The Effects of Aerobic, Resistance, and HIIT Exercise on Testosterone and Cortisol

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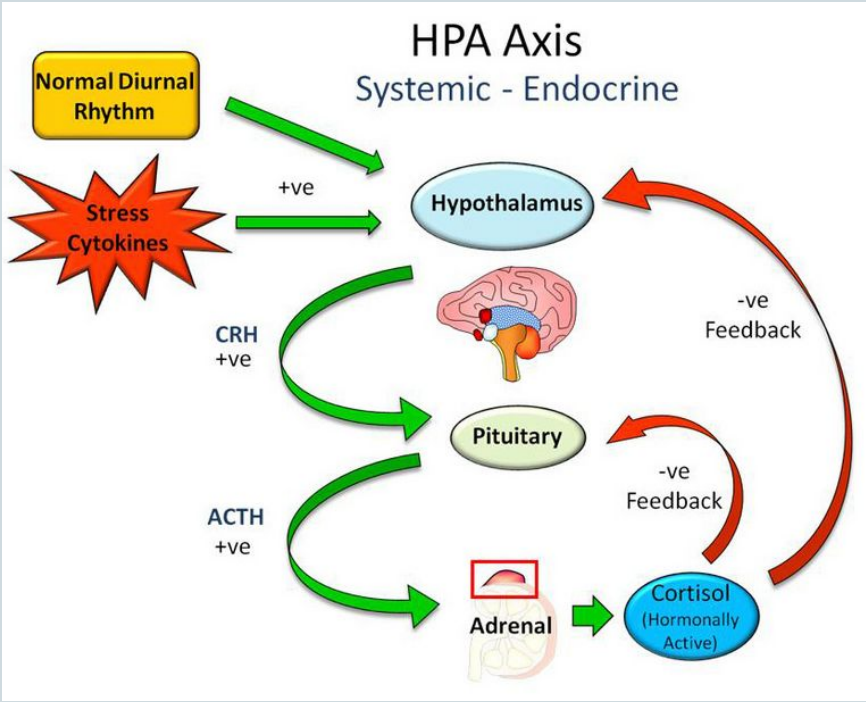
Overview

- Background information
  - Hormones
    - Cortisol
    - Testosterone
  - Types of exercise
- Why does this all matter?
- Hypotheses
- Study Design & Procedure
- Data Analysis
- Expected Outcomes & Alternatives

Cortisol

- Hypothalamic-Pituitary-Adrenal (HPA) axis
- Stress hormone
  - ‘Fight or Flight’
- Exercise as a stressor



Cortisol x Exercise

- Aerobic exercise
  - Intermittent cycling, salivary-cortisol increase (J.P. Hough et al., 2011)
- Resistance exercise
  - 1 rep max for 3 exercises, large variability in salivary-cortisol (Ghigiarelli et al., 2013)
- HIIT
  - Initial data shows salivary-cortisol increase

Testosterone

- Hypothalamic-Pituitary-Gonadal (HPG) axis
- Testosterone increases:
  - Mating efforts
  - After a competitive win
  - During aggressiveness
- Dual-hormone hypothesis
  - HPA mediates HPG levels
- Side Note: Hormone level delay in saliva

Testosterone x Exercise

- Aerobic exercise
  - Increase in salivary-testosterone after cycling intervals (J.P. Hough et al., 2011)
- Resistance exercise
  - After 1 rep max, salivary-testosterone increase (Ghigiarelli et al., 2013)
- HIIT
  - No testosterone evidence

Why does this all matter?

- Anxiety
  - Exercise as a treatment
  - Hormone effects
- Age related disorders

Study Design

- Hypotheses:
  - H1: ↓pre-ex C & ↑ pre-ex T →larger T increase after resistance than aerobic
  - H2: Under the same conditions (↓ pre-ex C & ↑ pre-ex T) → largest T increase after HIIT, as compared to aerobic and resistance
  - H3: ↑pre-ex C & both ↑/↓ T →No effect for all three exercise styles

Study Design

- Independent Variables
  - Types of exercise
    - Aerobic
    - Resistance
    - High Intensity Interval Training (HIIT)
- Dependent Variables
  - Post-exercise hormone levels
    - Salivary-testosterone
    - Salivary-cortisol

Methods Overview

- Participants
  - 100 undergraduate males
  - SONA recruitment
- Hormone measurement
  - 1.8 mL of saliva
  - Hormone fluctuations (Touitou & Haus, 2000)

Procedure

- Obtain consent
- Pre-exercise saliva sample & resting heart rate taken
- 3 minute directed stretch
- Perform the exercise
  - Aerobic / Resistance / HIIT
- 3-5 minute cool-down
- Post-exercise saliva samples taken

Exercise Modalities

- Aerobic
  - Stationary Bike
  - 5 minute slow warm-up
  - 25 minutes at 65-75% VO_2max
- Resistance
  - 4 Weightlifting exercises (Ghigiarelli, Sell, Raddock, & Taveras, 2013)
    - Bench press, Back squat, Seated row, and Leg press
  - 8-10 reps each at 70% 1 rep max, 3 sets each
- HIIT
  - In-progress

Data Analysis

- Descriptive statistics for all dependent variables
- Analysis of variance (ANOVAs)
  - Hormones x Exercise conditions

Expected Outcomes

- T increase from HIIT = largest
- T increases between pre → post for all exercises
- If C is high, then no effect on T
- After HIIT, Cortisol increase

- Alternatives,
  - Exercise has no effect on testosterone and cortisol
  - ↑ pre-ex C → ↑ post-ex T