Promethion 能量代谢观测系统参考文献综述

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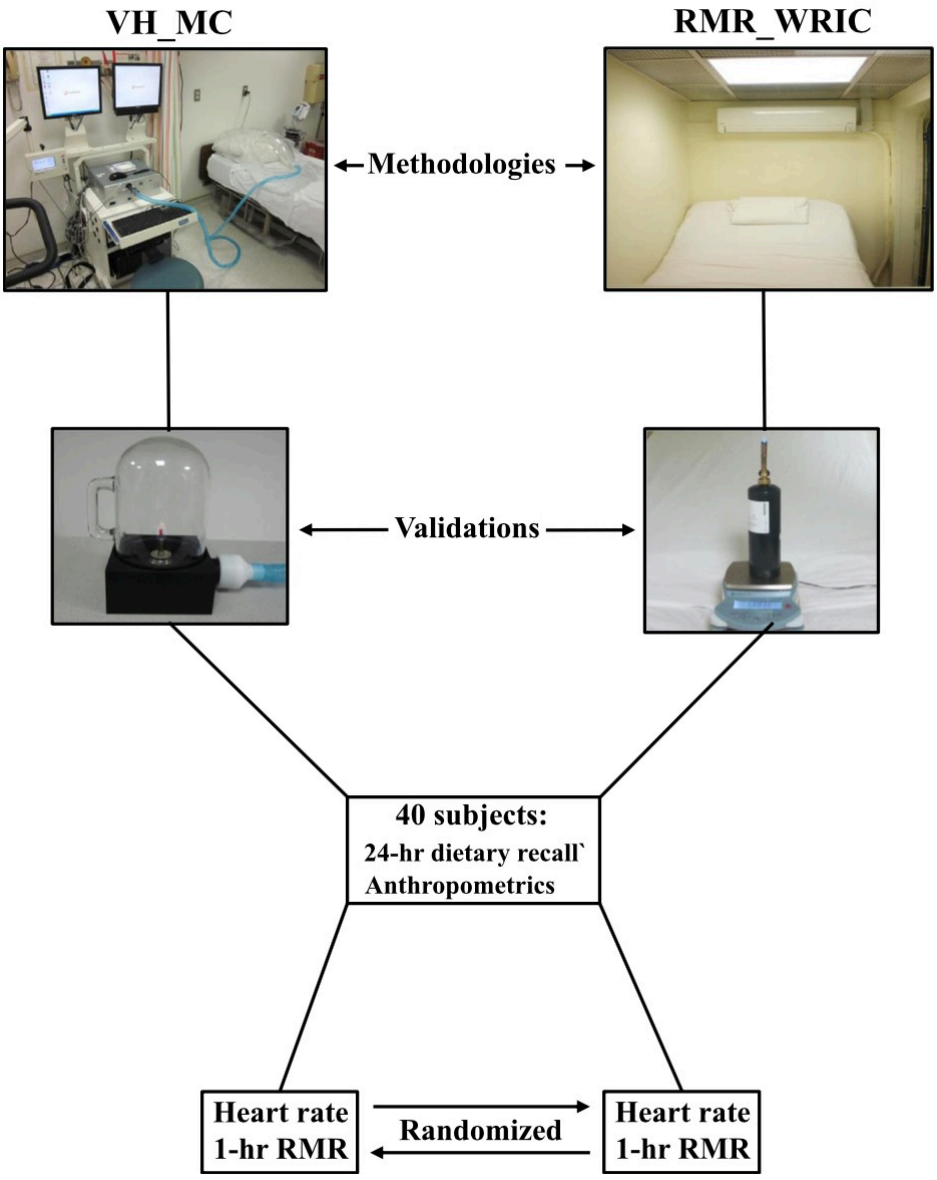
Promethion 能量代谢与行为观测系统是由美国 SSI 公司(Sable Systems International)最新研制生产的呼吸代谢与行为观测平台，主要包括实验动物（大鼠和小鼠等）呼吸代谢与行为观测系统、人类呼吸代谢观测舱（Human Room Calorimetry）等。本文就最近（2015 年、2016 年）应用 Promethion 系统发表的研究论文做一简要综述。

Ecolab 实验室检索到 20 篇论文，其中发表于 2015 年的有 11 篇、发表于 2016 年的有 9 篇；20 篇论文中 1 篇是研究人类能量代谢、其它 19 篇是以实验动物（大鼠、小鼠）为研究对象的。



Russell Rising 等在《Nutrition & Metabolism》2015 发表论文介绍了利用 Promethion 系统测量人体基础代谢率的研究成果

Charles Robb Flynn 等(2015)利用食诱导肥胖（DIO）小鼠模型，研究了胆汁分流术对小鼠能量代谢的影响，发现其与胃分流术减肥手术有类似的效果。文章发表在《Nature Communications》（参见下图）。

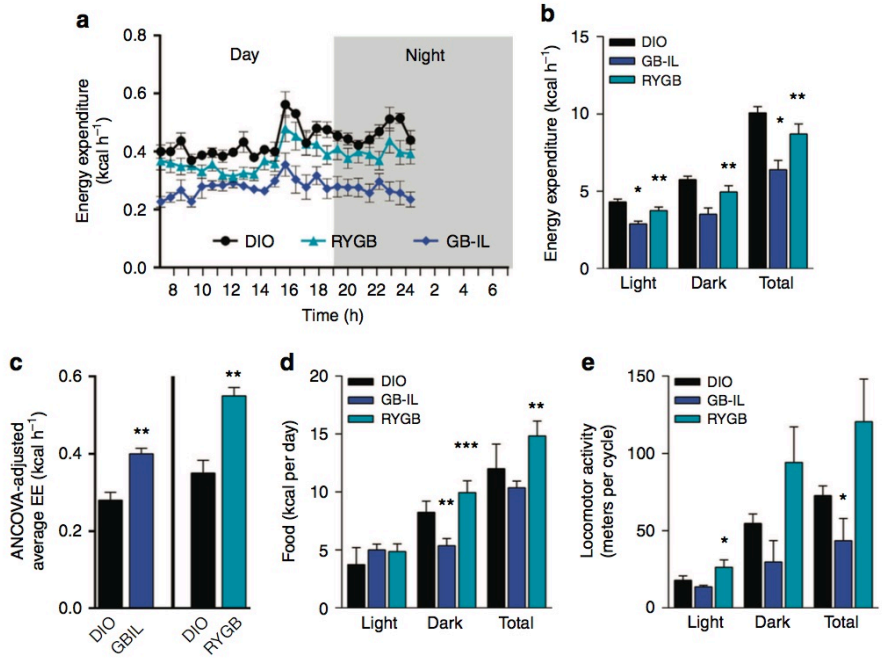
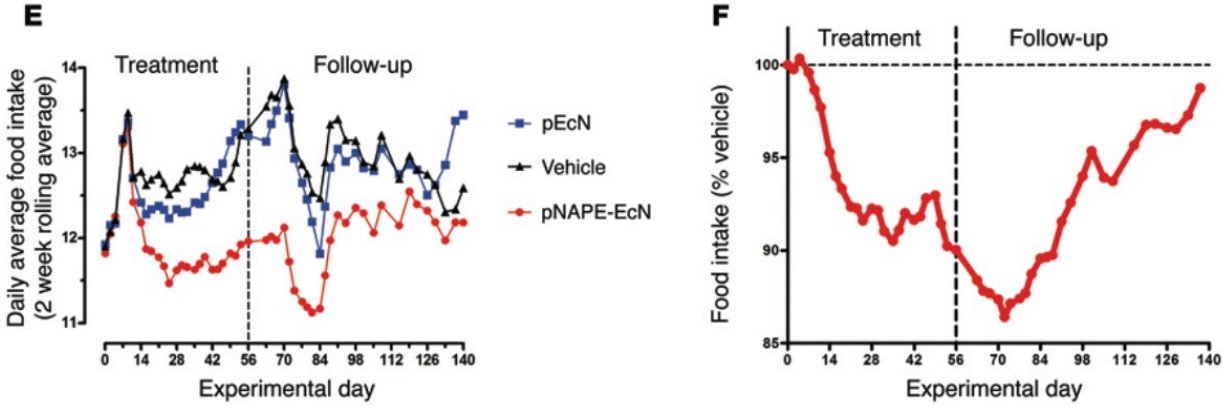


Figure 4 | Energy expenditure in response to bariatric procedures. (**a**) Energy expenditure over a 24-h period was assessed by indirect calorimeter in DIO, GB-IL and DIO mice at 4 weeks post-operative. (**b**) Unadjusted energy expenditure (kcal h^{-1}). (**c**) ANCOVA adjusted mean energy expenditure. (**d**) Food intake (kcal per day) was monitored daily for 5 days in each study group. (**e**) The frequency of locomotor activity (pedestrian meters) as determined by beam breaks per 24-h period. *N* of 4 DIO, *N* of 6 GB-IL, *N* of 6 RYGB per group. Values shown are the mean ± s.e.m. *$P<0.05$ by two-way ANCOVA.

代谢异常包括肥胖症、糖尿病、心血管病等成为现代人类健康的重大问题，肠道细菌是影响人类代谢异常易感性的重要因子。Zhongyi Chen 等（2016）利用生物工程 NAPE 表达的大肠杆菌放到饮用水中饲喂小鼠，发现可以减少摄食量、提高基础代谢率、阻止体重增加等代谢异常症。文章发表在《The Journal of Clinical investigation》（参见下图）。



Karl J. Kalyala 等（2015）利用 Leptin 缺乏小鼠和其野生（WT）型，研究了其在不同环境温度条件下的能量代谢、进食量及动态活动情况，其研究成果发表于 PLOS ONE（参见下图）。

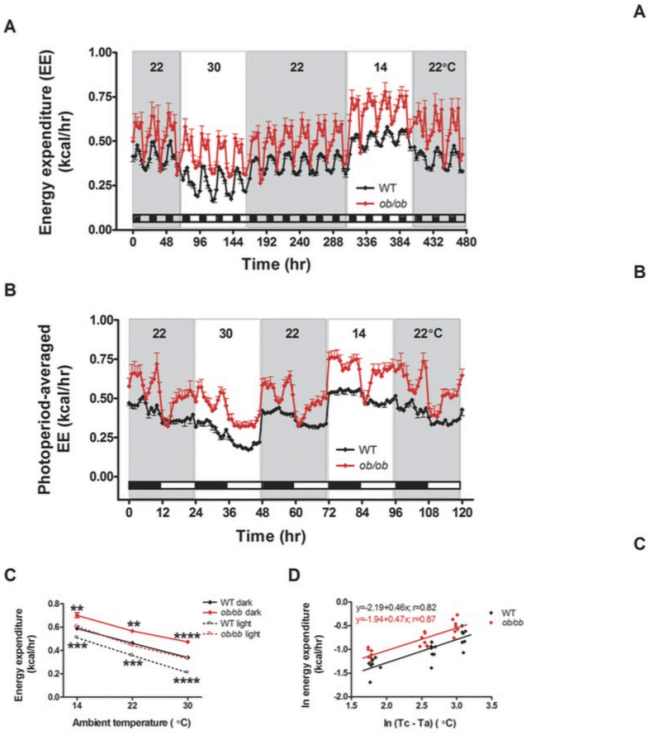


Fig 4. Leptin deficiency does not impair the whole body heat production response to cold stress in mice. (**A**) Energy expenditure across all photoperiods, (**B**) photoperiod-averaged energy expenditure (EE) profiles and (**C**) the relationship between energy expenditure and ambient temperature in adult male *ob/ob* mice and wild-type (WT) littermate controls housed under different ambient temperature conditions (n = 8/group). (D) Regression of natural log (ln) of mean 24h EE values on the natural log of the mean difference between core temperature (Tc) and ambient temperature (Ta) (see S1 Fig.). Mean±SEM. ****p<0.0001, ***p<0.001, **p<0.01.

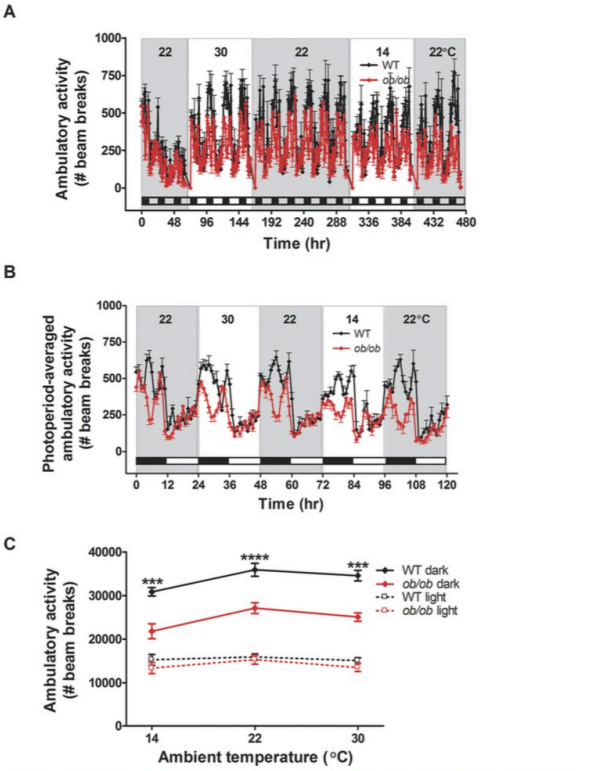


Fig 6. Ambulatory activity levels do not change at different ambient temperatures. (**A**) Ambulatory activity across all photoperiods, (**B**) photoperiod-averaged ambulatory activity and (**C**) the relationship between ambulatory activity and ambient temperature in adult male *ob/ob* mice and wild-type (WT) littermate controls housed under different ambient temperature conditions (n = 8/group). Mean±SEM. ****p<0.0001, ***p<0.001.

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