Energy requirements during pregnancy: old questions and new findings¹,²

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The question of how much extra energy a pregnant woman needs to obtain through her diet is closely linked to the question of the amount of weight she ought to gain during her pregnancy. A short but useful description of recommendations for weight gain during pregnancy, published over the past 50 y, is provided by Abrams et al (1). It has long been recommended that pregnant women restrict their food intake to avoid excessive weight gain to prevent toxemia, difficult births, and maternal obesity. However, this policy was challenged in the 1960s when the significance of low birth weight for infant health began to be recognized. Consequently, in 1970 the US Food and Nutrition Board increased the formal recommendation for weight gain during pregnancy and stated that severe caloric restrictions and routine limitations for weight gain should be avoided during pregnancy (2). In Britain, Hytten and Leitch (3) also studied the maintenance energy cost of pregnancy because, after much effort, they were able to conclude that ≈3 of the 12.5-kg recommended weight gain consisted of fat retained in the maternal body. Considering the methods available at that time, this finding was indeed a major achievement. In 1980, Hytten and Chamberlain (5) published their estimate of the total energy cost of pregnancy, i.e., ≈80 000 kcal, based on an estimated fat retention of 3.8 kg and an increase in maintenance energy metabolism corresponding to 36 000 kcal. Other authors thereafter published studies regarding the energy cost of pregnancy in women living in different countries under different nutritional conditions. The results indicated that average gestational fat retention varies considerably among different populations of women and that the increase in maintenance energy metabolism during pregnancy varies in relation to the prepregnant body fat content of the women and in relation to energy intake during pregnancy (6).

The studies by Butte et al reported in this issue of the Journal (7) and in the American Journal of Obstetrics and Gynecology (8) represent a logical continuation of the studies cited above, because these authors measured the energy cost of pregnancy in women classified before pregnancy into different BMI groups defined by the IOM (4). The results confirmed earlier observations that the increase in maintenance energy metabolism, one of the main components of the energy cost of pregnancy, varies in response to prepregnant body fat content. The study also showed that weight gain above the IOM recommendations tends to consist of fat, which confirms that such weight gain is undesirable. Furthermore, the study included assessment of total energy expenditure with the doubly labeled water method, which made it possible to conclude that, for the population under study, decreases in the amount of energy spent on physical activity were not sufficient to counterbalance the energy cost of pregnancy because of fat retention and increases in maintenance energy metabolism. Consequently, although the statement by Hytten and Leitch that “the energy cost of pregnancy could be met without increase of food intake by economy of activity” may well be true, this was not the case for this healthy, moderately active

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population of American women. This is an important finding because it confirms that pregnancy in a real-life situation is associated with increased requirements for dietary energy, an assertion that may appear trivial but that is nevertheless frequently questioned. Furthermore, the study includes valuable data regarding the effect of reproduction on the body protein content of women, thereby providing much-needed solid scientific evidence for assessing protein requirements during pregnancy. Thus, the findings presented by Butte et al (7, 8) have substantially advanced our knowledge regarding nutritional needs during pregnancy. This is most important in light of increasing awareness regarding the effect of nutrition during the beginning of life on health in adults. This issue has recently attracted considerable interest because of its potential for improving the health of human populations. The contributions of Butte et al (7, 8) will help us to continue more successfully with studies within this important area.

REFERENCES