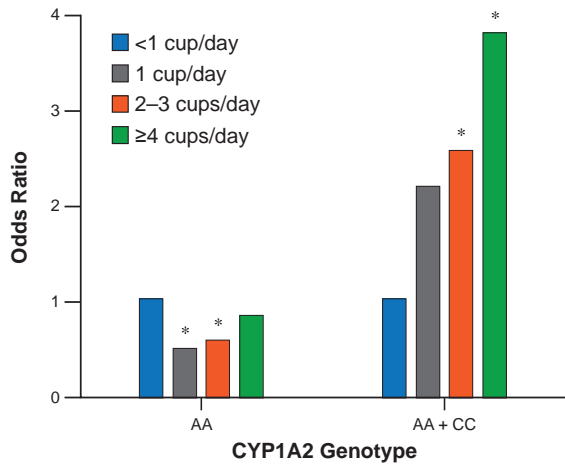


Figure 3. Coffee Intake, MI, and CYP1A2 Genotype



*p<0.05.

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The Breakfast Controversy

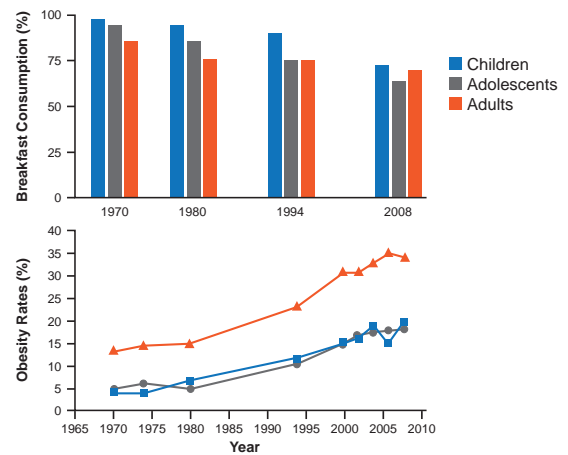
Written by Phil Vinall

Although most people will say they believe it is the most important meal of the day and lay publications often link it with increases in metabolism, weight loss, and improvements in mood and the immune system, Americans frequently skip breakfast. Heather J. Leidy, PhD, School of Medicine, University of Missouri, Columbia, Missouri, USA, discussed the potential relationship between skipping breakfast and the rise in obesity in America and the benefits of eating a daily breakfast.

Fifty years ago breakfast was a staple in the American diet. Today ~30% of young people skip their morning meal [Deshmukh-Taskar PR et al. *J Am Diet Assoc* 2010]. Data from several studies indicate that the gradual decline in breakfast eating has mirrored the rise in obesity (Figure 1) [Haines PS et al. *J Am Diet Assoc* 1996; Siega-Riz AM et al. *Am J Clin Nutr* 1998; Timlin TM et al. *Pediatrics* 2008]. An analysis of cross-sectional data from the National Health and Nutrition Examination Survey (1999-2006) of children and adolescents showed that individuals who consume cereal at breakfast had lower intakes of total fat and cholesterol and higher intakes of total carbohydrate, dietary fiber, and several micronutrients (p<0.05 for all) than breakfast skippers. Breakfast skippers also had a higher body mass index (BMI) than cereal consumers (p<0.05) [Deshmukh-Taskar PR et al. *J Am Diet Assoc* 2010]. Breakfast skippers consume more sweets (40%), chips (55%), soft drinks (55%), and white bread (40%), and less vegetables (45%), fruit (30%), milk (60%) and whole grains (65%) [Sjoberg A et al. *Eur J*

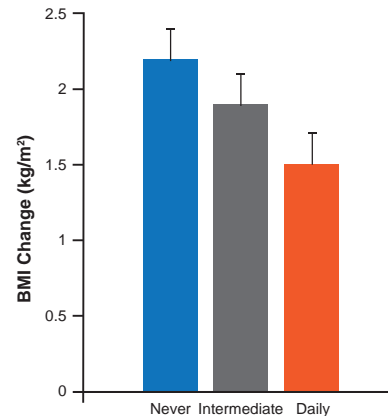
Clin Nutr 2003; Haire-Joshu D et al. *J Am Diet Assoc* 2011]. Among adolescents, there is an inverse relationship between increased BMI and breakfast frequency (Figure 2) [Timlin MT et al. *Pediatrics* 2008].

Figure 1. Relationship Between Reduced Breakfast Consumption and Obesity



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Figure 2. Time 2 Breakfast and BMI Change (Adjusted for Baseline BMI and Breakfast Category, Age, and Gender)



Reproduced with permission from *Pediatrics* 2008;121(3), Copyright © 2008, by the American Academy of Pediatrics.

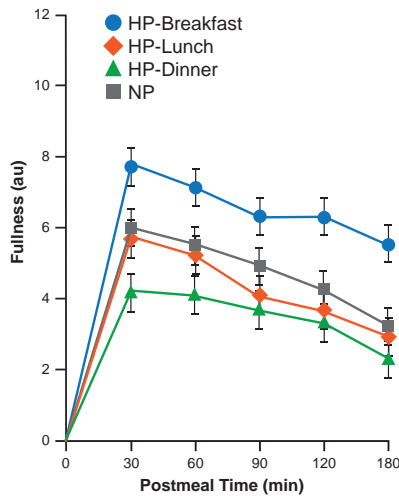
Although there is much observational evidence that breakfast skipping leads to overeating, poor diet control, poor food choices, cravings, weight gain, and hunger, there are few well designed randomized controlled trials (RCT). One RCT examined how the daily timing of increased dietary protein influences the feelings of fullness during energy balance and restriction in male adults [Leidy HJ et al.



OTHER NEWS

Br J Nutr 2009]. Diet comparisons were between normal- and high-protein meals given at breakfast, lunch, or dinner. Men given additional amounts of protein at breakfast felt greater satiety throughout the day (Figure 3).

Figure 3. Increases in Breakfast Protein Improves Feelings of Fullness



HP=high protein; NP=normal protein.

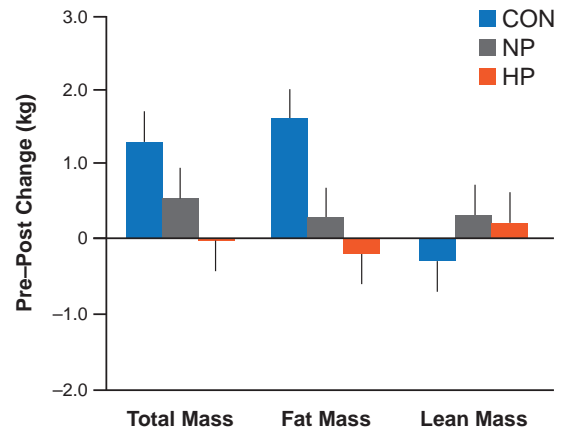
Reproduced with permission from HJ Leidy, PhD.

Dr. Leidy also presented recent results from a randomized crossover study of the effects of high versus normal protein intake at breakfast on appetite, satiety, food motivation, and reward and evening snacking in overweight or obese breakfast-skipping girls (n=20) [Leidy HJ et al. *Am J Clin Nutr* 2013]. After 7 days, girls eating a normal- or high-protein breakfast had lower levels of the daily hunger and increased daily feelings of fullness. Breakfast eaters experienced beneficial alterations in the appetitive, hormonal, and neural signals that control food intake regulation (ghrelin and peptide YY). A high-protein breakfast led to further alterations in these signals and reduced evening snacking compared with those skipping breakfast, although no differences in daily energy intake were observed. High-protein intake at breakfast might provide a useful strategy to improve satiety, reduce food motivation and reward, and improve diet quality in overweight or obese teenage girls.

A follow-up to this study looked at long-term improvements (12 weeks) in energy intake regulation and body weight management in a similar, but older (mean age 19 years) adolescent population (n=57) using the same input parameters [Leidy HJ et al. *FASEB J* 2013 (abstr 249.7)]. High-protein intake at breakfast led to reduced daily hunger, increased daily fullness, voluntary reductions in daily calorie intake (mostly due to a reduction in unhealthy

evening snacking of high fat/high sugar foods). Breakfast skipping individuals had significant (p<0.05) increases in fat mass by the end of the study compared with normal and high protein consumers (Figure 4).

Figure 4. Body Composition After 12 Weeks of Increased Breakfast Protein Consumption



CON=control group (habitual breakfast skipping group); HP=high protein; NP=normal protein.

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The daily addition of a breakfast, particularly rich in dietary protein intake (35 g protein) leads to increased appetite control and satiety, and potentially improves body weight management in young people. Further research including longer-term RCTs with larger sample sizes is warranted to examine mechanisms of action throughout the day and causal links regarding breakfast and obesity.

Balancing Dietary Nutrients for Good Health

Written by Maria Vinall

When discussing diet quality, the ratios of sodium to potassium, calcium, and magnesium may be more important than intake of any one nutrient. Connie M. Weaver, PhD, Purdue University, West Lafayette, Indiana, USA, believes the best strategy, particularly for heart and bone health may be a high-quality diet that increases potassium and calcium intake and reduces sodium.

Despite long-standing research indicating a direct relationship between sodium intake and cardiovascular (CV) risk, particularly from hypertension, Americans still consume >3400 mg of sodium daily [United States Department of Agriculture (USDA), Agricultural Research Service (ARS). *What We Eat in America* 2009-2010]. Particularly compelling evidence of the health benefits of a healthy diet combined with a reduction in sodium