Genetic determinants of hormonal changes and health risks in post-maturation women.

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Introduction

Women undergo significant physiological and hormonal changes throughout their lives, with one of the most prominent periods being maturation or puberty. However, the influence of genetics on hormonal changes and associated health risks in post-maturation women is a topic of growing interest and research. This article delves into the genetic determinants of hormonal fluctuations and health risks in women after maturation. Non-coding RNA (ncRNAs) is greatly known to be involved in many cellular processes such as growth and development including tumorigenesis. Alterations in expression of ncRNAs are observed in several cancers. Therefore, they are regarded as potential players in carcinogenesis. In a broader view, it has been documented that ncRNAs are also involved in hormone-associated cancers (HACs) by regulating their epigenetic processes. Hence, HACs emerge on the radar of scientific community and cancer research as they are widely influenced by hormone levels and latter promotes cancer growth [1].

Although various risk factors point to HACs, findings are inconsistent and not uniform. Dietary flavonoids are amongst the natural compounds that are capable of repressing the proliferation and growth of numerous cancer cells. This could be rewarding and might open new avenues for cancer treatment. In addition, flavonoids seem to have anti-hormone like properties in HACs. Maturation marks the transition from childhood to adulthood and is characterized by the onset of secondary sexual characteristics. During this phase, hormonal changes are orchestrated by a complex interplay of genetic factors, including variations in specific genes. Estrogen and progesterone are two of the key hormones that undergo significant fluctuations during a woman's reproductive years. Genetic factors can influence the production, metabolism, and sensitivity to these hormones. Variations in genes involved in hormone synthesis, such as CYP19A1 (aromatase), can impact estrogen levels. Likewise, variations in genes like NR3C1, which encodes the glucocorticoid receptor, can affect how the body responds to hormonal signals [2].

Genetic factors can also influence the secretion and regulation of FSH and LH, which play crucial roles in ovulation and the menstrual cycle. Variations in genes related to Gonadotropin-Releasing Hormone (GnRH) and its receptors can impact the timing and regularity of the menstrual cycle. Thyroid hormones, including thyroxin (T4) and Triiodothyronine (T3), have a significant impact on metabolism and overall health. Genetic variations in genes like TPO (thyroid peroxidase) and TSHR (thyroid-stimulating hormone receptor) can influence thyroid hormone production and function. Thyroid disorders, which are influenced by genetics, can affect hormonal balance and overall well-being. Genetic mutations in the BRCA1 and BRCA2 genes are well-known risk factors for breast cancer. Women who inherit these mutations have a significantly higher risk of developing breast cancer, often at an earlier age. Understanding one's genetic predisposition to breast cancer can inform screening and prevention strategies. Mutations in the BRCA genes are also associated with an increased risk of ovarian cancer. Women with BRCA mutations may opt for risk-reducing surgeries such as prophylactic mastectomy or oophorectomy to reduce their cancer risk. PCOS is a common hormonal disorder affecting women of reproductive age. While its exact cause is multifactorial, genetics play a significant role. Women with a family history of PCOS are at a higher risk of developing the condition. Genetic factors can contribute to thyroid disorders, including hypothyroidism and hyperthyroidism. Understanding one's genetic predisposition can help in early diagnosis and personalized treatment approaches [3].

Genetic variations can influence the risk of cardiovascular disease in women. Certain gene variants related to lipid metabolism and inflammation are associated with an increased risk of heart disease. Genetic testing can provide insights into individual risk profiles. Osteoporosis, a condition characterized by weakened bones, can also have genetic components. Variations in genes related to bone density and remodelling can influence an individual's susceptibility to osteoporosis. Advances in genetic testing have made it possible for individuals to assess their genetic predispositions to various health conditions. For post-maturation women, genetic testing and counselling can provide valuable insights into their hormonal health and associated risks [4].

Women with a family history of breast or ovarian cancer may consider BRCA testing to assess their cancer risk. Positive results can inform decisions about preventive measures and surveillance. Some genetic tests focus on specific hormone-related genes, helping individuals understand their hormonal profile and potential risks, such as PCOS or thyroid

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disorders. Genetic tests can identify variants associated with cardiovascular risk, allowing for proactive measures to reduce the risk of heart disease. Genetic testing related to bone health can help individuals take preventive actions to maintain strong bones and reduce the risk of osteoporosis [5].

Conclusion

Genetic determinants play a significant role in hormonal changes and health risks in post-maturation women. Understanding one's genetic predispositions can empower women to make informed decisions about their health, including preventive measures and personalized treatment strategies. Genetic testing and counselling have emerged as valuable tools in assessing and managing health risks associated with genetic factors, ultimately contributing to improved health outcomes for post-maturation women.

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