

Evaluating beta-hydroxybutyrate (BOHB) as indicator for early termination of 72 hour fast for spontaneous hypoglycaemia

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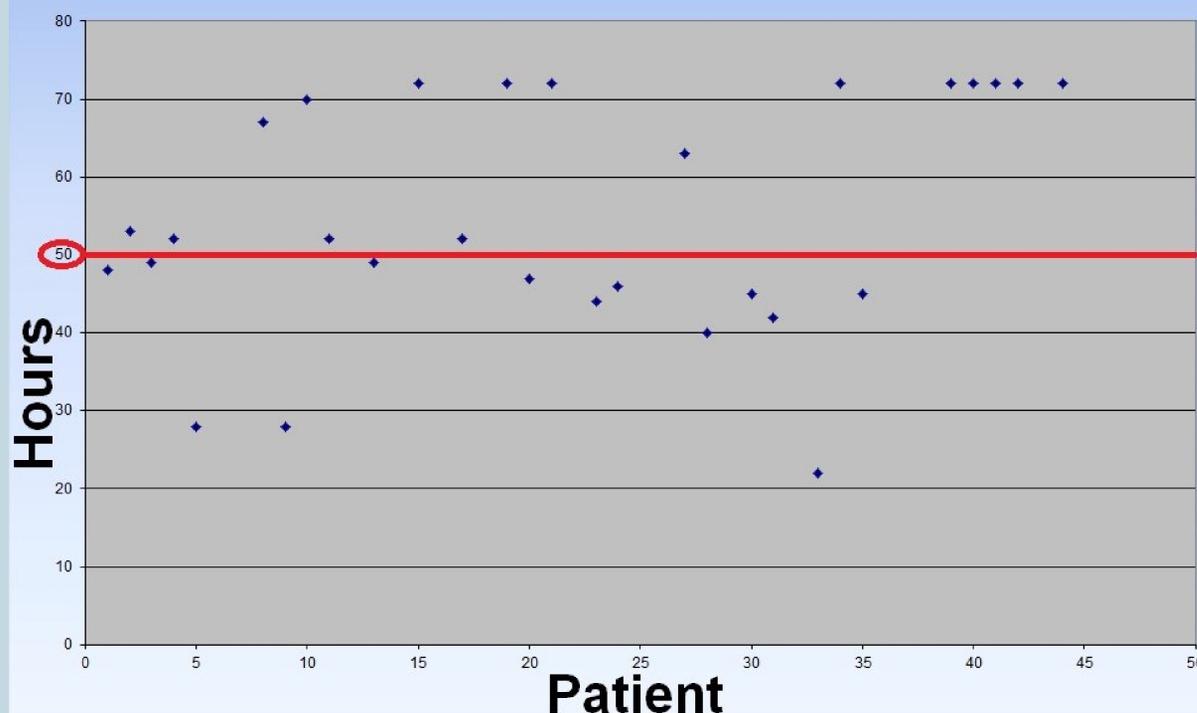
Background

- 72 hours fast is the gold standard investigation for suspected spontaneous hypoglycaemia.
- This aims to “capture” a hypoglycaemic episode, to confirm Whipple’s triad and to measure simultaneous insulin and C peptide levels.
- 75% patients with confirmed insulinoma develop hypoglycaemia within 24 hours of fasting.
- Conversely, in many individuals in whom clinical suspicion is low, it remains uncertain how long is long enough to rule out spontaneous hypoglycaemia.
- We propose that ketone (Beta-hydroxybutyrate BOHB) testing may significantly shorten the test required in many such cases.

Method

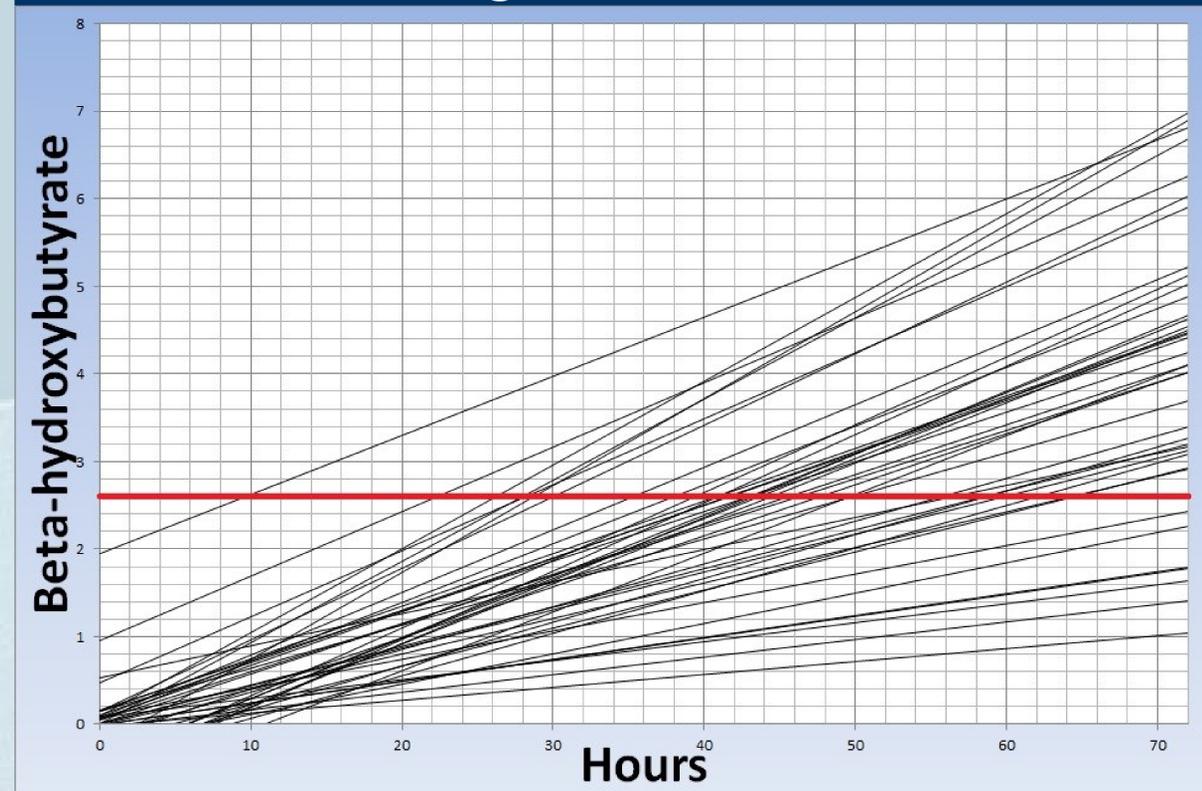
- BOHB testing was introduced to our supervised fast protocol in 2010 following the 2009 Endocrine Society guidelines.
- We have performed retrospective analysis of 43 consecutive cases admitted to investigate suspected spontaneous hypoglycaemia.
- Magnitude and timing of the rise in BOHB, and fall in glucose as well as eventual clinical outcomes have been correlated.

First value ≥ 2.7 mmol/l (hours)



If fast terminated when BOHB > 2.7mmol/l = 29 bed day reduction

BOHB levels during 72 hour fast



Results

- 39 patients (Male/Female 1:3.8) were analysed.
- 4/43 patients were excluded because ketone testing had not been performed (3), or due to self-discharge prior to completing the fast (1).
- 2 had proven spontaneous hypoglycaemia: one was confirmed to have insulinoma, the other was found to have a glucokinase mutation but no insulinoma. Neither of these patients demonstrated a rise in ketones over 2.7mmol/L (maximum: 0.2 and 1.9 mmol/L respectively).
- 37 had negative fasts. 74% of these demonstrated a rise in blood ketones to over 2.7 mmol/l during the fast: median 50.5 hours.

Conclusion

- We propose that a rise in BOHB >2.7mmol/L is an excellent surrogate marker for relative hypoinsulinaemia. A rise in BOHB above 2.7mmol/L could therefore be used to rule out pathological insulin mediated hypoglycaemia (or IGF mediated hypoglycaemia).
- We therefore propose that a rise in BOHB >2.7mmol/L could allow early termination of this unpleasant and expensive investigation for approximately 74% patients.
- However, other work suggests that patients with previous surgery for insulinoma or with a very high index of suspicion continue to complete the formal 72 hour fast until further data are available.