

# Decoding the 31-Day Exogenous Ketone Trial

A visual synthesis distilling the physiological, cognitive, and metabolic impacts of high-dose Ketone Monoester (KME) on endurance athletes.



Based on the 2026  
Randomized Controlled  
Trial by Prins et al.

# Two Paths to Nutritional Ketosis

What happens to human physiology when endurance athletes chronically consume high-dose exogenous ketones without restricting their habitual carbohydrate intake?

## Panel A: Endogenous (The Slow Path)



Restrictive Diet



Bloodstream  
(Ketone Production)

## Panel B: Exogenous (The Rapid Path)



Exogenous Ketone  
Supplement

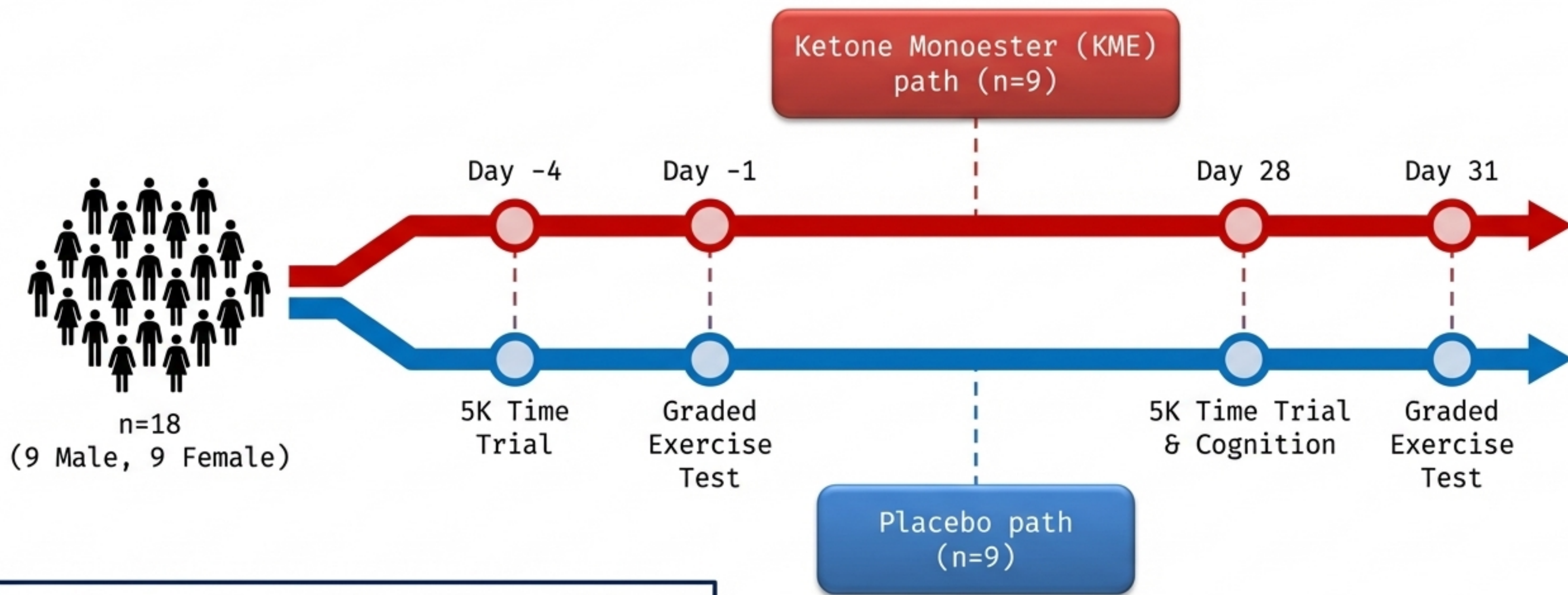


Inactive Liver  
(Bypassed)



Bloodstream  
(Ketone Saturation)

# The 31-Day Telemetry Protocol

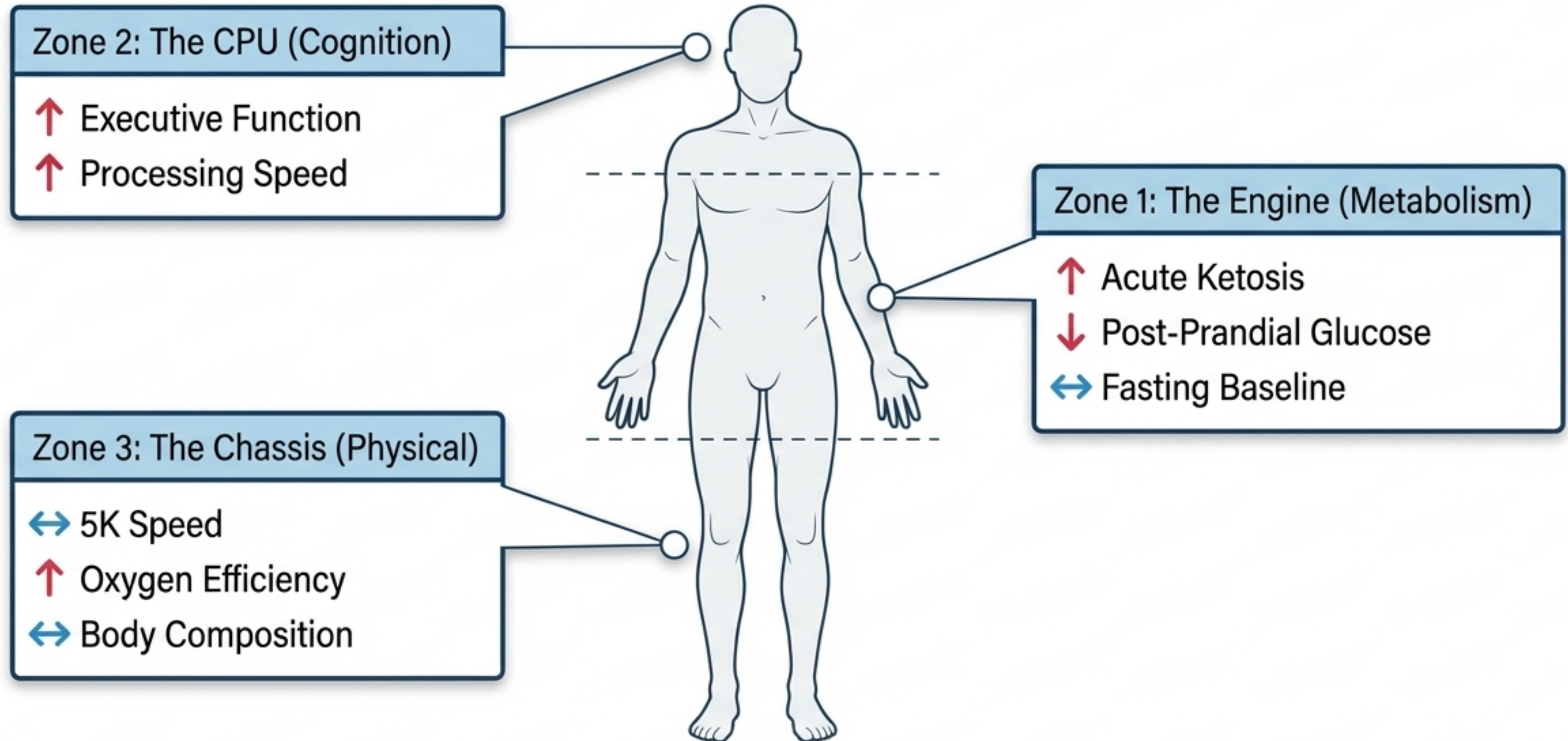


## The Parameters:

- The Dose: 90g/day (3x30g doses)
- The Diet: Uncontrolled habitual diets

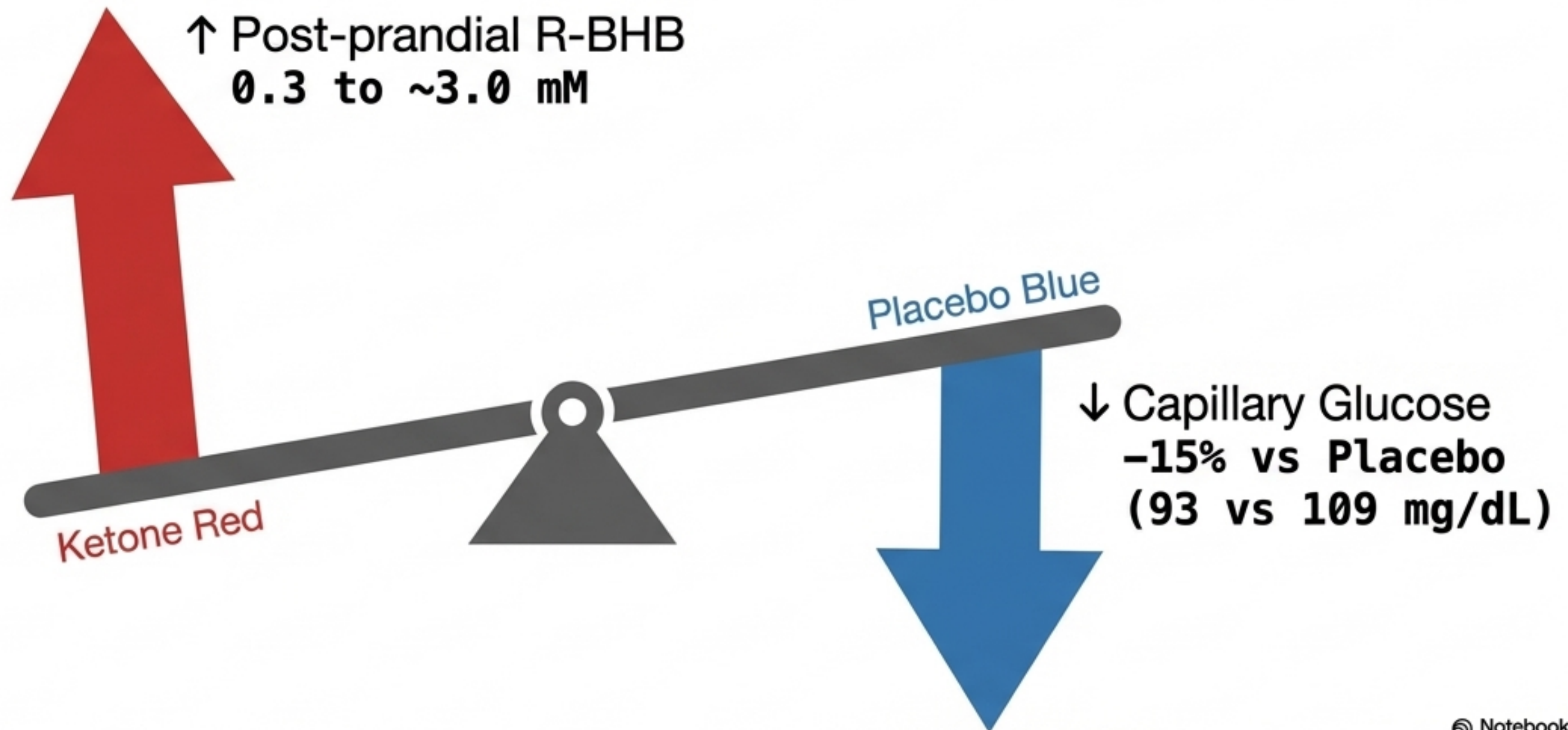
# Multi-System Diagnostic Readout

High-dose KME interventions yield highly specific, localized adaptations rather than universal performance enhancements.



# The Glucose-Ketone Seesaw

High-dose KME reliably induces deep nutritional ketosis **within 30 minutes of ingestion**, entirely independent of dietary carbohydrate restriction. This massive ketone influx simultaneously exerts a strong, reliable glucose-lowering effect.



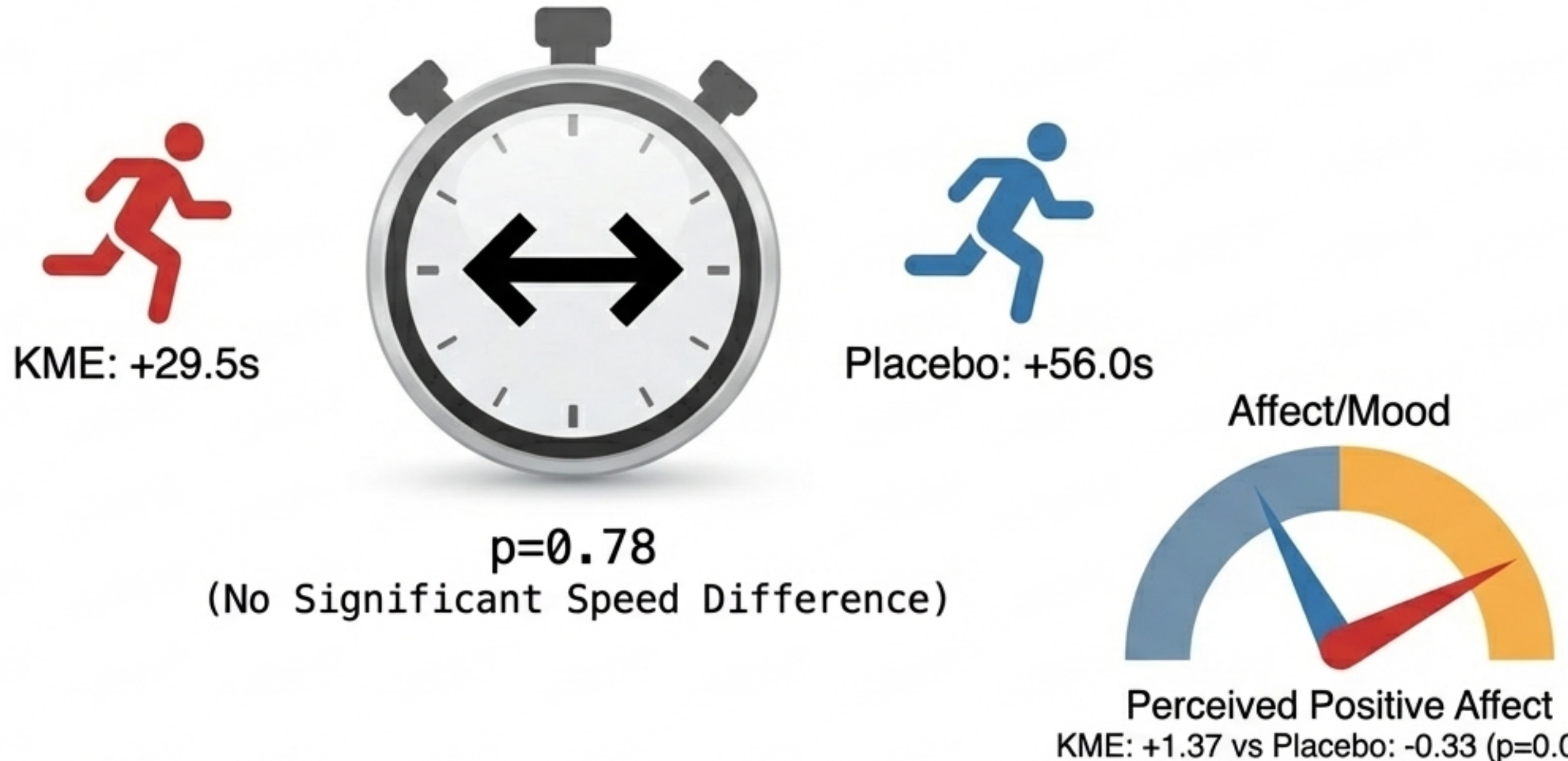
# The Fasting Illusion

Chronic ingestion of exogenous ketones transiently mimics a ketogenic state, but it does not augment endogenous fasting ketonemia. Supplementation cannot replace dietary carbohydrate restriction for sustained endogenous ketone production.



# Physical Output During the 5K Time Trial

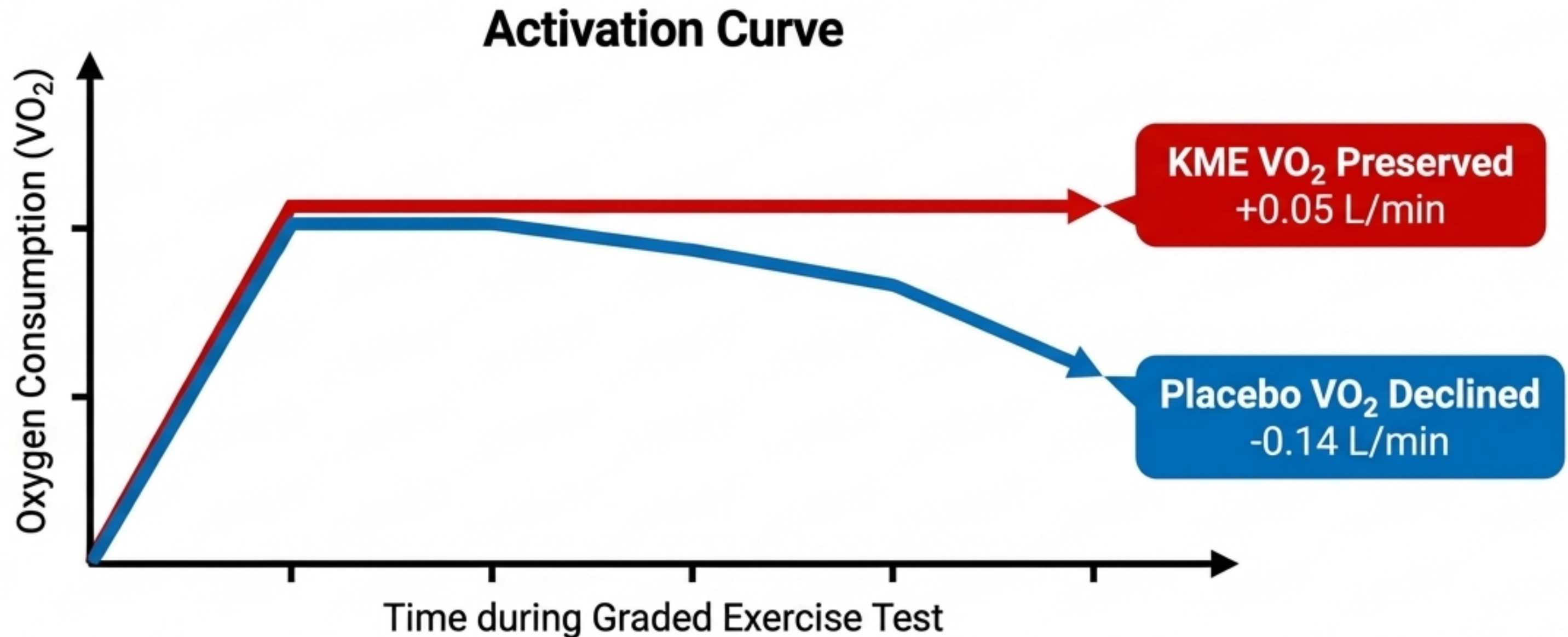
Elevated ketonemia alone is insufficient to confer an ergogenic speed advantage in a 3-hour post-absorptive state, though athletes reported feeling perceptually better during the effort.



# Residual Efficiency and $\text{VO}_2$ Sparing

The Graded Exercise Test was conducted in a **fasted state**, without acute KME ingestion.

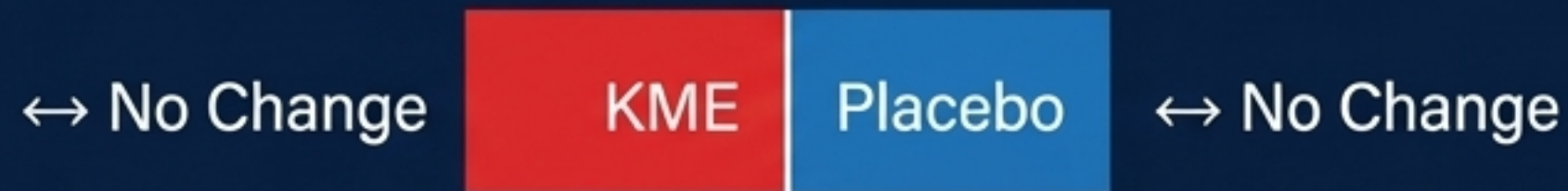
The preservation of absolute mean  $\text{VO}_2$  suggests an underlying **oxygen-sparing effect** or enhanced metabolic efficiency that persists even days after the supplementation stops.



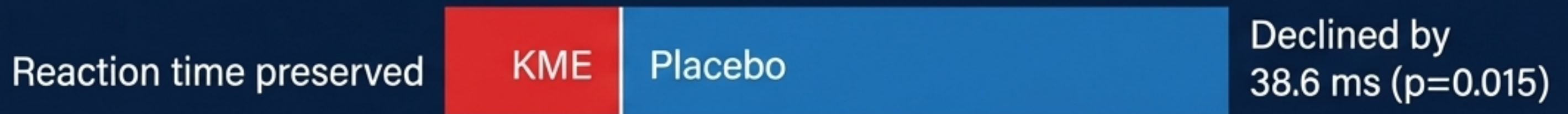
# Preserving the CPU Under Stress

Ketones serve as a preferential fuel substrate for the brain. KME supplementation actively preserved executive function, cognitive flexibility, and response inhibition under fatigue.

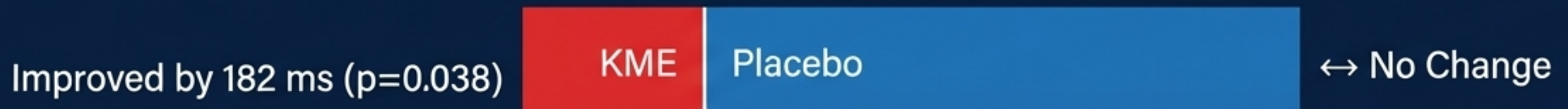
## Stroop Congruent (Basic Processing)



## Stroop Incongruent (Cognitive Flexibility)

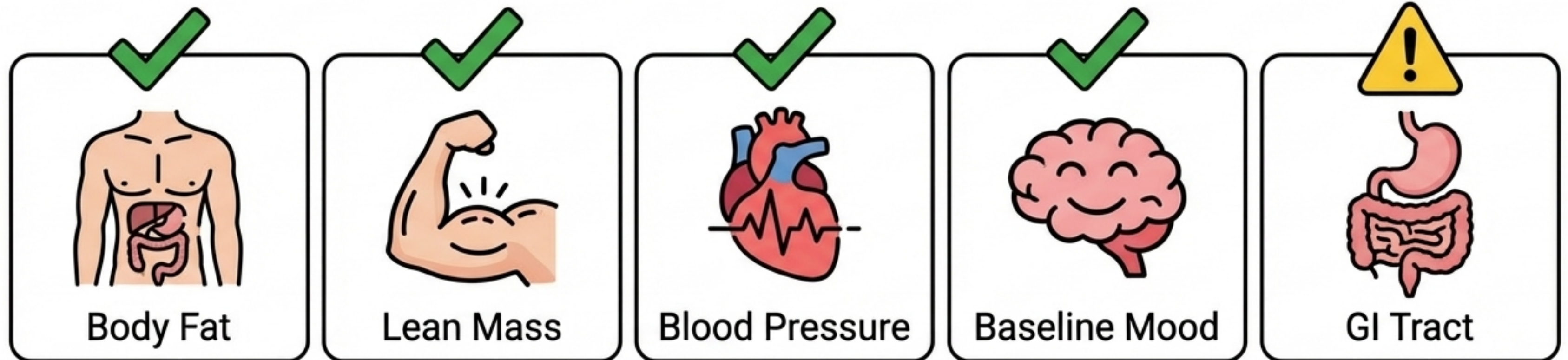


## Switching Task (Response Inhibition)



# Systemic Tolerability and Adaptation

The 90g/day KME protocol is broadly safe and well-tolerated. Body composition, resting hemodynamics, and baseline mood scores remained completely unchanged.



## **CAVEAT: Transient GI Distress**

A moderate spike in lower GI distress occurred specifically at Week 3 for the KME group ( $p=0.012$ ) before resolving by Week 4, indicating an adaptation phase to the high chemical load.

# The KME Impact Matrix

Ketone Monoesters are not a magical performance enhancer for immediate physical speed. They are a highly targeted physiological tool for metabolic shifting and cognitive preservation.

High Impact



- Cognitive preservation under fatigue



- Post-prandial glucose regulation



- Oxygen efficiency (VO2 sparing)

Low Impact



- Explosive 5K endurance speed



- Baseline endogenous ketosis
- Body recomposition

Acute Intervention

Chronic Adaptation

# The High-Performance Playbook



## 1. Deploy for the Brain

Optimal for endurance events or occupational scenarios where complex decision-making and task-switching are required under heavy fatigue.



## 2. Manage the Gut

Athletes must taper up dosing protocols to allow the GI tract to adapt and avoid the Week 3 distress phase before competition.



## 3. The EPO Frontier

Future research must investigate if the delayed VO<sub>2</sub> sparing effect is directly linked to KME's potential to augment erythropoietin (EPO) over long durations.