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Total daily energy expenditure among middle-aged men and women: the OPEN Study^{1, 2, 3}

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Background: Few large doubly labeled water (DLW) studies have provided an objective measure of total energy expenditure (TEE) in free-living men and women. The committee that developed the 2002 Dietary Reference Intake (DRI) estimated energy requirements (EER) noted that DLW studies in adults aged 40 to 60 y were limited.

Objective: We aimed to describe TEE and physical activity energy expenditure in middle-aged men and women by sex, age, menopausal status, and level of obesity, and to compare TEE to the DRI EER.

Design: TEE was measured by the DLW method in 450 men and women aged 40–69 y from the Observing Protein and Energy Nutrition Study. Resting metabolic rate was estimated by use of the Mifflin equation.

Results: Unadjusted TEE was lower in women than in men (591 kcal/d); however, when the analysis was adjusted for fat-free mass, women had significantly higher TEE than did men (182 kcal/d). This difference appeared to be due to higher physical activity levels in women (physical activity energy expenditure adjusted for FFM was 188 kcal/d greater in women than in men). Mean TEE was lowest in the seventh decade. TEE from DLW was highly correlated ($r = 0.93$) with EER from the DRI equations.

Conclusion: In this population, TEE was higher in women than in men when adjusted for FFM, apparently because of higher physical activity levels in women. There were no significant differences in TEE, FFM, or physical activity levels in women by menopausal status. TEE was inversely associated with age and increased linearly with body mass index. This study corroborates the use of the DRI equations for EER.

Key Words: Total energy expenditure • doubly labeled water • dietary reference intake • estimated energy requirement

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