

The Problem of Evaluation and Analysis of the Influence of Xenobiotics in the Modern Urban Environment

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ABSTRACT

This article considers modern problems in determining xenobiotics, their sources and assessing their harm to the human body. Articles of authors from near and far abroad and their ideas about the group of xenobiotics and control of their level in the urban environment are studied.

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Introduction

The study of xenobiotic metabolism has developed rapidly over the past few decades. These studies have played a fundamental role in evaluating drug efficacy, safety, and developing dosing regimens; in the development of food additives and the assessment of the potential hazard of contaminants; when evaluating toxic chemicals; and in the development of pesticides and herbicides and their metabolic fate in insects, other animals and plants. The metabolism of many xenobiotics underlies many toxic processes such as carcinogenesis, teratogenesis, and tissue necrosis. Often the same enzymes involved in drug metabolism also regulate and metabolize endogenous substances. Therefore, inhibition and induction of these enzymes by drugs and xenobiotics may have a profound effect on normal intermediate metabolic processes such as tissue growth and development.

Increasing knowledge about xenobiotics and their fate in living organisms, along with the need for a more thorough assessment of the safety of drugs and chemicals, has led to an increase in the number of publications and a series of monographs that reflect the current state of knowledge about the metabolism of foreign compounds from a biochemical and pharmacological point of view. All new knowledge comes to us thanks to the formation of the International Society for the Studying Xenobiotics (ISSX) [3]. It is the leading scientific organization for researchers interested in the metabolism and utilization of xenobiotics. It was organized in 1982 when a small group of scientists, brought together in the 1970s under the auspices of the Gordon Research Conferences on Drug Metabolism, created an international community to facilitate the interaction of scientists involved in the study of xenobiotics in living systems.

With the advent of a research society purposefully engaged in the study of xenobiotics, it determined the further development of the study of this area. Taking as a basis knowledge, theories and principles from toxicology, pharmaceuticals, biology, the study of environmental pollution, medicine, they still encounter obstacles in combining all this data into one unified direction of scientific research. Although the listed sciences have much in common, and unlike the humanities, their theories cannot be accused of subjectivity, the differences in the objects and levels of research and the presentation of various systems

in various categories are a problem that does not allow to fully integrate all the available knowledge accumulated by various scientists about xenobiotics, to unite into a single whole, which can independently serve as further tools and a basis for new research.

The term “xenobiotics” comes from two Greek components xeno - alien and bios - living. In modern scientific literature, this term refers to chemicals that are foreign in a living organism and its system, which lead to an imbalance in biochemical processes, but already here we face the first problem of categorization. Most studies on xenobiotics and their effect on organisms take into account not only foreign chemicals, but also chemical compounds that are natural for our body, the level of which is much higher than the norm. In a scientific article on the determination of xenobiotics of plant origin, which was written by N. N. Roeva, M. B. Moiseyak, S. A. Yankovsky and S. S. Voronich, describes this case. Contaminants - pollutants used in crop production are an important group of xenobiotics that enter our body through food [2]. And according to the same study, “..., of the total amount of foreign substances that enter the human body from the environment, 30-80% comes with food.” [2]. Nitrogen fertilizers, or rather nitrates, accumulated in beets and potatoes, which are nitrate bioaccumulators, are relatively harmless, however, when eating food in which nitrates are contained in large quantities, more than 600 mg / day, it is dangerous to health. The fact is that conventional chemicals at high concentrations do not have time to go through their full metabolic cycle and form nitrites and nitroso compounds, which lead to methemoglobinemia. The conclusion is that when determining explicit xenobiotics that do not appear in our body at all, it is necessary to take into account “latent” xenobiotics, whose actions and manifestations can be different depending on the living system and the concentration of these xenobiotics in it.

The second feature in evaluating xenobiotics is their property of additivity and emergence. When two or more relatively harmless chemical compounds, when they hit at the same time or under certain conditions, when they can react with each other, exhibit a new property, which in turn can disrupt the homeostasis of the living system in which it manifests itself and thereby cause it certain harm. These properties can be considered on the example of the work of I. A. Kiyayeva “The influence of xenobiotics on the elementary homeostasis of the body” [1]. The xenobiotics that exhibit these properties in her work are ethanol and cadmium. Simultaneous exposure was modeled on two-month-old Wistar rats. 4 groups of 10 rats had a different diet, three with different content of ethanol and cadmium containing nutrients in their diet and one control. The experiment was carried out in a vivarium with no other external harmful effects on rats and lasted 8 weeks. The result of the experiment was a reduced percentage of macro and micro elements in the blood of the organisms of the three groups, and the group with the lowest indicators was the one with a high content of cadmium and ethanol in the diet.

These features that arise in the study of xenobiotics are not the only ones, and the cases presented are also not isolated. For a complete perception of the problem and understanding of its features, a more complete and in-depth study and analysis of all the works available to the scientific community at the moment is necessary.

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