SMLM Udan

Society of Meaningful life Management

THE E-NEWSLETTER JUNE 2025

THEME: ORCHESTRA OF HORMONES IN WOMAN

www.smlm.in

President SMLM Message

Editor in chief - Dr Prof (Hony) Maninder Ahuja

I feel honored, happy, and fulfilled to finally launch the E-newsletter of SMLM as the Founder President. This initiative aims to promote the concept of holistic health for women, spanning from adolescence to menopause.

Our multidisciplinary team comprises key opinion leaders with expertise in their respective specialties. These clinicians will provide valuable insights, covering everything from fundamental concepts to innovative ideas in women's health.

In this issue, we explore the "Orchestra of Hormones" throughout a woman's life cycle—from adolescence and normal menstruation to the challenges of PCOS, perimenopause, and menopause. Our goal is to present concise, practical information that can be easily retained and applied in clinical practice.

Please subscribe so that we can deliver you at regular intervals at your email address or your whatsapp number. With Dr Neharika Malhotra as Editor of E-News letter we would scale new heights in reaching out with right meaningful messages for Holistic Health of women

Secretary SMLM Message

Dr. Anita Kant

- Chairman, OBG Services, Asian Institute of Medical Sciences, Faridabad, Haryana
- Past president Faridabad Obstetrics & Gynaecology Society (FOGS)
- Past president Faridabad Menopausal Society (FMS)
- Member of FOGSI Vaccination Committee

Dear readers,

I am honoured to be a part of this great initiative by Dr. Maninder Ahuja through her brain child Society of Meaningful Life Management (SMLM) to as a resource to enlighten every women of the society in whatsoever profession about the signs of menopause and methods to navigate the journey of this unique phase of life.

This will be our attempt to have an evidence based insight with compassionate support and conversation to let you strengthen with knowledge and choices for healthcare approach. Through this platform we aim to empower her with knowledge and confidence to embrace the dynamic changes of her life as beginning of new strength.

With best wishes and regards

EDITORIAL TEAM

Message

Prof. Dr. Jaideep Malhotra
• Managing Director: ART Rainbow IVF, Ujala Cygnus Rainbow Hospital and Malhotra Nursing & Maternity Home, Agra
• President Elect InSARG

Dear readers,
I am pleased to write to you in this SML newsletter about the orchestra (Band) which makes life of a woman a beautiful tune of music. Let me take you through the – "Orchestra of Hormones: From Adolescence to Menopause: the symphony of a woman's life cycle."

"Hormones are the silent music-makers of a woman's life — conducting, the music and rhythm, growth, emotion, reproduction, and renewal."

From adolescence to menopause, a woman's journey is powerfully influenced by a symphony of hormones. Each phase from womb to tomb is a different tune –birth, puberty, reproductive years, perimenopause, menopause, post menopause– brings with it unique hormonal melodies that shape not only physical health but emotional and mental well-being.
Hypothalamic Pituitary axis is the conductor and each of the female hormones, estrogen, progesterone, FSH, LH, and androgens play critical tunes across this continuum. If the conductor malfunctions or the various hormones (music instruments) play out of tune we see Irregular cycles, PCOS, infertility, mood swings, perimenopausal transitions, and menopause symptoms all rooted in this hormonal dysfunction.
Deep understanding of this orchestra is key for both doctors and women themselves. Timely education, screening, lifestyle modifications, and appropriate interventions can optimize transitions and well-being.
This newsletter is a big step towards simplifying this complexity. My heartiest congratulations to Dr. Maninder Ahuja and her editorial team of youngsters Dr. Neharika Malhotra & Dr. Neha Priyadarshini for this timely initiative. Let's continue to decode and demystify women's hormones — one note at a time and play a soothing music for a lifetime of dancing.
With warmth and gratitude,
Prof. Dr. Jaideep Malhotra

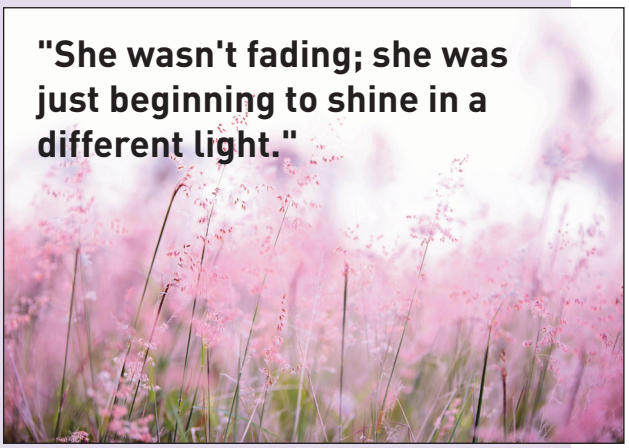
Message

Prof. Dr. Narendra Malhotra
• Managing Director: Ujala Cygnus Rainbow Hospital, ART Rainbow IVF and Malhotra Nursing & Maternity Home, Agra
• Director International Relations SAFOG

Dear Readers,
It's my great pleasure to write a message for the SML newsletter. The concept of a Society for Midlife is very innovation, congratulations to Dr. Maninder Ahuja for starting this initiative and bringing out this newsletter to spread awareness. Let me just express my views on female Hormone balance.

"Hormonal balance is not a luxury — it's a necessity for every stage of a woman's life."

Hormones are at the heart of a woman's health, yet their impact is often underestimated. The journey from adolescence to menopause is a dynamic hormonal rollercoaster – affecting bones, metabolism, skin, mood, fertility, and cardiovascular health.
A woman undergoes hormonal changes at birth, growing up, menarche, young adulthood, preconceptual, pregnancy, postpartum, premenopause, menopause & post menopause the journey of a Women's life is like a ship scaling through rough waters of hormonal changes.
In adolescence, the rise of estrogen and progesterone sets the foundation of reproductive health. In perimenopause, declining estrogen levels lead to hot flashes, mood disorders, and osteoporosis risk. Menopause is not the end — it's the beginning of a new hormonal rhythm that must be addressed through awareness and evidence-based care.
As clinicians, it is our responsibility to ensure hormonal health is integrated into every wellness dialogue. Let us equip our women with knowledge and personalized care strategies.
My sincere compliments to the editorial team Dr. Neharika Malhotra & Dr. Neha Priyadarshini of this edition of "Pearls of Wisdom." May this serve as a practical guide to every clinician and a beacon for women across all ages.
Best wishes,
Prof. Dr. Narendra Malhotra



Introduction to Society of Meaningful Life Management

Dr Maninder Ahuja

This society was launched in July 2019 before COVID 19 was declared with the aim of " let us go Digital. This was concerted efforts of all the Key opinion leaders Please visit page of KOL but in effect was launched by Dr. Ashok Khurana along with one of SFM conferences This was one of my passions for a long time to be cost effective and to reach out our vast population of women with right ideas so Web site was also launched https://smlm.in Please visit and become member for a futuristic journey into health of women at academic level and public health initiative . we have a very active web site where you can access our public health initiatives along with academic videos and articles .we are collaborating with many organizations for our various activitie and Research also.

We have many activities of our webinars , news letters , blogs and direct public health activities Please, look into our Aims objectives and Vision of society.

Aims & Objectives

• To promote healthy aging through holistic, lifelong care, starting from adolescence and continuing through midlife and beyond—embodying a "Womb to Tomb" approach.

• To address and prevent key health challenges affecting women in midlife, including osteoporosis, sarcopenia, lifestyle diseases (diabetes, hypertension, obesity), hot flashes, sleep disturbances, dementia, cancers, and psychological disorders.

• To provide cost-effective, digital access to health education and updates through a dedicated website, social media, and AI-driven tools to ensure the widest possible reach.

• To build a multidisciplinary care model by involving medical, mental health, fitness, nutrition, and wellness professionals in a collaborative framework.

Vision and Strategic Objectives

1. National Platform Creation

Develop a comprehensive, multidisciplinary platform to support adolescent and midlife women's health at the national level, with centralized access to education, services, and updates.

2. Medical Professional Education

Conduct skill enhancement programs, hands-on training workshops, and virtual learning modules accessible via the members-only section of the website, promoting continuous professional development.

3. Public Health Awareness & Outreach

Launch public-friendly digital campaigns using short videos, pamphlets, webinars, and interactive public health events on platforms like Facebook, WhatsApp, and Twitter to raise awareness on midlife health issues.

4. Government and Industry Collaboration

Establish liaison with government bodies for policy advocacy and program implementation. Partner with industry to provide accessible home-based health and rehabilitation technologies.

5. Holistic Integration with Health Associations

Collaborate with various national and international health associations to unify efforts toward integrated, preventive, and therapeutic care for women across their lifespan.

6. Feasible and Impactful Research

Facilitate research on practical and community-relevant health interventions, aiming for scalable solutions that can influence national public health outcomes.

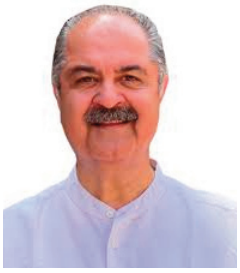
7. Interactive Engagement & Community Building

Host regular chat forums, discussion panels, and virtual events to discuss clinical controversies, clarify myths, and engage the community in meaningful health dialogue.

By becoming a member you can access all our academic work at one place and which would be always available on the click of a button.

Hormonal Journey from Adolescence to Menopause

Mohd Faisal Khan



Dr. Ashok Khurana

Dr Maninder Ahuja

Hormonal Dynamics from Adolescence to Menopause

Hormones serve as the body's intricate regulators, guiding women through distinct life stages from adolescence to menopause. These chemical messengers, including estrogen, progesterone, follicle-stimulating hormone (FSH), luteinizing hormone (LH), and others, orchestrate physical development, reproductive function, and emotional health. Their complex interplay, governed by the hypothalamic-pituitary-gonadal (HPG) axis, shapes each phase of a woman's life, with recent research shedding light on these transitions and their implications for health [1].

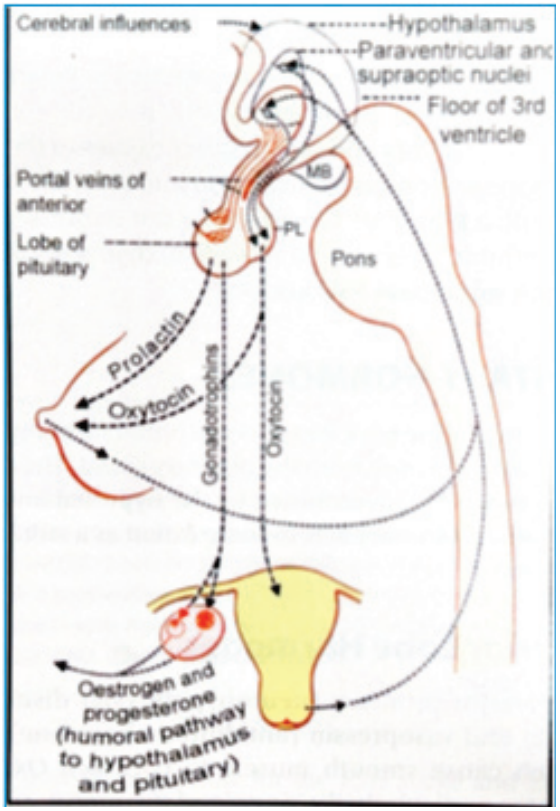


FIG-1- : Hypothalamic Pituitary axis

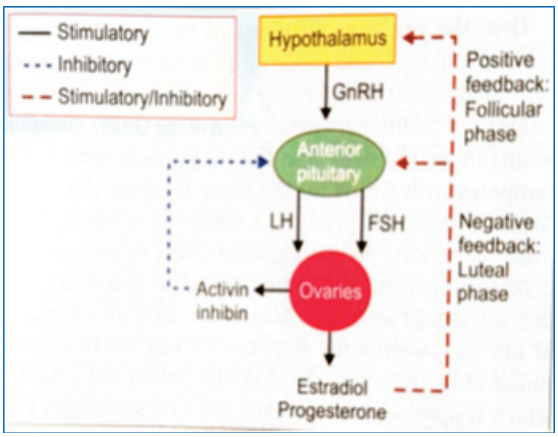


Fig -2-: Stimulatory and Inhibitory Pathways of HPG Axis

During adolescence, puberty begins between ages 8 and 13,(fig-1-2) triggered by the hypothalamus releasing gonadotropin-releasing hormone (GnRH). This prompts the pituitary gland to produce FSH and LH, which stimulate the ovaries to secrete estrogen and progesterone. These hormones drive physical changes, such as breast development (thelarche) around ages 9 to 10, pubic hair growth (pubarche), and the onset of menstruation (menarche), typically at age 12.8 for White girls and slightly later for African American girls [2].(FIG- 1)

Early menstrual cycles are often irregular due to an immature HPG axis. Adrenal androgens contribute to pubarche and acne, while growth hormone and insulin-like growth factor 1 (IGF-1) support skeletal growth and metabolic shifts, highlighting the multifaceted hormonal environment of puberty [3]. (Fig -3)

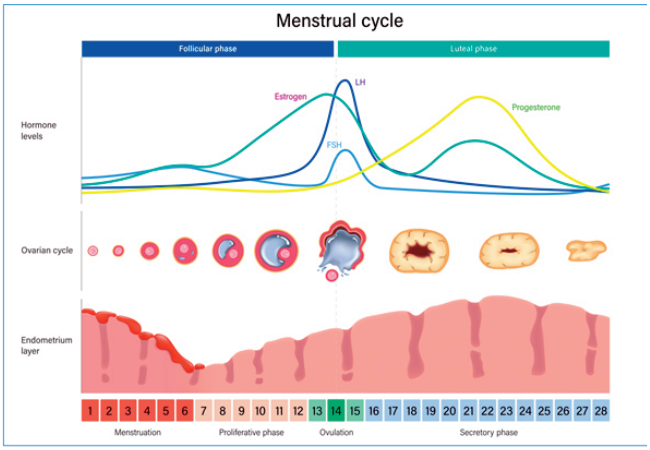


FIG-3- : Normal Menstrual cycle

In the reproductive years, typically spanning from the teens to the mid-40s, hormonal balance supports regular menstrual cycles of 21 to 35 days.(fig -) Estrogen, produced during the follicular phase, thickens the uterine lining, while an LH surge triggers ovulation.(Chart -1) Post-ovulation, the corpus luteum secretes progesterone, preparing the uterus for potential pregnancy.(FIG 2) If pregnancy does not occur, hormone levels drop, initiating menstruation [4]. Disruptions, such as polycystic ovary syndrome (PCOS), affect up to 10% of women, causing irregular cycles, elevated androgens, and fertility chal-

lenges [5]. Oxytocin, released during childbirth and breastfeeding, further illustrates the diverse roles hormones play in reproduction.

Perimenopause, often starting in the mid-40s, marks a transitional phase as ovarian function declines. Estrogen and progesterone levels decrease, while FSH rises to stimulate diminishing follicles, leading to irregular periods, hot flashes, night sweats, and mood changes.(fig -3) Up to 75% of women experience vasomotor symptoms, impacting daily life [6]. Inhibin, which normally suppresses FSH, also declines, disrupting HPG axis feedback. This phase, lasting several years, reflects the body's adjustment to waning reproductive capacity, with symptoms varying widely in severity [1].

Menopause, defined as 12 consecutive months without menstruation, typically occurs around age 51. Estrogen production drops significantly, halting ovulation and menstruation. This reduction increases risks for osteoporosis and cardiovascular disease, as estrogen previously supported bone density and vascular health [7]. Symptoms like vaginal dryness and sleep disturbances persist for some women. Hormone replacement therapy (HRT) can alleviate these issues, but its risks, including potential breast cancer links, require careful consideration [8]. The adrenal glands and fat tissue produce minimal estrogen post-menopause, insufficient for premenopausal functions. (fig -4) chart -Estrogen dominance can be there as there is 35 % fall in estrogesn and progesterone reduction is 75% from age 35-50 years and this can cause Heavy menstrual bleeding which needs addition of progesterone to control the bleeding .

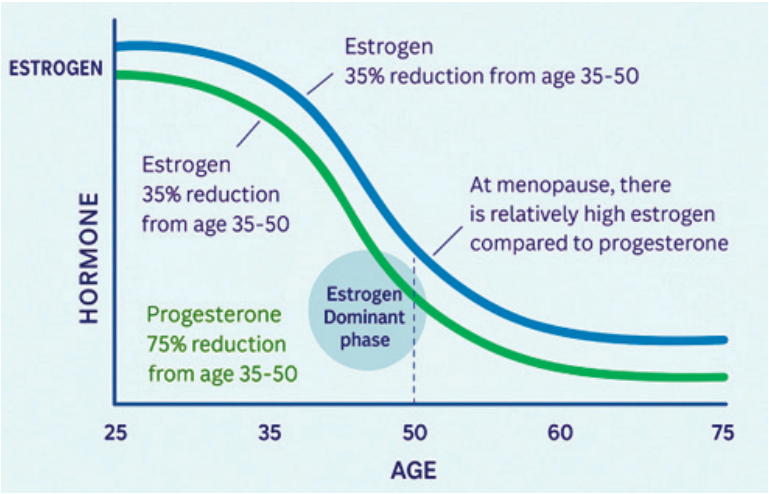


Chart -2 hormonal changes of Menopause dominance to estrogens around perimenopause

Other hormones influence these stages. Thyroid hormones regulate metabolism, and imbalances can worsen menopausal fatigue. Cortisol, linked to stress, interacts with estrogen, potentially exacerbating mood issues during perimenopause [9]. Insulin resistance, which is more common with age, complicates hormonal balance and raises metabolic risks. These interactions emphasize the interconnected nature of the endocrine system.

The hormonal journey from adolescence to menopause reflects a delicate balance, with each stage presenting unique challenges and adaptations. Puberty initiates reproductive potential, the reproductive years sustain it, and perimenopause and menopause signal its decline, each shaped by intricate hormonal dynamics. Advances in research continue to inform strategies for managing these transitions, enhancing women's health across the lifespan.

References:

1. Santoro, N., Perimenopause: From Research to Practice. J Womens Health (Larchmt), 2016. 25(4): p. 332-9.
2. Herting, M.M. and E.R. Sowell, Puberty and structural brain development in humans. Frontiers in neuroendocrinology, 2017. 44: p. 122-137.
3. Breehl, L. and O. Caban, Physiology, puberty. 2018.
4. Schliep, K.C., et al., Perceived stress, reproductive hormones, and ovulatory function: a prospective cohort study. Epidemiology, 2015. 26(2): p. 177-184.
5. Sadeghi, H.M., et al., Polycystic ovary syndrome: a comprehensive review of pathogenesis, management, and drug repurposing. International journal of molecular sciences, 2022. 23(2): p. 583.
6. Avis, N.E., et al., Duration of menopausal vasomotor symptoms over the menopause transition. JAMA Internal Medicine, 2015. 175(4): p. 531-539.
7. Lobo, R., Menopause and care of the mature woman. Lentz, Comprehensive Gynecology, 2012: p. 273-299.
8. Faubion, S.S., et al., The 2022 hormone therapy position statement of the North American Menopause Society. Menopause, 2022. 29(7): p. 767-794.
9. Gordon, J.L., et al., Ovarian hormone fluctuation, neurosteroids, and HPA axis dysregulation in perimenopausal depression: a novel heuristic model. American Journal of Psychiatry, 2015. 172(3): p. 227-236.

CHARTS

Hormonal Values (Approximate ranges) in Adolescents

Hormone	Typical Range During Puberty	Role
GnRH	Not routinely measured	Initiates puberty
FSH	0.3–10 mIU/mL	Stimulates ovarian follicles
LH	0.1–8 mIU/mL	Triggers ovulation
Estrogen (estradiol)	20–300 pg/mL	Promotes secondary sexual characteristics
Progesterone	<1 ng/mL	Early luteal phase levels

TABLE 1-Hormonal values in Adolescents
values of GNRH, FSH.LH,Estradiol Progesterone GnRH-Gonadotropin releasing hormone, FSH -Follicular Stimulating hormone, LH-Luteinising hormone ,Estrodiol , Progesterone

Hormonal Values (Average menstrual cycle):

Phase	Estrogen (pg/mL)	Progesterone (ng/mL)	LH (mIU/mL)	FSH (mIU/mL)
Follicular	30–150	<1	Low (~1–10)	3–10
Ovulation	Peak (~200)	1–2	Surge (~20–200)	5–15

Table 2-Hormonal values in Menstrual cycle

Hormonal Values (Approximate) in perimenopause:

Hormone	Typical Range (per cycle)	Change
FSH	>10–>30 mIU/mL	Elevated due to decreased ovarian feedback
Estrogen (estradiol)	Fluctuates; may be low or variable	Decreases overall
Progesterone	Fluctuates; often low	Decreases

Table -3- Hormonal values in Perimenopause FSH-Follicular Stimulating hormone

Hormonal Values In Menopause :

Hormone	Typical Range	Note
Estrogen (estradiol)	<20 pg/mL	Significantly decreased
Progesterone	<0.2 ng/mL	Very low
FSH	>30–100 mIU/mL	Elevated
LH	Elevated	Elevated

Table -4-hormonal values in Menopause -LH-lutenising hormone DHEA-Dehydroepiendrostenedion

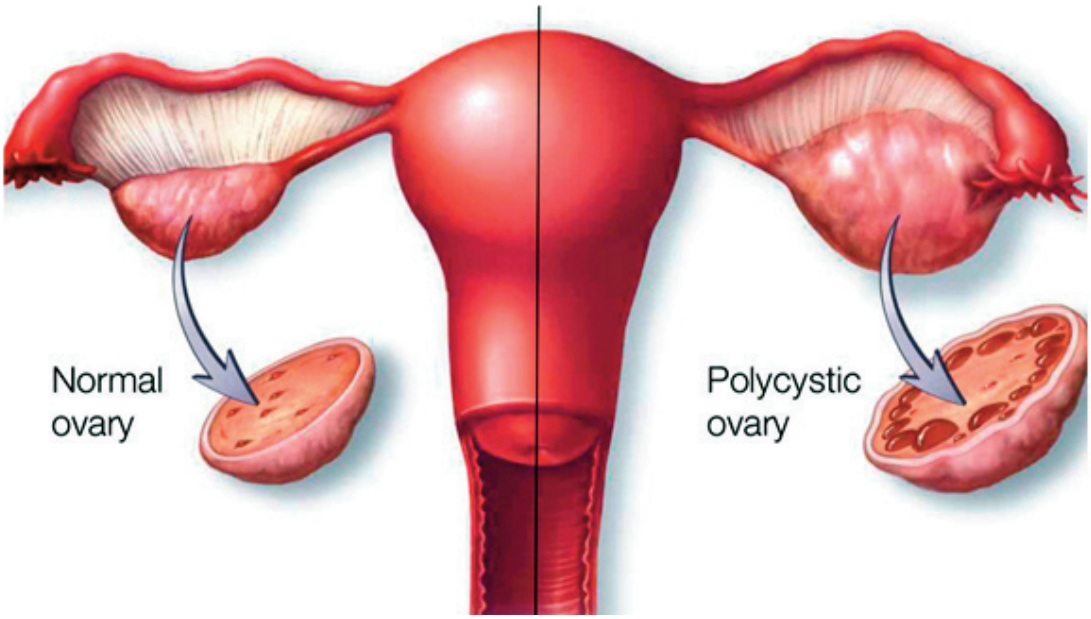
Additional Hormones:

• **Androgens (DHEA, Testosterone):** Slight decline, but adrenal sources provide

The Endocrine Pathophysiology of Polycystic Ovary Syndrome (PCOS): A Hormonal Perspective

Dr Neharika Malhotra
Rainbow IVF, AGRA.
MD Obgyn (gold medallist) DRM (Germany), FICOG, FICMCH

Dr Neha Priyadarshini
Satvik IVF, DHANBAD



Polycystic Ovary Syndrome (PCOS) is a multifactorial endocrine disorder with reproductive, metabolic, and dermatologic manifestations. It affects approximately 6–12% of women of reproductive age and is diagnosed based on the Rotterdam Criteria (2003), which require the presence of at least two of the following:

1. Oligo- or anovulation,
2. Clinical and/or biochemical hyperandrogenism,
3. Polycystic ovarian morphology on ultrasound.

At the core of PCOS lies a complex interplay of hormonal imbalances, primarily involving the hypothalamic-pituitary-ovarian (HPO) axis, insulin signaling pathways, and adipokine modulation.

1. Hyperandrogenism: The Central Pathophysiological Feature

Biochemical hyperandrogenism is a hallmark of PCOS. Elevated levels of:

• Testosterone
• Androstenedione
• Dehydroepiandrosterone sulfate (DHEAS) are commonly observed. The ovarian theca cells are primarily responsible for increased androgen synthesis, driven by elevated luteinizing hormone (LH) and hyperinsulinemia.

Mechanism:

• LH binds to LH receptors on theca cells → upregulates CYP17A1 (17α-hydroxylase/17,20-lyase) → enhanced androgen biosynthesis.
• Insulin acts synergistically with LH, enhancing steroidogenic enzyme expression and reducing sex hormone-binding globulin (SHBG) synthesis in the liver, increasing free androgens.

2. Altered Gonadotropin Secretion

a. Increased LH Secretion

• Women with PCOS often exhibit a pulsatile increase in GnRH frequency, favoring LH over FSH production.
• This leads to a raised LH:FSH ratio (>2:1 or 3:1 in many cases).
• LH hypersecretion is driven by impaired feedback sensitivity to estradiol and progesterone.

b. FSH Deficiency

• Relatively lower FSH levels impair follicular maturation.
• Accumulation of arrested preantral and small antral follicles gives the characteristic

"polycystic" ovarian morphology.

3. Insulin Resistance and Hyperinsulinemia

Insulin resistance (IR), independent of obesity, is observed in 50–70% of PCOS patients.

Mechanism:

• Post-receptor signaling defects in insulin pathways impair glucose uptake, especially in skeletal muscle and adipose tissue.

• Hyperinsulinemia compensates for IR and enhances ovarian androgen production via:

o Upregulation of P450c17 (CYP17A1) in theca cells.

o Inhibition of hepatic SHBG synthesis → higher free testosterone.

Insulin also exacerbates pituitary LH secretion and affects granulosa cell function, contributing to follicular arrest.

4. Dysregulated Estrogen and Progesterone Profiles

a. Estrogen Dominance

• Persistent anovulation results in a lack of cyclic progesterone rise.

• Continuous estrogen exposure (primarily estrone, derived from peripheral aromatization of androgens in adipose tissue) leads to unopposed endometrial stimulation, increasing the risk of:

o Endometrial hyperplasia

o Endometrial carcinoma

b. Low Progesterone

• Absence of corpus luteum formation due to anovulation results in chronically low luteal progesterone, contributing to irregular cycles and unregulated endometrial proliferation.

5. Role of SHBG and Free Androgen Index

• SHBG levels are suppressed by insulin and androgens.

• Decreased SHBG → increased Free Androgen Index (FAI) =

(TotalTestosterone/SHBG)×100

(TotalTestosterone/SHBG)×100

→ Enhances androgen bioavailability, worsening symptoms like hirsutism and acne.

6. Adrenal Contribution

• A subset of women with PCOS exhibit elevated DHEAS, suggesting an adrenal contribution to hyperandrogenism.

• ACTH stimulation tests can help differentiate adrenal from ovarian androgen excess.

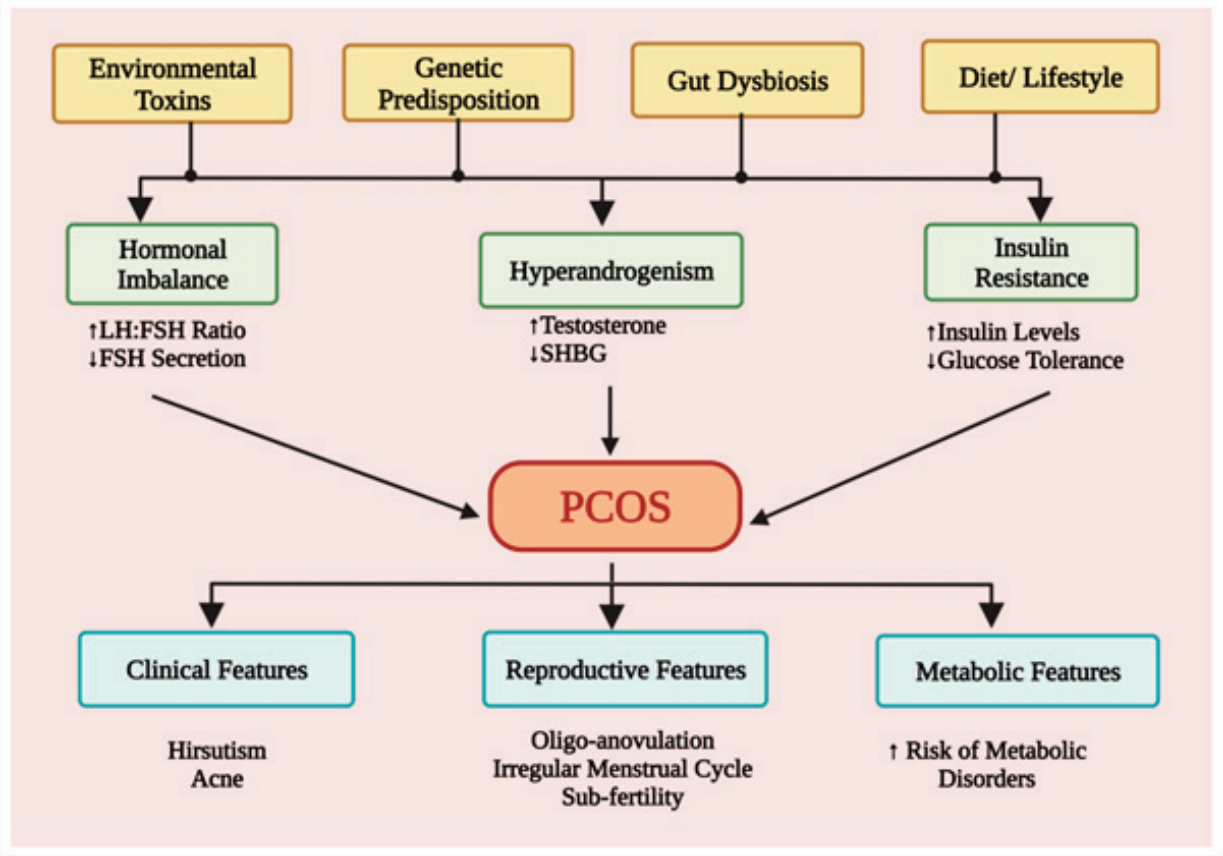
7. Adipose Tissue, Leptin, and Adipokines

Obesity exacerbates PCOS symptoms by:

• Amplifying insulin resistance.

• Increasing aromatase activity (estrone production).

• Dysregulating leptin, adiponectin, and resistin, which further impair insulin signaling and gonadotropin regulation.



Hormonal Summary Table in PCOS

Hormone	PCOS Status	Pathophysiological Role
LH	↑	Stimulates theca cell androgen synthesis
FSH	Normal or ↓	Impaired folliculogenesis
Testosterone	↑ (Total and free)	Clinical/biochemical hyperandrogenism
DHEAS	↑ (in ~20–30%)	Adrenal androgen source
Estrone	↑	Peripheral aromatization; unopposed endometrial stimulation
Progesterone	↓	Due to chronic anovulation
Insulin	↑ (due to IR)	Potentiates androgen synthesis; decreases SHBG
SHBG	↓	Increases free testosterone
GnRH	↑ pulse frequency	Alters LH/FSH ratio

Diagnostic Algorithm for PCOS (2023 Monash University Summary)

Step 1: Exclude Other Causes

Before diagnosing PCOS, exclude:

- Thyroid disorders (TSH)
- Hyperprolactinemia (serum prolactin)
- Non-classic congenital adrenal hyperplasia (17-OHP)
- Androgen-secreting tumors (testosterone, DHEAS)
- Cushing's syndrome (if clinically suspected)

Step 2: Assess for Diagnostic Features

A diagnosis of PCOS requires 2 out of the following 3 features:

Feature	Clinical / Diagnostic Signs
1. Ovulatory Dysfunction	Irregular or absent menstrual cycles (typically <21 or >35 days apart; <8 cycles/year)
2. Hyperandrogenism	Clinical signs (hirsutism, acne, androgenic alopecia) or elevated androgens (total/free testosterone)
3. Polycystic Ovarian Morphology (PCOM) (in adults)	On ultrasound (≥20 follicles per ovary or ≥10 mL volume) OR AMH ≥ 35 pmol/L

Step 3: Use Age-Specific Guidelines

Age Group	Diagnostic Recommendation
Adolescents	Both: Persistent ovulatory dysfunction + Hyperandrogenism Do not use PCOM (ultrasound or AMH)
Adults	2 out of 3 Rotterdam criteria AMH can be used in place of ultrasound (≥35 pmol/L threshold)
Postmenopausal	Diagnosis based on historical features, since cycle and morphology are no longer valid

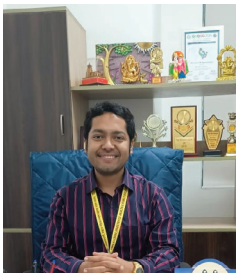
Step 4: Consider Differential PCOS Phenotypes

Phenotype	Ovulatory Dysfunction	Hyperandrogenism	PCOM
A	Yes	Yes	Yes
B	Yes	Yes	No
C	No	Yes	Yes
D	Yes	No	Yes

Conclusion

The hormonal milieu in PCOS is marked by neuroendocrine dysregulation, hyperandrogenism, insulin resistance, and chronic anovulation, with downstream effects on reproductive and metabolic health. Understanding the molecular and cellular mechanisms underlying each hormonal alteration is critical for the development of individualized therapeutic strategies, including ovulation induction, anti-androgen therapy, and insulin sensitizers.

Physiological and hormonal changes in Menopause-Receptor Mediated



Dr. Avir Sarkar

Dr Anita Kant

Menopause signifies the cessation of ovarian function, leading to profound hormonal and physiological alterations. With the decline in ovarian hormone production, this transition encompasses perimenopause, menopause and postmenopausal phases, each marked by distinct hormonal changes and clinical manifestations [1]. In this article we have tried to explore the hormonal fluctuations characteristic of menopause, emphasizing the role of estrogen and progesterone and examine the receptor-mediated mechanisms underlying associated symptoms. Understanding these processes is pivotal for developing targeted therapeutic interventions.

Hormonal Dynamics During Menopause:

• **Estrogen:** The decline in estrogen levels is central to menopausal symptoms. Estrogen receptors (ERs), primarily ERα and ERβ, are expressed in various tissues, including the brain, bone, and cardiovascular system. These receptors mediate estrogen's effects through genomic and non-genomic pathways, influencing gene transcription and cellular signalling [2,3].

• **Progesterone:** Progesterone levels decrease following the cessation of ovulation. Progesterone receptors (PRs) are present in reproductive tissues and the brain, where they modulate mood and cognitive functions.

• **Gonadotropins:** FSH and LH levels rise due to decreased negative feedback from ovarian hormones, reflecting the diminished ovarian reserve.

Receptor-Mediated Mechanisms in Menopausal Symptoms:

• **Central Nervous System (CNS):** Estrogen's influence on neurotransmitter systems, including serotonin, dopamine and GABA, is well-documented. For instance, estrogen enhances serotonin receptor binding, which may alleviate mood disturbances and cognitive decline observed during menopause [3].

• **Bone:** Estrogen receptors on osteoblasts and osteoclasts regulate bone remodelling. Estrogen deficiency leads to increased bone resorption, heightening the risk of osteoporosis in postmenopausal women.

• **Cardiovascular System:** Estrogen's effects on vascular endothelium, mediated through ERs, include modulation of nitric oxide production and lipid metabolism, contributing to cardiovascular protection.

• **Urogenital System:** Estrogen receptors in vaginal and bladder tissues maintain epithelial integrity and function. Estrogen deficiency results in atrophic changes in the urogenital system leading to symptoms such as vaginal dryness and urinary incontinence and dyspareunia and secondary sexual desire disorder

The reduction in estrogen levels has systemic effects beyond the reproductive system. Estrogen receptors (ERs), primarily ERα and ERβ, are expressed in multiple tissues, including the brain, bones, cardiovascular system, skin, and urogenital tract. These receptors mediate the genomic and non-genomic actions of estrogen. In the brain, particularly the hypothalamus, declining estrogen levels affect thermoregulation, which is believed to contribute to vasomotor symptoms such as hot flashes. Estrogen also influences the synthesis and regulation of neurotransmitters such as serotonin and dopamine, accounting for changes in mood, sleep, and cognition during menopause [2,3]. As a result there is a surge in cardio-metabolic disorders at menopause and beyond [4]. BMI and waist circumference are the first warning signs of metabolic disorders after menopause. Thus, regular biochemical screening through lipid profile and fasting blood glucose measurements are helpful in detecting metabolic disorders in peri and postmenopausal women and treating them early [4].

Bone metabolism is another critical area affected by estrogen deficiency. Estrogen plays a pivotal role in maintaining bone density by inhibiting osteoclast-mediated bone resorption. ERs in osteoblasts and osteoclasts modulate bone turnover, and reduced estrogen activity accelerates bone loss, predisposing postmenopausal women to osteoporosis. Additionally, estrogen has a cardioprotective effect through its action on ERs in vascular endothelium, where it enhances nitric oxide production, reduces vascular inflammation, and modulates lipid profiles. Loss of estrogen is thus associated with an increased risk of cardiovascular disease in postmenopausal women.

In the urogenital system, estrogen maintains the integrity of the vaginal epithelium, enhances blood flow, and preserves collagen content. Its deficiency leads to atrophic changes manifesting as vaginal dryness, dyspareunia, and urinary symptoms. These effects are mediated by estrogen receptors in the vaginal mucosa and bladder tissues, highlighting the hormone's regulatory role across epithelial, muscular, and connective tissues. Receptor sensitivity and distribution also change with age and hormonal status. Estrogen receptor expression may decline in certain tissues post-menopause, contributing to reduced hormonal responsiveness. Moreover, the differential roles of ERα and ERβ contribute to tissue-specific effects. For example, ERα is more involved in reproductive tissues and bone, whereas ERβ predominates in the cardiovascular and central nervous systems. Selective estrogen receptor modulators (SERMs) and hormone replacement therapy (HRT) aim to exploit these differences to provide symptom relief while minimizing adverse effects.

Progesterone, though less studied in the context of menopause, also acts through specific nuclear receptors—progesterone receptors A and B—which modulate reproductive tissue function and influence the nervous system. Declining progesterone levels contribute to irregular menstruation and may also affect mood and cognition, though its role is often secondary to estrogen.

Menopausal Hormone Therapy (MHT) and Receptor Interactions:

MHT aims to alleviate menopausal symptoms by supplementing estrogen and, in some cases, progesterone. The efficacy and safety of HRT are influenced by the timing of initiation, hormone types, and individual receptor profiles. Early initiation of HRT, particularly within the first few years of menopause, has been associated with beneficial effects on bone density and cardiovascular health. However, prolonged use may increase the risk of breast cancer, especially in estrogen receptor-positive subtypes.

The menopausal transition involves complex hormonal changes that significantly impact various physiological systems. Receptor-mediated mechanisms play a crucial role in mediating these effects. A comprehensive understanding of these processes is essential for developing personalized therapeutic strategies to manage menopausal symptoms and associated health risks.

References:

1. Boss GR, Seegmiller JE. Age-related physiological changes and their clinical significance. West J Med. 1981 Dec;135(6):434-40.
2. Monteleone P, Mascagni G, Giannini A, et al. Symptoms of menopause - global prevalence, physiology and implications. Nat Rev Endocrinol. 2018 Apr;14(4):199-215.
3. Deecher DC, Dorries K. Understanding the pathophysiology of vasomotor symptoms (hot flushes and night sweats) that occur in perimenopause, menopause, and postmenopause life stages. Arch Womens Ment Health. 2007;10(6):247-57.
4. Ahuja M, Sharma JB, Perumal V, et al. A Survey on Relation of Menopause to Metabolic Syndrome - SAFOMS STUDY (South Asian Federation of Menopause Societies) - Interim Analysis. J Midlife Health. 2023 Oct-Dec;14(4):291-298.

Menopause Medical Quiz - Dr Anita Kant, Dr Amrita Razdan Kaul

1. Which health risk increases after menopause due to lower estrogen levels?
A. Asthma
B. Osteoporosis
C. Skin cancer
D. Tuberculosis

2. Which type of bone is most affected by postmenopausal bone loss?
A. Compact bone
B. Spongy (trabecular) bone
C. Cartilage
D. Cortical bone

3. Why does cardiovascular risk increase after menopause?
A. Estrogen no longer protects blood vessels
B. Increase in LDL ("bad" cholesterol)
C. Increase in central (abdominal) fat
D. All of the above

4. Which medication is often prescribed to strengthen bones in postmenopausal women at high risk of fractures?
A. Statins
B. Bisphosphonates
C. Antidepressants
D. Diuretics

5. Which lipid profile change is commonly seen in postmenopausal women?
A. Increased HDL
B. Decreased triglycerides
C. Increased LDL
D. Increased estrogen

6. Hormone Replacement Therapy (HRT) can help prevent bone loss in menopause. Which of the following is true about its use?
A. It is recommended for all women over 50
B. It carries no risk and is safe for long-term use in everyone
C. It should be individualized and used at the lowest effective dose for the shortest duration
D. It replaces calcium supplements

7. Which of the following is a contraindication for MHT?
A. Mild hot flashes
B. Osteoporosis
C. History of venous thromboembolism (VTE)
D. Premature ovarian insufficiency

8. Which route of estrogen administration is associated with a lower risk of thromboembolism?
A. Oral
B. Intramuscular
C. Transdermal (patch or gel)
D. Sublingual

9. Which of the following is a potential risk of systemic MHT identified in the Women's Health Initiative (WHI) trial?
A. Reduced risk of stroke
B. Increased breast cancer risk (with combined therapy)
C. Improved cognitive function
D. Decreased colon cancer risk

10. Which of the following statements about transdermal estrogen therapy is TRUE?
A. It increases the risk of VTE more than oral therapy
B. It bypasses the first-pass hepatic metabolism
C. It is contraindicated in hypertension
D. It is ineffective for vasomotor symptoms

Answers

1. B. Osteoporosis
2. B. Spongy (trabecular) bone
3. D. All of the above
4. B. Bisphosphonates
5. C. Increased LDL
6. C. It should be individualized and used at the lowest effective dose for the shortest duration
7. C. History of venous thromboembolism (VTE)
8. C. Transdermal (patch or gel)
9. B. Increased breast cancer risk (with combined therapy)
10. B. It bypasses the first-pass hepatic metabolism

Contact number 9810881048
Email id: ahuja.maninder@gmail.com
Website: www.smlm.in

For member registration
https://smlm.in/register/

Fill form if you are working
https://forms.gle/65er2WaAGKCBWndC6