

Interpretation of Special Health Examinations Results (Ionizing Radiation)

Users of radioactive substances are obliged to undergo the Special Health Examinations (Ionizing Radiation) once a year, under the Ordinance on Prevention of Ionizing Radiation Hazards and the Radiation Hazard Prevention Act. Those who will use radioactive substances for research, laboratory work, etc., and those who are directed to undergo the special health examinations by occupational health physicians based on the results of the regular personal dosimetry measurements, should undergo the Special Health Examinations.

【How does radiation affect the human body?】

Ionizing radiation is radiation with enough energy to remove electrons from atoms, creating ions. Ions made by this ionization effect react with molecules (e.g., water) that make up the human body to form active ions called free radicals, which induce cellular DNA (deoxyribonucleic acid) damage.

Most of the DNA damaged by free radicals is restored to its original structure immediately. However, some damaged DNA is left unrepaired or anomalies occur during the repair process. If DNA damage causes lethal cell injury, cell death by apoptosis may occur, leading to clinical radiation injury. In addition, DNA damage can potentially cause cancer.

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.

White blood cell count

White blood cell (WBC) count increases when there is inflammation in the human body. Excess radiation exposure leads to a decrease in WBC count. Furthermore, radiation exposure may cause hematological disorders, resulting in leukocytosis. Smoking and drug use (e.g., corticosteroids) may increase WBC count. A decrease in WBC count may be attributed to viral infection, one's physical constitution, liver disorders, drug use, or hematological disorders.

Differential leukocyte count

●Neutrophils (NEUT) ●Lymphocytes (LYMPH) ●Monocytes (MONO) ●Eosinophils (EOSINO) ●Basophils (BASO)

WBCs are categorized into five types of cells, namely neutrophils (NEUT), lymphocytes (LYMPH), monocytes (MONO), eosinophils (EOSINO), and basophils (BASO). A high neutrophil count and neutropenia are caused by myeloid leukemia and pneumonia, and a low neutrophil count is caused by pernicious anemia and radiation exposure. A high lymphocyte count and lymphopenia are caused by lymphoid leukemia and Graves' disease and a low lymphocyte count is caused by aplastic anemia and radiation exposure. A high monocyte count is caused by monocytic leukemia and Hodgkin's disease. A high eosinophil count and eosinopenia are caused by chronic myeloid leukemia and radiation exposure, and a low eosinophil count is caused by aplastic anemia.

Anemia

●Red blood cells (RBC) ●Hemoglobin (HGB) ●Hematocrit (HCT) ●Platelets (PLT)

●Mean corpuscular volume (MCV) ●Mean corpuscular hemoglobin (MCH) ●Mean corpuscular hemoglobin concentration (MCHC)

These are useful tests to determine if someone has anemia and to figure out what is causing it. One cause of anemia and a decrease in platelet count is radiation exposure.

Health interview

At the Keio University Health Center, to determine whether you have any health problems caused through your work, we carry out interviews and physicians give medical examinations such as checking skin for damage by ionizing radiation (skin redness, dry skin, vertical skinfolds, skin ulcers, nail disorders, etc.) and cataracts. If you have cutaneous or eye abnormalities, we will refer you to a dermatologist or ophthalmologist.

【Please have regular checkups】

Please follow the three principles of protection from external exposure (Shielding: Maintain a shield between a radiation source and your body; Distance: Maintain ample distance from a radiation source; Time: Minimize the time spent around a radiation source) and take all reasonable steps to ensure that you are not exposed. Also, always be diligent in maintaining your environment and inspecting devices in order to prevent radiation-related accidents.

Health Center, Keio University