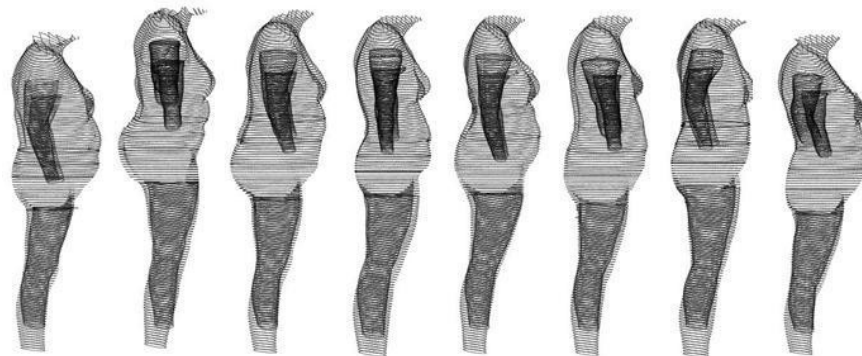


This lab is my own work.

Lab: Energy and Macronutrient Intake



Part 1: Calculating Basal Metabolic Rate and Macronutrient Intake

Most people can have a successful healthy diet just by estimating their quantity of food and timing their meals equally throughout the day. Until you get used to a new diet regimen though, you may need to weigh some foods at first to grasp the idea of what one cup looks like and what 'two ounces of salad dressing' is in your bowl. Most people, at first, will over estimate and therefore over consume.

Your Basal metabolic Rate (BMR) is the rate at which your body uses energy while at rest to keep vital functions going, such as breathing and keeping warm. It is a good formula to work into your diet regimen to understand how much fuel you need to survive. Using the formula below, calculate your BMR. (Only calculate for your own gender. Leave the other gender blank).

Women: BMR = 655.1 + (4.35 x weight in lbs) + (4.7 x height in inches) - (4.7 x age in years)

$$655.1 + (4.35 \times \frac{\text{weight in lbs}}{\text{weight in lbs}}) + (4.7 \times \frac{\text{height in inches}}{\text{height in inches}}) - (4.7 \times \frac{\text{age in years}}{\text{age in years}}) = \frac{\text{BMR}}{\text{BMR}}$$

Men: BMR = 66.5 + (6.23 x weight in pounds) + (12.7 x height in inches) - (6.8 x age in years)

$$66.5 + (6.23 \times \frac{\text{weight in lbs}}{\text{weight in lbs}}) + (12.7 \times \frac{\text{height in inches}}{\text{height in inches}}) - (6.8 \times \frac{\text{age in years}}{\text{age in years}}) = \frac{\text{BMR}}{\text{BMR}}$$

This formula uses the variables of height, weight, age and gender to calculate the BMR. This is a good formula because it is more accurate than calculating calorie needs based on body weight alone. The only factor that is omitted is lean body mass (the ratio of muscle to fat that a body has). So the leaner a body is the more kilocalories it needs than heavier ones. This equation is very accurate but be aware that more muscular people will underestimate their caloric needs and very obese people will overestimate their caloric needs.

Once you know your BMR, you need to calculate your daily caloric needs based on your activity level. The Harris Benedict Equation, used below, has been found to be very accurate.

To determine your total **daily calorie needs**, multiply your BMR by the appropriate activity factor, as follows.

- Sedentary (little or no exercise) : Calorie-Calculation = BMR x 1.2
- Lightly active (light exercise/sports 1-3 days/week) : Calorie-Calculation = BMR x 1.375
- Moderately active (moderate exercise/sports 3-5 days/week) : Calorie-Calculation = BMR x 1.55
- Very active (exercise/sports 6-7 days a week) : Calorie-Calculation = BMR x 1.725
- Extra active (very hard exercise/sports & physical job or 2x training) : Calorie-Calculation = BMR x 1.9

BMR X Activity Level = Daily Caloric Needs to maintain current weight.

_____ X _____ = _____ DAILY CALORIC NEEDS to maintain current weight.

Part 2: Planning for Informed Nutrient Intake

Remember, those biological macromolecules we learned about early on in the semester? In nutrition, these are called macronutrients in food, and they are the building blocks of your cells and therefore your body. When planning our food intake, we must consider more than just the number of kilocalories. We must also consider which food items will be the most nutrient dense. These are foods that contain the most micronutrient bang for our kilocalorie buck. This means foods chock full of those micronutrients, the various vitamins and minerals, that we find especially in colorful vegetables. These types of foods also are high in fiber and antioxidants. Unfortunately, most of the American diet consists of food that is high on kilocalories (especially from sugars) and low on micronutrients. Let's investigate how much of each of the macronutrients we should be consuming.

Contrary to the quick and easy government tables showing one number for protein needs for all men aged 30-35 (65 grams per day), how much of each macronutrient you should consume varies depending on many factors. Are you a man or a woman? How old are you? Are you healing an injury? Are you diabetic? Are you pregnant or lactating?

In this laboratory, we will use recommendations offered by healthline.com for macronutrient intake. Keep in mind that these recommendations are ones I chose based on what I thought most people our class would strive for. For example, I did not choose protein intake based on numbers recommended for bodybuilders or lactating women. The higher-than-normal protein and fat intake percentages were chosen because they have been shown to boost metabolism and curb cravings of carbohydrates (the bad ones like Oreos, not the good ones like broccoli). Carbohydrate percentage was calculated by subtracting protein and fat percentages from 100%. For more specific guidelines on how much of each macronutrient you should be taking in, see the Healthline references at the end of this lab.

Calculating Macronutrients

Follow the equations below to calculate your daily Caloric needs for each of the macronutrients. We will make our calculations based on our Daily Caloric Needs value calculated at the end of Part I.

PROTEIN

Protein Daily Caloric Needs (25% of total kilocalories):

Daily Caloric Needs x 0.25 = protein needs in kilocalories

$$\underline{\hspace{2cm}} \times 0.25 = \underline{\hspace{2cm}} \text{protein kilocalories per day}$$

Protein Intake in Grams:

Since one gram of protein contains 4 kilocalories of energy, we can calculate the number of grams of protein we need to consume daily using the following equation:

$$\text{Protein kcal per day} \div 4 \text{ kcal per gram} = \underline{\hspace{2cm}} \text{grams protein per day}$$

CARBOHYDRATE

Carbohydrate Daily Caloric Needs (40% of total kilocalories):

Daily Caloric Needs x 0.40 = carb needs in kilocalories

$$\underline{\hspace{2cm}} \times 0.40 = \underline{\hspace{2cm}} \text{carbohydrates kilocalories per day}$$

Carbohydrate Needs in Grams:

Since one gram of carbohydrates contains 4 kilocalories of energy, we can calculate the number of grams of carbohydrates we need to consume daily using the following equation:

$$\text{Carbohydrate kcal per day} \div 4 \text{ kcal per gram} = \underline{\hspace{2cm}} \text{grams carbohydrate per day}$$

FAT

Fat Daily Caloric Needs (35% of total kilocalories):

Daily Caloric Needs x 0.35 = fat needs in kilocalories

$$\underline{\hspace{2cm}} \times 0.35 = \underline{\hspace{2cm}} \text{fat kilocalories per day}$$

Fat Needs in Grams:

Since one gram of fat contains 9 kilocalories of energy, we can calculate the number of grams of fat we need to consume daily using the following equation:

$$\text{Fat kcal per day} \div 9 \text{ kcal per gram} = \underline{\hspace{2cm}} \text{grams fat day}$$

Part 3: Recording Nutrient Needs

Think about what you ate yesterday. Go the food journaling website www.myfitnesspal.com and create an account if you do not already have one. Once you have your account set up, click on *Food* to record what you ate yesterday. Myfitnesspal has a huge database of foods so feel free to be specific. It also has barcode scanning capabilities so that if you are using it as an app, you can scan the package barcode with your camera-phone for instant data on the food.

Once you have logged all of your food for yesterday, take a photo your results on your computer screen or device (phone, iPad) and insert below. Make sure your photo is clear and large enough and includes the the Calorie and macronutrient totals at the bottom and the date at the top (see example at Canvas lab link).

Questions:

1. How many kilocalories per day do you need in order to maintain your current weight? (Hint: This is your **Daily Caloric Intake** from Part 1). Compare this with your *actual* **Total Caloric Intake** as tabulated in MyFitnessPal in Part 3 of the lab. (**Note: Total Intake \neq Goals**)

2. To lose a pound of fat in a week, you should have a deficit of 500 kcal per day. Based on this information and your **Daily Caloric Needs** calculated at the end of Part 1, how many kcal would you need to take in daily in order to lose a pound of fat in a week? Does your **Total Caloric Intake** from **MyFitnessPal** support weight loss, weight gain, or maintenance of your current weight? (**Note: Total Intake \neq Goals**)

3. Report your CALCULATED DAILY NEEDS in the table below *based on your calculations* in the lab.

TABLE 1: CALCULATED DAILY NEEDS

Macronutrient (#kCal/g)	kCal/Day (from Part 2)	Calculated Grams (g)/Day
Protein (4 kCal/g)		
Carbohydrate (4 kCal/g)		
Fat (9 kCal/g)		

4. Report your ACTUAL DAILY INTAKE *based on your MyFitnessPal journal entry tabulations* for a full day's food and drink.

TABLE 2: ACTUAL DAILY INTAKE (from MyFitnessPal - Report Totals, NOT Goals)

Macronutrient	Total Kilocalories per Day	Total Grams per Day
Protein		
Carbohydrate		
Fat		

5. Discuss discrepancies between the two tables and implications for your weight maintenance and health.

References:

<https://www.healthline.com/nutrition/how-much-protein-per-day>
<https://www.healthline.com/nutrition/how-much-fat-to-eat>
<https://www.healthline.com/nutrition/how-many-carbs-per-day-to-lose-weight#section2>
https://commons.wikimedia.org/wiki/File:8_Women_with_a_BMI_of_30.JPG
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