Coffee and **Sports Performance Factsheet**

Key Points

- Moderate caffeine supplementation is associated with improvements in sports performance
- Aerobic endurance shows the most consistent benefits from caffeine supplementation
- Individual responses differ due to factors such as individual sensitivity and type of exercise
- Caffeinated coffee can be an effective source of caffeine, however many sports performance studies have used caffeine supplements rather than coffee so findings may vary

Background

- Research suggests that caffeine may help to improve physical performance during endurance and high-intensity exercise, in both trained and untrained sportspeople[1,2].
- The benefits have been observed with moderate amounts of caffeine (around 3mg/kg body weight) across a range of sports, including endurance events, team and racquet sports and sustained high-intensity activity such as swimming and rowing[3,4].

Practical considerations

- Individual responses differ due to factors such as individual sensitivity, habitual caffeine intake, genetic differences in caffeine metabolism, possible effects on sleep and type of exercise[5].
- The effects of caffeine supplementation have typically been studied around 60 minutes before exercise, though timing depends on the delivery method (e.g. caffeine chewing gums act faster that capsules)[5].

Association with CVD risk

- Caffeine has been shown to provide small to moderate improvements across a range of exercise performance, including endurance, strength, movement velocity, sprinting, jumping, throwing, and aerobic and anaerobic sport-specific actions[5].
- Aerobic endurance shows the most consistent benefits from caffeine supplementation, although responses vary between individuals[5].
- When consumed in moderate amounts, caffeine may also benefit some short-duration, high-intensity activities, including power-based sports and team sports, although effects are more variable[6,7,8].

Potential mechanism

The impact of caffeine supplementation is strongest for aerobic endurance performance.

- Caffeine blocks adenosine receptors in the brain, helping to reduce tiredness and increase adrenaline production[9].
- Caffeine can modulate fatigue and reduce perceived exertion and pain while increasing feelings of vigour[9].
- The increased production of adrenalin may help to stimulate energy production and improve blood flow to the muscles and heart[9].

Fluid balance

- Fluid balance is particularly important for athletes, as dehydration can reduce performance.
- Coffee contains over 95% water and contributes to fluid balance. While caffeine in coffee can have a mild, short-term diuretic effect, this does not offset the fluid intake provided by the beverage when consumed in moderate amounts[10,11].

Important notes

- Many sports performance studies have used caffeine supplements rather than coffee. While these provide a useful basis to explain the effects of coffee, the composition and caffeine content of coffee varies and so findings may differ.

Scan to explore the research on Sports Performance in more detail

Safety considerations

Moderate caffeine consumption is associated with improvements in sports performance[12]. The European Food Safety Authority's (EFSA) review on the Safety of Caffeine concluded that single servings of caffeine up to 200mg (about 3mg/kg body weight) from all sources do not raise safety concerns for healthy adults, including when consumed less than two hours before intense physical exercise under normal environmental conditions[13].

References

1 Astorino T.A. et al. (2012) Effect of caffeine on RPE and perceptions of pain, arousal, and pleasure/displeasure during a cycling time trial in endurance trained and active men. *Physiol Behav*, 106(2):211-7. doi: 10.1016/j.physbeh.2012.02.006.

2 Laurence G. et al. (2012) Effects of caffeine on time trial performance in sedentary men. *J Sports Sci*, 30 (12):1235-1240. doi: 10.1080/02640414.2012.693620.

3 Burke L.M. (2008) Caffeine and sports performance. *Appl Physiol Nutr Metab*, 33(6):1319-1334. doi: 10.1139/H08-130.

4 Goldstein E.R. et al. (2010) International Society of Sports Nutrition position stand: caffeine and performance. *J Int Soc Sports Nutr*, 7:5. doi: 10.1186/1550-2783-7-5.

5 Guest N.S. et al. (2021) International Society of Sports Nutrition position stand: caffeine and exercise performance. *J Int Soc Sports Nutr*, 18:1. doi: 10.1186/s12970-020-00383-4.

6 Astorino T.A. and Roberson D.W. (2010) Efficacy of acute caffeine ingestion for short-term high-intensity exercise performance: a systematic review. *J Strength Cond Res*, 24(1):257-265. doi: 10.1519/JSC.0b013e3181c1f88a.

7 Grgic J. (2018) Caffeine ingestion enhances Wingate performance: a meta-analysis. *Eur J Sport Sci*, 18(2):219-225. doi: 10.1080/17461391.2017.1394371.

8 Ferreira R.E.S. et al. (2021) Effects of caffeine supplementation on physical performance of soccer players: systematic review and meta-analysis. *Sports Health*, 13(4):347-358. doi: 10.1177/1941738121998712.

9 Hodgson A.B. et al. (2013) The metabolic and performance effects of caffeine compared to coffee during endurance exercise. *PLoS One*, 8(4):e59561. doi: 10.1371/journal.pone.0059561.

10 Silva A.M. et al. (2013) Total body water and its compartments are not affected by ingesting a moderate dose of caffeine in healthy young adult males. *Appl Physiol Nutr Metab*, 38(6):626-632. doi: 10.1139/apnm-2012-0253.

11 Killer S.C. et al. (2014) No evidence of dehydration with moderate daily coffee intake: a counterbalanced cross-over study in a free-living population. *PLoS One*, 9(1):e84154. doi: 10.1371/journal.pone.0084154.

12 EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA) (2011) Scientific opinion on the substantiation of health claims related to caffeine and increased physical performance during short-term high-intensity exercise, increased endurance performance and capacity, and reduced perceived exertion pursuant to Article 13(1) of Regulation (EC) No 1924/2006. *EFSA Journal*, 9(4):2053. doi: 10.2903/j.efsa.2011.2053.

13 EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA) (2015) Scientific opinion on the safety of caffeine. *EFSA Journal*, 13(5):4102. doi: 10.2903/j.efsa.2015.4102.