

and sensitive to the special needs of older adults. For example, centers and services for persons with Alzheimer's disease or other dementias must take special precautions to ensure that people do not wander away from the facility.

Results

The aging population in the United States, the increasing incidence of Alzheimer's disease, and rising popularity of adult day care have created new and additional opportunities for health professionals and other care-giving and service personnel.

Resources

BOOKS

- Buelow, J. R. *Listening to the Voices of Long-Term Care*. Lanham, MD: University Press of America, 2007.
- Capezuti, E. A., E. L. Siegler, and M. D. Mezey. *Encyclopedia of Elder Care*, 2nd ed. New York: Springer Publishing, 2007.
- Mace, N. L., and P. V. Rabins. *The 36-Hour Day: A Family Guide to Caring for People with Alzheimer Disease, Other Dementias, and Memory Loss in Later Life*, 4th ed. Baltimore: Johns Hopkins University Press, 2006.
- Moore, K. D., L. D. Geboy, and G. D. Weisman. *Designing a Better Day: Guidelines for Adult and Dementia Day Services Centers*. Baltimore: Johns Hopkins University Press, 2006.

PERIODICALS

- Cohen-Mansfield, J., and B. Jensen. "Changes in habits related to self-care in dementia: the nursing home versus adult day care." *American Journal of Alzheimer's Disease and Other Dementias* 23, no. 3 (2007): 184–189.
- Gerdner, L. A., T. Tripp-Reimer, and H. C. Simpson. "Hard lives, God's help, and struggling through: caregiving in Arkansas Delta." *Journal of Cross-Cultural Gerontology* 22, no. 4 (December 2007): 355–374.
- Walker, R. J., and H. A. Kiyak. "The impact of providing dental services to frail older adults: perceptions of elders in adult day health centers." *Special Care in Dentistry* 27, no. 4 (July 2007): 139–143.
- Yan, E., T. Kwok, C. Tang, and F. Ho. "Factors associated with life satisfaction of personal care workers delivering dementia care in day care centers." *Social Work in Health Care* 46, no. 1 (2007): 37–45.

OTHER

- "Adult Day Care: One Form of Respite for Older Adults." *ARCH National Respite Network Fact Sheet* 54, April 2002. <http://www.archrespite.org/archfs54.htm> (March 20, 2008).
- "Adult Day Care Fact Sheet." *Eldercare, U.S. Department of Health and Human Services* July 6, 2005. http://www.eldercare.gov/eldercare/Public/resources/fact_sheets/adult_day.asp (December 24, 2007).

- "Nursing Homes." *Medicare, U.S. Department of Health and Human Services* April 10, 2007. <http://www.medicare.gov/Nursing/Alternatives/Pace.asp> (December 24, 2007).
- "Adult Day Services: The Facts." *National Adult Day Services Association*. <http://www.nadsa.org/adsfacts/default.asp> (March 20, 2008).

ORGANIZATIONS

- Alzheimer's Association, 225 N. Michigan Ave., Fl. 17, Chicago, IL, 60601-7633, (312) 335-8700, (800) 272-3900, (866) 699-1246, info@alz.org, <http://www.alz.org>.
- California Association for Adult Day Services, 921 11th Street Suite 1101, Sacramento, CA, 95814, (916) 552-7400, (916) 552-7404, caads@caads.org, <http://www.caads.org>.
- National Adult Day Services Association, 85 South Washington, Suite 316, Seattle, WA, 98104, (877) 745-1440, (206) 461-3218, info@nadsa.org, <http://www.nadsa.org>.
- U.S. Administration on Aging, One Massachusetts Ave., Washington, DC, 20201, (202) 619-0724, AoAInfo@aoa.hhs.gov, <http://www.aoa.gov>.

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AICD see **Implantable cardioverter-defibrillator**

Alanine aminotransferase test

Definition

The alanine aminotransferase test, also known as ALT, is one of a group of tests known as **liver function tests** (or LFTs) and is used to monitor damage to the liver.

Purpose

ALT levels are used to detect liver abnormalities. Since the alanine aminotransferase enzyme is also found in muscle, tests indicating elevated ALT levels may indicate muscle damage; however, other tests, such as the levels of the MB fraction of creatine kinase should indicate whether the abnormal test levels are because of muscle or liver damage.

Demographics

The number of ALT tests administered each year can only be estimated. Since statins are the most prescribed drugs in the United States and standards of care call for quarterly liver function tests, the number of ALTs can easily exceed 500 million per year.

Description

The alanine aminotransferase test (ALT) can reveal liver damage. It is probably the most specific test for liver damage; however, the severity of the liver damage is not necessarily shown by the ALT test since the amount of dead liver tissue does not correspond to higher ALT levels. Also, persons with normal, or declining, ALT levels may experience serious liver damage without an increase in ALT.

Nevertheless, ALT is widely used, and useful, because ALT levels are elevated in most patients with liver disease. Although ALT levels do not necessarily indicate the severity of the damage to the liver, they may indicate how much of the liver has been damaged. ALT levels, when compared to the levels of a similar enzyme, aspartate aminotransferase (AST), may provide important clues to the nature of the liver disease. For example, within a certain range of values, a ratio of 2:1 or greater for AST:ALT might indicate that a person suffers from alcoholic liver disease. Other diagnostic data may be gleaned from ALT tests to indicate abnormal results.

Preparation

No special preparations are necessary for this test.

Aftercare

This test involves blood being drawn, usually from a vein in the person's elbow. The person being tested should keep the wound from the needle puncture covered with a bandage until the bleeding stops. Individuals should report any unusual symptoms to their physician.

Risks

The greatest risk associated with an ALT test is bleeding. The odds of experiencing uncontrolled bleeding are fewer than one in a million.

Normal results

Normal values vary from laboratory to laboratory, and should be available to physicians at the time of the test. An informal survey of some laboratories indicates many laboratories find values from approximately 7 to 50 IU/L (international units per liter) to be normal.

Abnormal results

Mildly elevated levels of ALT (generally below 300 IU/L) may indicate any kind of liver disease. Levels above 1,000 IU/L generally indicate extensive

liver damage from toxins or drugs, viral hepatitis, or a lack of oxygen (usually resulting from very low blood pressure or a heart attack). A briefly elevated ALT above 1,000 IU/L that resolves in 24–48 hours may indicate a blockage of the bile duct. More moderate levels of ALT (300–1,000 IU/L) may support a diagnosis of acute or chronic hepatitis.

It is important to note that persons with normal livers may have slightly elevated levels of ALT. This is a normal finding.

Morbidity and mortality rates

Morbidity rates are excessively miniscule. The most common problems are minor bleeding and bruising. Since neither are reportable events, morbidity can only be estimated. Mortality is essentially zero.

Alternatives Resources

There are no alternatives to an alanine amino transferase test.

Precautions

The only precaution needed is to clean the venipuncture site with alcohol.

Side effects

The most common side effects of an alanine amino transferase test are minor bleeding and bruising.

Interactions

There are no known interactions with an alanine amino transferase test.

Resources

BOOKS

- Fischbach, F. T. and M. B. Dunning. *A Manual of Laboratory and Diagnostic Tests*, 8th ed. Philadelphia: Lippincott Williams & Wilkins, 2008.
- McGhee, M. *A Guide to Laboratory Investigations*, 5th ed. Oxford, UK: Radcliffe Publishing Ltd., 2008.
- Price, C. P. *Evidence-Based Laboratory Medicine: Principles, Practice, and Outcomes*, 2nd ed. Washington, DC: AACC Press, 2007.
- Scott, M. G., A. M. Gronowski, and C. S. Eby. *Tietz's Applied Laboratory Medicine*, 2nd ed. New York: Wiley-Liss, 2007.
- Springhouse Corp. *Diagnostic Tests Made Incredibly Easy!*, 2nd ed. Philadelphia: Lippincott Williams & Wilkins, 2008.

PERIODICALS

- Inoue, K., M. Matsumoto, Y. Miyoshi, and Y. Kobayashi. "Elevated liver enzymes in women with a family history

of diabetes.” *Diabetes Research in Clinical Practice* 79, no. 3 (February 2008): e4–e7.

Kansu, A. “Treatment of chronic hepatitis B in children.” *Recent Patents on Anti-Infectious Drug Discoveries* 3, no. 1 (January 2008): 64–69.

Lampe, E., C. F. Yoshida, R. V. De Oliveira, G. M. Lauer, and L. L. Lewis-Ximenez. “Molecular analysis and patterns of ALT and hepatitis C virus seroconversion in haemodialysis patients with acute hepatitis.” *Nephrology (Carlton)* 13, no. 3 (June 2008): 186–192.

Lazo, M., E. Selvin, and J. M. Clark. “Brief communication: clinical implications of short-term variability in liver function test results.” *Annals of Internal Medicine* 148, no. 5 (March 2008): 348–352.

OTHER

American Clinical Laboratory Association. Information about clinical chemistry. <http://www.clinical-labs.org/> (February 24, 2008).

Clinical Laboratory Management Association. Information about clinical chemistry. <http://www.clma.org/> (February 22, 2008).

Lab Tests Online. Information about lab tests. <http://www.labtestsonline.org/> (February 24, 2008).

National Accreditation Agency for Clinical Laboratory Sciences. Information about laboratory tests. <http://www.naacls.org/> (February 25, 2008).

ORGANIZATIONS

American Association for Clinical Chemistry, 1850 K Street, NW, Suite 625, Washington, DC, 20006, (800) 892-1400, <http://www.aacc.org/AACC/>.

American Society for Clinical Laboratory Science, 6701 Democracy Blvd., Suite 300, Bethesda, MD, 20817, (301) 657-2768, <http://www.ascls.org/>.

American Society for Clinical Pathology, 1225 New York Ave., NW, Suite 250, Washington, DC, 20005, (202) 347-4450, <http://www.ascp.org/>.

College of American Pathologists, 325 Waukegan Rd., Northfield, IL, 60093-2750, (800) 323-4040, <http://www.cap.org/apps/cap.portal>.

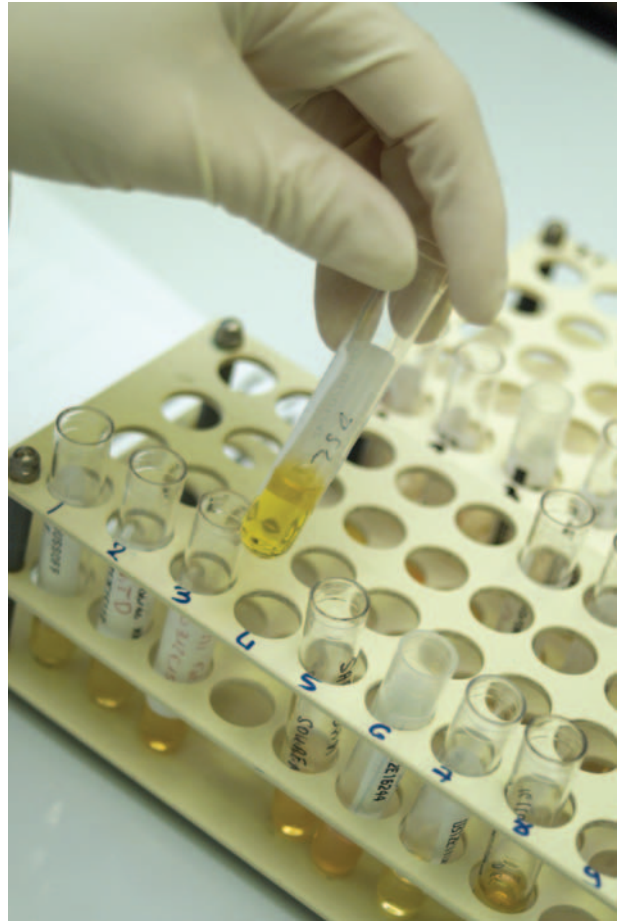
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Albumin test see **Liver function tests**

Albumin Test, Blood

Definition

Albumin is a type of protein found in the plasma (liquid) portion of the blood. Of all the types of protein in plasma, albumin is found in the highest concentrations, constituting about two-thirds of total plasma protein.



Vials of blood serum. (AJP / Hop Americain / Photo Researchers, Inc.)

Albumin serves a number of important purposes. It transports a variety of other important chemicals in the blood, allowing them to be delivered to various organs and tissues. Chemicals that bind to albumin include thyroxine, bilirubin, penicillin, cortisol, estrogen, free fatty acids, warfarin, calcium, magnesium, and heme. Appropriate levels of albumin are also necessary in order to maintain sufficient quantities of fluid within the blood vessels. When the correct concentration of albumin is present in the blood's serum, fluid remains in the blood vessels in order to reach a chemical equilibrium of protein concentrations in and outside of the blood vessels. When there is an insufficient amount of albumin in the serum, fluid will leak out of the blood vessels in response to the considerably higher concentration of protein in the surrounding tissues. This can result in visible swelling of the lower legs (referred to as edema), or in ascites (an abnormal collection of fluid in the abdomen).

Purpose

Albumin levels are tested in order to monitor liver and kidney functioning, and in order to ascertain an individual's nutritional status. Albumin levels may be checked if there is new edema or ascites. Albumin is manufactured in the liver, therefore, low albumin levels may indicate liver damage. Under normal circumstances, no albumin leaves the body in urine; however, when the kidneys are damaged, they may become leaky, allowing albumin to be excreted in the urine. This happens, for example, in nephrotic syndrome, and in pregnant women with pre-eclampsia and eclampsia. Individuals who have poor diets, with an extremely low dietary intake of protein, may also have low serum albumin.

An increased concentration of albumin may suggest that an individual has become dehydrated. High albumin levels may also occur when an individual is using insulin, growth hormones, androgens, or anabolic steroids.

Precautions

Individuals who have been on intravenous fluids may not have an accurate serum albumin reading. Additionally, it's important to remember that women have lower-than-normal serum albumin levels during pregnancy. Individuals using certain medications, such as insulin, growth hormones, androgens, or anabolic steroids, may also have an abnormal serum albumin level.

Description

This test is usually performed as part of a panel of blood tests, in which a single sample of blood is tested for a variety of chemical elements. Serum albumin levels are often tested along with total protein levels. A blood test for serum albumin requires vein puncture with a needle, and is usually performed by a nurse or phlebotomist (an individual who has been trained to draw blood).

Preparation

There are no restrictions on diet or physical activity, either before or after the blood test.

Aftercare

As with any blood tests, discomfort, bruising, and/or a very small amount of bleeding is common at the puncture site. Immediately after the needle is withdrawn, it is helpful to put pressure on the puncture site until the bleeding has stopped. This decreases

KEY TERMS

Ascites—An abnormal collection of fluid within the abdomen, often suggests liver disease such as cirrhosis.

Cirrhosis—Liver disease that results in damage and scarring to the liver.

Dehydration—Low overall levels of body fluid. May occur due to increased loss of fluids through sweating, vomiting, or diarrhea.

Eclampsia—A serious, life-threatening complication of pregnancy, in which high blood pressure results in a variety of problems, including seizures.

Nephrotic syndrome—A kidney disorder which causes a cluster of symptoms, including low serum protein, loss of protein in the urine, and body swelling.

Plasma—The fluid component of blood which contains such substances as proteins, vitamins, minerals, enzymes, and sugars.

Pre-eclampsia—High blood pressure in pregnancy, which can result in protein in the urine; untreated, pre-eclampsia may lead to the life-threatening condition known as eclampsia, which is characterized by seizures.

the chance of significant bruising. Warm packs may relieve minor discomfort. Some individuals may feel briefly woozy after a blood test, and they should be encouraged to lie down and rest until they feel better.

Risks

Basic blood tests, such as serum albumin levels, do not carry any significant risks, other than slight bruising and the chance of brief dizziness.

Normal results

In general, the normal range of serum albumin is 3.4 to 5.4 g/dL (grams per deciliter). Different labs may have slightly different values listed for the normal range of serum albumin. If total serum proteins are also being tested, the fraction that is made up of albumin should be about 60%.

Abnormal results

Low albumin may indicate:

- liver disease, such as cirrhosis, hepatitis, or hepatocellular necrosis (death of liver cells);

- kidney disease, such as nephritic syndrome or glomerulonephritis;
- severe malnutrition, as occurs in developing countries where protein deficiencies are common. This type of malnutrition is referred to as kwashiorkor, and results in the stereotypical “potbelly” often associated with malnourished children;
- malnourishment due to chronic diseases such as HIV or cancer, or due to the effects of an eating disorder such as anorexia nervosa;
- inability to absorb and digest protein, as occurs in Crohn’s disease, Whipple’s disease, or sprue;
- loss of protein from severe or chronic diarrhea;
- inflammation;
- severe burns; or
- shock.

High albumin levels can result from dehydration or the presence of certain medications.

Resources

BOOKS

- Brenner, B. M., and F. C. Rector, eds. *Brenner & Rector’s The Kidney*, 7th ed. Philadelphia: Saunders, 2004.
- Feldman, M., L. S. Friedman, and L. J. Brandt. *Sleisenger & Fordtran’s Gastrointestinal and Liver Disease*, 8th ed. St. Louis: Mosby, 2006.
- McPherson R. A., and M. R. Pincus, eds. *Henry’s Clinical Diagnosis and Management by Laboratory Methods*, 21st ed. Philadelphia: Saunders, 2006.

OTHER

Medical Encyclopedia. Medline Plus. U. S. National Library of Science and the National Institutes of Health. <http://www.nlm.nih.gov/medlineplus/encyclopedia.html> (February 10, 2008).

ORGANIZATIONS

American Association for Clinical Chemistry, 1850 K Street, NW, Suite 625, Washington, DC, 20006, (800) 892-1400, <http://www.aacc.org>.

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Allogenic transplant see **Bone marrow transplantation**

Ambulatory surgery centers

Definition

Ambulatory surgery centers (ASCs) are medical facilities that specialize in elective same-day or outpatient surgical procedures. They do not offer emergency care.

The word ambulatory comes from the Latin verb *ambulare*, which means “to walk.” It means that the patients treated in these surgical centers do not require admission to a hospital and are well enough to go home after the procedure. Ambulatory surgical centers are also known as surgicenters.

Demographics

As of 2008, there were more than 5,300 ambulatory surgical centers in the United States, up from about 3,700 in 2003. In 1980, only 275 such centers existed. This rapid increase reflects a general trend toward surgeries performed on an outpatient basis. According to *American Medical News*, 70% of all surgical procedures performed in the United States in 2000 were done in outpatient facilities, compared to 15% in 1980. As of 2003, over seven million surgeries are performed annually in American ASCs. Between 1990 and 2000, the number of operations performed annually in these centers rose 191%, from 2.3 million procedures in 1990 to 6.7 million in 2000.

The types of surgical procedures performed in ASCs have also undergone significant changes in recent years. Many of the early ASCs were outpatient centers for **plastic surgery**. Advances in minimally invasive surgical techniques in other specialties, however, led to the establishment of ASCs for orthopedic, dental, and ophthalmologic procedures. According to the Federated Ambulatory Surgery Association (FASA), gastroenterology accounted for only 10% of all procedures performed in ASCs in 1995, while plastic surgery still represented 20%. These proportions changed rapidly. By 1998, only three years later, ophthalmology accounted for more procedures performed in ASCs than any other surgical specialty (26.8%), followed by gastroenterology (18.8%), **orthopedic surgery** (9.8%), gynecology (9.5%), plastic surgery (7.7%), and otolaryngology (6.9%). The remaining 20.6% included dental, urological, neurological, podiatric, and pain block procedures.

As of 2003, ASCs are not distributed evenly across the United States; they tend to be concentrated in urban areas, particularly those with a high ratio of physicians to the general population.

Description

Ambulatory surgical centers are sometimes classified as either hospital-associated or freestanding. The term freestanding is somewhat confusing because some hospital-associated ASCs are located in buildings that may be several blocks away from the main hospital. As