Chapter 7
Comprehensive Approaches to Cancer Prevention:
A Multifaceted Strategy for Global Health

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ABSTRACT

Cancer prevention involves various approaches, including genetics, environment, lifestyle, and occupation. Genetic testing for mutations like BRCA1 and BRCA2 aids early intervention. Regulations and awareness campaigns help mitigate environmental risks like pollutants and radiation. Healthy behaviors like balanced diet and exercise reduce cancer risks. Safety protocols in industries like mining lower occupational hazards. Screening programs and vaccinations against HPV and HBV are crucial. Despite challenges like vaccine hesitancy, ongoing research in cancer vaccines offers hope for broader prevention strategies, ultimately reducing cancer rates and improving global health.

INTRODUCTION

Cancer is now one of the top causes of mortality worldwide, and as the number of cancer cases increases, so does research into its treatment. In today's world, medicine has advanced significantly, and we now have many newer diagnostic and treatment techniques that are capable of treating cancer, but at a cost that only a small percentage of the population can afford. As a result, these advancements can help to treat cancer in a limited population while having no impact on the global incidence of cancer.

With an alarming increase in cancer incidence, our first goal should be to cover a bigger population, which may be accomplished by evolving and implementing adequate preventative approaches, particularly at the primary level, which will not only cover a larger population but also be cost effective. In this chapter, we explored cancer prevention and it importance.

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UNDERSTANDING CANCER RISK FACTORS

Cancer risk factors can be broadly categorized into genetic, environmental, lifestyle-related, and occupational factors. Understanding these factors is crucial for developing effective strategies for cancer prevention and intervention.

A. Genetic Predispositions

Cancer susceptibility can be influenced by inherited genetic factors. Certain gene mutations can predispose individuals to specific types of cancer. For example, mutations in the BRCA1 and BRCA2 genes significantly increase the risk of breast and ovarian cancer. (Petrucelli, Daly, & Pal, 1998/2023; Chen & Parmigiani, 2007; Li, Silvestri, Leslie, et al., 2022; Tai, Domchek, Parmigiani, & Chen, 2007; Evans, Susnerwala, Dawson, et al., 2010; Chen, Bae, Zhang, et al., 2020). Genetic testing and counseling can help identify individuals with inherited cancer predispositions, allowing for early detection and preventive measures. (Resta et al., 2006)

Recent advancements in genomic research have identified numerous genetic variants associated with cancer risk. However, it's essential to recognize that genetic predispositions alone may not determine cancer development (Mbemi, Khanna, Njiki, Yedjou, & Tchounwou, 2020). Environmental and lifestyle factors often interact with genetic susceptibility, influencing the overall risk profile.

B. Environmental Factors

Environmental exposures play a significant role in cancer development. Pollutants, radiation, and other environmental toxins can damage DNA and disrupt cellular processes, potentially leading to cancerous transformations (Parsa, 2012). For example prolonged sun exposure or exposure to ultra-violet radiations increases the risk of skin cancer.

About 18% of all cancers can be caused due to infections which can be both bacterial and viral. (Table 1)

Table 1. Various causative agents and types of cancer with which they are associated

Agent	Type of cancer
HPV	Cervical cancer
HIV	Kaposi's sarcoma, lymphoma
HTLV-1	Lymphoma, leukemia
EBV	Burkett's lymphoma
HBV,HCV	Hepatocellular carcinoma
H. Pylori	MALT lymphoma in stomach, oesophageal cancer

Efforts to mitigate environmental hazards, such as air and water pollution regulations, are essential for reducing cancer incidence. Additionally, public awareness campaigns can educate individuals on minimizing exposure to environmental carcinogens in their daily lives.