

DETERMINATION OF THE RELATIONSHIP BETWEEN BODY COMPOSITION AND ENERGY EXPENDITURE AT THREE EXERCISE INTENSITIES.

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With increasing rates of obesity and obesity related disease in our society, individual differences in energy expenditure (EE) are being explored to help explain excessive positive energy balances¹. Body composition is known to have an effect on EE².

The purpose of this study was to measure the EE associated with rest, walking at 3km/h and 6km/h, and running at 9km/h among healthy males and to determine the relationship between their body composition and EE. Healthy male subjects between 18 and 45 years visited the exercise laboratory at three similar time points one week apart for approximately 90 minutes.

Height, weight, Body Mass Index (BMI), %body fat and lean body mass (LBM), using skin fold calipers were recorded. EE using an Oxycon Mobile system was measured following a brief familiarisation period with the equipment. Each test consisted of 30 minutes quiet lying, followed by 5 minutes walking on a treadmill at 3 km/hr, 10 minutes rest, 5 minutes walking at 6 km/hr, another 10 minute rest and finally 5 minutes jogging at 9km/h. The Research Ethics Committee of the University of Dublin, Trinity College approved the research protocol.

Twenty two healthy males participated in this study. Average VO₂ corrected for weight, at rest, 3km/h, 6km/h, and 9km/h were 3.47 ± 0.43 , 9.87 ± 0.90 , 16.35 ± 1.41 and 32.81 ± 2.41 ml/min/kg respectively. A large significant positive correlation was seen between EE (VO₂ ml/min) and weight, BMI and LBM. When EE was corrected for weight, correlations with weight, BMI and LBM were negative and strongest at rest. ($r > 0.4225$, $p < 0.05$)

The negative correlations seen when EE is corrected for weight or resting metabolic rate indicate that although overall EE will be greater in a heavier individual, they expend less energy per kg. Further research is needed in this area to examine substrate utilisation during different exercise intensities.

1. Flatt, J. Differences in basal energy expenditure and obesity. *Obesity*, 2007; 15:2546 -2548.
2. Ravussin, E., Lillioja, S., Anderson, T.E., Christin, L., and Bogardus, C. Determinants of 24-hour Energy Expenditure in Man, Methods and Results Using a Respiratory Chamber. *The Journal of Clinical Investigation, Inc*, 1986; 78:1568-1578.