Journal of Cancer Science and Research

Opinion Article

An Overview of Genetic Ancestry and Its Molecular Correlates in Cancer

Arujim Obizun[*]

Department of Hygiene and Epidemiology, University of Athens Medical School, Athens, Greece

ABOUT THE STUDY

Cancer is a complex and multifaceted disease, influenced by a numerous of genetic and environmental factors. Recent advancements in genomics have explained the complex interaction between an individual's genetic ancestry and their exposure to various types of cancer. Understanding the molecular correlates of genetic ancestry in cancer can provide valuable insights into disease risk, treatment response, and overall outcomes.

Role of genetic ancestry in cancer

Genetic ancestry plays a major role in the development and progression of cancer. An individual's genetic makeup is influenced based on their ancestral history and cultural background. These genetic variations can impact various aspects of cancer, including:

Cancer susceptibility: Genetic ancestry contributes to an individual's susceptibility to cancer. Certain populations may have a higher tendency to specific types of cancer due to inherited genetic mutations or variations. Studying the genetic makeup of different populations helps identify common genetic factors associated with increased cancer risk.

Population-specific biomarkers: Genetic ancestry influences the presence of specific biomarkers associated with cancer. These biomarkers can serve as diagnostic tools and indicators of prognosis. Population-specific studies facilitate the identification of unique genetic markers that may be more dominant in certain groups, supporting in the development of targeted and effective diagnostic strategies.

Pharmacogenomics and treatment response: Genetic ancestry plays a vital role in how individuals respond to cancer treatments. Pharmacogenomics, the study of how an individual's genetic makeup affects their response to drugs, considers genetic variations linked to ancestry. Understanding these variations helps modify treatment plans, ensuring that patients receive the most effective therapies with minimal side effects based on their genetic background.

Molecular correlates of genetic ancestry in cancer

Genome-Wide Association Studies (GWAS): GWAS involves examining the genetic variations that are associated with cancer risk in specific populations. By comparing the genetic characteristics of people with and without cancer, researchers can identify genetic variants that are more common in certain ancestral groups. These variants can provide valuable understandings into the genetic basis of cancer susceptibility.

Transcriptomics: Transcriptomics involves studying the gene expression patterns in cancer tissues to identify differences between various ancestral groups. Research has shown that gene expression can vary considerably among different populations, affecting the biology and behavior of cancer cells.

Epigenetics: Epigenetic modifications, such as DNA methylation and histone modifications, can also differ among individuals with different genetic ancestries. These modifications can influence gene expression and play a role in cancer development. Understanding the epigenetic differences between populations can help identify potential therapeutic targets.

Case studies and examples

Breast cancer: Studies have shown that African, American women are more likely to be diagnosed with triple-negative breast cancer, which are likely to be more aggressive and challenging to treat. This difference is relatively associated to genetic ancestry and differences in gene expression patterns.

Prostate cancer: Genetic ancestry has been linked to variations in prostate cancer risk and outcomes. For example, African, American men have a higher risk of developing prostate cancer, and they often present with more advanced and aggressive disease. The main causes of these differences are Genetic factors, including specific gene mutations.

Colorectal cancer: Colorectal cancer exhibits variations in incidence and survival rates among different racial and ethnic groups. These differences are influenced by genetic ancestry, including variations in the genes involved in tumor development and response to therapy.

Correspondence to: Arujim Obizun, Department of Hygiene and Epidemiology, University of Athens Medical School, Athens, Greece; E-mail: obizun.a1@gmail.com

---

Pharmacogenomics: Pharmacogenomics, which studies how genetic variations affect an individual's response to drugs, is another area where genetic ancestry plays a role. Variations in drug metabolism enzymes can result in different responses to chemotherapy and targeted therapies.

Consequences of precision medicine

Understanding the relationship between genetic ancestry and cancer is necessary for advancing precision medicine. By modifying cancer treatment and prevention strategies to an individual's genetic ancestry, healthcare providers can improve outcomes and reduce disparities. This approach can lead to more effective therapies and better patient care. To achieve the ability of precision medicine, researchers and clinicians must continue to investigate the molecular correlates of genetic ancestry in cancer. This involves developing more targeted therapies and diagnostic tools, as

well as addressing disparities in access to healthcare and clinical trials among diverse populations.

CONCLUSION

Genetic ancestry plays an important role in cancer susceptibility, tumor biology, and treatment response. The comprehensive analysis of genetic ancestry and its molecular correlates in cancer is explaining on the complex interaction between genetics and cancer. The role of genetic ancestry in cancer is important for advancing personalized medicine, improving cancer prevention and early detection strategies, and addressing health disparities. By understanding these relationships, researchers and healthcare providers can develop more particular and personalized approaches to cancer prevention and treatment. This understanding ultimately presents the potential to reduce cancer-related differences and improve outcomes for patients of all genetic backgrounds.