ORIGINAL PAPER

LEVEL OF SPECIFIC X RADIATION BIOMARKERS FROM THE ENVIRONMENT

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Manuscript received: 02.03.2017; Accepted paper: 04.04.2017;
Published online: 30.06.2017.

Abstract. *X-rays are a type of ionizing radiation used by man for various purposes, leading to toxic contamination of variable duration. Exposure is indicted persons carrying out activities with artificial sources of radiation (the use of ionizing radiation in medicine for diagnosis and therapy), and in practice in other fields of activity (the use of ionizing radiation in medicine for diagnosis and therapy) and in practice in other fields of activity (phosphate rock processing materials, burning coal in power plants, operation of aircraft). In medicine, the level of occupational exposure by presenting the following amounts 0.6 mSv for radiation therapy, and the level of exposure in the industry is 1.9 mSv the production of isotopes, 0.1 mSv for radiation materials, 1.6 mSv for industrial radiography. Biological effects that occur as the body's response to the radiation dose received may be deterministic and stochastic. Deterministic effects are characterized by a causal relationship between dose and effect, with amount of radiation energy that is absorbed by tissue is higher by severity of the effect becomes more pronounced. Threshold dose that causes adverse effects, represented by the equivalent total dose acute exposure is 2.50 to 6.00 Sv single ovary and 0.15 / 3.50 to 6.00 Sv testicles and causes sterility, and in the case of bone marrow hematopoiesis hallmark is reduced. Ionizing radiation levels can be an indicator of risk for the human health.*

Keywords: *X-rays, human health, environment, exposure, toxic risk.*

1. INTRODUCTION

The ecotoxicology is a very complex science that addresses priority chemicals involved in producing harmful effects of organisms in the environment.

By virtue of its radioactivity is a medium risk factor and, therefore, must be carefully monitored sources whereas in many fields of activity are used radioactive sources (industry, biology, medicine). Also, the use of radioactivity to obtain nuclear energy, causes a potentially high risk to the environment. In conjunction with these activities, however, and the number of metallurgical plants, spent nuclear fuel, which amplifies the radioactive sources of toxic substances. Environmental contamination by radioactivity is performed on multiple paths by removing gaseous and liquid radioactive waste through leaks of radioactive elements through the reactor protection belt, through accidental emissions of radioactive elements, the explosion of some reactors and lack of protection.Cosmic radioactivity has several origins, being the Galactic or solar terrestrial, the latter is issued by the Van Allen belts (those are two areas that contain electrons and protons, located in the Earth). In terms of radioactivity, it is the terrestrial radiation emitted by natural radioactive substances in the Earth's crust [7].

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Table 1. Types of radition and percentages of their involvement

Source of radiation	Effective dose annual (mSv)	Observations
Artificial: - Medical - Nuclear energy - Weapon testing - Chernobyl	 0.4 0.0002 0.005 0.002	14% of the total value
Natural : - Space - Internal - Soil - Radon	 0.4 0.3 0.5 1.2	~ 50% average natural exposure
Of the average natural exposure	2.8	

X radiation exposure is followed by metabolic changes, cellular and lymphatic known as acute radiation syndrome (ARS) such as blood and lymph modifying components, Cytogenet biomarkers, somatic mutation. In response to the radiation damages are used biomarkers of exposure that enable long-term risk assessment for both acute and to the chronic exposure [8].

Ionizing radiation may also affect the status of the animal by the accumulation of oxidative reactive oxygen species (ROS), which disrupt cell immune activity [9]. The use of biomarkers allows the diagnosis and quickly treatment in the case of exposure to radiations [10]. The biological nature of biomarkers is an advantage in order to decrease the risk of mortality following irradiation [11].

2. MATERIALS AND METHODS

The passage of radiation through the substance, the latter absorbs a quantity of energy, leading to the appearance of change, this being used for registration in the radiation. In most cases, for the detection of nuclear radiation are loaded, use the processes of ionization or excitation of the atoms or molecules environment detector [1].

After the effects of nuclear radiation they produce, when passing through the substance detection devices are used detectors rely on ionization in gases (ionization chamber, Geiger counters, counters proportionally-Müler).

Environmental dosimeter aims at estimating the internal and external irradiation of the human body due to radiation sources incorporated into the various components of the environment. For achievement of this purpose should be identified all sources of radiation in the environment and known sizes which characterizes various components of environmental contamination, such as the concentration in air (Bq/m^3); concentration in surface waters and groundwater (Bq/l);concentration in the soil as alleged in a constant layer of a certain depth (Bq/kg);concentration in the spontaneous vegetation and cultivated that refers to the activity distributed in different parts of a plant (Bq/kg);concentration in submission (Bq/m^2/day).

The human and are widely used to assess the impact of environmental factors, ocupationali and nurses, on the stability of Genomics. After the effects of nuclear radiation they produce, when passing through the substance detection devices are used detectors rely on ionization in gases (ionization chamber, Geiger counters, counters proportionally-Müler).

The SI definition given by the International Committee for Weights and Measures (CIPM) says:

"The quantity dose equivalent *H* is the product of the absorbed dose *D* of ionizing radiation and the dimensionless factor *Q* (quality factor) defined as a function of linear by the ICRU"

$$H = Q \times D \qquad [1]$$

The value of Q is not defined further by CIPM, but it requires the use of the relevant ICRU and ICRP recommendations to provide this value.

The CIPM also says that "in order to avoid any risk of confusion between the absorbed dose *D* and the dose equivalent *H*, the special names for the respective units should be used, that is, the name gray should be used instead of joules per kilogram for the unit of absorbed dose *D* and the name sievert instead of joules per kilogram for the unit of dose equivalent *H*".[1]

In summary:

The gray - quantity "D"

1 Gy = 1 joule/kilogram - a physical quantity. 1 Gy is the deposit of a joule of radiation energy in a kg of matter or tissue.

The sievert - quantity "H"

1 Sv = 1 joule/kilogram - a biological effect. The sievert represents the equivalent biological effect of the deposit of a joule of radiation energy in a kilogram of human tissue. The equivalence to absorbed dose is denoted by Q.

3. RESULTS AND DISCUSSION

Putting the radioactive contamination is accomplished through the establishment of specific biomarkers of effect. A biomarker can be potentially any substance, structure or process that could be monitored in tissues or fluids, which may provide some input or influence health, or who can assess the impact of the conduct or of deterioration.

A biomarker of effect is measurable morphological, biochemical, physiological, or behavioural, indicating any alteration in a body that, according to its magnitude, may be associated with an impairment of health or disease. The biomarker of effect can be defined as an indicator of intrinsic or acquired an ability of an organism to respond to the challenge of being exposed to a toxic chemical or physical stimulus.

The biomarkers of genotoxicity are generally used to measure environmental exposures or to predict the risk of a disease or to monitor the effectiveness of exposure control procedures at genotoxic substances [7]. When the genitals are exposed to irradiation with a dose exceeding 6 Sv, can install sterility. The eyes exposure to ionizing radiation can cause the destruction of crystalline (Table 2).

In the article are presented general information about radiology and radiation produced artificially by humans. Along with nuclear radioactivity may be involved, and radiology. This may include: diagnostic radiology, radiotherapy, radiobiology, medical cell medicine. Radiation modes can be: internal and external. As a result of irradiation at the cellular level may appear abnormal biological effects which can serve as biomarkers for exposure to radioactivity. They can be altered: cellular, cell repair or cell destruction. Each person is exposed daily to different types of ionizing radiation originating from different natural sources: cosmic radiation, atmospheric, terrestrial, and also from artificial sources: mobile phone, TV, microwave, medical radiology.

Table 2 The values of threshold doses for deterministice effects

Anatomical region	Effect	The total dose equivalent in single acute exposure (Sv)	Annual dose exposures protracted or fractionated on an annual basis for several years (Sv\an)
Testicle	Temporal/permanent sterility	0.15/3.50-6.00	0.40/2.00
Ovar	Sterility	2.50-6.00	>0.20
Crystalline	Opacity	0.50-2.00/5.00	>0.10/0.15
Bone Marrow	Depression hematopoesis Fetal aplasia	0.500 3.00-5.00	>0.40

Depending on the dose of radiation received by the body we can distinguish the following effects (symptoms) presented in Table 3.

Table 3. The relationship between dose and adverse effects induced of radioactivity.

Dose (Gy)	Effects (symptoms)
< 0.25	Minor transformations of some biochemical parameters from blood
1-2	Slight changes to the blood formula
2-4	Dizziness, vomiting, fatigue, blood change
4-7	Changes of blood, nervous system damage, hemorrhage during vascular fragility, through dizziness, death likely within two months from the time of irradiation.

The human body is irradiated by an external air around him, radioactive deposits on the ground, buildings, equipment. but internally, through inhalation of air, ingestion of contaminated food and water.

Determination of dosimetric quantities is influenced by the way of irradiation of the body, thus, if in the case of external irradiation it is possible to determine the dosimetric calculation parameters and measurement, in this case the internal irradiation dosimetry sizes determine indirectly knowing concentrations of radioactive material that enters the body and quantities that are inhaled or ingested [5].

Studies have shown that it is easy to register the amount of radiation emitted by various natural or artificial sources, but it's much harder to be internal radiation caused by random keystrokes of radioactive isotopes.

Reporting these data can be done with greater objectivity in the radioactive source, what has prompted such an orientation towards study of generator of radio toxicities, a Radiology lab, to be able to monitor the doses absorbed and the risks involved.

CONCLUSIONS

As you may have noticed from the title, the aim of this paper is to contribute through various information to knowledge of some the terrestrial biomarkers of radioactivity.

The data involves referring to the present state of knowledge of terrestrial biomarkers radioactivity, emphasizing methods of their measurement values being reported when compared on the basis of tissue exposed and the amount of radiation received. For the most recent environmental source of radioactivity is Fukushima, evaluations required to make there can be a model of disaster scenario accompanied by radioactivity [2].

At the same time work is an indicator of the risk of ionizing radiation and non-ionizing. Those are the ones with non-ionizing man comes into contact commonly. The ionizing radiation are classified into alpha, beta, gamma and x-ray radiation because these constitute a danger to human health, it is appropriate that certain information about each type of radiation to be known by the population.

Study regarding the impact of the disaster from Fukushima is a sample of what means the adverse effects of radioactivity on a global basis. Observations are useful because they talk about the reality of the world we live in, that is, about the implications of some natural phenomena on the human activity, but also about what's harmful human activity enters. It is also a useful material because it uses specific terms research in the field, presents the procedures for the measurement of radioactivity.

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