

# **Glossary of Clinical Chemistry Terms**



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## *Preface*

It has not been possible to cover every aspect of such a vast field as clinical chemistry in the space available to us in this glossary. Consequently, in order that we might retain a reasonable degree of depth, we have been selective in our choice of material to be presented. This policy has been implemented by sacrificing information in two main ways. Firstly, anatomical and pathological terms are not included as separate entries but are referred to in the text where appropriate, and secondly, no attempt has been made to consider methods of analysis of individual body constituents. We have also assumed that readers will possess a general scientific background and have omitted definitions of commonplace scientific terms.

SI units and normal ranges are specific points which warrant mention here. While SI units have been recommended for adoption by a number of professional bodies and are taught in educational establishments, currently, few laboratories use them and their introduction into the para-medical literature has been sparse. We have therefore retained conventional units throughout the text of this book but have included a conversion table in Appendix A. As far as normal ranges are concerned, those we have quoted should be considered as a general guide only and are not intended to be definitive.

We hope that this glossary will be used by trainees in clinical chemistry, whether they be technologists or non-medical biochemists. We believe that the alphabetical presentation of information will make the book particularly useful to students revising for Ordinary and Higher National Certificate examinations or their equivalent, and to Science graduates proceeding directly to the Special Examination in Chemical Pathology of the Institute of Medical Laboratory Technology.

Our thanks are due to Miss J. M. Plant for preparation of the illustrations comprising *Figures 1, 3, 4, 5, 6, and 7*, to Mrs. G.A. Guthrie for typing the manuscript and to Mr. J. M. Prescod for his perceptive criticism of our drafts. We acknowledge the advice and encouragement received from Professor J. H. Wilkinson and Dr. J. R. Daly. Finally, we are indebted to Mrs. S. Robinson for her assistance during the early gestational period.

P.H.  
B.R.M.

## A

[光密度, 消光 (系数)]

**Absorbance (A)** (*Synonym:* Optical density, OD; Extinction, E) 吸光度

A fundamental concept in absorptiometry which provides a direct relationship between the absorptiometer reading and the concentration of the absorbing solution. It is derived from the Beer and Lambert laws, which can be combined to give the expression:

$$A = -\log_{10} T = kct$$

where T is transmission; c is concentration of the absorbing species; t is light path, the internal thickness of the cuvette; and k is a constant.

On most absorptiometers the galvanometer deflection is directly proportional to transmission. By superimposing an inverse logarithmic scale on to the galvanometer the deflection can be read off as absorbance. From the expression  $A = kct$  it follows that absorbance is directly proportional to concentration if the light path is kept constant. However, this relationship is ideal and deviations from it are encountered for a variety of reasons, both optical and chemical. Under these circumstances Beer's law is said to be disobeyed. The validity of the relationship must be determined experimentally for each instrument and concentration range to be used.

Absolute absorbance values may be quoted. They refer to a 1 cm light path, but the wavelength and, where relevant, the solvent must be quoted. They are either:

Molar Absorbance Coefficient ( $\epsilon$ ), the absorbance of a molar solution  
or

Specific Absorbance Coefficient, the absorbance of a 1 per cent solution.

*See also* Absorptiometry; Beer's law; Lambert's law; Transmission.

### **Absorptiometry** (*Synonym: Photometry*) 吸收光度法 [光度法]

Some molecules in solution exhibit the ability to absorb light. This absorption may be of light in the visible, ultraviolet or infra-red regions of the electromagnetic spectrum. Coloured solutions absorb visible light, the colour they display being complementary to the colour they absorb, i.e. a blue solution absorbs red light. A graph of absorption versus wavelength is called an absorption curve, and the wavelengths at which absorption maxima occur vary with different molecular species.

Absorptiometry is frequently the final step in an analytic procedure, preliminary stages being used for the production of an absorbing molecule which is quantitatively related to the substance being estimated. Optimum sensitivity is achieved by restricting the incident light to a narrow portion of the spectrum which includes the wavelength of maximum absorption.

Measurements are made in an absorptiometer, the essential components of which are the following.

#### *Light source*

A tungsten lamp is used for visible light, a hydrogen discharge tube or a deuterium lamp for ultraviolet light. Quartz iodide lamps are now frequently used for both visible and ultraviolet work.

#### *Monochromator*

The isolation of a narrow band of the spectrum may be achieved by means of a filter, prism or diffraction grating, each of which acts as a monochromator.

#### *Cuvette*

This container holds the test solution. Soda glass is a suitable material for visible light, but ultraviolet light requires quartz (silica) cuvettes. Recently plastic cuvettes suitable for both ultraviolet and visible work have become available.

#### *Photodetector*

Either a barrier layer cell or photomultiplier tube may be used to detect light transmitted by the test solution.

#### *Galvanometer*

The galvanometer displays the current produced by the photodetector. The instrument is usually calibrated as absorbance (or  $A \times 100$ ) so that a direct comparison between tests and standard may be made for those methods which obey Beer's law. When deviations from Beer's law occur reference must be made to a standard curve.

### **Absorption curve** 吸收曲线

See Absorptiometry.

**Accuracy 准确度**

*See* Quality control.

**Acetest (Ames) 商品名 (检查尿中酮体)**

A proprietary tablet form of Rothera's test for the detection of ketones in urine. One drop of urine is placed on a tablet containing sodium nitroprusside and a buffer system. A purple colour, which may be compared with a reference colour chart, is given by aceto-acetic acid in concentrations exceeding 10 mg/100 ml or acetone in concentrations exceeding 25 mg/100 ml.

**Aceto-acetic acid 乙酰乙酸**

*See* Ketone bodies.

**Acetone 丙酮**

*See* Ketone bodies.

**Acetylcholinesterase 乙酰胆碱酯酶**

Enzyme occurring in nerve tissue and erythrocytes, distinct from serum cholinesterase which is formed in the liver.

**Achlorhydria 胃酸缺乏**

The absence of free acid from gastric secretions even after the administration of a stimulant such as histamine or pentagastrin. Free acid is considered to be present when the pH of gastric juice is less than 2.8.

**Acid-base balance 酸碱平衡**

The maintenance of blood pH between narrow limits, i.e. 7.35–7.43, is achieved by a combination of homeostatic mechanisms including blood buffers, respiratory elimination of CO<sub>2</sub>, and renal excretion of hydrogen ions. Normal metabolism involves the continuous production of hydrogen ions, buffering of which is only a temporary measure. Operation of the other mechanisms is essential if acid-base balance is to be maintained.

Disturbances of acid-base balance may be respiratory or metabolic in origin. Examples of the latter are diabetic keto-acidosis and the alkalosis of vomiting (loss of hydrogen ion), while respiratory acidosis is a complication of obstructive lung disease.

**Acid excretion test 酸分泌试验**

*See* Ammonium chloride test.

**Acid phosphatase 酸性磷酸酶**

An enzyme present in high concentrations in the prostate gland and occurring in platelets, red cells, bone and liver, which catalyses the hydrolysis of phosphate esters at an acid pH. The prostatic isoenzyme may be distinguished from other forms which contribute to

activity in serum by including the inhibitors L-tartrate or formaldehyde in the assay system. Prostatic phosphatase is inhibited by tartrate, but unaffected by formaldehyde, hence the designations 'tartrate labile' and 'formol stable'.

Very high values are seen in carcinoma of the prostate if malignant growth has extended beyond the capsule of the gland, and especially if metastases are present. Slightly raised prostatic levels may be due to acute retention of urine or recent rectal examination. Total acid phosphatase may show slight increases in Paget's disease, Gaucher's disease or with haemolysed samples.

Normal ranges for serum acid phosphatase are as follows:

Total	0.5—4.0 K.A. units/100 ml	(<11 IU/l)
Formol stable	0—2.0     "     "	(< 4 IU/l)
Tartrate labile	0—1.0     "     "	(< 3 IU/l)

**ACTH** 促肾上腺皮质激素

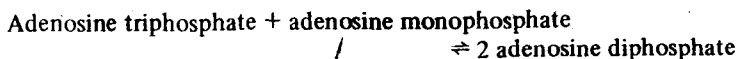
Abbreviation for adrenocorticotrophic hormone (q.v.)

**Acute phase protein** 急性期蛋白质

See C-reactive protein.

**Adenylate kinase** 腺苷酸激酶

An enzyme which catalyzes the reaction:



It is found predominantly in skeletal muscle and raised serum levels occur in muscle disease and thyrotoxicosis.

**ADH** 抗利尿素

Abbreviation for antidiuretic hormone (q.v.).

**Adrenaline (Synonym: Epinephrine)** 肾上腺素

A hormone synthesized and secreted by the adrenal medulla. Its physiological actions on the cardiovascular system include production of increased heart rate and cardiac output, which together raise systolic blood pressure. Physiologically increased secretion produces sweating, pilo-erection and a rise in basal metabolic rate (BMR). The metabolic effects of adrenaline result in increased blood levels of glucose, lactate, and non-esterified fatty acids, due to stimulation of glycogenolysis and lipolysis, and inhibition of insulin secretion.

Tumour of adrenal medullary tissue (phaeochromocytoma) gives rise to high circulating levels of the hormone, resulting in hypertension and raised BMR, frequently accompanied by decreased glucose tolerance

See also Catecholamines. (



#### 促肾上腺皮质激素

#### **Adrenocorticotrophic hormone (ACTH)** (*Synonym:* Corticotrophin)

A single chain polypeptide comprising 39 amino acid residues, secreted by the anterior pituitary. Residues 1–24 are required for full biological activity, immunoreactivity being a feature of residues 25–39. The hormone is secreted in response to corticotrophin-releasing factor from the hypothalamus, control of secretion being governed by a reciprocal feedback mechanism involving plasma cortisol.

The major role of ACTH is to maintain the structure and function of the adrenal cortex, stimulating the production of glucocorticoids (predominantly cortisol and corticosterone) and androgens. Extra-adrenal effects are generally to oppose the action of insulin.

Plasma ACTH exhibits a circadian rhythm, values ranging from 5–100 pg/ml when estimated by bio-assay. ACTH secretion and plasma cortisol increase acutely in response to stress, this responsiveness forming the basis of a number of procedures designed to test the integrity of the hypothalamic–pituitary–adrenal axis.

#### **Adsorption chromatography** 吸附层析

A form of chromatography in which retarding forces are due to adsorption on to the surface of a finely divided solid stationary phase. The mobile phase may be liquid or gas. (Only liquid will be considered here.) The stationary phase may be in the form of a column or thin layer. In the former a sample is applied to the top of the column and impelled downwards by addition of solvent. Aliquots are collected from the bottom of the column after sequential elution of different components. In the latter the solvent ascends the thin layer plate by capillary attraction and separated components are located by spraying with an appropriate reagent. The technique has proved useful for separating non-polar mixtures, e.g. cholesterol from cholesterol esters and pregnanediol from pregnanetriol.

*See also* Chromatography; Gas chromatography; Thin layer chromatography; Ion exchange chromatography.

#### **$\delta$ -ALA** 5-氨基-4-酮戊酸

Abbreviation for  $\delta$ -aminolaevulinic acid (q.v.).

#### **Alanine aminotransferase (Ala AT)** 丙氨酸氨基转换酶

*See* Aminotransferases.

#### **Albumin** 白蛋白

A protein, mol.wt. 69,000, which is synthesized in the liver, and which accounts for over half of the protein content of plasma. Albumin contributes 80 per cent towards the oncotic pressure of plasma, and hence hypo-albuminaemia frequently leads to oedema. A number of plasma constituents, including calcium, bilirubin, non-esterified fatty acids, drugs and hormones are transported bound to albumin.

Hypo-albuminaemia results in a fall in the plasma concentration of these constituents, but does not, however, affect the physiologically active unbound fractions. Albumin also contributes to the buffering capacity of plasma and acts as a pool of amino acids, readily available to the liver.

Plasma albumin, which may be measured by a variety of methods, normally falls within the range 3.7–5.3 g/100 ml. Increased concentrations are seen only in dehydration. Decreased albumin levels are the result either of decreased synthesis (e.g. liver disease, protein malnutrition, malabsorption), or of increased loss (e.g. renal loss as in the nephrotic syndrome, or intestinal loss as in protein-losing enteropathy).

Bisalbuminaemia, in which there are two electrophoretically distinct albumin fractions, and analbuminaemia, in which albumin is absent, are rare hereditary conditions.

#### **Albumin-globulin ratio** 白朊-球朊比例

See Plasma proteins.

#### **Albustix (Ames)** 商品名(检查尿蛋白)

A dipstick test for the detection of protein in urine. The stick consists of a Perspex strip, the end of which is impregnated with tetrabromophenol blue buffered to a pH of 3. The strip is dipped into urine and then withdrawn. Protein present in urine absorbed on the strip causes a change from yellow to green, an effect known as the protein error of indicators.

Degrees of colour change are assigned a number of + signs by comparison with a reference colour chart. The test is more sensitive to albumin than to other proteins, the former being detected in concentrations as low as 5 mg/100 ml. Highly alkaline urines may give false positive results.

#### **Alcohol (ethanol)** 乙醇

Individual variation exists in the response to ingested alcohol. However, blood levels above 100 mg/100 ml indicate average intoxication, and levels above 200 mg/100 ml serious intoxication. A direct correlation between alcohol concentrations in arterial blood and alveolar air is the basis for the breathalyser test. Concentrations in urine are about one-third higher than in blood.

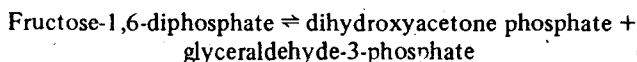
Blood and urine alcohol may be estimated by several methods, gas chromatography being preferred to alcohol dehydrogenase or dichromate reduction. Its estimation may carry legal implications.

#### **Alcohol test meal** 乙醇试验餐

See Gastric stimulation tests.

### **Aldolase 醛缩酶**

An enzyme widely distributed in the body, which catalyses the reaction:



Raised serum levels are found in destructive disease of muscle, especially progressive muscular dystrophy, but not in muscle lesions of neurogenic origin. There is a peak serum level 24 hours after myocardial infarction which returns to normal after 4–6 days. Other diseases causing raised levels in serum include acute hepatitis, megaloblastic anaemia and generalized malignancy.

Red cells and platelets possess very high aldolase activity and hence serum free from haemolysis is recommended for the assay.

Increased levels are found in cerebrospinal fluid in some sphingolipidoses.

### **Aldosterone 醛甾酮**

A steroid hormone synthesized by the adrenal cortex, secretion of which is regulated by the renin–angiotensin system by means of a negative feedback mechanism. Increased plasma potassium and reduced plasma sodium levels are potent stimuli of aldosterone secretion, while the effect of ACTH is permissive. Aldosterone is the major mineralocorticoid in plasma and as such is responsible for maintenance of sodium homeostasis.

The normal level for plasma aldosterone falls within the range 3–15 ng/100 ml, and the secretion rate is 50–200 µg per day. These are increased in hyperaldosteronism, which may arise as a primary condition due to adrenal tumour (Conn's syndrome), or be secondary to other disease states.

*See also* Mineralocorticoids; Renin.

### **Alkali reserve 碱贮(备)**

*See* Bicarbonate.

### **Alkaline phosphatase 碱性磷酸酶**

Generic term for a group of enzymes which catalyse the hydrolysis of a wide variety of phosphate esters at an alkaline pH. Many tissue-specific isoenzyme forms have been recognized, such as liver, bile duct, bone, intestine, lactating mammary gland and placenta. The activity in normal serum is due to both liver and bone isoenzymes, predominantly the former, with a small variable contribution from the intestine. Physiological increases are found in childhood, due to an increased level of bone isoenzyme, and in pregnancy, when the placental enzyme is added to the serum.

The isoenzymes giving rise to abnormal serum levels may be demonstrated by electrophoresis on starch or polyacrylamide gel. An alternative approach is the effect of inhibitors. Intestinal and placental enzymes are stable to heat and 3M urea, but inhibited by L-phenylalanine, whereas those from liver and bone are heat labile, inhibited by urea, and only slightly affected by L-phenylalanine.

Increased serum activities are most commonly seen in liver and bone diseases. In the former, higher levels are seen in extrahepatic cholestasis than in hepatocellular disease. However, this is due to increased synthesis in the liver cell and not, as might be expected, to impaired excretion. In bone disease the level of alkaline phosphatase reflects the degree of osteoblastic activity. High levels due to an atypical isoenzyme elaborated by tumour cells are occasionally seen in carcinoma (usually of the lung).

Normal range for serum alkaline phosphatase is 3–13 K.A. units/100 ml, values up to 30 being found in children.

#### **Alkaptonuria 黑酸尿**

*See Homogentisic acid.*

#### **Allen correction 艾伦校正法**

A formula used to correct for background absorbance in photometric methods which are subject to interference from non-specific chromogens. In its simplest form, readings are made at the optimum wavelength and at wavelengths equidistant on either side of this.

The corrected absorbance reading is given by the reading at the optimum wavelength minus half the sum of the other two readings. For example, when using the Zimmermann reaction:

$$A_{520} \text{ (corrected)} = A_{520} - \frac{A_{440} + A_{600}}{2}$$

#### **Amino acids 氨基酸**

Organic compounds containing both an amino group and an acidic group, 20 of which, with the general formula  $R\cdot CH(NH_2)COOH$ , account almost exclusively for the amino acid content of proteins.

#### **Aminoaciduria 氨基酸尿**

Excess excretion in the urine of one or more amino acids. Aminoaciduria may be due either to increased plasma levels, which swamp the reabsorptive capacity of the kidney, or to defects in the absorption mechanisms of the renal tubules themselves, leading to low plasma levels. Specific amino acids or groups of amino acids may be involved, indicating a defect of genetic origin, or a generalized aminoaciduria may occur secondary to some other disease state.

Methods for investigation of aminoaciduria include chemical estimation of individual or total amino acids, or their separation by paper, thin layer or ion exchange chromatography.

**p-Aminohippuric acid (PAH) 对-氨基马尿酸**

This substance is used in the assessment of two aspects of renal function. Firstly the clearance of PAH measured at low plasma levels ( $< 2 \text{ mg/100 ml}$ ) affords a good approximation to renal plasma flow, and secondly, urinary excretion measured at high plasma levels ( $> 20 \text{ mg/100 ml}$ ) can be used to derive maximum tubular secretory capacity ( $T_m$ ) from the formula :

$$T_m = UV - GFR \times P$$

where U is concentration of PAH in urine ( $\text{mg/100 ml}$ ); V is volume of urine in millilitres per minute; P is concentration of PAH in plasma ( $\text{mg/100 ml}$ ); and GFR is glomerular filtration rate.

Since PAH is not normally present in blood, suitable amounts have to be introduced either by continuous intravenous infusion or by injection into loose axillary tissue, making the tests inconvenient for routine use.

**$\delta$ -Aminolaevulinic acid ( $\delta$ -Ala) 5-氨基-4-酮戊酸**

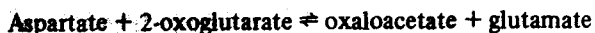
An intermediate of haem biosynthesis. Increased amounts are found in the urine in some types of porphyria and in poisoning by agents which interfere with haem synthesis, e.g. lead.

**Aminotransferases (Synonym: Transaminases). 氨基转换酶**

Enzymes which catalyse the transfer of an amino group from an amino acid to an oxo acid to form a second amino acid and oxo acid. Two of these enzymes, aspartate and alanine aminotransferases, are frequently measured in serum, raised levels indicating damage to the tissues of which they are normal intracellular components.

**Aspartate aminotransferase (Asp AT) 天冬氨酸氨基转换酶**

Previously known as serum glutamate oxaloacetate transaminase, SGOT, this enzyme catalyses the reaction:

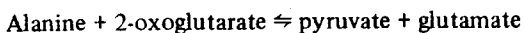


It is widely distributed, with high concentrations in heart, liver, kidney, skeletal muscle and red cells.

Raised serum levels occur in heart and liver disease. Following myocardial infarction a characteristic pattern is seen in which enzyme levels rise after 6–8 hours to a peak at 24–48 hours and return to normal by the fifth day. In liver disease the highest levels are seen in viral hepatitis and toxic liver necrosis, showing that rapid degeneration of liver tissue has occurred.

### **Alanine aminotransferase (Ala AT) 丙氨酸氨基转换酶**

Previously known as serum glutamate pyruvate transaminase, SGPT, this enzyme catalyses the reaction:



It is widely distributed, although less abundant than Asp AT. high levels being found only in liver, and to a lesser extent in kidney.

Raised serum levels are confined mainly to diseases of the liver, very high values occurring in viral hepatitis and toxic liver necrosis.

### **Ammonia 氨**

Blood ammonia is derived mainly from the large intestine following the action of micro-organisms on urea, with some contribution from the catabolism of amino compounds in the tissues. Rapid uptake of ammonia by the liver, where its conversion to urea takes place, maintains the blood concentration below about  $75 \mu\text{g}/100 \text{ ml}$ . Increased levels are seen in severe liver disease, especially acute hepatic necrosis.

Urinary ammonia arises as a secretion from the distal tubular cells, in which it is synthesized by the action of glutaminase on glutamine. Its function in the tubules is to buffer hydrogen ions, thus aiding the secretion of further acid. Variation from the normal 24-hour excretion of 20–70 m mol is seen in a variety of conditions, but measurements are most commonly made as part of the ammonium chloride test of renal tubular function.

See Ammonium chloride test.

### **Ammonium chloride test 氯化铵试验**

Assesses the ability of the kidneys to excrete ammonia and hydrogen ions. pH and ammonia content is measured on all urine samples voided between 2 and 8 hours following an oral dose of ammonium chloride (0.1 g/kg body weight). A normal person will void at least one specimen with a pH of 5.3 or less and will excrete between 30 and 90  $\mu\text{mol}$  of ammonia per minute.

### **Amniotic fluid (Synonym: Liquor amnii) 羊水**

Fluid within the amnion which bathes the developing foetus. Withdrawal of fluid (by amniocentesis) and examination for bilirubin, protein and creatinine, is of value in assessing foetal wellbeing. Bilirubin may be measured chemically, or spectrophotometrically by the absorbance at 450 nm after applying an Allen correction for the absorbance at 350 nm and 580 nm. The bilirubin to protein ratio gives an index which can be used to predict neonatal haemolysis. Liquor creatinine values correlate with foetal maturity.

See also Lecithins.

### **Amphetamine 苯丙胺**

Central nervous system stimulant which inhibits sleep and is frequently misused. A commonly used screening test which gives positive reactions up to 48 hours after amphetamine ingestion depends upon the formation of a coloured product when amines extracted from urine are reacted with diazotized metanilic acid. False positive, but not false negative, reactions are said to occur occasionally.

### **$\alpha$ -Amylase 淀粉酶**

An enzyme which catalyses the hydrolysis of ingested starch and glycogen to sub-units capable of being absorbed across the gastrointestinal mucosa. Both starch (a mixture of amylose and amylopectin) and glycogen are degraded as far as the reducing disaccharide maltose, and some free glucose is also formed. The enzyme is present in salivary and pancreatic secretions, also in liver, kidney, muscle, urine and plasma.

The normal range for serum amylase is 60–160 Somogyi units/100 ml. Values over 500 are encountered after the onset of acute pancreatitis, a peak being reached between 5 and 12 hours, returning to normal within 24–72 hours. Increases in chronic pancreatitis are only slight and difficult to interpret. A raised activity is also seen in mumps, perforated peptic ulcer, cholecystitis and renal failure, but is rarely as high as that seen in acute pancreatitis.

In the absence of renal impairment urinary amylase reflects plasma amylase, with elevated levels being maintained for slightly longer. On a 24-hour collection the normal range is 50–300 Somogyi units per hour or 5–20 Wohlgemuth units (sometimes called the diastatic index). Rarely, a raised plasma amylase is associated with a symptomless condition characterized by the presence of a macro-amylase (mol. wt. 200,000) which does not appear in the urine.

*See also* Somogyi unit; Wohlgemuth unit.

### **Anaemia 贫血症**

A reduction in the amount of circulating haemoglobin. This may be due to impaired synthesis of either haemoglobin or red cells, increased destruction of red cells, or excessive blood loss.

### **Androgens 雄激素**

C-19 steroids synthesized by the adrenals, testes and ovaries. The principal androgen, testosterone, is synthesized almost entirely in the testes, whereas dehydro-epiandrosterone and androstenedione which are far less potent, originate mainly from the adrenals.

Androgens act physiologically to maintain the male secondary sexual characteristics. Testosterone is a protein anabolic steroid which stimulates growth and enhances retention of potassium, nitrogen,

calcium and phosphorus. In addition it stimulates libido in both male and female.

### Angiotensin 血管紧张素

A pressor agent which acts on blood vessels causing vasoconstriction, and which stimulates the adrenal gland to secrete aldosterone. The production of angiotensin is initiated by renin, which splits the slightly active angiotensin I from the circulating  $\alpha_2$ -globulin, angiotensinogen. A plasma peptidase then removes a dipeptide from angiotensin I to yield the fully active octapeptide, angiotensin II. Plasma concentrations of the latter, which may be measured by radio-immunoassay, are increased in most forms of hypertension, but are low in primary hyperaldosteronism.

*See also* Renin; Aldosterone.

### Ångström unit 埃(单位)

One Ångström unit (Å) =  $10^{-10}$  m =  $10^{-1}$  nm.

### Antibody 抗体

A protein synthesized by an animal in response to stimulus by an antigen. The antibody thus produced has the ability to specifically bind the antigen and thereby render it inactive or insoluble.

*See also* Antigen; Antiserum; Immunoglobulin.

### Anticoagulants 抗凝剂

Substances which interfere with the process of blood clotting either *in vivo* or *in vitro*. They may be used prophylactically in patients with a tendency to thrombosis or in the laboratory to prevent coagulation of blood specimens required as whole blood, packed red cells, white cells or plasma.

Two anticoagulants are commonly used in clinical chemistry.

### Heparin 肝素

Heparin is an animal polysaccharide which acts by antagonizing thrombin. It is the anticoagulant of choice as its presence does not cause a redistribution of water between red cells and plasma. Although obtainable in a variety of salt forms, lithium heparin is the most frequently used, giving a sample uncontaminated by routinely estimated metal ions. However, it inhibits some enzymes and should not therefore be used indiscriminately.

### Potassium oxalate 草酸钾

Potassium oxalate acts by complexing calcium and hence removes this essential co-factor from the coagulation process. Its use is restricted because it interferes with the assay of potassium, calcium, magnesium and numerous enzymes. It is most commonly encountered



in conjunction with sodium fluoride for the combined anticoagulation and preservation of blood for glucose estimation. (Fluoride acts as a preservative by inhibiting the enzyme enolase, and hence prevents the glycolytic degradation of glucose by erythrocytes and lymphocytes.)

Salts of ethylenediamine tetra-acetate (Sequestrene, Versene) and sodium citrate, which also act by chelating calcium, are frequently used by haematologists.

抗利尿激素 [(垂体后叶)加血压(激)素]

**Antidiuretic hormone (ADH)** (*Synonym:* Vasopressin, Pitressin)

A nonapeptide secreted by the posterior pituitary. The hormone is involved in regulation of the volume of extracellular fluid, its effect being to promote reabsorption of water from the distal convoluted tubules and collecting ducts of the kidneys. A high plasma osmolality, acting via osmoreceptors in the hypothalamus, promotes ADH secretion and hence water retention. Conversely, a lowered plasma osmolality decreases ADH secretion, leading to increased water excretion. Deficiency of the hormone results in diabetes insipidus, a condition characterized by massive polyuria and concomitant thirst.

Administration of ADH in pharmacological doses causes a rise in blood pressure due to a pressor action on peripheral blood vessels.

**Antigen** 抗原

A substance which can evoke the synthesis of an antibody.

*See also* Antibody; Antiserum; Immunoglobulins.

**Antiserum** 抗血清

Serum, rich in antibody, obtained from an animal stimulated with appropriate antigen. Antisera may be of broad specificity, e.g. anti whole human serum, or be specific to individual proteins.

*See also* Antigen; Antibody; Immunoglobulins.

**$\alpha_1$ -Antitrypsin**  $\alpha_1$ -抗胰凝乳酶

A serum protein accounting for over 90 per cent of the  $\alpha_1$ -globulin fraction. Deficiency of the protein is associated with congenital early-onset emphysema and familial infantile cirrhosis.

**Arginine loading test** 精氨酸负荷试验

A procedure designed to assess the ability of the anterior pituitary to secrete growth hormone (GH) in response to amino acid infusion.

*Procedure*

Arginine hydrochloride, 0.5 g/kg body weight, is infused intravenously over 30 minutes. Blood samples for plasma GH assay are taken at the beginning of infusion, and then at half-hour intervals for 2 hours.