Daily Energy Intake Distribution And Weight Gain In Women

Martin Lajous, Insto Nacional de Salud Publica, Mexico, Mexico; Emilie Rossignol, Agnes Fournier, Guy Fagherazzi, Beverley Balkau, Marie-Christine Bouton-Ruault, Françoise Clavel-Chapelon, Inserm, Ctr for research in Epidemiology and Population Health (CESP), U1018, Nutrition, Hormones and Women’s Health team, Univ Paris-Sud, UMRS 1018, Villejuif, France

Background_Evidence points to an inverse relation between breakfast and obesity. Little information is available on the distribution of energy intake during the day and weight gain.

Methods_We evaluated the relation of the distribution of daily energy intake, eating frequency and weight change and weight gain in a prospective study of 61,543 disease-free French women in the E3N- EPIC cohort. At baseline in 1993, participants responded to a validated questionnaire on habitual diet over eight possible daily eating occasions. We calculated energy intake at various moments during the day. Women were categorized according to the energy distribution (% energy of total) for each eating moment into quintiles and according to the number of calorie-containing meals. Self-reported weight was updated on six occasions after baseline, using mailed questionnaires. Linear mixed models were used to evaluate mean weight change and Cox models to assess weight gain ≥5kg.

Results_Between 1993 and 2008, the mean weight change was +2.45 kg (SD± 0.2) and 22,808 women gained ≥5kg. After multivariable adjustment (including total energy), higher energy intake at breakfast was associated with a lower positive weight change from baseline, while higher energy intake at night was associated with a higher positive weight change (p-value <0.0001) (Figure). No association was observed for energy intake at midday or mid-afternoon. In multivariable models, HRs of gaining ≥5kg were 0.90 (95%CI 0.86-0.94; p-trend <0.0001) and 1.09 (95%CI 1.04-1.15; p-trend <0.0001) for women in the highest compared to the lowest energy consumption category at breakfast and at dinner, respectively. Conversely, eating frequency was directly associated to weight change (p-value <0.0001) but not ≥5kg weight gain.

Conclusion_Higher percent energy intake at breakfast was associated with a lower weight gain, while higher percent energy intake at dinner was associated with higher weight gain. The distribution of daily energy may be important for maintaining a healthy weight.

Figure. Change in weight over 15 years by quintile of percentage of energy intake at breakfast (Panel A) (p-value for overall difference between groups <0.0001) and dinner (Panel B) (p-value for overall difference between groups <0.0001). Adjusted for age, education, hypercholesterolemia, hypertension, physical activity, hormone therapy, menopause, smoking, total energy intake (kcal), alcohol, fruits and vegetables, red meat, sugar-sweetened and artificially sweetened beverages and number of meals.
Author Disclosure Block:

**M. Lajous**: B. Research Grant; Modest; Swiss Re research support. B. Research Grant; Significant; Non-restricted investigator-initiated grant AstraZeneca. **E. Rossignol**: None. **A. Fournier**: None. **G. Fagherazzi**: None. **B. Balkau**: None. **M. Boutron-Ruault**: None. **F. Clavel-Chapelon**: None.