Caffeine and Endurance Exercise: What is best practice?

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Caffeine and Endurance Exercise

Ganio et al. (2009) conducted a systematic review of the effect of caffeine on endurance performance in time trial tasks.

The mean improvement in performance with caffeine ingestion was 3.2 ± 4.3%; however, this improvement was highly variable between studies (-0.3 to 17.3%).


Reasons for Variation in Caffeine Study Results

- Dose
- Timing
- Withdrawal
- Test Protocol
- Mode of Delivery
- Habituation
- Training Status

Caffeine Studies

- Balance between control and application
- Dietary standardisation
  - Fasted
  - Replicate the same thing on all trials
  - Provide guidelines
  - Pre-package food
- Test protocol
  - Time to fatigue
  - Time trial, fixed end point

The Best Balance

- 24hr food provision
  - 8g/kg carbohydrate
  - 200 kJ/kg energy
- Meal 2hrs before performance test
  - 2g/kg carbohydrate
  - 40kJ/kg energy
- Carbohydrate during test
  - Approx 60g/hr
- Time trial protocol
  - 2 familiarisation sessions
  - Valid, reliable and has application
- Well trained participants
- Measure plasma caffeine
- Double blind, randomised
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Dose Comparison
- 16 well trained men (VO2max = 60ml/kg/min)
- Placebo, 3mg/kg and 6mg/kg caffeine trials
- Caffeine 90 mins before exercise
- Cycle time trial

Take Home Message
- Doses higher than 3mg/kg of caffeine provide no extra benefit
- 3mg/kg caffeine
  - 2 cups coffee
  - 2-3 x 250ml cans red bull
  - 8 cups of tea
  - 2 NoDoz tablets
  - Too much chocolate to be of benefit!!
Timing Study
- 14 well trained men
- 3 trials
  - Placebo
  - 6mg/kg caffeine 60 mins before test
  - 6mg/kg caffeine taken to elicit peak plasma caffeine before test (2-2.5 hours)
  - Placebo capsules taken at both time points for blinding
- Cycle time trial

Take Home Message
- Timing the consumption of the dose of caffeine to elicit peak plasma levels does not lead to any extra benefits in performance compared with consuming caffeine 60 minutes before exercise
- More questions about the potential mechanism of action involved in the ergogenic effect of caffeine

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Withdrawal Study

- 12 well trained men
- 4 trials
  - 4 days of placebo & placebo before test
  - 4 days of placebo & 3mg/kg caffeine before test
  - 4 days of 1.5mg/kg/day caffeine & placebo before test
  - 4 days of 1.5mg/kg/day caffeine & 3mg/kg caffeine before test
- Participants blinded throughout the study
- Cycle time trial

<table>
<thead>
<tr>
<th>Trial</th>
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<tr>
<td>PP</td>
<td>59:53 ± 4:54</td>
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<tr>
<td>CP</td>
<td>59:46 ± 4:13</td>
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<tr>
<td>PC</td>
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Take Home Message

- Withdrawing from caffeine has no influence on the ergogenic effect of caffeine.

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Athlete Knowledge and Attitudes

- Athletes believe caffeine is ergogenic
- Athletes are unsure about the dose required
- Athletes are unsure about the caffeine content of common foods
- Athletes get information about caffeine from a variety of sources and sports medicine professionals are low down on this list

Best Practice Guidelines

- Optimal caffeine dose appears to be 3mg/kg
- Consume caffeine 60-90 minutes before event
- No need to withdraw from caffeinated foods and beverages in the days leading up to the event
- Caffeine tablets may be the more sure method of delivery
- Educate athletes on the caffeine use and the content of common foods