1. Energy-yielding nutrients

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Energy (kcal/g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrate</td>
<td>4</td>
</tr>
<tr>
<td>Protein</td>
<td>4</td>
</tr>
<tr>
<td>Fat</td>
<td>9</td>
</tr>
</tbody>
</table>

2. Alcohol contributes 7 kcal/g. Alcohol can be used for energy, but it is not considered a nutrient because it interferes with the body’s growth, maintenance and repair.

3. Acceptable Macronutrient Distribution Ranges (AMDR): ranges of intake for a particular energy source that is associated with reduced risk of chronic disease while providing intakes of essential nutrients. An intake outside of the AMDR carries the potential of increased risk of chronic diseases and/or insufficient intakes of essential nutrients. (Dietary Guidelines for Americans 2010)

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>AMDR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrate*</td>
<td>45-65% of total kcalories</td>
</tr>
<tr>
<td>Protein*</td>
<td>10-35% of total kcalories</td>
</tr>
<tr>
<td>Fat</td>
<td>20-35% of total kcalories</td>
</tr>
</tbody>
</table>

*In addition to the AMDR, both carbohydrate and protein have an RDA. The values for these two standards will not generally be the same. The RDA for a nutrient represents the average daily amount of the nutrient that is considered adequate to meet the known nutrient needs of practically all healthy people; a goal for dietary intake by individuals. The RDA represents an amount of a nutrient that will prevent a deficiency disorder of that individual nutrient (e.g., carbohydrate, protein) in practically all healthy people. The AMDR represents a balance of energy sources that appears to reduce the risk for chronic diseases such as heart disease, diabetes, etc. Food sources that provide carbohydrate, protein & fat also provide other essential nutrients. A balance of the macronutrients can help ensure adequate intakes of micronutrients as well.

4. Examples of Macronutrient Calculations

a. Calculate total calories

A serving of canned peas provides 12 grams of carbohydrate and 5 grams of protein. How many calories does one serving provide?

12 grams of carbohydrate x 4 kcal/gram = 48 kcal
5 grams of protein x 4 kcal/gram = 20 kcal
48 kcal + 20 kcal = 68 kcal

b. Calculate % of total kcal provided by carbohydrate, protein and/or fat.

Mary’s usual diet provides an average intake of 342 grams of carbohydrate, 110 grams of protein, and 25 grams of fat. How many kcalories does she consume? What percentages of her calories are consumed from each macronutrient?

342 grams of carbohydrate x 4 kcal/gram = 1368 kcal
110 grams of protein x 4 kcal/gram = 440 kcal
25 grams of fat x 9 kcal/gram = 225 kcal

1368 + 440 + 225 = 2033 kcalories

carbohydrate: $\frac{1368}{2033} = .67 \times 100 = 67\%$
protein: $\frac{440}{2033} = .22 \times 100 = 22\%$
fat: $\frac{225}{2033} = .11 \times 100 = 11\%$

(*a simple way to check your figures is to add your percentages, they should total 100 or close to it.)

Ed has newly diagnosed type 2 diabetes. You are calculating a basic 2100 kcalorie meal plan for him that will provide 50% of his calories from carbohydrate; 20% of his calories from protein; and 30% of his calories from fat. How many grams of carbohydrate, protein, and fat will his meal plan include each day?

2100 kcal x .5 = 1050 kcal from carbohydrate
1050 kcal ÷ 4 kcal/gram = 263 grams of carbohydrate

2100 kcal x .2 = 420 kcal from protein
420 kcal ÷ 4 kcal/gram = 105 grams of protein

2100 kcal x .3 = 630 kcal from fat
630 kcal ÷ 9 kcal/gram = 70 grams of fat