Chapter 10

Childhood Leukemia and Environmental Risk Factors

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ABSTRACT

Leukemia is a cancer that starts in blood forming cells which occurs in several forms of chronic or acute diseases. It is the most common cause of pediatric malignancy, accounting for approximately 25% of all cancers occurring before age 20. It represents 32% of all cancer cases occurring among children younger than 15 years of age, with an annual incidence rate of 43 cases per million. In the last decade of the 20th century, the occurrence of childhood leukemia has shown a rise. This disease, like most cancers, has a multifactorial etiological causal mechanism and a heterogeneous biological composition involving the interaction between different aspects originating from the environment as well as human genetics. This chapter discusses, through the current published literature, the relationship between cancer, particularly childhood leukemia, and environmental exposures to heavy metals, pesticides, and mycotoxins.

INTRODUCTION

Cancer is the second most common cause of death worldwide following cardiovascular diseases (Siegel, Miller, & Jemal, 2017). Globally in 2018, there were documented 9.5 million deaths because of cancer excluding non-melanoma skin cancer (and 18.1 million new cases of cancer excluding non-melanoma skin cancer (Bray et al., 2018).

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Cancer include large group of diseases that can impair any organs. It is a multifactorial disease because the combined effect of external and genetic factors acting sequentially and concurrently. Several factors both inside and outside the body contributes to the promote cancer. Overwhelming evidence shows that the predominant contributor to many form of cancer is associated to the environment (Boffetta & Nyberg, 2003). These environmental factors risks including all non-genetic factors like lifestyle choices such as cigarette smoking, excessive alcohol consumption, excessive sunlight exposure, diet, and infectious agents. These factors environment is linked to cause the majority of cancers in human. Other factors include indoor air pollution, drinking water contamination and soil (Boffetta & Nyberg, 2003). The association with cancer and many environmental chemicals have been well studies through occupational groups that have elevated exposures to these chemicals compounds than the general population.

Different environmental exposures are associated to specific types of cancer. For example, exposure to benzidine, a chemical found in certain dyes, is linked with bladder cancer (Sun et al., 2018). Whereas exposure to asbestos is associated primarily to lung cancer (Richardson, Keil, Cole, & Dement, 2018). Also, environmental risk factors are influences in our surroundings, such as certain chemicals, that increase the risk of having diseases such as leukemias especially childhood leukemia (Fucic, Guszak, & Mantovani, 2017). Cancers Childhood remains one of the principal causes of death for children 1 to 14 years old worldwide. Annually, 30% to 40% of all pediatric cancers is leukemia and their origin is still understood (Zachek et al., 2015). However, Several studies reported that environmental hazards are implicated in the certain childhood cancers etiology (Zachek et al., 2015).

There are more than 12 types of leukemia, with the four mainly ones are chronic lymphocytic leukemia (CLL), acute myeloid leukemia (AML), acute lymphocytic leukemia (ALL) and chronic myeloid leukemia (CML). The differences between themes are related to the kind of blood cells that are affected and the multiple rates of progressions. ALL is the most leukemia common in the population pediatric; it about 75% of all pediatric leukemia cases and is five times more common than AML (Greenlee, Murray, Bolden, & Wingo, 2000). After AML and ALL, CML makes up most of the other leukemia childhood cases. Despite the advances in of childhood leukemia diseases, it is still unclear exactly what leads to this disease. Epidemiologic reports of acute leukemia in childhood have analyzed a number of potentially risk factors (e.g., environment, genetic, or infectious) in an effort to determine the etiology of the disease. The two most important environmental risk factors significantly linked with either ALL or AML are exposure to hydrocarbons and ionizing radiation; other environmental risk factors such as cigarette smoking, electromagnetic fields, alcohol and drugs have been weakly or inconsistently associated with either form of childhood leukemia (Belson, Kingsley, & Holmes, 2006). Therefore, this chapter book discusses concerns and evidences linking exposure to environmental factors such as heavy metals, pesticides and mycotoxins and risk of cancer with the focus on childhood leukemia. Through recognizing and understanding the discussed risk factors, in this chapter, of cancer and childhood leukemia then perhaps we can decrease the occurrence of this disease and help to reduce harmful exposure of childhood (Jin, Xu, An, & Wang, 2016).