

Nutrition Basics

Why Food Matters



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Summary

Each of us consumes about 50 tons of food in a lifetime. From this mammoth pile of goodies we obtain four basics of life – water, energy, protein, and a tiny bit of vitamins and minerals. *Nutrition Basics* is about why we need to eat and choosing carefully.

Key Points:

- **Water:** Water is our most urgent nutritional need and probably the one least studied in nutrition education classes. Find out why the body uses so much water, discover how much water we need and how “water out” = “water in.”
- **Energy:** Energy has to come from food. Everybody knows that, right? Answer these two questions. How many calories do you burn jogging for thirty minutes? How many calories do you eat in a six ounce bag of french fries? The answer to both questions is the same – no calories. Zip, nada, zero. You can’t burn calories, and you can’t eat them either. OK, so it’s a trick question, but a trick designed to teach your students the basics of human energy use. Learn the difference between carbs and fats and find out why calories count and why most diets don’t work.
- **Protein:** You’ve seen sci-fi flicks where a cyborg is blasted by fire, hit by bombs, shredded by a ten ton masher, then regenerates the missing body parts? We do that every day! You shed thirty to forty thousand skin cells every minute -- more than your household pet. And you replace them all. Like the sci-fi cyborg, you grow new skin -- over nine pounds each year. You constantly rebuild all your body parts. That’s protein at work.
- **Vitamins and Minerals:** We eat rocks. Well, okay, not literally, but the minerals in all the living bodies on Earth are recycled. The iron in the blood of your veins right now may have graced a cliff in Arizona eons ago. Discover why we need to “eat rocks” and what happens if we don’t get vitamins from food.

Nutrition Basics is ideal for courses in nutrition, life sciences, and food. Use it to correct the many commonly held misconceptions about why we eat and how food works

Water

Of the four basics, water is the most important to our lives. We can live surprisingly long without food, but only a matter of days without water.

Two-thirds of your weight is water. The average adult contains about 76 pints of water. Men, with a higher proportion of muscle to fat, usually have a higher percentage of water than women.

How much water do you need daily? You need about a quart of water for each thousand calories you use. That means a typical adult male who uses 2,500 calories a day needs about two and a half quarts of water.

But you don't need to get all that water from the tap or a bottle. Food contains lots of water. On average, food is two-thirds water—just like you.

Water by weight:

- Watermelon contains 92% water
- An orange contains 80% water
- Lettuce contains 95% water
- Meat contains 70% water

Some of the two to four quarts of water you need daily comes from food.

You need water frequently because you use it constantly. You're sweating right now even when you aren't active; it's how you keep a steady body temperature.

Why do you need water?

- To flex a muscle, any muscle
- To blink your eyes
- To carry oxygen and nutrients to your cells
- To cushions your joints
- To converts food into energy
- To help remove waste

In hard exercise, you can lose over a quart and a half of water in an hour.

A typical adult drinks about 70 ounces of water a day and gets 30 ounces from food. "Water In = Water Out." During a day you lose about 54 ounces in urine and feces, 30 ounces through sweat, and 17 ounces in water vapor. You breathe out water each time you exhale.

With just a loss of three percent of water in your body, your body begins telling you that it is dehydrated.

The signs of Dehydration are:

- Dry lips and mouth
- Weakness or dizziness
- Headache or nausea
- Muscle Cramps

Despite how important water is to our body, it does not give any energy to our body.

Energy

Fats, carbs and protein can be seen with a microscope, but calories cannot be seen because it is not a thing. The way we measure energy is by calories. Now remember, you burn energy, not calories, as calories are just a measurement tool.

You can figure out how many calories are in your foods just by looking at the Nutritional Food Label:

$$\text{Fat Calories} + \text{Carb Calories} + \text{Protein Calories} = \text{Total Calories}$$

Calories per gram

- Fat has 9
- Carbs have 4
- Protein has 4

Look at a food label:

- Total Fat 8g x 9 = 72
- Total Carbs 18g x 4 = 72
- Total Protein 4g x 4 = 16

Therefore: 72+ 72+ 16 = 160 calories

Fats, proteins, and carbohydrates all provide energy. Fat (butter) provides more than twice as much energy per ounce than protein (meat) and carbohydrate (potato).

In fact, fats, carbohydrates, and proteins have the same molecular structure – carbon, hydrogen, and oxygen. Carbohydrate generally contains hydrogen, oxygen as well as water – H₂O. That's why it's called carboHYDRATE. Fat and protein has only an occasional oxygen atom at the end of the chain that do not combine to make as much water

Just as "Water In = Water Out," "Energy In = Energy Out." The energy out is "burned" in every day life. Energy "In" is the calorie value of the food we eat. If we eat more energy than we use, we store it in the form of fat.

A pound of fat stores about 3,500 calories. To lose a pound of fat you have to use 3,500 more calories than you take in. That means a 150 pound person has to jog at nine minutes per mile pace for over four hours to lose just one pound.

Your body requires energy to:

- Think
- Create blood cells
- Veg-out
- Grow hair
- Sleep
- Heart to beat

The more energy you use, the more energy your body requires.

Nutritionists recommend you get energy from a variety of foods:

- 55% from carbohydrates
- 15% from proteins
- 30% or less from fat

Every cell in your body requires a sugar called glucose. Your brain can only use glucose for fuel. That is why over half your calories should come from carbohydrates, especially complex carbohydrates, as they provide other nutrients, too.

Take for instance a can or pop vs. a slice of bread. A can of pop only has sugar, whereas a slice of bread also has dietary fiber, protein, and various vitamins.

Fat is important because it:

- Keeps your body warm
- Provides energy
- Cushions your organs
- Carries vitamins to cells
- Keeps the brain and nerves in working order

Protein

You have the genetic knowledge to take apart a cream puff or a fish and reassemble it into human parts. We eat in order to turn other organisms into us.

Each of the trillions of cells in your body is made mainly of water and protein. Your cells don't live as long as you do, so the human body is a construction site during your whole life.

You make new body parts every day. Scratch your head or arm right now – go ahead. You just flaked off thousands of dead skin cells. You shed more than your household pet. Every minute about 30,000 to 40,000 skin cells fall off from your body. And you replace every one of them.

The skin you have today is not the same skin you had two months ago. Like the sci-fi cyborg, you grew new skin. In fact, you grow over nine pounds of new skin every year. Skin is about 1/12th of our total body weight.

It's not just skin – you're constantly rebuilding all your body parts. In the last minute your stomach replaced half a million cells in its lining. You completely re-line your stomach every three days! Now, that's protein at work.

Each protein is made of amino acids linked like beads in a necklace. We use about twenty different kinds of amino acids, and arrange them into thousands of proteins -- much like the 26 letters in the alphabet can be made into thousands of words. Each protein is organ specific – that means the protein your skin needs is different from what your lungs or heart needs.

It's like you have a protein production plant that uses twenty amino acids as raw ingredients. Eleven you can make "in house" on the factory floor. But the others you have to have delivered. This is delivered to you by eating food.

Animal protein contains all the essential amino acids you need to make protein. That's the main reason people eat animals.

We also get protein from plants. An egg has nearly the perfect balance of required amino acids our body needs. The best plant source is the soybean. Its protein does have all the essential amino acids.

In short, the answer to the question "what do you do with protein," is "just about everything connected with living."

Vitamins And Minerals

We also need tiny amounts of minerals in our food. Plants trap tiny bits of minerals washed from rocks by rain or dissolved in fallen leaves. The minerals in all the living bodies on earth are all recycled. At this moment your blood may contain iron that was once found on a cliff centuries ago in Arizona!

From food we get iron, calcium, iodine, phosphorus, sodium, potassium, magnesium, chlorine, copper, cobalt, zinc, and manganese among others.

Other chemicals we get from food in very small amounts are called vitamins and are commonly named by letters of the alphabet – A, B, C, and so forth.

These vitamins are chemicals we have to get from food – we cannot make on our own. Vitamins help almost every chemical reaction in our bodies. We need Vitamin C to make collagen – that's a protein that gives your skin both strength and elasticity. Without Vitamin K your blood doesn't clot and a nosebleed could be mean life or death. We can't make red blood cells without Vitamin B12.

Dietary fiber is also important to have in your daily diet. We can't digest this tough plant material, but adults must have one ounce a day to help move food through the digestive system. This can easily be found in oranges, celery and rhubarb.

Keep in mind, vitamins, minerals, and fibers do not add to muscle strength, supply energy, or cure diseases; though they are very important.

We are all recycling experts. The frozen yogurt you had for dessert yesterday was made up of molecules that may have once been part of a dinosaur, a person who lived in ancient Greece, or a slug beneath the sea eons ago. All creatures, those alive now and those long dead, feed one another. Nutrition is a part of the ongoing process that is life on this planet.

Nutrition Basics

Fill-In-The-Blank

Fill in the blanks with the correct words from the bank at the bottom of the page.

We have to eat _____ times a day to survive. We will consume over 100,000 pounds of _____ in a lifetime. We need to eat all of these foods because we need, water, energy, proteins and small amounts of vitamins and minerals. Of the four basics, _____ is most important. Think of a grape, without water a grape then becomes a _____. Water is essential for everything we do from flexing a muscle to blinking an eye. Your body _____ is also controlled by water. Water is consumed and perspired in the form of sweat; this is called "Water In _____ Water Out." It is easy to receive water without _____ it, as many foods already contain a large portion of water, such as a cucumbers, watermelon, soups and even meat.

For everything water does for our body, it does not provide us with _____. Fats, proteins, and carbohydrates all provide energy. They also all contain carbon, hydrogen and _____. Energy is the _____ value of food. This is how we measure what we eat. Just as "Water In equals Water Out," energy is the same. If we do not use up all the energy we eat, that energy turns into _____. Nutritionists recommend that our diet contain 55% _____, 15% proteins and under 30% fat. There are many choices of food we can consume. It is best to choose those that are _____ in fat.

Table sugar and _____ are both carbohydrates. So why do they taste so differently? Sugar has a _____ molecule that fits into the taste buds of your tongue. Whereas, flour has a longer chain of molecules that do not fit as easily into the taste buds of our tongue. This is why flour is called a _____ carbohydrate.

Fats in your diet come mainly from meat, dairy, _____ and even some vegetables. Of the fat that we eat, it is best to eat _____ fat over solid fat.

The skin you have today is not the same skin you had two months ago. In fact, you grow over _____ pounds of new skin every _____. And that isn't all! You are building new body parts all the time. Just within the last minute your stomach replaced half a million _____ in its lining. Now that is protein at work, hard work! Your body breaks down food into small protein units called _____ made of carbon, hydrogen, oxygen and nitrogen. We, humans, are capable of making _____ amino acids, but the other amino acids must be delivered to us as food. The most perfect food with the complete balance of amino acids is the _____. Animal protein also contains the essential amino acids you need to make proteins.

All creatures need one _____ to survive on Earth.

Word Bank:

amino acids	energy	years	flour	egg	complex	several	low
temperature	nine	drinking	food	oxygen	smaller	eleven	fat
carbohydrates	liquid	nuts	raisin	cells	equals	calorie	water
another							

Nutrition Basics

Fill-In-The-Blank Answer Key

We have to eat **several** times a day to survive. We will consume over 100,000 pounds of **food** in a lifetime. We need to eat all of these foods because we need, water, energy, proteins and small amounts of vitamins and minerals. Of the four basics, **water** is the most important. Think of a grape, without water a grape then becomes a **raisin**. Water is essential for everything we do from flexing a muscle to blinking an eye. Your body **temperature** is also controlled by water. Water is consumed and perspired in the form of sweat; this is called “Water In **equals** Water Out.” It is easy to receive water without **drinking** it, as many foods already contain a large portion of water, such as a cucumbers, watermelon, soups and even meat.

For everything water does for our body, it does not provide us with **energy**. Fats, proteins, and carbohydrates all provide energy. They also all contain carbon, hydrogen and **oxygen**. Energy is the **calorie** value of food. This is how we measure what we eat. Just as “Water In equals Water Out,” energy is the same. If we do not use up all the energy we eat, that energy turns into **fat**. Nutritionists recommend that our diet contain 55% **carbohydrates**, 15% proteins and under 30% fat. There are many choices of food we can consume. It is best to choose those that are **low** in fat.

Table sugar and **flour** are both carbohydrates. So why do they taste so differently? Sugar is a **smaller** molecule that fits into the taste buds of your tongue. Flour has a longer chain of molecules that do not fit into the taste buds of your tongue. This is why flour is called a **complex** carbohydrate.

Fats in your diet come mainly from meat, dairy, **nuts** and even some vegetables. Of the fat that we eat, it is best to eat **liquid** fat over solid fat.

The skin you have today is not the same skin you had two months ago. In fact, you grow over **nine** pounds of new skin every **year**. And that isn't all! You are building new body parts all the time. Just within the last minute your stomach replaced half a million **cells** in its lining. Now that is protein at work, hard work! Your body breaks down food into small protein units are called **amino acids** made of carbon, hydrogen, oxygen and nitrogen. We, humans, are capable of making **eleven** amino acids, but the other amino acids must be delivered to us as food. The most perfect food with the complete balance of amino acids is the **egg**. Animal protein also contains the essential amino acids you need to make proteins.

All creatures need one **another** to survive on earth.

Word Bank:

amino acids	energy	years	flour	egg	complex	several	low
temperature	nine	drinking	food	oxygen	smaller	eleven	fat
carbohydrates	liquid	nuts	raisin	cells	equals	calorie	water
another							

Nutrition Basics: Why Food Matters

Multiple Choice Worksheet

- 1) Most of your body weight is from:
 - a) protein
 - b) carbohydrates
 - c) skin
 - d) water

- 2) This is not seen through a microscope:
 - a) fats
 - b) calories
 - c) carbohydrates
 - d) proteins

- 3) An ounce of which of the following provides the most energy:
 - a) fat
 - b) sugar
 - c) protein
 - d) carbohydrate

- 4) Which of these foods supply the protein that includes all the essential amino acids in just the right balance:
 - a) celery and rhubarb
 - b) eggs
 - c) whole grains
 - d) cheeses

- 5) One reason you eat protein is to maintain:
 - a) blood flow
 - b) hydration
 - c) body parts
 - d) sweat

- 6) Cells are made up of water and:
 - a) protein
 - b) carbohydrates
 - c) vitamins and minerals
 - d) fiber

- 7) Calories are not seen because they are:
 - a) proteins
 - b) carbohydrates
 - c) vitamins and minerals
 - d) a measurement

Nutrition Basics: Why Food Matters

Multiple Choice Worksheet Answer Key

- 1) Most of your body weight is from:
 - a) protein
 - b) carbohydrates
 - c) skin
 - d) water**

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 - c) body parts**
 - d) sweat

- 6) Cells are made up of water and:
 - a) protein**
 - b) carbohydrates
 - c) vitamins and minerals
 - d) fiber

- 7) Calories are not seen because they are:
 - a) protein
 - b) carbohydrates
 - c) vitamins and minerals
 - d) a measurement**

Nutrition Basics

Quiz

Complete the sentences in the first column with the best available answer in the second column.

- | | | |
|-------|--|---------------|
| _____ | In large amounts, many vitamins and minerals are | 1) energy |
| _____ | Toast is crispy because it has been | 2) toxic |
| _____ | Water doesn't provide | 3) water |
| _____ | Celery and rhubarb contain | 4) clot |
| _____ | It is most important for our body to receive | 5) protein |
| _____ | Without Vitamin K your blood will not | 6) dehydrated |
| _____ | Most fat that we consume should come from what type of fat | 7) fiber |
| _____ | Cells are made up of water and | 8) liquid |

Nutrition Basics

Quiz Answer Key

Complete the sentences in the first column with the best available answer in the second column.

- | | | |
|----------------------|--|---------------|
| 2) toxic | In large amounts, many vitamins and minerals are | 1) energy |
| 6) dehydrated | Toast is crispy because it has been | 2) toxic |
| 1) energy | Water doesn't provide | 3) water |
| 7) fiber | Celery and rhubarb contain | 4) clot |
| 3) water | It is most important for our body to receive | 5) protein |
| 4) clot | Without Vitamin K your blood will not | 6) dehydrated |
| 8) liquid | Most fat that we consume should come from what type of fat | 7) fiber |
| 5) protein | Cells are made up of water and | 8) liquid |

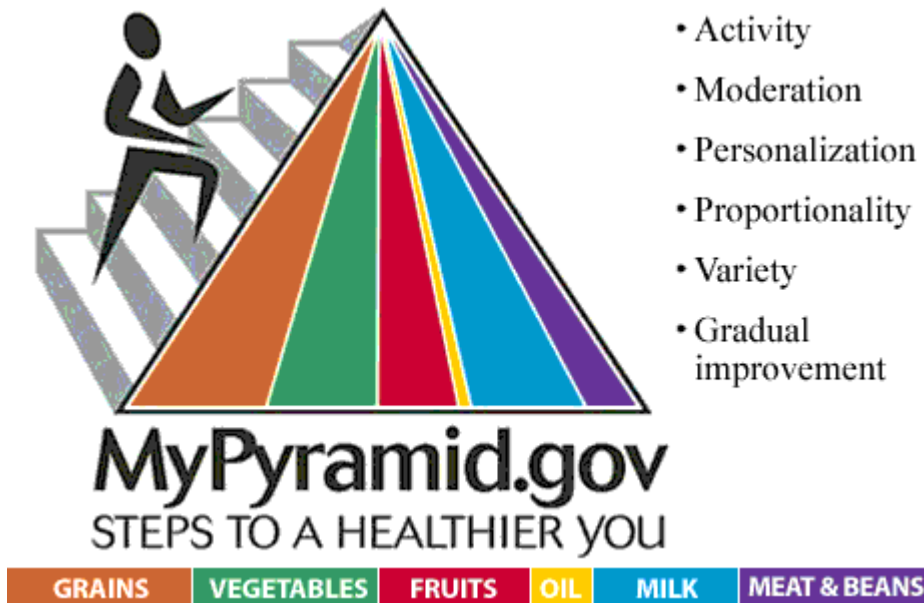
Chart #1

Total Body Water (TBW) as a Percentage of Total Body Weight as We Age

People	TBW as % of Body Weight
Newborn to 6 months old	74
6 months to 1 year old	60
1 to 12 years old	60
12 to 18 years old, Male	59
12 to 18 years old, Female	56
19 to 50 years old, Male	59
19 to 50 years old, Female	50
51 years old and above, Male	56
51 years old and above, Female	47

Source: Altman, 1961

Chart #2:



Source: U.S. Department of Agriculture (USDA). Available online: <http://www.mypyramid.gov/>

The food guide pyramid was developed by the U.S. Department of Agriculture (USDA) and the U.S. Department of Health and Human Services. Nutrition experts have revised the guide to emphasize controlling portion sizes and making the healthiest choices possible within groups.

One size doesn't fit all

The USDA's new MyPyramid symbolizes a personalized approach to healthy eating and physical activity. The symbol has been designed to remind consumers to make healthy food choices and to be active every day. The different parts of the symbol are described below.

- **Activity:** Daily physical activity is important.
- **Moderation:** Within each group, there are choices that are healthier (little or no solid fats or added sugars) and those that are less healthy (added sugars and solid fats). Choose healthier foods more often and less healthy foods less often.
- **Personalization:** The interactive website <http://www.MyPyramid.gov> allows you to personalize a food guide pyramid based on your age, your gender, and the amount of daily physical activity you get.
- **Proportion:** Watch your serving sizes. Eat less from those groups with narrow bands.
- **Variety:** Choose foods from all of the food groups.
- **Gradual improvement:** Take small steps to improve your diet and lifestyle.

Glossary

Amino Acids	Contain hydrogen, carbon, oxygen, and nitrogen. Each protein is made up of this.
Calories	The measurement of energy.
Cellulose	A strong rubbery material that makes up fiber.
Complex Carbohydrate	Large sugar molecules.
Dehydration	The loss of water from the body.
Energy	Proteins, carbohydrates and fats.
Glucose	The most important carbohydrate. It is a sugar that every cell in your body requires and it is the only carbohydrate your brain will use.
Heat Stroke	Your body temperature at or above 105 degrees.
Minerals	Trapped by plants; these are found in tiny amounts in our food.
Multivitamin	A daily tablet that nutritionists recommend that contains vitamins and minerals.
Nutritionist	One that studies the nutrients in food, how nutrients are used by the body, and the relationship between diet, health and disease.
Vitamins	Chemicals received from food in very small amounts.

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