

11.5: Storage Sites

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Storage of toxicants in body tissues sometimes occurs. Initially, when a toxicant enters the blood plasma, it may be bound to plasma proteins. Toxicants attached to proteins are considered a form of storage because they do not contribute to the chemical's toxic potential. Albumin is the most abundant plasma protein that binds toxicants. Normally, the toxicant is only bound to the albumin for a relatively short time.

The primary sites for toxicant storage are adipose tissue, bone, liver, and kidneys.

Adipose Tissue

Lipid-soluble toxicants are often stored in **adipose tissues**. Adipose tissue is located in several areas of the body but mainly in subcutaneous tissue. Lipid-soluble toxicants can be deposited along with triglycerides in adipose tissues. The lipids are in a continual exchange with blood and thus the toxicant may be mobilized into the blood for further distribution and elimination, or redeposited in other adipose tissue cells.

Bone

Bone is another major site for storage. Bone is composed of proteins and the mineral salt hydroxyapatite. Bone contains a sparse blood supply but is a live organ. During the normal processes that form bone, calcium and hydroxyl ions are incorporated into the hydroxyapatite-calcium matrix. Several chemicals, primarily elements, follow the same kinetics as calcium and hydroxyl ions and therefore can be substituted for them in the bone matrix.

For example, strontium (Sr) or lead (Pb) may be substituted for calcium (Ca), and fluoride (F-) may be substituted for hydroxyl (OH-) ions. Bone is continually being remodeled under normal conditions. Calcium and other minerals are continually being resorbed and replaced, on the average about every 10 years. Thus, any toxicants stored in the matrix will eventually be released to re-enter the circulatory system.

Liver and Kidneys

The **liver** is a storage site for some toxicants. It has a large blood flow and its hepatocytes (that is, liver cells) contain proteins that bind to some chemicals, including toxicants.

As with the liver, the **kidneys** have a high blood flow, which preferentially exposes these organs to toxicants in high concentrations. Storage in the kidneys is associated primarily with the cells of the nephron (the functional unit for urine formation).

Knowledge Check

1) The areas of the body which most frequently store toxicants are:

- a) Adrenal gland, thyroid gland, and pancreas
- b) Adipose tissue, bone, liver, and kidney
- c) Skeletal muscle, tendons, and leg joints

Answer

1) Adipose tissue, bone, liver, and kidney - **This is the correct answer.**

The primary sites for toxicant storage are adipose tissue, bone, liver and kidneys. Lipid-soluble toxicants store in adipose tissues; chemicals that follow calcium or hydroxyl ion kinetics store in bone; and the liver and kidney cells are subjected to high concentrations of toxicants.

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