Dear Alice,

I know that plants (besides soy) are considered "incomplete" protein sources, because they don't contain all of the essential amino acids. However, why is it that the nutrition facts of many grains and vegetables say they have protein? For example ? a serving of pasta has 7 g of protein, corn has 2 g, and chickpeas have 6 g. Is this considered "incomplete" or "complete" protein, and how can you know how much complete protein you are eating when you mix, for example, a serving of corn, and beans? I think average people should eat 50 to 60 g of protein a day, but how can you ever know how much you are really eating if you are mixing incomplete proteins that together contribute to your day's protein requirement?

? Perplexed by protein

Answer

Dear Perplexed by protein,

You're not alone ? this can be a confusing subject. First some clarification ? a complete protein is a protein that contains all nine essential amino acids (the building blocks of protein, which can only be obtained through eating food). Complete proteins come from animal-based products (meat, poultry, dairy, eggs, fish, etc), soy, and quinoa (a grain). An incomplete protein contains fewer than all nine essential amino acids, however incomplete proteins can be combined in meals to make a complete protein (for example by combining rice and beans or peanut butter and toast). These foods don't need to be eaten at the same time in order to be used by the body to build protein, as once was thought. We just need to eat these complementary proteins within 24 hours. Incomplete proteins come from plant-based foods, such as beans, rice, grains, legumes (other than soy), and vegetables.

Our bodies use amino acids from foods to make proteins. As a matter of fact, the amazing human body manufactures all types of substances ? from hormones to muscle tissue, blood cells, enzymes, hair, nails, and many others ? given the right proportions of amino acids.

All of the foods you mention contain amino acids, and therefore varying amounts of protein. Just because they don't contain all of the amino acids we need doesn't negate the fact that they contain some protein.
Although protein is a vital nutrient, our bodies don't require quite as much as you may think. The U.S. Recommended Dietary Allowance (RDA) of protein is 0.8 grams/kg per day for adults. This recommendation has been shown to meet the needs of 97.5 percent of the population. For a woman weighing 125 lbs (57 kg), her needs would be met with an intake of 46 grams of protein per day. For a man weighing 154 lbs. (70 kg), his needs would be met with 56 grams of protein a day. A person must be taking in sufficient calories to maintain their weight for these values. Dieters need larger amounts of protein, because some is burned for energy. Athletes require slightly more protein as well.

It's believed that people usually eat a variety of foods, thereby getting the amino acids needed to manufacture complete proteins. Granted, if a person only ate bread, s/he would be missing an essential amino acid. The same would be true if a person only ate vegetables. However, if these vegetarians added legumes to their diet, they would be able to obtain all of the essential amino acids needed to remain healthy. The Food and Nutrition Board of the National Academy of Sciences (which sets the RDAs) spell out the amount of each essential amino acid needed to form complete proteins. However, it isn't necessary to go that far, as long as you are covering your protein needs with a varied eating plan.

To determine your protein needs according to the RDA, divide your body weight in pounds by 2.2, which gives you your weight in kilograms, and then multiply that number by 0.8. Consult the following charts for protein content in various foods. Adjust for the serving size and the number of servings you actually eat.

<table>
<thead>
<tr>
<th>Animal Sources of Protein</th>
<th>Serving Size</th>
<th>Protein (in grams)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat/Poultry/Fish</td>
<td>3 oz.</td>
<td>21</td>
</tr>
<tr>
<td>Cottage cheese</td>
<td>½ cup</td>
<td>14</td>
</tr>
<tr>
<td>Milk</td>
<td>1 cup</td>
<td>8</td>
</tr>
<tr>
<td>Yogurt</td>
<td>1 cup</td>
<td>8</td>
</tr>
<tr>
<td>Cheese</td>
<td>1 oz.</td>
<td>7</td>
</tr>
<tr>
<td>Egg</td>
<td>1 whole</td>
<td>6</td>
</tr>
<tr>
<td>Egg white only</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Plant sources of Protein</th>
<th>Serving Size</th>
<th>Protein (in grams)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tofu, raw, firm</td>
<td>3 oz.</td>
<td>13</td>
</tr>
<tr>
<td>Legumes: (Black beans, Kidney beans, Chickpeas, etc.)</td>
<td>½ cup</td>
<td>7 ? 8</td>
</tr>
<tr>
<td>Peanut butter</td>
<td>2 T.</td>
<td>8</td>
</tr>
<tr>
<td>Nuts</td>
<td>1 oz.</td>
<td>5</td>
</tr>
<tr>
<td>Bread</td>
<td>1 oz. (1 slice)</td>
<td>3</td>
</tr>
<tr>
<td>Cereal</td>
<td>1 oz.</td>
<td>3</td>
</tr>
<tr>
<td>Vegetables</td>
<td>½ cup cooked or 1 cup raw</td>
<td>3</td>
</tr>
</tbody>
</table>
So, as you can see, it's not difficult to reach your daily protein needs, as long as you include a variety of foods in your daily intake. Incomplete proteins needn't be too much of a concern. Vegetarians who consume complementary proteins are usually able to easily meet their protein requirements. If you'd like to get more information, it may be helpful to make an appointment with a registered dietitian to help you understand and meet your specific nutrition needs.

Alice!
Category: Nutrition & Physical Activity
Optimal Nutrition
Nutrients
Vegetarianism

Related questions

Very low protein diet? Good for health? 
Non-meat proteins
Vegetarian wants to bulk up with protein foods
Do bodybuilders and other weightlifters need more protein?
What are the benefits of soy?
Vegan eating

Resources

Columbia Health Nutrition Services (Morningside)
Student Health Service Nutrition Services (CUMC)
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