

UNDERSTANDING FEMALE HORMONES: A GUIDE TO THEIR COMPLEXITY AND EVERYDAY IMPACT

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Abstract: Hormones are critical regulators of numerous physiological processes in women, influencing reproduction, metabolism, mood, and stress response. This paper provides a comprehensive overview of key hormones such as oestrogen, progesterone, and testosterone, emphasizing their roles beyond reproductive health. Oestrogen supports bone density, cardiovascular health, and cognitive function, while progesterone aids in pregnancy preparation and mood regulation. Testosterone, though present in smaller amounts in women, contributes to muscle mass and libido. The paper also explores hormonal changes during menopause, highlighting symptoms such as hot flashes and increased risks of osteoporosis, and considers hormone replacement therapy (HRT) as a management option.

Keywords: female hormones, everyday consequences, systemic approach

Introduction

Hormones are chemical messengers that have a profound influence on the body, orchestrating everything from growth and metabolism to mood, stress responses, and reproductive functions (Christensen et al., 2012). For women, the balance and interplay of these hormones are especially critical, as they impact everything from monthly cycles to long-term health. Understanding the complexity of female hormones can help demystify many aspects of daily life, from energy levels and mood swings to sleep quality and stress resilience (Brannon, 2020). This article dives into the intricate world of hormones, highlighting their various roles and how they shape women's physical and emotional well-being.

Major Hormones in Female Physiology

The hormonal landscape in women is dominated by a few key players: oestrogen, progesterone, and testosterone. These hormones are essential for regulating reproductive functions, but their influence extends far beyond fertility (Christensen et al., 2012).

Often termed the "primary female hormone", oestrogen is produced mainly by the ovaries, with smaller amounts coming from the adrenal glands and fat tissue. It governs the menstrual cycle and plays a pivotal role in sexual and reproductive health. However, oestrogen's reach goes beyond reproduction—it also helps maintain bone density, skin health, cardiovascular function, and even cognitive processes, such as memory and mood regulation (Salerni et al., 2015). Its neuroprotective properties make it vital for brain

health, which is why fluctuations during perimenopause and menopause can have a notable impact on cognitive functions (Matsumoto, 2013).

Progesterone is a hormone synthesized in the ovaries, primarily after ovulation and during pregnancy by the placenta. Progesterone prepares the uterus for a potential pregnancy by thickening the uterine lining, making it crucial for supporting early embryo development. Beyond its reproductive roles, progesterone has a calming effect on the body, often acting as a natural mood stabilizer. It is known to promote restful sleep and help balance the stimulating effects of oestrogen, contributing to an overall sense of well-being throughout the menstrual cycle (Brannon, 2020).

Although testosterone is commonly associated with male physiology, it also plays an essential role in female health. Women produce testosterone in smaller amounts in their ovaries and adrenal glands. It helps regulate libido, contributes to muscle mass, and supports bone strength. During menopause, testosterone levels decline contributing to reduced energy levels, diminished muscle tone, and reduced sexual drive (Hansen, 2018). Understanding the role of testosterone helps to highlight that hormone health is not just about "female" or "male" hormones but rather about maintaining a balanced hormonal ecosystem.

While the hormonal landscape of women is dominated by the previously mentioned few key players (oestrogen, progesterone, and testosterone), other hormones, such as Follicle-Stimulating Hormone (FSH), Luteinizing Hormone (LH), Anti-Müllerian Hormone (AMH), Human Chorionic Gonadotropin (hCG), and oxytocin, play equally vital roles in the regulation of reproductive health and overall physiological balance (Silva et al., 2018).

Follicle-Stimulating Hormone (FSH), which is produced by the pituitary gland, plays a critical role in the menstrual cycle and the development of eggs in the ovaries. During the first half of the menstrual cycle, FSH stimulates the growth of ovarian follicles, which contain the eggs. In response to rising levels of FSH, these follicles produce oestrogen, which helps regulate the development of the uterine lining in preparation for potential pregnancy. As women age and their ovarian reserve decreases, FSH levels naturally increase, which can serve as an indicator of fertility status. FSH is often measured during fertility assessments, making it a key hormone for understanding reproductive health (Christensen et al., 2012).

Also produced by the pituitary gland, Luteinizing Hormone (LH) works closely with FSH to regulate the menstrual cycle. LH levels surge mid-cycle, triggering ovulation—the release of a mature egg from the ovary. This surge is essential for maintaining the luteal phase of the cycle, during which progesterone levels rise to support the development of the uterine lining. If pregnancy does not occur, LH levels drop, leading to the onset of menstruation. The timing of the LH surge is critical for understanding fertility windows, making it a focus for those tracking ovulation for conception purposes (Brannon, 2020).

The Anti-Müllerian Hormone (AMH) is produced by the small follicles in the ovaries and serves as a marker of ovarian reserve, which refers to the number of remaining

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eggs a woman has. Unlike FSH, which fluctuates throughout the menstrual cycle, AMH levels remain relatively stable, thereby providing a more consistent measurement of ovarian function. AMH levels are often used in fertility treatments to predict how a woman's ovaries will respond to ovarian stimulation. Low levels of AMH can indicate reduced fertility potential, whereas higher levels are associated with conditions such as polycystic ovary syndrome (PCOS), which can affect ovulation (Bhide & Homburg, 2016).

Human Chorionic Gonadotropin (hCG) is a hormone produced by the placenta shortly after a fertilized egg attaches to the uterine lining. It plays a critical role in maintaining the early stages of pregnancy by supporting the corpus luteum, which in turn produces progesterone to sustain the uterine lining. hCG levels rise rapidly in the early weeks of pregnancy, which is why it is the hormone detected by home pregnancy tests. Beyond its role in early pregnancy, hCG also supports immune tolerance of the developing embryo, ensuring that the mother's immune system does not reject the pregnancy (Brannon, 2020). Its presence and levels can provide valuable insights into the health and progression of a pregnancy.

Oxytocin, which is often called the "love hormone", is produced in the hypothalamus and released by the pituitary gland. It is most commonly associated with childbirth and breastfeeding, as it stimulates uterine contractions during labour and helps the milk let-down reflex during breastfeeding. Beyond its reproductive roles, oxytocin also plays a significant part in social bonding and emotional regulation. It is involved in maternal bonding with a newborn, as well as in romantic and social relationships, contributing to feelings of trust and connection. Recent studies have highlighted oxytocin's role in reducing stress and promoting feelings of calm, making it an important hormone for overall emotional well-being (Kumsta & Heinrichs, 2013).

As it is clearly visible, these additional hormones interact closely with oestrogen, progesterone, and testosterone to regulate various stages of the menstrual cycle, pregnancy, and overall reproductive health. Their functions emphasize the delicate balance required to maintain fertility and highlight the body's ability to adapt to different phases of life, from puberty to pregnancy, and eventually to menopause. Together, they create a dynamic hormonal network that affects not only physical processes but also emotional and social experiences, reflecting the profound impact hormones have on every aspect of a woman's life.

The Impact of Female Hormones on Bodily Systems

While oestrogen and progesterone are often discussed in the context of reproduction, their roles extend far beyond the ovaries and the menstrual cycle. These hormones interact with numerous bodily systems, shaping cardiovascular health, supporting brain function, influencing respiratory efficiency, and even playing a role in immune responses (Baldaçara & Silva, 2017). By exploring the wider influence of these hormones, we can appreciate the integral roles they play in maintaining overall health and well-being (Eubanks, 1997).

The cardiovascular system is one of the most significantly affected by oestrogen. Oestrogen helps to maintain the flexibility and integrity of blood vessels, which is critical for smooth blood flow and reducing the risk of cardiovascular diseases. It promotes the production of nitric oxide, a molecule that dilates blood vessels, thereby helping to keep blood pressure in check and ensuring that oxygen and nutrients are efficiently delivered throughout the body (Salerni et al., 2015). Additionally, oestrogen has a positive effect on cholesterol levels; it raises levels of HDL (the “good” cholesterol) and lowers LDL (the “bad” cholesterol). This balance helps prevent the buildup of plaque in arteries, reducing the risk of atherosclerosis and heart attacks. However, as oestrogen levels decline with menopause, this protective effect diminishes, which is why postmenopausal women face an increased risk of cardiovascular conditions. This connection between oestrogen and heart health highlights the importance of heart-healthy lifestyle choices, such as a balanced diet and regular exercise, particularly as women age.

Progesterone, while more commonly associated with pregnancy, also has notable effects on cardiovascular function (Salerni et al., 2015). It has a calming effect on the smooth muscles of blood vessels, helping to prevent excessive constriction and thereby promoting healthy blood flow. In some instances, progesterone can complement the vasodilatory effects of oestrogen, supporting overall cardiovascular stability. However, its influence is more subtle compared to oestrogen, and fluctuations in progesterone levels can contribute to symptoms like bloating and fluid retention, which may impact blood pressure. During the menstrual cycle, the rise and fall of progesterone can influence blood pressure patterns, which some women may notice as temporary changes in energy levels or circulation. Understanding progesterone's role alongside oestrogen paints a more complete picture of how hormones shape cardiovascular health.

Of course, it is not only oestrogen and progesterone that play a critical role in maintaining cardiovascular health, influencing everything from heart rate to blood vessel flexibility. Testosterone also contributes to cardiovascular health, though its role is often less recognized (Salerni et al., 2015). In women, testosterone helps maintain the balance of red blood cell production, which is crucial for oxygen transport and overall energy levels. Adequate testosterone levels can support heart function by ensuring sufficient blood supply to the tissues, thereby reducing the risk of anaemia. Additionally, testosterone has been shown to positively influence the function of blood vessels, contributing to healthy circulation and overall cardiovascular resilience. An imbalance in testosterone can lead to issues such as hypertension or increased cholesterol levels, underscoring the importance of maintaining hormonal balance for heart health. Thyroid hormones, including triiodothyronine (T3) and thyroxine (T4), are pivotal in regulating heart rate and cardiac output. These hormones directly influence metabolic processes, ensuring that the body can efficiently utilize energy. An overactive thyroid, or hyperthyroidism, can lead to increased heart rate and a heightened risk of cardiovascular complications, while hypothyroidism may result in decreased heart function and elevated cholesterol levels (Hulbert, 2000). Therefore, maintaining proper thyroid function is crucial for cardiovascular health, especially as hormonal fluctuations can occur during different life stages.

Beyond the heart, oestrogen also plays a pivotal role in supporting neural health, influencing brain function and emotional regulation (Cutter et al. 2003). Oestrogen has

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neuroprotective properties; it promotes the growth and survival of neurons and helps to maintain synaptic connections, which are essential for communication between brain cells. This is particularly important for memory formation and cognitive processes, explaining why some women experience changes in memory or cognitive clarity as oestrogen levels fluctuate during perimenopause and menopause. Oestrogen's impact on the brain extends to mood regulation as well; it influences the production of neurotransmitters like serotonin, which is closely linked to feelings of well-being and happiness. This is why hormonal shifts can sometimes trigger mood swings, anxiety, or even depression. The decline in oestrogen during menopause can lead to what some refer to as "brain fog" or a feeling of mental sluggishness. These changes underscore the deep connection between hormonal health and cognitive function, emphasizing the need for support strategies during life transitions like menopause.

Progesterone contributes to neural health as well, but in a different way. It has a soothing, sedative effect on the brain, often acting as a natural antidepressant. This calming influence is particularly evident in the luteal phase of the menstrual cycle, when progesterone levels peak after ovulation. During this time, progesterone can promote better sleep quality by interacting with GABA receptors in the brain, which are responsible for relaxation and reducing anxiety (Rapkin, 1999). This makes progesterone a key player in managing stress responses and supporting restful sleep. However, when progesterone levels are imbalanced or drop too sharply, it can contribute to premenstrual syndrome (PMS) symptoms, such as irritability and insomnia. The intricate balance between oestrogen's stimulating effects and progesterone's calming influence highlights how these hormones work together to create emotional stability and mental clarity throughout the menstrual cycle.

The influence of various other hormones on neural function is also profound, affecting mood, cognition, and overall brain health (Brannon, 2020). Testosterone is important for cognitive function in women; it helps enhance memory and spatial awareness. It also contributes to neuroprotection by promoting the growth and maintenance of neurons, which can aid in preventing neurodegenerative conditions. Research indicates that women with optimal testosterone levels may experience improved cognitive resilience, highlighting its role in mental clarity and focus, especially during aging. Thyroid hormones also have a significant impact on brain function. Adequate levels of T3 and T4 are crucial for maintaining energy levels in brain cells and supporting neurotransmitter function. When thyroid hormone levels are imbalanced, cognitive impairments may arise; for instance, hypothyroidism can lead to difficulties with memory and concentration, often described as "brain fog." Conversely, hyperthyroidism can result in anxiety and irritability due to overstimulation of the nervous system (Demet, 2002). Thus, maintaining balanced thyroid hormones is essential for cognitive health and emotional stability.

When it comes to the respiratory system, oestrogen also shows its influence, albeit in less obvious ways (Tam, 2011). Oestrogen can enhance the sensitivity of the respiratory centres in the brain to carbon dioxide, which helps to regulate breathing patterns, especially during sleep. This sensitivity is thought to be one reason why some women experience changes in their breathing or an increased incidence of sleep apnoea after

menopause, when oestrogen levels drop. Oestrogen also plays a role in maintaining the strength of the diaphragm and other muscles involved in breathing, which can influence overall lung function. For women, the decrease in oestrogen during menopause can sometimes coincide with a reduction in lung capacity and efficiency, highlighting how hormonal health can impact physical stamina and endurance over time (Yunget al., 2018).

Progesterone also plays a unique role in respiratory health. It has been shown to stimulate respiration by increasing the sensitivity of the respiratory centres to carbon dioxide, leading to deeper breathing (Baldaçara & Silva, 2017). This is particularly evident during pregnancy, when elevated levels of progesterone help to ensure that both the mother and the developing foetus receive sufficient oxygen. This respiratory stimulation can sometimes cause a sense of shortness of breath during the second half of the menstrual cycle, but it is generally a sign of the body's natural adjustments to hormonal shifts. The interplay between progesterone and oestrogen in regulating breathing patterns showcases how deeply hormones can influence physical functions that are often taken for granted.

In the realm of respiratory function, testosterone and thyroid hormones play complementary roles. Testosterone can enhance respiratory muscle strength, including the diaphragm, which is vital for effective breathing. Improved respiratory muscle function can lead to increased lung capacity and efficiency, particularly during physical activity (Alexander et al., 2022). The relationship between testosterone and overall respiratory function highlights the importance of this hormone in maintaining an active lifestyle. Thyroid hormones, particularly T3, influence the respiratory centres in the brain, helping to regulate breathing patterns. They enhance the sensitivity of the respiratory centres to changes in carbon dioxide levels, ensuring that the body responds appropriately to fluctuations in oxygen demand (Baldaçara & Silva, 2017). When thyroid hormone levels are balanced, this regulation helps maintain optimal respiratory efficiency. Conversely, thyroid dysfunction can lead to breathing irregularities, further emphasizing the importance of hormonal health in respiratory performance.

Finally, hormones like oestrogen and progesterone also interact with the immune system, influencing its activity and responsiveness (Ortona et al., 2019). Oestrogen generally enhances immune function, helping to activate immune cells that fight off infections and repair tissues. This may contribute to the fact that women tend to have stronger immune responses than men, but it also means that women are more prone to autoimmune conditions, where the immune system mistakenly attacks the body's own tissues. Progesterone, on the other hand, has an immune-modulating effect; it helps to reduce inflammation and prevents the immune system from becoming overactive, which is particularly important during pregnancy to protect the foetus. This balance between oestrogen's stimulating effect and progesterone's calming influence on the immune system highlights another layer of their complex roles in maintaining health (Ortona et al., 2019).

When it comes to the impact of hormones on the immune system, cortisol plays a central role. As the body's primary stress hormone, cortisol is essential for managing the immune response, helping mobilise energy and resources during times of stress (Ortona, et al., 2019). However, while cortisol is necessary for initiating immune responses, chronic elevation of cortisol levels can suppress immune function and increase susceptibility to

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infections and illnesses. This highlights the importance of stress management and the need to balance cortisol levels to maintain a healthy immune system. In addition to cortisol, prolactin plays a unique role in immune regulation. Traditionally known for its role in lactation, prolactin also modulates immune responses by influencing immune cell activity. It has been shown to enhance the production of antibodies, which are crucial for fighting infections. Interestingly, prolactin levels fluctuate with stress and can be elevated in women experiencing significant psychological or physical stressors, which may have implications for immune function. The interaction between prolactin and cortisol underscores the complex relationship between hormones and the immune system, emphasising the need for holistic approaches to health that consider stress and hormonal balance (Ortona et al., 2019).

Overall, the role of various female hormones extends far beyond reproduction, influencing key bodily systems including cardiovascular, neural, respiratory, and immune functions. Understanding the intricate ways in which these hormones interact with each system can provide insights into the maintenance of overall health. From the supportive role of testosterone in heart and brain health to the critical functions of thyroid hormones and the regulatory effects of cortisol and prolactin, it is clear that hormonal balance is essential for women's well-being throughout their lives. By fostering awareness of these influences, women can better navigate their health, especially during times of hormonal changes, ensuring a holistic approach to maintaining vitality and resilience.

Hormones and Bone Health

While female hormones clearly affect every sphere of our everyday lives, in aging populations one of the most important aspects is connected to the often overlooked aspect of bone health. Oestrogen and testosterone both play a role in maintaining bone density, ensuring a healthy balance between bone formation and bone resorption, the natural process of breaking down old bone tissue (Rizzoli & Bonjour, 1997).

As women age, particularly after menopause, the decrease in oestrogen levels can lead to a rapid loss of bone density, making women more susceptible to osteoporosis—a condition characterized by weak and brittle bones. Oestrogen's role in supporting bone health underscores the importance of hormone replacement therapy (HRT) as an option for some women during menopause to help mitigate this risk.

Additionally, testosterone's support in maintaining muscle mass indirectly helps bone health by encouraging physical activity and weight-bearing exercises, which are crucial for bone strength (Alexander et al., 2022). Integrating regular exercise and ensuring adequate intake of calcium and vitamin D can be powerful preventive measures against age-related bone loss (Rizzoli & Bonjour, 1997). This aspect of hormone interaction highlights the broader systemic impacts hormones have on the body, influencing how we move and stay active as we age.

Naturally, the relationship between hormones and bone health extends far beyond oestrogen and testosterone. A variety of other hormones play vital roles in maintaining bone density and supporting the musculoskeletal system, working together to ensure bones

remain strong and resilient throughout life. Understanding this complex hormonal network can help explain why maintaining bone health requires a multifaceted approach, especially as women age (Rizzoli & Bonjour, 1997). One of the key players in this network is parathyroid hormone (PTH), which is secreted by the parathyroid glands and is essential for regulating calcium levels in the blood. Calcium is a crucial mineral for building and maintaining strong bones, and PTH ensures that sufficient levels of calcium are available by stimulating its release from bones when blood levels are low. It also aids in the absorption of calcium in the intestines, making sure the body can make the most of dietary intake. However, too much PTH can lead to excessive calcium withdrawal from bones, resulting in conditions like hyperparathyroidism, which can thin bones over time. This delicate balance underscores the importance of not just hormonal regulation but also ensuring adequate calcium intake through diet.

Working in tandem with PTH is calcitonin, a hormone produced by the thyroid gland that helps to lower blood calcium levels by inhibiting the activity of osteoclasts—cells that break down bone tissue. While calcitonin's role is more prominent during periods of rapid growth in childhood and adolescence, it continues to support bone health in adults by helping to maintain bone density (Rizzoli & Bonjour, 1997). Researchers are exploring the potential of calcitonin-based therapies for managing osteoporosis, especially in postmenopausal women, highlighting how this hormone could help counterbalance the natural decline of oestrogen.

The effects of hormones on bone health are not limited to calcium regulation. Growth hormone (GH) and insulin-like growth factor 1 (IGF-1), which are primarily known for their role in stimulating growth during childhood and adolescence, continue to be influential in adulthood. GH, produced by the pituitary gland, prompts the liver to release IGF-1, which in turn stimulates the activity of osteoblasts—cells responsible for building new bone. This process helps maintain bone density and promotes the regeneration of bone tissue (Rizzoli & Bonjour, 1997). As levels of GH and IGF-1 naturally decline with age, it becomes increasingly important to engage in activities that can help sustain their levels, such as regular exercise and a balanced diet rich in protein. These lifestyle factors support the hormonal mechanisms that help keep bones strong, illustrating the interplay between hormonal health and everyday habits.

Vitamin D also plays an integral role in this complex hormonal landscape, even though it functions more like a prohormone. Once ingested or synthesized through sun exposure, vitamin D is converted into its active form, calcitriol, in the kidneys. Calcitriol then facilitates the absorption of calcium in the intestines, ensuring that dietary calcium can be effectively used to support bone strength. Without adequate vitamin D, the body struggles to maintain appropriate levels of calcium, which can lead to conditions like osteomalacia—a softening of the bones. This highlights the importance of monitoring vitamin D levels, especially for women approaching menopause, as it works hand in hand with other hormones like PTH to maintain strong bones (Rizzoli & Bonjour, 1997).

The thyroid hormones, triiodothyronine (T3) and thyroxine (T4), add another layer to the regulation of bone turnover (Gogakos et al., 2010). These hormones control the rate at which bones are broken down and rebuilt, affecting overall bone density. When the

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thyroid becomes overactive, a condition known as hyperthyroidism, the accelerated breakdown of bone can lead to increased risks of osteoporosis. Conversely, hypothyroidism, or an underactive thyroid, can slow down bone turnover, leading to different challenges for bone health. Maintaining balanced thyroid hormone levels is crucial, as even slight imbalances can disrupt the delicate equilibrium of bone remodelling, especially in the context of aging.

As women transition through menopause, not only does oestrogen decline, but follicle-stimulating hormone (FSH) levels also rise, leading to another layer of complexity in the regulation of bone health. While FSH is primarily involved in regulating the menstrual cycle, recent research suggests that it may directly affect bone density. Elevated FSH levels during menopause might stimulate bone resorption, independently contributing to bone loss (Rizzoli & Bonjour, 1997). This emerging understanding of FSH's impact emphasises that changes during menopause are multifactorial, affecting women's bones in ways that go beyond the decline in oestrogen alone.

Together these hormones form a complex system that governs the health of the musculoskeletal system. They interact in ways that are sometimes complementary and at other times counterbalancing, ensuring that bones remain strong and adaptable to life's challenges. Recognising the importance of each of these hormonal players provides a more comprehensive understanding of why bone health can be challenging to maintain, especially during the significant hormonal shifts of menopause. It also points to the importance of a holistic approach, combining hormone management with lifestyle factors such as nutrition, exercise, and regular medical check-ups to sustain healthy bones and an active lifestyle throughout life.

Conclusion

As described in current article, female hormones exert a profound and far-reaching influence over multiple aspects of a woman's health, extending well beyond their commonly understood roles in reproduction. Hormones such as oestrogen, progesterone, and testosterone are crucial not only for regulating the menstrual cycle and fertility but also for maintaining the health of various bodily systems. From cardiovascular health and brain function to bone density and immune regulation, the impact of these hormones is pervasive and critical for overall well-being.

Oestrogen, often regarded as the primary female hormone, plays a vital role in supporting heart health by promoting blood vessel flexibility and influencing cholesterol levels, while also protecting cognitive function and mental health through its neuroprotective properties. Similarly, progesterone not only prepares the body for pregnancy but also aids in emotional regulation, sleep quality, and stress resilience. Testosterone, though present in smaller quantities in women, contributes to muscle mass, libido, and energy levels, further highlighting the systemic nature of these hormones (Burrows, et al., 2012). These hormonal interactions demonstrate the intricate balance that exists within the female body, with shifts in hormone levels—such as during menopause—having significant effects on health, including increased risks of cardiovascular disease, osteoporosis, and cognitive decline.

As women transition through various life stages, such as puberty, pregnancy, and menopause, hormonal fluctuations become increasingly pronounced, often leading to a range of symptoms that can affect quality of life. The decline in oestrogen during menopause, for example, not only leads to common symptoms such as hot flashes and mood changes but also increases the risk of long-term health issues, particularly in areas like bone density and cardiovascular function. Hormone replacement therapy (HRT) can offer relief for many women, helping to mitigate some of these effects, particularly in reducing the risk of osteoporosis and improving cardiovascular health. However, it is important to approach such treatments with careful consideration of individual health profiles and potential risks.

Beyond reproduction, hormones such as Follicle-Stimulating Hormone (FSH), Luteinizing Hormone (LH), Anti-Müllerian Hormone (AMH), and oxytocin further underscore the complexity of the hormonal landscape in women. These hormones interact with oestrogen, progesterone, and testosterone to regulate not only reproductive functions but also emotional and social experiences, immune responses, and even respiratory efficiency. The interplay of these hormones is not only essential for physiological health but also influences mental and emotional well-being, reinforcing the need for a comprehensive approach to understanding and managing hormone health. Thus, maintaining hormonal balance is a key factor in promoting overall well-being. Women benefit from being aware of the wide-reaching effects of their hormones, particularly during critical transitions such as menopause. A multifaceted approach that includes hormone monitoring, lifestyle interventions such as diet and exercise, stress management, and, when appropriate, medical treatments such as HRT, can help women navigate these changes and maintain vitality. Additionally, ensuring adequate intake of nutrients such as calcium and vitamin D, along with regular physical activity, supports bone health and helps mitigate the risk of conditions such as osteoporosis, which are exacerbated by hormonal changes.

All in all, the complexity of female hormones and their influence on every aspect of life demands a holistic perspective when addressing women's health. By recognizing the wide-ranging effects of hormonal shifts, particularly during menopause, healthcare providers and women alike can better understand and manage the interconnected nature of these processes. Ultimately, a comprehensive approach that considers the systemic roles of hormones is essential for supporting long-term health, vitality, and resilience in women as they age.

Acknowledgement

„SUPPORTED BY THE 2024-2.1.1 UNIVERSITY RESEARCH SCHOLARSHIP PROGRAM OF THE MINISTRY FOR CULTURE AND INNOVATION FROM THE SOURCE OF THE NATIONAL RESEARCH, DEVELOPMENT AND INNOVATION FUND.”

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