Calories Close Up:

A detailed look at the energy unit that rules our diets

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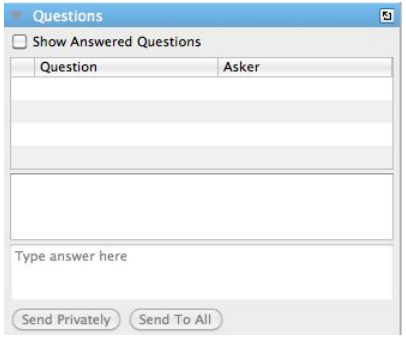

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Objectives

- Report on recent research on calories and metabolism
- Understand the impact of calorie research on guidance around weight loss/weight maintenance
- Examine how calories on food labels may not define how calories are utilized by the body
- Share science and resources with patients, clients, students, colleagues and others to encourage further understanding

What is a calorie?

Calorie

noun cal·o·rie \ˈka-lə-rē, ˈkal-rē\

:a unit of heat used to indicate the amount of energy that foods will produce in the human body

:the amount of energy needed to raise 1 gram of water 1 degree

A calorie is a calorie…right?

True:
All calories have the same amount of energy

But…
We may not actually know exactly how many calories we are consuming

Back to School: Calories 101

Wilbur O. Atwater

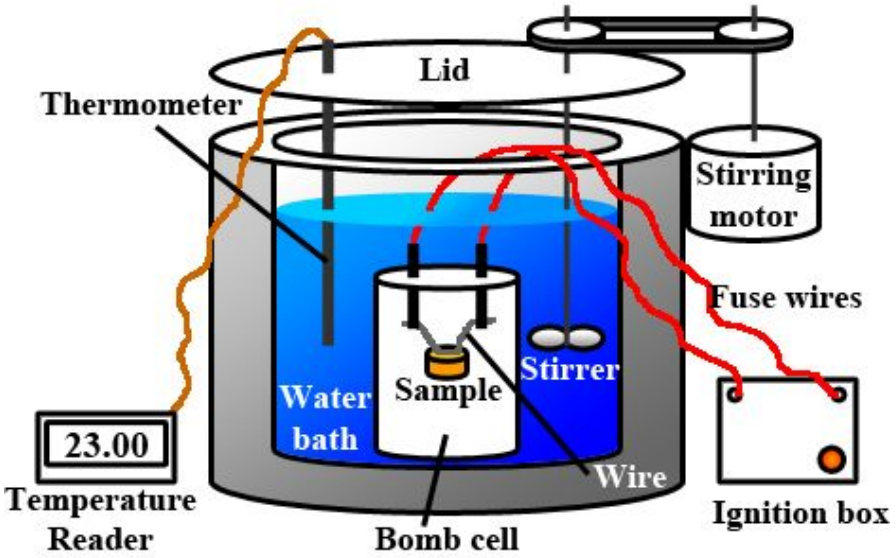
- Carbohydrate 4 kcals/gram
- Protein 4 kcals/gram
- Fat 9 kcals/gram
- Alcohol 7 kcals/gram

Harris-Benedict Equation

A closer look: Measuring calories in food

Calorimetry: the science of measuring the heat

Bomb Calorimeter: a device used to measure the heat given off by solid and liquid foods (AKA calories)



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Dietary influences impacting energy balance

Promotion of increased/decreased food intake

Individual variation

Influence on energy absorption

Differences in effects on energy expenditure

Source: The role of higher protein diets in weight control and obesity-related comorbidities, Int J Obes, May; 39(5): 721–726.Prepublished online 2014 Dec 26. doi: 10.1038/ijo.2014.216

Promotion of increased/decreased food intake

Directly through bigger portions

Palatability

Other sensory impacts

Satiety

Individual variation

Net absorption of macronutrients varies

Genetic variants may impact:

- How bodies respond to higher protein/lower GI diets
- How blood lipids respond to specific types of diets

Sources:
Energy balance and its components: implications for body weight regulation,Am J Clin Nutr. 2012 Apr; 95(4): 989–994
The role of higher protein diets in weight control and obesity-related comorbidities Int J Obes (Lond). 2015 May; 39(5): 721–726.

Influences on energy absorption

#1 Some foods break down differently than others
Metabolizable Energy

#2 Individuals absorb foods differently

Bottom line: What *you* absorb may not be what *the label* indicates you will

Influences on energy absorption: **Nuts**

#1 Some foods break down differently than others

#2 Individuals absorb foods differently

Influences on energy absorption: **Microbiota**

#1 Some foods break down differently than others

#2 Individuals absorb foods differently

Differences in effects on energy expenditure

- Rate of energy expenditure varies (REE/RMR)
- Over-consumption and food restriction impact REE
- Mounting evidence that they type of calories we consume (macronutrient balance) impacts metabolism as well
- Distribution of calories through the day may play a role

So maybe all calories are not created equal…

Sources:

1) Personalized weight loss strategies—the role of macronutrient distribution, Martinez, J., *Nature Reviews Endocrinology* 2014;10,749–760.
2) Am Soc. Nutr. Consensus Statement "Energy balance and its components: implications for body weight regulation," *Am J Clin Nutr* 2012;95:989–94.
3) Effects of dietary composition on energy expenditure during weight loss maintenance, Ebbeling, C, Ludwig, D. et al JAMA 2012;307(24) 2627-2634.
4) High caloric intake at breakfast vs dinner differentially influences weight loss of overweight and obese women, *Obesity* 2013 Dec;21(12):2504-12.

High protein diets and calories

Satiety

Thermic effect of protein

Slow Cooker Greek Chicken - 1 Guiding Star
stars.gs/greek-chicken

High fat diets and calories

Increased body fat and a trend toward unfavorable metabolic markers—*despite reduced caloric intake*—have been shown in both animals and humans

Ludwig's premise: High insulin levels (such as from too much refined carbohydrate) have "programmed" fat cells to store too much energy, leaving the blood "hungry" for more calories

Low-fat/low-cal diet may compound the problem (more cravings and slowing metabolism), hence a current "backlash" against low-fat diets

Do calories still matter?

Calories are the “currency” of weight control/loss

Should we measure individual metabolic rate?

How can we broaden the discussion?

Changing the focus

Changing focus for nutrition's sake

- Whole foods
- Portion control
- Mindful eating
- Cooking at home

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The formula **credits** a product's score for:

Vitamins,
Minerals,
Dietary Fiber,
Whole Grains

The formula **debits** a product's score for:

Trans Fat,
Saturated Fat,
Added Sodium,
Added Sugar

The resulting score represents a *weighted total*

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One Guiding Star indicates good nutritional value

Good

Two Guiding Stars indicate better nutritional value

Better

Three Guiding Stars indicate the best nutritional value

Best

Resources

Tufts Jean Mayer USDA Human Research Center on Aging

USDA Agricultural Research Service

WNYC Only Human Podcast: Don’t Count on the Calorie

USDA National Agricultural Library

Food Label Accuracy of Common Snack Foods

Q&A

Daily Calorie Log
Breakfast 150
Snack 100
Lunch 380
Snack 120
Snack 200
Snack 180
Dinner
I Quit!

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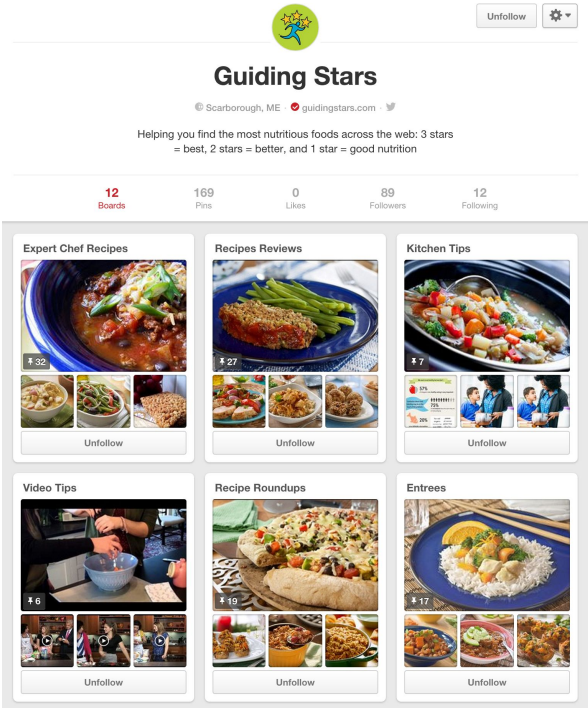

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