連續陽壓呼吸器對呼吸中止症能量消耗、攝取、荷爾蒙調節和身體組成的效果：一項隨機試驗

李佩玲[1,2,3,4,5]，簡盟月[6]，賴聖如[7]，Joshua Gooley[8]，馮馨醇[7]，陳示國[9]，林明澤[1,10]，陳永瑄[1,2,3]，邱鴻志[11]，劉博剛[11]，古博文[11]，王素梅[12]，張晉豪[12]，楊偉勛[2,3]，余忠仁[2,3]

台大醫院[1]睡眠中心[2]內科部[7]營養部;台灣大學[3]醫學院[4]電子科技整合中心[9]生命科學;[5]台大醫院新竹分院睡眠中心;[6]輔大醫院物理治療學;[8] Duke-NHS 新加;[10]蕭中正醫;[11]聯發科技

CPAP Effects on Energy Expenditure, Intake, Hormonal Regulation, and Body Composition: A Randomized Trial

Pei-Lin Lee[1,2,3,4,5]; Meng-Yueh Chien[6]; Shang-Ru Lai[7]; Joshua J. Gooley[8]; Hsin-Chun Feng[7]; Shih-Kuo Chen[9]; Ming-Tzer Lin[10]; Yung-Hsuan Chen[1,2,3]; Hung-Chih Chiu[11]; Po-Kang Liu[11]; Bo-Wen Ku[11]; Su-Mei Wang[12]; Chin-Hao Chang[12]; Wei-Shiung Yang[2,3]; Chong-Jen Yu[2,3]

[1]Center of Sleep Disorder; [2]Department of Internal Medicine, [7]Department of Dietetics; [12]Department of Medical Research; National Taiwan University Hospital, Taipei, Taiwan
[3]School of Medicine; College of Medicine, [4]Center for Electronics Technology Integration, [9]Department of Life Science; National Taiwan University, Taipei, Taiwan
[5]Sleep Disorders Center, National Taiwan University Hospital Hsin-Chu Branch, Hsin-Chu, Taiwan
[6]Division of Physical Medicine & Rehabilitation, Fu Jen Catholic University Hospital
[8]Neuroscience and Behavioural Disorders Programme, Duke-NUS Medical School
[10]Hsiao Chung-Cheng Hospital, New Taipei, Taiwan
[11]MediaTek Inc., Hsinchu, Taiwan

Study Objectives
Weight gain after continuous positive airway pressure (CPAP) initiation in obstructive sleep apnea (OSA) is common, but its mechanism and relevance remain unclear. This open-label randomized trial evaluated CPAP effects on energy expenditure, intake, body composition, physical activity, and appetite-regulatory hormones.
Methods
Patients with OSA were randomized (1:1) to 12-week CPAP or inactive control. The primary outcome was resting energy expenditure (REE). Secondary outcomes included dietary intake, eating behavior, fat mass (FM), fat-free mass (FFM), and activity count. Tertiary outcomes included appetite-regulatory hormones. CPAP effects were assessed as baseline-adjusted between-group differences using intention-to-treat (ITT) analysis; Per-protocol analysis (completers) served as sensitivity analysis.
Results
Of 52 randomized participants, 45 completed the study. In ITT analysis, CPAP had no effect on REE (8.6 kcal/day [95% CI: –51.5, 68.7]; P=0.774) or caloric intake (144.4 kcal/day [95% CI: –123.1, 411.9]; P=0.283). Although insignificant in morning, CPAP significantly increased evening body weight (P=0.017) and body mass index in morning and evening (P=0.040 and 0.030). CPAP also increased FFM, raised acylated ghrelin and insulin-like growth factor 1, and reduced cortisol and cognitive restraint. No changes were observed in macronutrient intake, FM, activity, insulin resistance, leptin, or neuropeptide Y. Per-protocol findings were similar.
Conclusions
CPAP-induced weight gain, probably primarily from FFM, occurred without measurable changes in REE, activity, or significant increases in caloric intake. Accompanying hormonal and behavioral changes suggest a subtle positive energy balance. This gain may not reflect adverse metabolic effects and support evaluating CPAP's metabolic impact through body composition, not weight alone.