Gut hormones in relation to body mass and torpor patterns changes during food restriction and re-feeding in the grey mouse lemur

**Introduction:**

- Torpor involves a periodic lowering of body thermostat resulting in a hypometabolic state and represents an outstanding ability of energy savings (1).
- Underlying physiological mechanisms of torpor are not yet fully characterized.
- Gut-produced hormones are involved on numerous aspects of fuel homeostasis in diverse animal species (2).
  - Ghrelin caused body mass gain by increasing food intake and reducing fat oxidation.
  - Peptide YY (PYY) decreases energy expenditure and promotes fat use.
  - Glucagon-like peptide 1 (GLP-1) decreases body temperature, suppresses food intake and reduces energy expenditure.

**Hypothesis:** Gut hormones may play a role in the control of energy homeostasis in heterothermic species.

**Methods**

Hormonal levels were measured using the human gut hormones multiplex panel (Lincoplex™ Multiplex Assays, Bioscience) and Luminex technology.

Torpor depth was appreciated by the minimal body temperature (Tb) recorded during the resting phase (i.e. torpor state) of animals.

**Correlations**

- GLP-1 was negatively correlated with the minimal Tb only in LD food restricted mouse lemurs and returned to baseline after re-feeding.
- Ghrelin and PYY were significantly correlated with body mass only in re-fed SD mouse lemurs.

**These results suggest:**

A. a potential relation of two gut-produced hormones, active ghrelin and PYY, with the seasonal mechanism of fattening.

B. a putative relation of GLP-1 with the energy-regulatory process (torpor phase) that was likely masked when *M. murinus* fully expressed its winter phenotype but clearly emerged in the grey mouse lemur in summer.

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**Figures:**

- **Body mass** showing changes during calorie restriction and re-feeding.
- **Gut hormonal patterns** displaying changes in ghrelin, PYY, and GLP-1 levels.
- **Torpor depth** showing changes during calorie restriction and re-feeding.

**Tables:**

- **Body temperature recording** showing changes in Tb during calorie restriction and re-feeding.

**References:**