Clinical Insights on Hormonal Monitoring with Mira and Its Relevance in Perimenopause Management

The information presented here is based on clinical observations from providers using Mira, along with available research and contributions from ongoing third-party studies and clinical practices. The insights provided by Mira are clinically relevant for certain perimenopausal and HRT patients.

OVERVIEW

During perimenopause, ovulatory dysfunction often signals the onset of the transition, leading to reduced progesterone levels and irregular estrogen production. This dysfunction is characterized by inadequate progesterone response, causing disrupted hormone patterns. Mira provides a detailed view of ovarian activity and hormonal fluctuations, enabling providers to manage and adjust treatments effectively and ensuring optimal hormonal support throughout the menopausal transition.

> Mira provides valuable affirmation data that supports clinical suspicion regarding hormone replacement therapy (HRT) decisions, regardless of age. Unlike “spot testing,” which can be misleading, Mira offers a comprehensive view of hormone patterns over time, helping clinicians make more informed and accurate decisions about HRT.
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Indications for Mira Testing in Perimenopause

Mira helps providers assess hormone patterns, identify imbalances, distinguish ovulatory from anovulatory cycles, and evaluate luteal phase defects.

Hormone Patterns & Cycle Assessment

1. Identify hormone patterns and abnormalities
   - Assess for patterns of estrogen deficiency
   - Assess for patterns of estrogen dominance, excess, or unopposed estrogen
   - Identify low PdG or unusual PdG patterns
2. Distinguish between ovulatory and anovulatory cycles
   - Determine whether ovulatory cycles are occurring
   - Correlate how symptoms may differ between these cycle patterns

3. Propose markers of luteal phase defects
4. Assess menstrual cycle phases after procedures such as hysterectomy or uterine ablation

Ovarian Function & Hormonal Fluctuations

1. Track ovarian activity and monitor hormonal fluctuations
   - Determine if hormones are coordinated, balanced, and functioning optimally
2. Monitor FSH levels to assess ovarian function/dysfunction
   - Track changes in FSH levels over time to monitor the progression of perimenopause
3. Correlate symptoms with hormonal patterns where applicable

Treatment & Intervention Support

> Testing (e.g. Dutch, serum, Mira) alone cannot determine if HRT is therapeutic. Currently, no test, device, or solution can directly assess whether HRT has achieved its desired outcomes; only a woman, based on her symptoms and experiences, can evaluate this. Mira is a valuable tool, but clinical data, patient feedback, symptoms, and observations should also be factored into the assessment.

1. Support clinical suspicion that HRT is appropriate
2. Support ovulatory patterns with timed HRT
   - Coordinate timing of luteal phase progesterone (timed cyclic progesterone)
   - Facilitate physiological HRT timing
3. Track endogenous hormone levels during certain types of hormone replacement therapy (HRT), where applicable.
4. Assist with timing of interventions, procedures, diagnostics, and other timed strategies
   - Accurately time mid-luteal phase tests, such as serum or Dutch tests, by timing them 7 days after ovulation rather than using the generic cycle day 21
   - Accurately time interventions, such as seed cycling, based on the follicular and luteal phases.
   - Accurately time modifications to diet and eating habits during the luteal phase to counteract decreased insulin sensitivity and optimize glucose management.
5. Assess whether non-pharmaceutical interventions, such as lifestyle modifications, diet, supplements, herbs, sleep patterns, and others, affect hormone patterns, either improving or worsening them.
   - For example: Monitor whether Vitex leads to improvements in the PdG pattern, or if inositol has a positive effect on the LH pattern.
6. Assess whether the underlying hormone pattern has shifted
7. Evaluate changes in the hormonal pattern of a previously stable perimenopausal patient

Section 1: Hormone Tracking

PdG (Pregnanediol Glucuronide) Monitoring: A Metabolite of Progesterone

Details

Women are at risk for a natural decline in progesterone levels, primarily due to decreased luteal secretion and a reduction in ovulation frequency. Understanding the physiological changes associated with this decline, as well as the effects of unopposed estrogen, can provide valuable insights into the symptoms women experience during this transition. See additional information here.

Mira helps with

Mira helps identify low progesterone levels or irregular progesterone patterns.

Clinical Observations (Used for)

Timing progesterone administration after ovulation during the luteal phase (timed-cyclic progesterone or cooperative HRT) helps maintain coordinated ovulatory events, rather than following a generic cyclic pattern (e.g., CD 14 to menses), which may disrupt the natural hormonal rhythm.

Clinical Observations (Not used for)

Mira is not intended to assess therapeutic progesterone levels following supplementation. Mira PdG levels do not indicate whether the supplemental progesterone dose is too much or too little. See additional information below.

E3G (Estrone 3-Glucuronide) Monitoring: A Urinary Metabolite of Estradiol (E2)

Details

Perimenopause involves declining ovarian function, leading to irregular cycles and unopposed estrogen production. Estradiol can fluctuate erratically, with some cycles showing higher estrogen and others lower, often accompanied by low progesterone levels.

Mira helps with

Mira is useful for identifying low estrogen levels or abnormal estrogen patterns, such as the absence of a mid-follicular rise or luteal out-of-phase (LOOP) follicular events. It helps identify fluctuations in estrogen, as levels can vary significantly across cycles, being high in some cycles and low in others.

Clinical Observations (Used for)

Mira can help women and their providers identify symptoms that may be related to estrogen abnormalities, as well tracking estrogen patterns and detecting irregular cycles, including those with multiple attempts to ovulate.

Clinical Observations (Not used for)

Mira measures the urinary metabolite of estradiol (E2), E3G (estrone 3-glucuronide), but does not assess the full estrogen metabolism pathway.

LH monitoring

Details

A study identified a variable pattern of LH and negative LH feedback as the hormone patterns most strongly linked to increased vasomotor symptoms (VMS). Fluctuations in LH associated with low progesterone production were linked to VMS but not negative mood, indicating that different endocrine patterns may contribute to VMS and negative mood. The results also confirmed that a significant decline in estrogen production or excretion was not a major early factor in the breakdown of the HPO axis.

Mira helps with

Offering valuable insights into LH patterns Mira is enabling the assessment of hormone coordination. It helps determine whether LH changes have successfully triggered ovulation, with corresponding changes in PdG levels following an LH surge. By monitoring these hormone patterns, Mira provides a comprehensive view of the ovulatory process, allowing providers to evaluate the effectiveness of hormonal cycles in supporting successful ovulation.

Clinical Observations (Used for)

Mira allows providers to assess both normal and abnormal LH patterns, offering a deeper understanding of individual cycles, ovulation patterns, and potential hormonal imbalances. This valuable information can guide clinical decisions, including the timing of fertility interventions, hormone replacement therapy, and adjustments in lifestyle or supplementation.

Clinical Observations (Not used for)

Related to LH, Mira cannot directly diagnose or treat underlying conditions that may affect LH production, such as polycystic ovary syndrome (PCOS) or other hormonal disorders. While Mira tracks LH levels and provides insights into ovulatory patterns, it does not offer a complete diagnosis of potential reproductive health conditions. Providers should use Mira data in conjunction with other clinical assessments and diagnostic tools to fully evaluate and address any underlying health concerns.

FSH monitoring

Details

During perimenopause, FSH levels rise as ovarian function declines, signaling the transition to menopause. However, FSH fluctuates from cycle to cycle, so a single measurement may not reflect the progression. Elevated FSH often coincides with decreased estrogen and irregular cycles. FSH, along with E3G, can provide insights but should be interpreted cautiously due to natural fluctuations.

Mira helps with

Mira helps track FSH to provide insights into ovarian function throughout the menstrual cycle. Elevated FSH levels often signal a decline in ovarian function, common during perimenopause. By monitoring FSH alongside with E3G, LH, and PdG, Mira enables the assessment of coordinated hormone surges that trigger ovulation. This comprehensive tracking helps determine whether ovulation has occurred successfully.

Clinical Observations (Used for)

FSH levels are useful for monitoring ovarian function, tracking improvements with treatment, and observing variations across cycles. Some providers choose to assess FSH levels after initiating estrogen therapy, as a decline in FSH is typically expected.

Clinical Observations (Not used for)

Providers cannot rely solely on FSH levels to predict outcomes for individuals trying to conceive (TTC) or determine the exact timing of menopause. While Mira cannot identify the underlying cause of elevated FSH levels, it can detect hormone abnormalities that may be contributing.

Section 2: Hormonal supplementation and HRT

Progesterone topical/transdermal application

Details

Topical/transdermal hormones may slightly increase serum and therefore may slightly increase PdG excretion (reference). Tracking PdG will allow you to continue to track the underlying natural progesterone hormone pattern.

Mira helps with

Mira helps determine if the patient's underlying endogenous hormone pattern is ovulatory or changing and assess the need for alternative treatment.

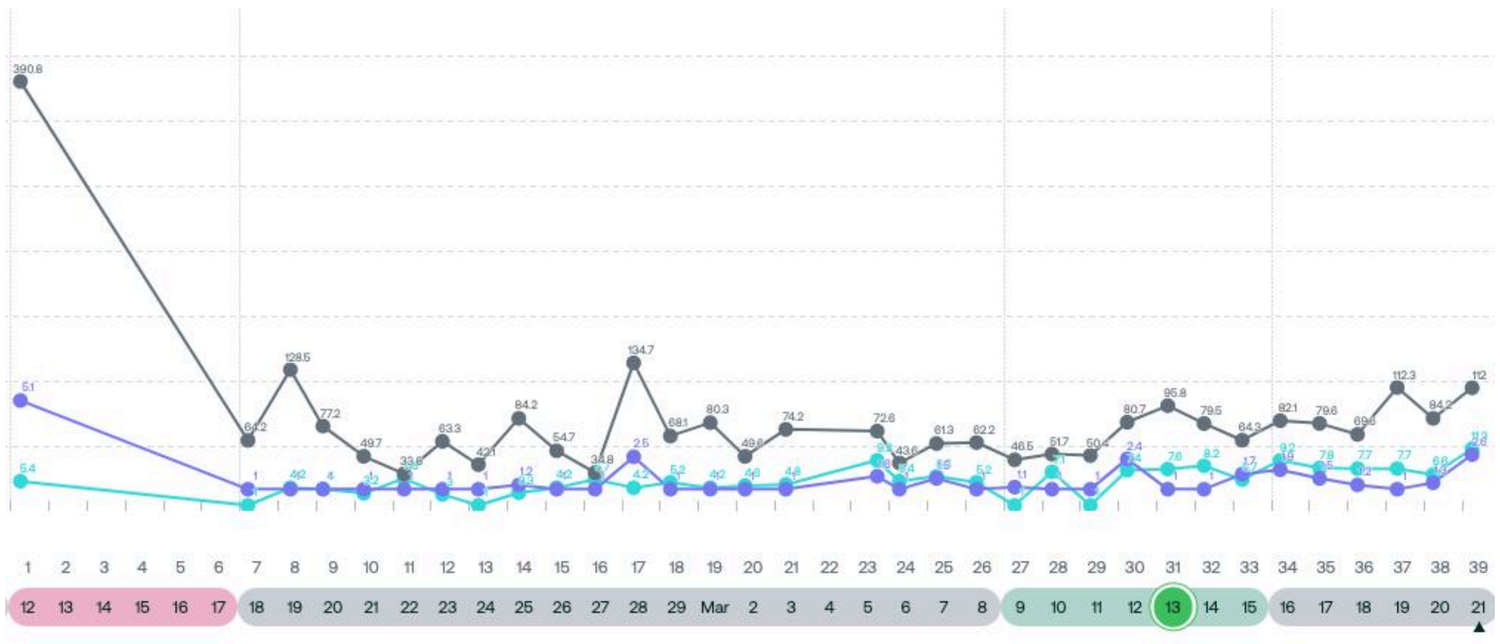
Clinical Observations (Used for)

Assist in timing progesterone administration during the natural luteal phase and assess the response to treatment initiation, determining whether it supports ovulatory events and promotes the establishment of a more regular cycle.

Clinical Observations (Not used for)

Mira is not intended to assess therapeutic progesterone levels following supplementation. Mira PdG levels do not indicate whether the supplemental progesterone dose is too much or too little*. (See additional information below.)

Daily topical progesterone use in perimenopause



Mira data discovered:

- Minimally fluctuating E3G
- Lack of LH surge
- No significant PdG changes observed following topical progesterone use
- Ongoing low PdG levels, indicating lack of ovulation

Progesterone systemic (oral, vaginal, injectable)

Details

Systemic oral and injectable hormones that raise serum hormone levels will raise urine metabolites. Compounded vaginal progesterone that raises serum hormones less will rise urine metabolites, this may be variable.

Mira helps with

Mira PdG levels will reflect the rise in serum progesterone, likely reaching the upper threshold of 30. While endogenous progesterone levels can no longer be directly assessed, providers can evaluate the indirect effects of supplemental progesterone, such as improvements in the E3G pattern and support for ovulation, particularly in cases like PCOS or for individuals trying to conceive. Additionally, monitoring its impact on symptoms and luteal phase length is recommended.

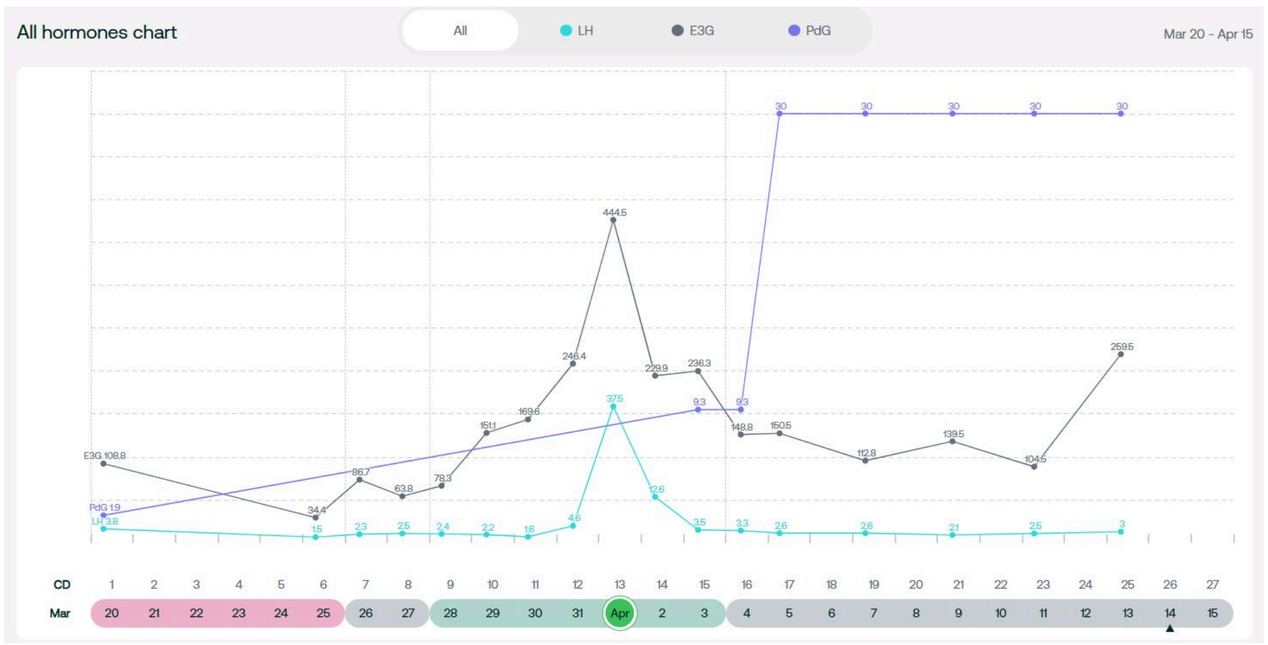
Clinical Observations (Used for)

Assist in timing progesterone administration during the natural luteal phase and assess the response to treatment, determining whether it supports ovulatory events and promotes a more regular cycle. While endogenous progesterone levels can no longer be directly assessed, providers can evaluate the indirect effects of supplemental progesterone, such as improvements in the E3G pattern and support for ovulation, particularly in cases like PCOS or for individuals trying to conceive.

Clinical Observations (Not used for)

Mira is not intended to assess therapeutic progesterone levels following supplementation. Mira PdG levels do not indicate whether the supplemental progesterone dose is too much or too little. See additional information below.

Oral progesterone use after ovulation



Mira data discovered:

- Rising E3G levels leading to LH surge
- LH surge on CD 13
- Elevated PdG after LH surge confirms ovulation
- PdG reaches MAX threshold of 30 after oral progesterone supplementation

Daily oral progesterone use in anovulatory cycle

Mira data discovered:

- Minimally fluctuating E3G
- Lack of hormone coordination
- PdG reaches MAX threshold of 30 during oral progesterone supplementation

Estrogen Supplementation Therapy

Details

Estrogen therapy during perimenopause can be highly effective in alleviating a range of perimenopausal symptoms, such as hot flashes, night sweats, mood swings, and vaginal dryness. By supplementing the body's declining estrogen levels, it helps restore hormonal balance and improve overall well-being. Estrogen therapy can also support the maintenance of bone density and cardiovascular health during this transitional period. However, the decision to initiate estrogen therapy should be individualized, considering factors such as symptom severity, health history, and the potential risks and benefits for each patient.

Mira helps with

Mira provides insights into monthly hormonal patterns, assisting providers in determining the timing for initiating estrogen therapy.

Clinical Observations (Used for)

Mira helps identify low estrogen levels and correlates symptom responses to newly initiated treatments. It also aids in determining the optimal timing for starting estrogen therapy, especially during the early stages of perimenopause (mid to late 30s).

Clinical Observations (Not used for)

E3G levels are not intended for determining therapeutic serum E2 levels. Some providers use a serum reference range as a target, assess the patient's serum levels, correlate them with Mira data, and then utilize Mira to track hormonal patterns and identify changes over time.

Estrogen Therapy: Systemic Topical/Transdermal Applications (Patches, Creams, and Gels)

Details

Systemic estrogen supplementation results in a linear, dose-dependent increase in serum estradiol levels, which subsequently leads to an increase in E3G levels. In contrast to PdG, E3G levels are more significantly influenced by the systemic absorption of

Mira helps with

Mira helps identify underlying endogenous hormone patterns and allows for the observation of linear, dose-dependent increase following supplementation.

Clinical Observations (Used for)

Determine if the patient's underlying endogenous hormone pattern is changing and assess the need for alternative treatment.

Clinical Observations (Not used for)

E3G levels are not intended for determining therapeutic serum E2 levels. Some providers use a serum reference range as a target, assess the patient's serum levels, correlate them with Mira data, and then utilize Mira to track hormonal patterns and identify changes over time.

Estrogen Therapy: Locally Absorbed Topical Applications

Details

Topical applications for skin care or vaginal atrophy that are locally absorbed may not affect serum estradiol levels, and as a result, Mira data may remain unaffected. However, there is a potential risk of contamination when using vaginal estrogen, which could influence the results.

Mira helps with

Tracking E3G levels allows you to identify the underlying endogenous estradiol hormone pattern.

Clinical Observations (Used for)

Determine the patient's underlying endogenous hormone pattern.

Clinical Observations (Not used for)

Mira cannot determine whether the local estrogen is achieving its desired outcome.

Estrogen Therapy: Oral Administration

Details

Oral estrogen supplementation, which increases serum hormone levels, will also elevate urine metabolites.

Mira helps with

Mira E3G levels will reflect the rise in estradiol, likely reaching the upper threshold of 640.

Clinical Observations (Used for)

FSH, LH, and PdG levels can continue to be monitored to assess how estrogen supplementation is supporting ovulation or affecting other hormones. Changes in FSH levels, such as a decrease in response to E3G supplementation, can also be evaluated.

Clinical Observations (Not used for)

Endogenous estradiol levels cannot be monitored using Mira while taking oral estrogen. E3G levels are not designed to determine therapeutic serum E2 levels.

DHEA supplementation

Details

Dehydroepiandrosterone (DHEA) is a hormone produced by the adrenal glands that serves as a precursor to other hormones, including testosterone and estrogen. DHEA levels peak in early adulthood and gradually decline with age.

Mira helps with

Expected findings include an increase in E3G levels due to the rise in serum estradiol.

Clinical Observations (Used for)

Monitor changes in E3G levels in response to DHEA supplementation to assess its impact on hormone balance and ovulation. Clinical observations indicate an increase in E3G, and in some patients, an increase in PdG.

Clinical Observations (Not used for)

Cannot be used for determining therapeutic dosing of DHEA.

Pellet HRT

Details

Expect to see elevated serum levels.

Mira helps with

No data at this time

Clinical Observations (Used for)

No data at this time

Clinical Observations (Not used for)

No data at this time

Section 3: Situation- Based

Post-hysterectomy

Details

Women with intact ovaries may continue to have coordinated hormones with ovulatory events despite the lack of menstrual periods. Studies indicate that after a hysterectomy women are at risk for earlier transition to menopause.

Mira helps with

Mira helps identify her underlying endogenous hormone pattern and determine if she continues to have coordinated hormonal fluctuations that lead to ovulatory events.

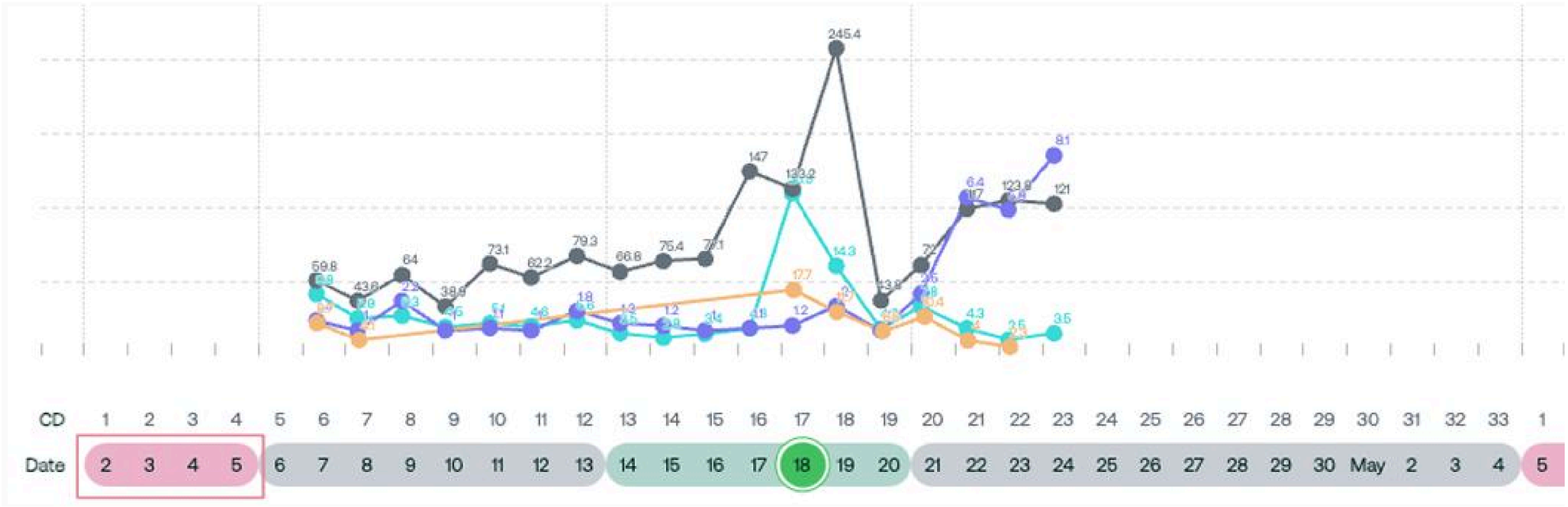
Clinical Observations (Used for)

Determine if hormones are coordinated, assess if they are low and require supplementation, correlate with symptoms, and time progesterone administration during the natural luteal phase. Visualizing hormone patterns helps the woman understand her hormonal status.

Clinical Observations (Not used for)

Mira cannot pinpoint the exact time of menopause but can track hormonal fluctuations to monitor progression.

Ovulatory cycle despite hysterectomy



Patient marked her suspected period since she no longer has periods

Mira data discovered:

- Rising E3G levels leading to LH surge
- LH surge on April 18 and 19th
- Elevated PdG after LH surge confirms ovulation

Uterine ablation

Details

After a uterine ablation women can continue to have coordinated hormones with ovulatory events despite the lack of menstrual periods.

Mira helps with

Mira helps identify patient's underlying endogenous hormone pattern and determine if the patient continues to experience coordinated hormonal fluctuations that lead to ovulatory events.

Clinical Observations (Used for)

Determine if hormones are coordinated, assess if they are low and require supplementation, correlate with symptoms, and time progesterone administration during the natural luteal phase. Visualizing hormone patterns helps the woman understand her hormonal status.

Clinical Observations (Not used for)

Mira cannot pinpoint the exact time of menopause but can track hormonal fluctuations to monitor progression.

More than 2 years past menopause

Details

Hormones are expected to be baseline low.

Mira helps with

No data at this time

Clinical Observations (Used for)

No data at this time

Clinical Observations (Not used for)

No data at this time

Section 4: Birth control and synthetic hormones

Synthetic hormones in oral birth control

Details

Hormonal birth control typically suppresses ovulation, but some women may still ovulate and have menstrual cycles. Combined oral contraceptives typically suppress ovulation, which can result in non-ovulatory, non-menstrual bleeding cycles, breakthrough bleeding, or even amenorrhea. In contrast, progestin-only pills (POPs) may allow for the continuation of regular cycles.

Mira helps with

Identifying background ovarian activity—whether it is regular, irregular, or resulting in successful ovulation—is important, as low hormone levels indicate a lack of hormonal fluctuations. For perimenopausal women, there may be a discrepancy between Mira data and the symptoms they experience while on hormonal birth control. Some providers have observed that when a woman is transitioned from ovulatory suppression (such as an implant or OCP) to perimenopausal or menopausal hormone therapy, her symptoms typically improve.

Clinical Observations (Used for)

Mira may be useful for women experiencing symptoms they attribute to hormonal fluctuations or deprivation while using contraception methods that suppress ovulation. If symptoms like vaginal dryness, pain during sex, low mood, or low desire are present, Mira can confirm low hormone levels and the absence of fluctuating LH/FSH, supporting the idea of hormonal deprivation. If symptoms seem cyclical but Mira shows no hormonal fluctuations, as expected with ovulatory suppression, providers can help distinguish those symptoms from hormonal causes.

Clinical Observations (Not used for)

Mira is not intended to determine whether synthetic hormones in oral birth control are achieving its intended effect.

Birth control implants

Details

Typically birth control implants suppress ovulation but some woman will continue to have cycles.

Mira helps with

Identifying background ovarian activity—whether it is regular, irregular, or resulting in successful ovulation—is important, as low hormone levels indicate a lack of hormonal fluctuations. For perimenopausal women, there may be a discrepancy between Mira data and the symptoms they experience while on hormonal birth control. Some providers have observed that when a woman is transitioned from ovulatory suppression (such as an implant or OCP) to perimenopausal or menopausal hormone therapy, her symptoms typically improve.

Clinical Observations (Used for)

Mira can be useful for women experiencing symptoms they attribute to hormonal fluctuations or deprivation while using contraception methods that suppress ovulation. If symptoms like vaginal dryness, pain during sex, low mood, or low desire are present, Mira can confirm low hormone levels and the absence of fluctuating LH/FSH, supporting the idea of hormonal deprivation. If symptoms seem cyclical but Mira shows no hormonal fluctuations, as expected with ovulatory suppression, providers can help distinguish those symptoms from hormonal causes.

Clinical Observations (Not used for)

Mira is not intended to determine whether birth control implants are achieving its intended effect.

Hormonal IUD

Details

Hormonal IUDs do not always suppress ovulation, which means that even if a woman is amenorrheic she may still be having ovulatory hormonal fluctuations.

Mira helps with

Identifying the underlying hormone pattern, determining whether ovulation is occurring, and assessing if symptoms are related to hormonal fluctuations throughout the cycle.

Clinical Observations (Used for)

Mira can be useful for women experiencing symptoms they attribute to hormonal fluctuations or deprivation while using contraception methods that suppress ovulation. If symptoms like vaginal dryness, pain during sex, low mood, or low desire are present, Mira can confirm low hormone levels and the absence of fluctuating LH/FSH, supporting the idea of hormonal deprivation. If symptoms seem cyclical but Mira shows no hormonal fluctuations, as expected with ovulatory suppression, providers can help distinguish those symptoms from hormonal causes

Clinical Observations (Not used for)

Mira is not intended to determine whether a hormonal IUD is achieving its intended effect.

Ovulatory event with Mirena IUD

Mira data discovered:

- Rising E3G levels leading to LH surge
- LH surge on CD 15 and CD 16
- Elevated PdG after LH surge confirms ovulation

Ovulatory event with Kyleena IUD

Mira data discovered:

- Rising E3G levels leading to LH surge
- Abnormally high E3G in the luteal phase
- LH surge on CD 15 and CD 16
- Elevated PdG after LH surge confirms ovulation

Non-hormonal IUD (copper IUD)

Details

Non-hormonal IUD (copper IUD) does not suppress ovulation and therefore most women will continue to have ‘normal’ cycles.

Mira helps with

Mira helps identify underlying endogenous hormone pattern and determine if she continues to experience coordinated hormonal fluctuations that lead to ovulatory events.

Clinical Observations (Used for)

Identify cycle changes and help confirm whether an individual is experiencing ovarian dysfunction during perimenopause.

Clinical Observations (Not used for)

Mira is not intended to determine whether a non-hormonal IUD is achieving its intended effect.

Ovulatory event with Copper IUD

Mira data discovered:

- Rising E3G levels leading to LH surge
- LH surge on CD 16
- Elevated PdG after LH surge confirms ovulation
- Luteal phase 10 days
- Low and poor PdG pattern

Medically reviewed by Christina Saldanha and Dr. Liz Leek.

* No reliable lab test exists to directly measure endometrial protection from progesterone therapy.

- Urine metabolites have limitations in reflecting endometrial protection. Mira PdG data cannot be used to measure endometrial protection of progesterone supplementation.
- Measuring oral progesterone effects is difficult because serum progesterone levels rapidly rise and fall within a few hours after dosing, and some of the clinical effects may be coming from progesterone-like metabolites.
- Studies have found that 100-200 mg of oral or 45-90 mg of vaginal micronized progesterone nightly consistently protects the endometrium. Studies are mixed with respect to transdermal progesterone, and it cannot be trusted to protect the endometrium without endometrial surveillance.
- Urine progesterone metabolites cannot be used to calculate a serum progesterone level. When using oral progesterone urine metabolites include predominantly metabolites created during progesterone's first pass through the gut and liver.

Appendix: Brief Table Version

Overview of Clinical Insights on Hormonal Monitoring with Mira in Perimenopause Management

Section 1: Hormone Tracking	Details	Mira helps with	Clinical Observations (Used for)	Clinical Observations (Not used for)
PdG (Pregnanediol Glucuronide) Monitoring: A Metabolite of Progesterone	Progesterone decline from reduced luteal secretion and ovulation, plus unopposed estrogen, can contribute to transition-related symptoms.	Mira helps identify low progesterone levels or irregular progesterone patterns.	Timing progesterone after ovulation in the luteal phase maintains natural hormonal rhythm, avoiding disruption from a generic cycle.	Mira does not assess therapeutic progesterone levels or determine if supplementation is too high or low. See more below.
E3G (Estrone 3-Glucuronide) Monitoring: A Urinary Metabolite of Estradiol (E2)	Perimenopause involves declining ovarian function, irregular cycles, unopposed estrogen, and fluctuating estradiol with low progesterone.	Mira helps identify low estrogen or abnormal patterns, including absent mid-follicular rise and luteal out-of-phase events.	Mira helps identify symptoms linked to estrogen abnormalities, track estrogen patterns, and detect irregular cycles with multiple ovulation attempts.	Mira measures the urinary metabolite of estradiol (E2), E3G (estrone 3-glucuronide), but does not assess the full estrogen metabolism pathway.
LH monitoring	A study linked variable LH patterns and negative LH feedback to increased VMS, with low progesterone associated with VMS, not mood.	Mira enables LH pattern assessment, tracking ovulation and PdG changes, providing a comprehensive view of hormonal cycle effectiveness.	Mira helps assess LH patterns, providing insights into cycles, ovulation, and hormonal imbalances to guide fertility, HRT, and lifestyle decisions.	Mira tracks LH levels and ovulatory patterns but cannot diagnose conditions like PCOS. Use it alongside other clinical assessments.
FSH monitoring	FSH rises during perimenopause but fluctuates; interpretation should be cautious alongside E3G due to cycle variability.	Elevated FSH signals ovarian decline, common in perimenopause, and helps monitor hormonal changes throughout the menstrual cycle.	FSH helps monitor ovarian function, treatment progress, and cycle variations; a decline is expected after starting estrogen therapy.	FSH is useful for monitoring ovarian function and treatment progress, but cannot predict TTC outcomes or menopause timing.

Section 2: Hormonal supplementation and HRT	Details	Mira helps with	Clinical Observations (Used for)	Clinical Observations (Not used for)
Progesterone topical/ transdermal application	Topical hormones may slightly increase PdG excretion; tracking PdG helps monitor natural progesterone patterns.	Mira helps assess if the patient's hormone pattern is ovulatory or changing, guiding the need for alternative treatment.	Mira helps time progesterone administration during the luteal phase and assess treatment response, supporting ovulation and cycle regularity.	Mira does not assess therapeutic progesterone levels; PdG levels do not indicate if the supplemental dose is too high or low.

Section 2: Hormonal supplementation and HRT	Details	Mira helps with	Clinical Observations (Used for)	Clinical Observations (Not used for)
Progesterone systemic (oral, vaginal, injectable)	Systemic oral/injectable hormones raise serum and urine metabolites, while compounded vaginal progesterone may raise urine metabolites variably.	Mira PdG levels reflect serum progesterone rise; providers can assess supplemental progesterone effects through E3G patterns, ovulation, and symptoms.	Mira helps time progesterone during the luteal phase, assessing treatment response, E3G patterns, and ovulation, especially in PCOS or TTC cases.	Mira does not assess therapeutic progesterone levels; PdG levels cannot determine if the supplemental dose is too high or low.
Estrogen Supplementation Therapy	Estrogen therapy effectively alleviates perimenopausal symptoms and supports bone density and cardiovascular health, tailored to individual needs.	Mira provides hormonal pattern insights, helping providers determine the optimal timing for initiating estrogen therapy.	Mira identifies low estrogen levels, correlates symptoms with treatments, and helps determine the optimal timing for starting estrogen therapy.	E3G levels don't determine therapeutic serum E2 levels; some providers correlate serum levels with Mira data to track changes.
Estrogen Therapy: Systemic Topical/ Transdermal Applications (Patches, Creams, and Gels)	Systemic estrogen increases serum estradiol and E3G levels, with topical and transdermal estrogen therapies more significantly affecting E3G than topical progesterone affects PdG.	Mira helps identify endogenous hormone patterns and tracks linear, dose-dependent increases following supplementation.	Determine if the patient's underlying endogenous hormone pattern is changing and assess the need for alternative treatment.	E3G levels don't determine therapeutic serum E2 levels; providers correlate serum data with Mira to track hormonal patterns over time.
Estrogen Therapy: Locally Absorbed Topical Applications	Topical skin or vaginal estrogen may not affect serum estradiol or Mira data, but vaginal estrogen use risks contamination.	Tracking E3G levels allows you to identify the underlying endogenous estradiol hormone pattern.	Determine the patient's underlying endogenous hormone pattern.	Mira cannot determine whether the local estrogen is achieving its desired outcome.
Estrogen Therapy: Oral Administration	Oral estrogen supplementation, which increases serum hormone levels, will also elevate urine metabolites.	Mira E3G levels will reflect the rise in estradiol, likely reaching the upper threshold of 640.	FSH, LH, and PdG levels track estrogen's effect on ovulation and hormones, with FSH changes assessed in response to E3G supplementation.	Mira cannot monitor endogenous estradiol with oral estrogen; E3G levels are not designed to determine therapeutic serum E2 levels.
Pellet HRT	Expect to see elevated serum levels.	No data at this time	No data at this time	No data at this time
DHEA supplementation	DHEA, produced by the adrenal glands, peaks in early adulthood and declines with age, serving as a precursor to estrogen and testosterone.	Expected findings include an increase in E3G levels due to the rise in serum estradiol.	Monitor E3G changes with DHEA supplementation to assess hormone balance and ovulation, with potential increases in E3G and PdG.	Cannot be used for determining therapeutic dosing of DHEA.

Section 3: Situation-Based	Details	Mira helps with	Clinical Observations (Used for)	Clinical Observations (Not used for)
Post-hysterectomy	Women with intact ovaries may have coordinated hormones and ovulation without periods, while hysterectomy may lead to earlier menopause.	Mira identifies endogenous hormone patterns and helps determine if coordinated hormonal fluctuations still lead to ovulatory events.	Determine hormone coordination, assess for low levels, correlate with symptoms, and time progesterone during the luteal phase for better understanding.	Mira cannot pinpoint the exact time of menopause but can track hormonal fluctuations to monitor progression.
Uterine ablation	After a uterine ablation women can continue to have coordinated hormones with ovulatory events despite the lack of menstrual periods.	Mira identifies the patient's endogenous hormone pattern and determines if coordinated hormonal fluctuations lead to ovulatory events.	Assess hormone coordination, deficiencies, correlate with symptoms, time progesterone during the luteal phase, and visualize hormone patterns.	Mira cannot pinpoint the exact time of menopause but can track hormonal fluctuations to monitor progression.
More than 2 years past menopause	Hormones are expected to be baseline low.	No data at this time	No data at this time	No data at this time
Section 4: Birth control and synthetic hormones	**Details**	**Mira helps with**	**Clinical Observations (Used for)**	**Clinical Observations (Not used for)**
Synthetic hormones in oral birth control	Hormonal birth control suppresses ovulation, but some women still ovulate; combined pills may cause non-ovulatory or breakthrough bleeding.	Identify ovarian activity and hormonal fluctuations to determine if hormones are suppressed or coordinated for ovulation; perimenopausal women on birth control may have symptom-Mira discrepancies.	Providers have observed symptom improvement when women transition from ovulatory suppression (implant/OCP) to perimenopausal or menopausal hormone therapy.	Mira is not intended to determine whether synthetic hormones in oral birth control are achieving its intended effect.
Birth control implants	Typically birth control implants suppress ovulation but some woman will continue to have cycles.	Identify ovarian activity and hormonal fluctuations to determine if hormones are suppressed or coordinated for ovulation; perimenopausal women on birth control may have symptom-Mira discrepancies.	Providers have observed symptom improvement when women transition from ovulatory suppression (implant/OCP) to perimenopausal or menopausal hormone therapy.	Mira is not intended to determine whether birth control implants are achieving its intended effect.

Hormonal IUD	Hormonal IUDs may not suppress ovulation, so ovulatory hormonal fluctuations can still occur despite minimal bleeding.	Identify hormone patterns, assess ovulation, and coorelate symptoms to hormonal fluctuations across the cycle.	Mira helps identify hormonal deprivation or suppression in women using contraceptives, distinguishing symptoms from hormonal causes.	Mira is not intended to determine whether a hormonal IUD is achieving its intended effect.
Non-hormonal IUD (copper IUD)	Copper IUDs don't suppress ovulation, so most women experience 'normal' cycles.	Mira helps identify hormone patterns and determine if coordinated fluctuations lead to ovulation.	Mira helps identify cycle changes and confirm ovarian dysfunction during perimenopause.	Mira is not intended to determine whether a non-hormonal IUD is achieving its intended effect.

Medically reviewed by Christina Saldanha and Dr. Liz Leek.

* No reliable lab test exists to directly measure endometrial protection from progesterone therapy.

- Urine metabolites have limitations in reflecting endometrial protection. Mira PdG data cannot be used to measure endometrial protection of progesterone supplementation.
- Measuring oral progesterone effects is difficult because serum progesterone levels rapidly rise and fall within a few hours after dosing, and some of the clinical effects may be coming from progesterone-like metabolites.
- Studies have found that 100-200 mg of oral or 45-90 mg of vaginal micronized progesterone nightly consistently protects the endometrium. Studies are mixed with respect to transdermal progesterone, and it cannot be trusted to protect the endometrium without endometrial surveillance.
- Urine progesterone metabolites cannot be used to calculate a serum progesterone level. When using oral progesterone urine metabolites include predominantly metabolites created during progesterone's first pass through the gut and liver.