

Interpretation of Special Health Examinations Results (Organic Solvents and Specific Chemical Substances)

Test findings

A: The measured result is within the reference range.

B: The measured result deviates slightly from the reference range. Please undergo a medical interview, reexamination, or seek advice for improving your lifestyle habits as deemed necessary.

C: The measured result deviates from the reference range. You should undergo a medical interview, reexamination, or treatment, or seek advice for improving your lifestyle habits.

1. Blood test

WBC count

White blood cell (WBC) count increases when there is inflammation in the human body. WBC count is also elevated by inflammation of the skin, eyes, and respiratory system caused by organic solvents. One's physical constitution, smoking, drug use (e.g., corticosteroids), or hematological disorders may increase WBC count, and 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 cells (RBC) ●Hemoglobin (HGB) ●Hematocrit (HCT) ●Mean corpuscular volume (MCV) ●Mean corpuscular hemoglobin (MCH) ●Mean corpuscular hemoglobin concentration (MCHC)

These are useful tests to determine if someone has anemia and figure out what is causing it. Toluene, xylene, n-hexane, and benzene can cause mild anemia.

●Platelets (PLT)

Platelets play a critical role in hemostasis. Causes of a decrease in platelet count include liver disorders and connective tissue diseases. Hematological disorders may increase or decrease platelet count.

Liver

●Aspartate aminotransferase (AST [GOT]) ●Alanine aminotransferase (ALT [GPT]) ●Gamma-glutamyl transferase (GGTP)

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, alcoholic liver disease, etc. After vigorous exercise, etc., AST (GOT) may increase since it is also present in skeletal muscles and myocardia. GGTP, ALP, and T-Bil also increase due to liver disorders and biliary tract diseases, and GGTP and ALP are strongly associated with the consumption of alcohol or obesity.

Contact with organic solvents (chloroform, carbon tetrachloride, 1,2 - dichloroethane, chlorobenzene, trichloroethylene, N,N-dimethylformamide, etc.) can cause liver dysfunction.

GGTP may increase due to a breakdown of the cells of the bile ducts in the liver. If this happens, this will be accompanied by an increase in ALP, an enzyme found in the biliary tract. Cholangitis and bile duct cancer are two of the most representative causes of elevated GGTP and ALP.

Recently, there have been reports in Japan of bile duct cancer in persons working with large volumes of dichloromethane and dichloropropane. When the degree of liver damage is severe or when there is damage to the biliary tract, this can lead to elevated T-Bil. When T-Bil in the blood reaches a certain level, symptoms of jaundice may appear, causing the conjunctiva and skin to appear yellow.

However, even if there is no liver damage, there are those who constitutionally exhibit high T-Bil values.

Such cases are referred to as constitutional jaundice and pose little hazard for health.

2. Urinalysis

●Protein: May be a sign of renal disease since increases in protein in urine are caused by various renal diseases. On the other hand, fever or vigorous exercise also increases protein in urine.

●Occult Blood: May be a sign of diseases or tumors of the urinary tract or prostate. Positive results can also be caused by menstruation, vigorous exercise, or without any known cause.

There is a risk of kidney damage being caused by organic solvents such as chloroform, carbon tetrachloride, chlorobenzene, trichloroethylene, and N,N-dimethylformamide.

●Urobilinogen: May reflect a blood level of bilirubin which increases due to various liver disorders and hemolytic anemia. Although it is a test of urine, it is worthy for screening of liver diseases and blood disorder.

●Urogenous metabolites test

Certain solvents will be excreted in urine after being metabolized in various organs following ingestion. It is possible to estimate exposure levels of persons working with organic solvents by testing their waste products (urogenous metabolites).

This test determines the exposure level of persons working with xylene (urogenous methylhippuric acid), styrene

(urogenous mandelic acid), toluene (urogenous hippuric acid), 1,1,1 trichloroethane (urogenous trichloroacetic acid or total trichloride), n-hexane (urogenous 2,5-hexanedione), N,N-dimethylformamide (urogenous N-methylformamide), trichloroethylene (urogenous trichloroacetic acid or total trichloride), tetrachloroethylene (urogenous trichloroacetic acid or total trichloride) by testing the metabolites indicated in brackets.

When needed, please wear protective equipment (eye protection, mask, hat, rubber or plastic gloves, etc.). Please have regular checkups, and if you notice any symptoms, please see a doctor immediately.

Health Center, Keio University