that "I-theanine and caffeine seem to have a synergistic action in decreasing mind wandering."
- Acute effects of theanine, caffeine and theanine-caffeine combination on attention. In 2017, this study found that L Theanine "improves cognitive and neurophysiological measures of selective attention, to a degree that is comparable with that of caffeine. Theanine and caffeine seem to have additive effects on attention in high doses."
- <u>The combination of L-theanine and caffeine improves cognitive performance and increases subjective alertness.</u> In 2010, this study found that "L-theanine in combination with ... caffeine helps to focus attention during a demanding cognitive task."
- <u>L-theanine and caffeine improve task switching but not intersensory attention or</u> <u>subjective alertness.</u> In 2010, this study found that "L-theanine and caffeine in combination can improve attention."
- <u>The combined effects of L-theanine and caffeine on cognitive performance and</u> <u>mood.</u> In 2008, this study found that "L-theanine and caffeine in combination are beneficial for improving performance on cognitively demanding tasks."

- The effects of L-theanine, caffeine and their combination on cognition and mood. In 2008, this study found that "in addition to improving [rapid visual information processing] accuracy and 'mental fatigue' ratings, the combination also led to faster simple reaction time, faster numeric working memory reaction time and improved sentence verification accuracy ... 'headache' and 'tired' ratings were reduced and 'alert' ratings increased ... there was also a significant positive caffeine x L-theanine interaction on delayed word recognition reaction time."
- <u>Time for tea: mood, blood pressure and cognitive performance effects of caffeine</u> <u>and theanine administered alone and together.</u> In 2008, this study found that "Theanine antagonised the effect of caffeine on blood pressure."
- L-theanine and caffeine in combination affect human cognition as evidenced by oscillatory alpha-band activity and attention task performance. In 2008, this study found that "combined ingestion of [caffeine and theanine] ... facilitated behavioral performance."