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PROCEEDINGS OF THE NUTRITION SOCIETY

ABSTRACTS OF COMMUNICATIONS

A Scientific Meeting was held at the University of Southampton on Tuesday–Friday, 2–5 August 1994, when the following papers were presented. These abstracts arrived too late for inclusion in Volume 53 no. 3.

All abstracts are prepared as camera-ready material by the authors.

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Food photographs improve estimates of nutrient intake in dietary surveys. By M. NELSON, M. ATKINSON, and S. DARBYSHIRE. *Department of Nutrition and Dietetics, King's College London, Campden Hill Road, London W8 7AH*

Many researchers use food photographs in dietary surveys as an aid to improving estimates of food portion sizes and thence nutrient intake, but the value of photographs has not been well evaluated. Errors relate to perception of food portion sizes, conceptualization, and memory. In a previous paper we have described errors in perception (Nelson et al 1994). The present study was carried out to determine the errors in the conceptualization of portion size using photographs.

Male and female volunteers (*n* 136) aged 18-90 years from a wide variety of social and occupational backgrounds completed 602 assessments of portion size in relation to food photographs. Subjects served themselves between four and six foods at one meal (breakfast, lunch or dinner). Portion sizes were weighed by the investigators at the time of serving, and any waste was weighed at the end of the meal. Within 15 minutes of the end of the meal, subjects were shown a series of eight photographs depicting the foods just consumed ranging from the 5th to the 95th centile of the distribution of portion sizes observed in the Dietary Survey of British Adults (Gregory et al 1990). Subjects were asked to indicate on a visual analogue scale the size of the portion consumed in relation to the photographs. The nutrient contents of meals were estimated from food composition tables.

In general, small portion sizes tended to be overestimated, and large portion sizes underestimated. Older subjects overestimated portion size more often than younger subjects. Excluding butter and margarine (which tended to be substantially overestimated), the nutrient content of meals based on estimated portion sizes was on average within $\pm 7\%$ of the nutrient content based on the amounts consumed, except for Vitamin C (21% overestimate), and for subjects over 65 years (15%-20% overestimated for energy and fat). In subjects whose body mass index (BMI, kg/m^2) was less than 25, the energy and fat content of meals based on estimated portion size was 5%-10% greater than the nutrient content based on actual portion size, but was 2%-5% underestimated in subjects with BMI greater than 30. The correlation of the nutrient content of meals based on actual or estimated portion sizes ranged from 0.84 to 0.96. Between 69 and 89 percent of subjects were correctly classified into thirds of the distribution of nutrient intake using estimated portion size compared with the nutrient intake based on actual portion sizes. When standard portion sizes based on the measured portion weights were used in place of the estimates based on photographs, the number of subjects correctly classified fell to between 60% and 79%.

We conclude that photographs depicting a wide range of portion sizes are a useful aid to the estimation of portion size and thence nutrient intake. Misclassification of subjects according to their nutrient intake from one meal is reduced when photographs are used to estimate portion size, compared with the use of standard portions. When subjects were served three meals and asked to recall their consumption the following day using 24 h recall, estimates of energy and fat intake using portion sizes estimated from 4 photographs exceeded the estimates using 8 photographs by between 5% and 14%. We conclude additionally that use of 8 photographs yields more accurate estimates of portion size and thence nutrient intake than 4 photographs.

Nelson, M., Atkinson, A., Darbyshire, S. (1994). *British Journal of Nutrition* (In the Press).
Gregory, J., Foster, K., Tyler, H., Wiseman, M. (1990). *The Dietary and Nutritional Survey of British Adults*, London:H.M.Stationery Office.

Total energy expenditure, basal metabolic rate and activity plus thermogenesis before and after elective vertical band gastroplasty in obese females. By N.J. FULLER, W.A. COWARD, M.B. SAWYER and M. ELIA, *MRC Dunn Clinical Nutrition Centre, Cambridge CB2 2DH*

Following weight loss, many patients perceive greater levels of physical activity and improved well-being. The aim of the present pilot study was to assess whether such perceptions are accompanied by objective changes in the energy expended in physical activity plus thermogenesis. Four weight-stable women (median age 45.5 (range 19-49) years; mean weight 136.3 (SD 24.3) kg; body mass index (BMI) 50.6 (SD 7.2) kg/m^2; fat-free mass (FFM) 61.5 (SD 8.2) kg and fat (as a percentage of weight) 54.6 (SD 3.0); three-component model, Fuller *et al.* 1992) were studied before surgery for gastroplasty and again once stable weight had been achieved, about 18 months later (weight 94.4 (SD 13.6) kg; BMI 35.1 (SD 3.8) kg/m^2; FFM 53.1 (SD 5.1) kg and fat 43.3 (SD 5.1) %).

Total energy expenditure (TEE) was estimated using doubly-labelled water. This method used the observed deuterium (D_2O) and oxygen ($H_2{}^{18}O$) space and assumed that the energy equivalent of CO_2 was 23.8 kJ/l, which applies closely to individuals with a respiratory quotient of 0.85. Basal metabolic rate (BMR) was measured after an overnight fast in the Dunn Clinical Nutrition Centre's whole-body indirect calorimeter. The physical activity level ratio (PAL ratio = TEE : BMR) and physical activity plus themogenesis (TEE-BMR) were calculated.

Changes in indices of energy expenditure are shown in the Table. Despite major weight loss, decreased BMR, and only a small increase in mean TEE (only two subjects increased TEE), both the physical activity ratio and the energy expended in physical activity plus thermogenesis increased considerably. Results obtained using normalized D_2O and $H_2{}^{18}O$ spaces followed this same trend.

	Before gastroplasty		Following weight loss		Significance (paired *t* test)
	Mean	SD	Mean	SD	
Total energy expenditure :					
whole body (MJ/d)	11.9	1.9	12.4	1.3	NS
per kg body weight (J/kg per min)	61.3	9.8	93.2	18.3	$P < 0.05$
per kg FFM (J/kg per min)	135.3	21.9	163.6	18.0	NS
Basal metabolic rate :					
whole body (MJ/d)	8.5	0.7	6.6	0.2	$P < 0.01$
per kg body weight (J/kg per min)	44.0	7.0	48.9	7.0	NS
per kg FFM (J/kg per min)	96.6	11.1	86.5	10.1	NS
Physical activity plus thermogenesis					
whole body (MJ/d)	3.4	1.6	5.9	1.5	$P < 0.01$
per kg body weight (J/kg per min)	17.3	7.2	44.3	14.1	$P < 0.01$
per kg FFM (J/kg per min)	38.8	17.1	77.1	17.0	$P < 0.01$
Physical activity level ratio	1.4	0.2	1.9	0.3	$P < 0.05$

NS, not significant.

These results support the patient's perception of increased physical activity after gastroplasty, once a stable weight has been attained, but greater numbers are required to clarify this preliminary conclusion.

Fuller, N.J., Jebb, S.A., Laskey, M.A., Coward, W.A. & Elia, M. (1992). *Clinical Science* 82, 687-693.