BREATH vs BLOOD
Real Starving vs Simulated Starving

Robert Ness
I tracked ketone bodies with two devices to see how one compared to the other.

• Why I wanted to track ketosis
• Can breath measurement replace blood pricks?
• Full Fast vs Fat fast vs normal keto-diet
• Results
• Conclusions
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I build statistical models for proteomics and metabolomics, so...

- Super interested in tracking biochemical data
- Most direct way to control what is happening inside
- Focusing on tracking ketone bodies
Ketogenic diet induces ketosis in the body, leading to some desirable outcomes

- Ketosis: metabolic state where most of the body's energy supply comes from ketone bodies in the blood
- Can be induced through dietary program
- Favored as a weight-loss approach, research suggests other potential benefits
- Gateway to DIY metabolomics: ketone bodies are measured with cheap devices
Why I’m interested in tracking ketones

- Building a database on nootropics and cognitive interventions with Jesse Lawler at SmartDrugSmarts.com
- Reviewing research on the effects of ketosis on neurology and cognition
- Could tracking of ketone bodies be used in pursuit of optimal cognitive function?
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Devices used for tracking ketone bodies

Precise Xtra Glucose and Ketone monitor
- Measures ketone body called BHB* in blood
- Reports mmol/L

Ketonix Sport
- Measures ketone body called acetone in the breath
- Reports integer between 0 and 30, greater numbers meaning higher acetone detection

*beta-hydroxybutyrate
Sanity testing the Ketonix Sport

• Blood ketone tests are reliable, but strips are expensive and require blood pricks.
• New Ketonix Sport is much easier and affordable, but is it a reliable replacement for blood tests?
• Do sanity testing! — benchmark your new devices on ones you know work before you just start tracking things!
I tried different diets to get full range of measurements

1. Varied the energy economy so data would have more range

2. Repeated measurements over 3 days for each diet to see day-to-day variation

3. Took measurements at 12PM, 1PM, 4PM each day to see hour-to-hour variation. On eating days I ate at 11AM
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21 days of measurement:
7 days full fast -> 7 days fat fast -> 7 days keto

1. Full fast (except water and tea)

2. Fat fast (fat only, 0 carb, 0 protein, vitamins, roughage)

3. Keto diet (high fat, medium protein, low carb)

Each diet lasted 7 days, took measurements on the last 3 days
But Robert, why didn’t you carb up?

• I often go on full fasts and fat-only fasts
• I normally eat keto.
• I very rarely break my diet with high carb foods
• Not interested in measurements during carb digestion
• Ketonix can’t just work in general, it must be precise enough to be useful in the ketosis range
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Similar behavior between devices over the course of the day
Looks like there’s a trend between my blood ketones and Ketonix Sport measurements
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Conclusions

• Too much variation for strong conclusions, but feeling better about purchasing Ketonix.

• My fat only diet had greater variation in measurements across both devices. Artifact? Post-fast effects? Use of MCT oil?
Ketone body tracking needs a bigger goal than the diet

• Ketogenic diet = eating few carbs = being in ketosis.
• Diet compliance doesn’t require tracking
• So why track?
Possibilities lie in combining ketone bodies with other analytes to optimize performance

• **Muscle training**: target ketones, glucose, and insulin response for optimal training.

• **Endurance training**: target ketones to optimize VO2max

• **Nootropic effects**: target ketones for optimal cognition?

• More research needed before these can be made into practice.
THANK YOU