



## Energy in pregnancy<sup>1,2</sup>

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Women have higher energy needs when pregnant than when not pregnant to support the growth and development of the fetus, placenta, and reproductive tissues such as the uterus and breasts. Additional energy needs reflect maternal fat storage and the general increase in metabolism that normally accompany gestation. Nearly 30 y ago, Hytten and Leitch (1) presented their theoretical estimates of the energy cost of pregnancy. Assuming average values for protein and fat deposition and increased basal metabolism, they calculated an extra energy requirement of 355 640 kJ (85 000 kcal) over the course of gestation; this value has found general (though perhaps not universal) acceptance as a basis for setting dietary standards. The World Health Organization as well as several versions of the recommended dietary allowances (2) used it to derive recommendations for daily increments in energy of 1046–1255 kJ (250–300 kcal) during most of gestation.


This theoretical estimate has proven difficult to confirm by empirical observation (3). Dietary surveys have not usually found incremental energy intakes as high as 1046 kJ (250 kcal/d) in pregnant women, and in some instances little if any increase has been observed. Moreover, the correlation between energy intake and gestational weight gain has been surprisingly poor, with *r* values typically ranging from 0.2 to 0.3 and sometimes not even statistically significant. In general, observed values have varied widely, presumably reflecting confounding by variation in body size, physical activity, individual differences in efficiency, and most of all by methodologic inadequacies in carrying out what is, by any criterion, extraordinarily difficult research.

In this issue of the Journal, Kopp-Hoolihan et al (4) describe the latest examination of the important question of energy balance during pregnancy. The study design was impeccable. Healthy women planning pregnancy were studied before, at 3 points during, and after pregnancy. The logistic difficulties in a prospective design such as this are formidable, but the results are vastly superior to those from the “quick and dirty” cross-sectional studies that, unfortunately, have been all too prevalent in pregnancy research. The methodology was state of the art and the analysis and interpretation balanced, rigorous, and insightful. In short, this study represents a model of metabolic research.

The findings relating to the energy cost of pregnancy were—in a word—variable. The degree of variation from subject to subject was astonishing. Although resting metabolic rate increased consistently with advancing gestation, the degree of increase differed among individual subjects by a factor of 8. Diet-induced thermogenesis and activity and total energy expenditure decreased modestly in some subjects and increased substantially in others. The change in fat mass ranged from a slight decrease to a marked increase. This degree of variability,

which has been found in earlier studies, has often been attributed to methodologic weaknesses; however, in view of this superb investigation, we are left with the inescapable conclusion that how women meet the additional energy demands related to pregnancy is astonishingly variable and not predictable to any appreciable degree.

Because gravidas seem to meet the increased energy demands of pregnancy in a variety of ways—some by increasing intakes, others by decreasing activity or diet-induced thermogenesis, and still others by limiting fat storage—the authors argue against setting a specific recommendation for increased energy intake for all pregnant women. The Food and Nutrition Board’s Committee on Dietary Reference Intakes has not yet begun its consideration of energy needs during pregnancy, and it will be interesting to see how the present findings and their interpretation will be regarded in that analysis.

What do these findings mean practically at the clinical level to nutritionists, physicians, and others who give dietary advice to pregnant women? Clearly, we should avoid the kind of “one-size-fits-all” advice we have traditionally given. A prudent course seems to be to permit considerable latitude in energy intake recommendations on the basis of individual preferences and to monitor weight gain carefully, making adjustments in energy intake only in response to deviations from the normal pattern of gain. Even in circumstances under which specific and precise recommendations have been the rule, such as gravidas with diabetes mellitus, we perhaps should take a more relaxed position. Just letting nature take its course may seem too *laissez-faire*; however, the kind of variability in energy costs shown by Kopp-Hoolihan et al must be normal and natural and, at least for women with uncomplicated pregnancies, Mother Nature is a pretty good obstetrician. 

### REFERENCES

1. Hytten FE, Leitch I. The physiology of human pregnancy. London: Blackwell Scientific Publications, 1971.
2. National Research Council. Recommended dietary allowances. 10th ed. Washington, DC: National Academy Press, 1989:33–4.
3. Institute of Medicine. Nutrition during pregnancy: weight gain and nutritional supplements. Washington, DC: National Academy Press, 1990:137–75.
4. Kopp-Hoolihan LE, van Loan MD, Wong WW, King JC. Longitudinal assessment of energy balance in well-nourished pregnant

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