

Interpretation of Blood Test Results

Classifications

- (No mark) **A** : The measurement value is within the reference range.
- * **B** : The measurement value deviates slightly from the reference range. Please undergo a medical interview, re-examination, or treatment or seek advice for improving your life habits as deemed necessary.
- ** **C** : The measurement value deviates from the reference range. You should undergo a medical interview, re-examination, or treatment or seek advice for improving your life habits.

Each result is just an indication of your health. Regardless of the results, if you have noticed any symptoms or are currently undergoing observation or treatment, please consult your doctor or the Health Center.

What are reference ranges?

Reference ranges (normal ranges, standard values, normal levels, reference values, etc.) are defined as the range of values, and 95% of the population, who are considered to be healthy, fall under these ranges.

●White Blood Cell (WBC)

WBC count increases when there is inflammation due to bacterial and other infections, one's physical constitution, smoking, drug use (corticosteroids etc.), or hematological disorders. On the other hand, a decrease in WBC count may be attributed to viral infection, one's physical constitution, liver disorders, drug use, or hematological disorders.

Anemia

- Red Blood Cell (RBC)
- Hemoglobin (HGB)
- Hematocrit (HCT)
- Mean corpuscular volume (MCV)
- Mean corpuscular hemoglobin (MCH)
- Mean corpuscular hemoglobin concentration (MCHC)

RBC count, HGB and HCT are decreased when there is anemia. It is important to figure out what causes abnormal levels of these since slowly progressive anemia often produces no symptoms.

To figure out what causes anemia, MCV, MCH, and MCHC are useful. MCV indicates the mean size of RBCs. MCH and MCHC indicate the mean amount of HGB and the mean concentration of HGB in each cell, respectively.

When decreased MCV and decreased MCHC are observed, it is diagnosed as microcytic hypochromic anemia and is an iron-deficiency anemia, which is a common anemia and is caused by an insufficient intake of iron, gynecological disorders with hypermenorrhea, gastrointestinal blood loss, etc. When increased MCV and normal MCHC are observed, it is diagnosed as macrocytic normochromic anemia, which is induced by vitamin B₁₂ deficiency, folic acid deficiency, etc., the cause of which needs to be examined.

When normal MCV and normal MCHC are observed, it is known as normocytic normochromic anemia and a thorough examination to determine the cause is necessary as it may indicate hematological disorders with erythropoietic suppression in bone marrow, hemolytic anemia, chronic inflammatory disorders, etc.

●Platelet Count (PLT)

A decrease in platelet count is caused by liver disorders, connective tissue diseases, or hematological disorders.

●Total Protein (TP)

Total protein means all serum proteins such as albumin (ALB), globulin, etc. Causes for decreased TP include malnutrition with decreasing ALB, liver disorders, protein-losing disorders (nephrotic syndrome, bleeding, protein-losing gastroenteropathy, etc.). Causes for increased TP include dehydration, chronic infectious diseases, autoimmune diseases, myeloma, etc.

●Albumin (ALB)

Albumin (ALB) is a protein produced in the liver. ALB decreases due to malnutrition, liver dysfunction, or renal dysfunction.

Liver

●Aspartate aminotransferase (AST (GOT)) ●Alanine aminotransferase (ALT (GPT))

●Alkaline phosphatase (ALP) ●Gamma-glutamyl transferase (GGTP) ●Total bilirubin (TB)

AST (GOT) and ALT (GPT) are enzymes that are present predominantly in the liver and increase when there is liver damage, the leading causes of which are hepatitis, fatty liver, alcoholic liver disease, etc. After vigorous exercise and so on, AST (GOT) increases since it is also present in skeletal muscles and myocardia. Although ALP, GGTP and TB increase with liver disorders and biliary tract diseases, GGTP is strongly associated with the consumption of alcohol or obesity. In addition, ALP also increases due to bone diseases, etc. Please note that from 2020, international standard values will be adopted for ALP (IFCC method) and the results will drop to around 1/3 of previous levels. (AY2019 Reference range: 100~359 U/L ⇒ AY2020 Reference range: 38~113U/L)

Kidney

●Creatinine (CRTNN)

Creatinine (CRTNN) is an indicator of renal function. Increased CRTNN indicates the decline of renal function.

●Estimated glomerular filtration rate (eGFR)

eGFR is short for estimated glomerular filtration rate and is a key indicator of kidney function. The eGFR is a number calculated using a patient's serum creatinine level, age, and sex. A lower eGFR can indicate reduced kidney function. If your eGFR is consistently less than 60 ml/min/1.73m², you may be diagnosed with chronic kidney

disease, but it is important to have a comprehensive evaluation that also considers urinalysis results and any other underlying illnesses.

●Uric Acid (UA)

Uric acid (UA) causes gout, urinary tract stones, arteriosclerosis, etc. UA increases due to one's physical constitution, alcohol consumption, excessive intake of purines (meat, internal organs [liver, etc.], fish eggs, natto [fermented soybeans], etc.), obesity, stress, renal diseases, hematological disorders, etc. If UA is more than 7 mg/dL, hyperuricemia is diagnosed. If UA is more than 9 mg/dL, treatment is recommended.

Diabetes Mellitus

●Glucose (GLU)

Blood glucose level is high at all times in patients with diabetes mellitus (DM). Early detection and treatment for DM are important since DM causes serious complications such as arteriosclerosis, renal failure, visual loss due to retinopathy, numbness due to peripheral neuropathy, etc. DM is diagnosed if fasting plasma glucose ≥ 126 mg/dL and/or 2-hour postprandial glucose ≥ 200 mg/dL are detected.

●Hemoglobin A1c (HbA1c) ※For those 40 years and older

Hemoglobin A1c (HbA1c) is a glucose-combined hemoglobin in RBC. HbA1c is also called glycohemoglobin. HbA1c provides an integrated measure of the blood glucose profile over 1~2 months. HbA1c is not influenced by diet and used as a screening test for DM.

When the international standard value (NGSP value) is equal to or more than 6.0%, impaired glucose tolerance (borderline diabetes) is suspected. When the NGSP value is equal to or more than 6.5%, DM is suspected.

Lipids

●Triglycerides (TG)

Normal triglyceride levels are less than 150 mg/dl. TG is included as a diagnostic criterion for metabolic syndrome. Not only LDL-C but also TG increases exacerbate arteriosclerosis. Being overweight, excessive intake of carbohydrates (sweets, rice, bread, etc.), and excessive alcohol consumption are known to increase TG.

●High-density Lipoprotein-Cholesterol (HDL-C)

High-density lipoprotein-cholesterol (HDL-C) is also called "good" cholesterol. A normal HDL-C level is more than 40 mg/dL. Low levels of HDL-C exacerbate arteriosclerosis since HDL-C has an anti-atherosclerotic effect. Since smoking decreases HDL-C level, smoking cessation (stopping smoking) is very important. Furthermore, regular exercise increases HDL-C level.

●Low-density Lipoprotein-Cholesterol (LDL-C)

Low-density lipoprotein-cholesterol (LDL-C) is also called "bad" cholesterol. A normal LDL-C level is less than 140 mg/dL. LDL-C is the most important risk factor for atherosclerosis. Not only restricting eggs and fatty meat, but also restricting calories is important for those with high levels of LDL-C. The effect of

exercise on controlling LDL-C is less than regulating TG and HDL-C.

The "lipid management targets for patients with different risk levels" offered by the Japan Atherosclerosis Society in 2017 are as follows. If patients do not have DM, family history of coronary artery disease (CAD), or other risk factors, their lipid management target is less than 160 mg/dL. If a patient cannot achieve their target LDL-C level after modifying their lifestyle, drug therapy should be considered. If patients have risk factors such as DM, hypertension, or smoking, their lipid management target is less than 120 mg/dL. If patients have a history of CAD, their lipid management target is less than 100 mg/dL.

Heart

●Brain natriuretic peptide (BNP) ※For those 40 years and older

Brain natriuretic peptide (BNP) is a hormone secreted in response to cardiac overload. Cardiomyopathy, cardiac failure, myocardial infarction, renal failure, hypertension, etc. increase BNP level.

Prostate

●Prostate-specific antigen (PSA) ※For those 50 years and older men

Prostate-specific antigen (PSA) is a tumor marker for early detection and diagnosis of prostate cancer. When there is an increased level of PSA, indicating the possibility of prostate cancer, further follow-up by urologists is required.

Upper Gastrointestinal Tract

●Anti-Helicobacter pylori (H. pylori) antibody in blood (LA) ※For those who are 49 years of age If 10 U/mL or more (positive)

Indicates high probability of being infected by H. pylori. Persons who returned a positive result have the option of treating the H. pylori infection either at the Health Center, Keio University or an external medical institution.

If 3 U/mL or more and less than 10 U/mL

You may still be infected by H. pylori even with results within this range of values. We recommend that you consult with the Health Center or an external medical institution just in case.

If less than 3 U/mL (negative)

Indicates high probability of not being infected by H. pylori. Although there is currently no need for further measures, you may have bacterial infections other than H. pylori and unrelated to this antibody in your stomach. Furthermore, this result in no way guarantees that similar tests later in life will always come back negative or that you will not develop stomach cancer in the future.

Please have regular health checkups to manage your own health.

Health Center, Keio University