Short Communication
Volume 08:02, 2024

Reports in Thyroid Research

ISSN: 2684-4273 Open Access

Impact of Endocrine Disruptors on Thyroid Function

Miklós Chiarelli*

Department of Medicine, University of Medicine, H-1143 Budapest, Hungary

Introduction

Endocrine Disruptors (EDs) are chemicals that can interfere with the endocrine system, potentially causing a wide range of health issues. These substances are found in various sources, including industrial chemicals, pesticides, plastics, personal care products, and even some pharmaceuticals. The thyroid gland, which plays a crucial role in regulating metabolism, growth, and development through the secretion of thyroid hormones, is particularly vulnerable to the effects of endocrine disruptors [1]. he impact of endocrine disruptors extends to thyroid hormone receptors as well. Certain EDs can mimic the action of thyroid hormones or block their binding to receptors. For example, these chemicals can bind to thyroid hormone receptors, preventing the normal interaction of T3 and T4 with their target tissues. This disruption can impair the regulation of gene expression and cellular metabolism, leading to various health issues.

This paper aims to explore the impact of endocrine disruptors on thyroid function, examining the mechanisms through which these chemicals interfere with thyroid hormone production, secretion, and regulation. Understanding these impacts is critical for developing strategies to mitigate the risks associated with endocrine disruptors and protect thyroid health.

Description

Endocrine Disruptors (EDs) have a profound impact on thyroid function by interfering with various aspects of thyroid hormone production, regulation, and action. These chemicals, prevalent in a wide range of products from industrial chemicals and pesticides to plastics and personal care items can disrupt thyroid health through several mechanisms [2]. One primary way EDs affect thyroid function is by inhibiting iodine uptake. Iodine is essential for the synthesis of thyroid hormones, and chemicals like perchlorate and thiocyanate can block its absorption by the thyroid gland. This inhibition results in decreased production of thyroid hormones, including thyroxine and triiodothyronine, leading to hypothyroidism. Without adequate iodine, the thyroid cannot produce sufficient hormones, which impairs metabolic processes and can cause symptoms such as fatigue, weight gain, and cold intolerance. Endocrine disruptors also impact the metabolism of thyroid hormones. Poly Chlorinated Biphenyls (PCBs) and dioxins are examples of chemicals that alter the activity of deiodinases, enzymes responsible for converting T4 into the more active T3.

By affecting this conversion process, these EDs can disrupt the balance of thyroid hormones, potentially exacerbating conditions like hyperthyroidism or hypothyroidism. An imbalance in thyroid hormone levels can have widespread effects on metabolism, growth, and development. Additionally, some EDs affect thyroid hormone transport within the body. Bisphenol A (BPA), commonly found in plastics and coatings, can bind to thyroid hormone transport proteins, thereby reducing the availability of free thyroid hormones for cellular uptake. This interference can diminish the effectiveness of thyroid hormones, further contributing to thyroid dysfunction [3]. Endocrine disruptors are chemicals that can interfere with the endocrine (hormone) systems at certain doses, leading to adverse developmental, reproductive, neurological, and immune effects in humans and wildlife. Among the endocrine disruptors, there is growing concern about their impact on thyroid function due to the critical role of thyroid hormones in metabolism, growth, and development.

These disruptors can mimic, block, or alter the normal hormonal functions of the thyroid gland, leading to various thyroid dysfunctions. They include industrial chemicals like Poly Chlorinated Biphenyls, dioxins, flame retardants such as Poly Brominated Diphenyl Ethers (PBDEs), pesticides like dichlorodiphenyltrichloroethane and its metabolites, bisphenol A found in plastics, and phthalates used in personal care products and plastics. These substances can be found in the environment, consumer products, and even in the food chain, leading to widespread exposure [4]. One of the primary ways endocrine disruptors affect thyroid function is by interfering with thyroid hormone synthesis. Certain chemicals can inhibit the uptake of iodine by the thyroid gland, which is essential for the production of thyroid hormones. For example, perchlorates, which are found in rocket fuel and explosives, compete with iodine for uptake by the thyroid gland, leading to reduced thyroid hormone production and potentially causing hypothyroidism. Additionally, chemicals like PCBs and dioxins can interfere with the enzymes involved in thyroid hormone synthesis, further disrupting hormone production. Endocrine disruptors can also impact the transport and metabolism of thyroid hormones. Thyroid hormones in the bloodstream are bound to transport proteins, which carry them to target tissues. Some endocrine disruptors can displace thyroid hormones from these transport proteins, increasing the levels of free hormones in the blood and potentially leading to thyroid hormone imbalances. Furthermore, chemicals like PBDEs can alter the metabolism of thyroid hormones by affecting the enzymes responsible for converting thyroxin to the more active triiodothyronine thus are disrupting the balance between these hormones. Another significant mechanism of disruption involves the thyroid hormone receptors. Endocrine disruptors can bind to these receptors, either mimicking or blocking the action of thyroid hormones [5]. For instance, BPA can bind to thyroid hormone receptors and either activate or inhibit their function, depending on the context. This can lead to altered gene expression and disrupted cellular functions in tissues that rely on thyroid hormone signaling.

Conclusion

The impact of endocrine disruptors on thyroid function is a significant public health concern. These chemicals can interfere with various aspects of thyroid hormone production, metabolism, and action, leading to a range of health issues from hypothyroidism to thyroid cancer. Understanding the mechanisms through which endocrine disruptors affect the thyroid gland is crucial for developing effective strategies to mitigate their impact. By implementing regulatory measures, increasing public awareness, advancing research, and integrating exposure assessments into healthcare, we can better protect thyroid health and reduce the burden of thyroid-related disorders associated with endocrine disruptors. The impact of endocrine disruptors on thyroid function can have severe health consequences. During pregnancy and early childhood, thyroid hormones are crucial for brain development and growth. Disruption of thyroid function during these critical periods can lead to cognitive deficits, developmental delays, and other neurological issues. In adults, thyroid dysfunction can result in metabolic disorders, cardiovascular

***Address for Correspondence:** Miklos Chiarelli, Department of Medicine, University of Medicine, H-1143 Budapest, Hungary; E-mail: miklos@chiarelli.com*

Received: 29 May, 2024, Manuscript No. rtr-24-143693; **Editor Assigned:** 31 May, 2024, PreQC No. P-143693; **Reviewed:** 14 June, 2024, QC No. Q-143693; **Revised:** 20 June, 2024, Manuscript No. R-143693; **Published:** 28 June, 2024, DOI: 10.37421/2684-4273.2024.8.78

issues, and impaired reproductive health. The widespread presence of endocrine disruptors in the environment and their persistence in the human body pose a significant public health challenge.

Epidemiological studies have shown associations between exposure to endocrine disruptors and various thyroid disorders, including hypothyroidism, hyperthyroidism, thyroiditis, and thyroid cancer. However, establishing causality is complex due to the multifactorial nature of thyroid diseases and the diverse sources and modes of exposure to endocrine disruptors. Overall, the impact of endocrine disruptors on thyroid function is a growing area of concern that necessitates on-going research and regulatory efforts. Improved understanding of the mechanisms by which these chemicals disrupt thyroid function, along with strategies to reduce exposure, is essential for protecting public health. Regulatory policies aimed at limiting the use and release of known endocrine disruptors, coupled with public awareness and education campaigns, can help mitigate the risks associated with these harmful substances.

Acknowledgement

None.

Conflict of Interest

None.

References

1. Groh, Ksenia J., Birgit Geueke, Olwenn Martin and Maricel Maffini, et al. "Overview of intentionally used food contact chemicals and their hazards." *Environ Int* 150 (2021): 106225.
2. Street, Maria Elisabeth and Sergio Bernasconi. "Endocrine-disrupting chemicals in human fetal growth." *Int J Mol Sci* 21 (2020): 1430.
3. Lamb IV, James C., Paolo Boffetta, Warren G. Foster and Julie E. Goodman, et al. "Critical comments on the WHO-UNEP State of the Science of Endocrine Disrupting Chemicals–2012." *Regul Toxicol Pharmacol* 69 (2014): 22-40.
4. Mantovani, Alberto. "Endocrine disrupters and the safety of food chains." *Horm Res Paediatr* 86 (2016): 279-288.
5. Vargas, Felix, Isabel Rodriguez-Gomez, Pablo Vargas-tendero and Eugenio Jimenez, et al. "The renin-angiotensin system in thyroid disorders and its role in cardiovascular and renal manifestations." *J Endocrinol* 213 (2011): 25-36.

How to cite this article: Chiarelli, Miklós. "Impact of Endocrine Disruptors on Thyroid Function." *Rep Thyroid Res* 8 (2024): 78.