Learning Objectives

• Describe the consequences of fasting, starvation, and malnutrition.

In a typical high-carbohydrate diet, the human body relies on free as its primary energy source. The level of blood sugar is ; as blood glucose is consumed, the releases , a hormone that stimulates the to convert stored into glucose. The glycogen stores are ordinarily replenished after every meal, but if the store is depleted before it can be replenished, the body enters , and begins the .

In a context, fasting may refer to the status of a person who has not eaten overnight, or to the metabolic state achieved after complete and absorption of a meal. Several metabolic adjustments occur during fasting. After the exhaustion of the glycogen reserve, and for the next 2–3 days,. At first, the brain continues to use glucose. If a non-brain tissue is using fatty acids as its metabolic fuel, the use of glucose in the same tissue is switched off. Thus, when fatty acids are being broken down for energy, all of the remaining glucose is made available for use by the brain.

After 2 or 3 days of fasting, the liver begins to synthesize from precursors obtained from fatty acid breakdown. This metabolic state in which some of the body’s energy supply comes from in the blood is called ketosis. The brain uses these ketone bodies as fuel, thus cutting its requirement for glucose. After fasting for 3 days, the brain gets 30% of its energy from ketone bodies. After 4 days, this may go upwards to 70% or more. Thus, the production of ketone bodies cuts the brain’s glucose requirement from 80 g per day to 30 g per day, about 35% of normal, with 65% derived from ketone bodies. But of the brain’s remaining 30 g requirement, 20 g per day can be produced by the liver from (itself a product of fat breakdown). But this still leaves a deficit of about 10 g of glucose per day that must be supplied from some other source. This other source will be the body’s own proteins. If there are high levels of ketones secreted, it results in a condition known as ketoacidosis. The high level of ketones in the blood decreases the blood’s pH (it becomes more acidic). It is debatable whether mild ketoacidosis is harmful, but severe ketoacidosis can be lethal.

After exhaustion of fat stores, the cells in the body . This releases and produced from into the bloodstream, which can be converted into glucose by the liver. Since much of human muscle mass is protein, this phenomenon is responsible for the wasting away of muscle mass seen in starvation. However, the body is able to selectively decide which cells will break down protein and which will not. About 2–3 g of protein has to be broken down to synthesize 1 g of glucose; about 20–30 g of protein is broken down each day to make 10 g of glucose to keep the brain alive. However, this number may decrease the longer the fasting period is continued in order to conserve protein.

Starvation ensues when the fat reserves are completely exhausted and protein is the only fuel source available to the body. Thus, after periods of starvation, the loss of body protein affects the function of important organs, and death results, even if there are still fat reserves left unused. (In a leaner person, the fat reserves are depleted faster). The ultimate cause of death is, in general, or brought on by tissue degradation and imbalances. Alternatively, things like may also cause death in starving people.

Symptoms of Starvation

Early symptoms include impulsivity, irritability, and hyperactivity. (wasting away) of the stomach weakens the perception of hunger, since the perception is controlled by the volume of the stomach that is empty. Individuals experiencing
starvation lose substantial () and muscle mass as the body breaks down these tissues for energy. Is the process of a body breaking down its own muscles and other tissues in order to keep vital systems such as the heart muscle functioning. The energy deficiency inherent in starvation causes and renders the victim more over time. As the starving person becomes too weak to move or even eat, their interaction with the surrounding world diminishes. In females, when the body fat percentage is too low to support a fetus.

Victims of starvation are often too weak to sense thirst, and therefore become . All movements become painful due to muscle atrophy and dry, cracked skin that is caused by severe dehydration. With a weakened body, diseases are commonplace. Fungi, for example, often grow under the , making swallowing painful. is also a common result of starvation, often leading to , , and . These diseases collectively can also cause , , and . Individuals are often irritable and lethargic as a result.

There is insufficient scientific data on exactly how long people can live without food. Although the length of time varies with an individual's percentage of body fat and general health, one medical study estimates that in adults complete starvation leads to death within 8 to 12 weeks. Starvation begins when an individual has lost about 30%, or about a third, of their normal body weight. Once the loss reaches 40% death is almost inevitable.

Processed Foods Less Nutrition

For many, the word “malnutrition” produces an image of a child in a third-world country with a bloated belly, and skinny arms and legs. However, this image alone is not an accurate representation of the state of malnutrition. For example, someone who is 150 pounds overweight can also be malnourished.

Malnutrition refers to one not receiving proper nutrition and does not distinguish between the consequences of too many nutrients or the lack of nutrients, both of which impair overall health. Undernutrition is characterized by a lack of nutrients and insufficient energy supply, whereas overnutrition is characterized by excessive nutrient and energy intake. Overnutrition can result in obesity, a growing global health threat. Obesity is defined as a metabolic disorder that leads to an over accumulation of fat tissue. Anywhere in the world, regardless of economic status, reliance on processed foods could result to malnutrition.

Food processing does have some benefits, such as making food last longer and making products more convenient. However, there are drawbacks to relying on a lot of heavily processed foods that could lead to undernutrition and/or overnutrition. Whole foods and those that are only minimally processed, like frozen vegetables without any sauce, tend to be more healthy. An unhealthy diet high in fat, added sugar and salt, such as one containing a lot of highly-processed foods, can increase the risk for cancer, and heart disease, according to the World Health Organization.

Nutrient losses

Processing foods often involves nutrient losses, which can make it harder to meet your needs if these nutrients aren't added back through fortification or enrichment. For example, using high heat during processing can cause vitamin C losses. Another example is refined grains, which have less fiber, vitamins and minerals than whole grains. Eating refined grains, such as those found in many processed foods, instead of whole grains may increase your risk for high , diabetes and obesity, according to a study published in "" in December 2007.
New research highlighting the importance to human health of a rich microbial environment in the intestine indicates that abundant food processing (not fermentation of foods) endangers that environment.

Web Link

The conducted a study of nutrient retention in 2004, creating a table of foods, levels of preparation, and nutrition.


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**Added Contaminants**

Food processing is typically a mechanical process that utilizes extrusion, large mixing, grinding, chopping and emulsifying equipment in the production process. These processes introduce a number of contamination risks. Such contaminants are left over material from a previous operation, animal or human bodily fluids, microorganisms, nonmetallic and metallic fragments. Further processing of these contaminants will result in downstream equipment failure and the risk of ingestion by the consumer.

**Added Sodium and Sugar**

One of the main sources for sodium in the diet is processed foods. Sodium is added to prevent spoilage, add flavor and improve the texture of these foods. Americans consume an average of 3,436 milligrams of sodium per day, which is higher than the recommended limit of 2,300 milligrams per day for healthy people, and more than twice the limit of 1,500 milligrams per day for those at increased risk for heart disease.

While you don't need to limit the sugars found naturally in whole, unprocessed foods like fresh fruit, eating too much found in many processed foods can increase your risk for heart disease, obesity, cavities and Type 2 diabetes. The recommends women limit added sugars to no more than 100 calories, or 25 grams, and men limit added sugars to no more than 155 calories, or about 38.75 grams, per day. Currently, Americans consume an average of 355 calories from added sugars each day.

**Trans Fats**

Foods that have undergone processing, including some commercial baked goods, desserts, margarine, frozen pizza, microwave popcorn and coffee creamers, sometimes contain . This is the most unhealthy type of fat, and may increase your risk for high cholesterol, heart disease and stroke. The 2010 Dietary Guidelines for Americans recommends keeping your trans fat intake as low as possible.

**Other Potential Disadvantages**

Processed foods also tend to be more allergenic than whole foods, according to a June 2004 "Current Opinion in Allergy and Clinical Immunology" article. Although the preservatives and other food additives used in many processed foods are generally recognized as safe, a few may cause problems for some individuals, including sulfites, artificial sweeteners, artificial colors and flavors, sodium nitrate, BHA and BHT, olestra, caffeine and monosodium glutamate.
Summary

• The level of blood sugar is; as blood glucose is consumed, is converted into glucose. Several metabolic adjustments occur during fasting. After the exhaustion of the glycogen reserve and ketone bodies are produced. After the fat reserves are used up, the cells in the body.
• Fasting may refer to the status of a person who has not eaten overnight, or to the metabolic state achieved after complete and absorption of a meal.
• Starvation ensues when the fat reserves are completely exhausted and protein is the only fuel source available to the body.
• Malnutrition refers to one not receiving proper nutrition and does not distinguish between the consequences of too many nutrients or the lack of nutrients, both of which impair overall health. Undernutrition is characterized by a lack of nutrients and insufficient energy supply, whereas overnutrition is characterized by excessive nutrient and energy intake.
• Heavily processed foods could cause malnutrition due to the effects of processing on the food or the addition of additives like salt or sugar that are above and beyond the daily recommended levels for consumption.

Sources

Wikipedia

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