

EDITORIAL

Environmental and occupational risk factors associated with different pathological conditions

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A wide body of evidence indicates that environmental and occupational risk factors are associated with the development of pathological disorders. The pathogenic role of many environmental pollutants or occupational contaminants is already known and has been extensively investigated. However, the molecular mechanisms of action and the pathogenic effects of many substances remain unknown. Therefore, there is a need to better investigate the role of new environmental and occupational risk factors that may cause the development of several diseases.

The association between occupational risk factors and diseases has been studied since 1700. Percivall Pott was the pioneer of observational studies on occupational risk factors and tumor development. In the second half of the 18th century, Pott demonstrated how the rate of incidence of testicular cancer was higher in London chimney sweepers compared to the general population. These findings were explained by the poor hygienic conditions of these workers; following persistent exposure to ash, they developed tumors (1). Subsequently, with the advances of scientific knowledge on the role of the environment in public health, other risk factors have been identified and well characterized, in fact, several premature deaths are due firstly to ischemic heart disease and stroke caused by outdoor air pollution, secondly are due to chronic obstructive pulmonary disease or acute lower respiratory tract infections and, finally, lung cancer (2). Some air pollutants, such as heavy metals or polycyclic aromatic hydrocarbons (PAHs), have been considered certain risk factors for the development of a number of pathologies (3), including neoplastic diseases (4,5) but also the excess of classic pollutants such as NO_x, PM₁₀,

PM_{2.5} and SO₂ are related to high mortality in particular also in urban environment (6,7).

Different molecular mechanisms induced by such environmental and occupational risk factors have been identified. In the case of heavy metals, one of the main mechanisms of action is represented by the interaction between these elements and enzymatic activities involved in cell functioning (8). Other substances, such as PAHs, mineral fibers, biological agents (viruses and bacteria), pesticides, air pollutants (PM₁₀ particulates, radon gas and chlorofluorocarbons) are able to directly interact with DNA and determine driver mutations that lead to neoplastic transformation (9-19).

The Special Issue entitled 'Environmental and occupational risk factors associated with different pathological conditions' aims to provide a broad overview of the gained knowledge about the interaction between environmental and professional risk factors during disease development. The exact characterization of these factors, and their roles in human diseases, may prove to be useful in the identification of novel strategies aimed at reducing such risk factors and, in turn, the disease rate. Accordingly, the issue contains original data and an extensive analysis of the literature, emphasizing the molecular actions of various pollutants at the cellular and systemic level. The roles of heavy metals in deep vein thrombosis, including modifications of oxidative stress markers, kidney failure and cancer are also discussed. In this context, the treatment with propionyl L-carnitine may induce the reduction of such oxidative parameters (20,21). Furthermore, the pathogenic role of volcanic dust and mineral fibers in the context of lung diseases is shown. The toxic effects of lead, benzene and pesticide exposure in workers are also discussed. Such effects may comprise the occurrence of immunologic reaction including the hypersensitivity that can be modulate with different immunosuppressive treatments (22,23). Finally, among the biological occupational risk factors, hepatitis C virus (HCV) infection is also described as one of the main factors responsible for extrahepatic manifestations.

According to the contents of this issue, it is clear that in addition to the already known lifestyle habits (24), the environmental and occupational exposure to several hazardous compounds is also linked to the development of several chronic degenerative diseases, including cancer. The pathogenic

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mechanisms of oncogenic transformation are often caused by the activation of several pathways, such as p53, Raf/MEK/ERK and PI3K/AKT (21-25). Based on these data, additional studies are required in order to determine and characterize the type of contaminants and the estimated exposure values that lead to the development of pathologies. Epidemiological registries and environmental data on the association between specific risk factors and the development of diseases may be of utmost importance, ensuring a better health surveillance and a more effective evaluation of the risks in exposed individuals.

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