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DUTCH Test Interpretation & Real-World Case Studies

Kelly Ruef, ND

February 25, 2026

DUTCH Monthly Webinars

Kelly Ruef, ND



Dr. Ruef is a licensed naturopathic doctor who completed her medical education at the National University of Natural Medicine (NUNM) in Portland, Oregon in 2017. She completed a private residency at Pearl Natural Health in downtown Portland, where she specialized in inflammatory bowel diseases and women's health. For undergraduate education, Dr. Ruef received a Bachelor of Science degree in biochemistry and cell biology with a minor in cognitive neuroscience from the University of California, San Diego (UCSD).

She has been a clinical educator for Precision Analytical, makers of the DUTCH Test, since 2019, and has played a large role in the educational content development for DUTCH Fest. She has spoken on the topics of menopausal hormone therapy (MHT), perimenopause management, laboratory monitoring, and more for organizations such as the American Association of Naturopathic Physicians (AANP) and the California Naturopathic Doctors Association (CNDA). You can find her on Instagram under @drkellyruef.

Medical Disclaimer

The medical information in this lecture is provided as an information resource only and is not to be used or relied on for any diagnostic or treatment purposes. This lecture contains general information about medical conditions and treatments. The information is not advice and should not be treated as such. This information is not intended to be patient education, does not create any patient-physician relationship, and should not be used as a substitute for professional diagnosis and treatment.

The medical information in this lecture is provided “as is” without any representations or warranties, express or implied. Kelly Ruef, ND makes no representations or warranties in relation to the medical information in this presentation.

Learning Objectives

1 Learn about our upcoming DUTCH Fest 2026 and how it can help you become the hormone expert.

2 Understand the purpose and clinical application of the DUTCH Dozen assessments.

3 Utilize the DUTCH Dozen for quick and comprehensive DUTCH Test interpretation and treatment plan formulation.



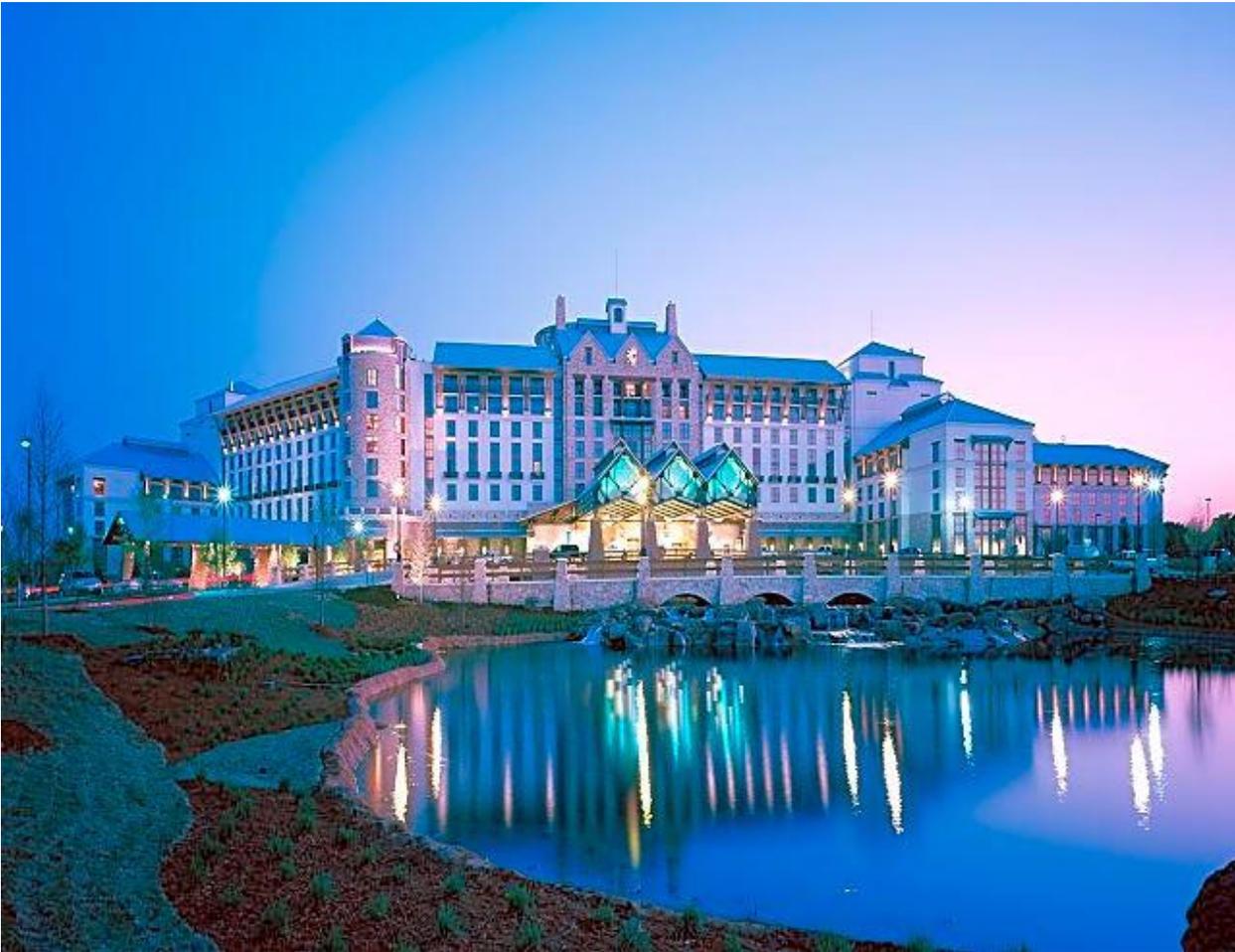
LEARN HOW TO INTERPRET DUTCH REPORTS WITH
SPEED, CONFIDENCE & CLARITY

Join us for *DUTCH Fest*

Where You Become the Hormone Expert

Gaylord Texan Resort | Dallas, TX
March 12 - 14

DUTCH Fest 2026 – Gaylord Texan Resort & Conference Center – Dallas, TX



DUTCH Fest 2026 – Speakers

Mark Newman, MS

Founder and president of Precision Analytical, Inc., is the innovative mind behind the DUTCH Test and a leader in advancing hormone testing through rigorous science and data.



Jaclyn Smeaton, ND

Renowned naturopathic physician and Chief Medical Officer at Precision Analytical, is celebrated for her clinical expertise in fertility, women's health, and integrative endocrinology.



SPECIAL GUEST

Carrie Jones, ND

Internationally recognized speaker and educator on the topic of women's health and hormones. Dubbed the "Queen of Hormones", she has advanced training in endocrinology and led medical education at Rupa Health. She now consults across the women's health space, hosts the Hello Hormones podcast, and serves as Chief Medical Officer at NuEthix Formulations.

DUTCH Fest 2026 Case Studies



Amenorrhea & Hot Flashes

Meet Tanya, 29, underweight and living with an eating disorder, hypothyroid, absent periods, hot flashes, and anxiety. Her estrogen and progesterone sit below postmenopausal levels, yet cortisol runs extremely high, signaling hypothalamic amenorrhea with RED-S.

Can we get her ovulating again?



Early-Stage Perimenopause

Meet Shreya, 47: cycles irregular at 11-21 days, heavy bleeding, breast pain, night wakings, crushing fatigue, and iron-deficiency anemia — all while her estrogen is above range and she's rarely ovulating. Classic early-stage perimenopause ovarian dysfunction.

Can we help her feel like herself again?



Menopausal Hot Flashes & Insomnia

Meet Emma, 51, one year past menopause: nightly hot flashes, broken sleep, stubborn weight gain, painful sex, and persistent UTIs. Her labs show very low estrogen and progesterone with sharply elevated bedtime cortisol that keeps disrupting her nights all nite.

Can we help fix her sleep, flashes, and metabolism all at once?

DUTCH Fest 2026 Case Studies



Burnout & HPA-Axis Dysregulation

Meet Teresa, 42, battling low mood, reduced exercise tolerance, and widespread joint pain while navigating a Rheumatoid Arthritis diagnosis and drinking to cope. Cortisol curve is flat, sex hormones are depleted, and methylation capacity is sluggish and strained.

Can we help get her energy and spirits up?



Endometriosis with Dysmenorrhea

Meet Anna, 20, managing a demanding new job alongside crippling period pain, heavy flow, endometriosis, headaches, and awful sleep. Labs show elevated high-sensitivity CRP and borderline-high testosterone and estrogen, each contributing to her clinical picture.

Can we help calm the fire and get her feeling good again?



PCOS & Anovulatory Infertility

Meet Gabby, 31, struggling to conceive while losing hair, battling adult acne, and feeling chronically overwhelmed. She's insulin-resistant, overweight, and anovulatory, with consistently high baseline estrogen that heightens concern for endometrial hyperplasia risk.

Can we fix the root cause or keep giving Clomid?

DUTCH Fest 2026 – Schedule

Friday



Breakfast
7-8 am

**Morning
Interactive Lectures**

DUTCH Dozen
8 am-1 pm



Lunch
1-2 pm

**Afternoon
Collaborative Case Studies**

DUTCH Dozen
2-5 pm



Glass Cactus
Food, live music, and
dancing!

Saturday



Breakfast
7-8 am

**Morning
Interactive Lectures**

Advanced Insights
8 am-1 pm



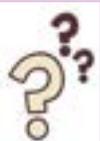
Lunch
1-2 pm

**Afternoon
Collaborative Case Studies**

Advanced
2-5 pm

Thursday

**Welcome Kickoff
Party!**



Evening

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2-5 pm

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**Welcome Kickoff
Party!**

Evening



DUTCH Dozen & Advanced Insights

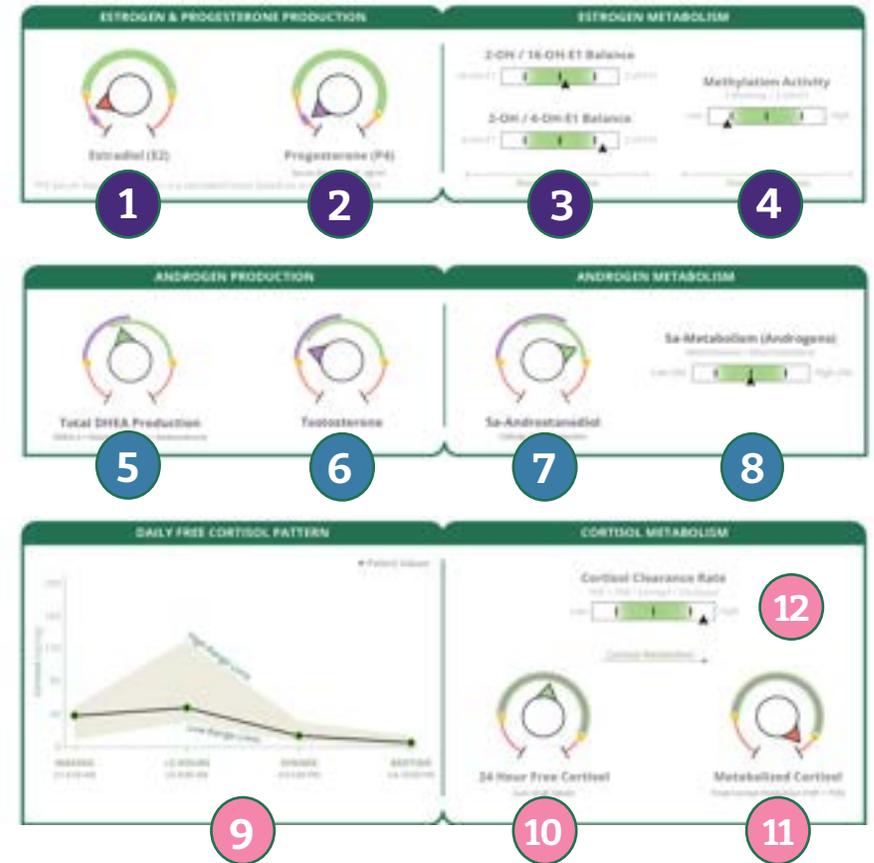
DUTCH Dozen

DUTCH Dozen

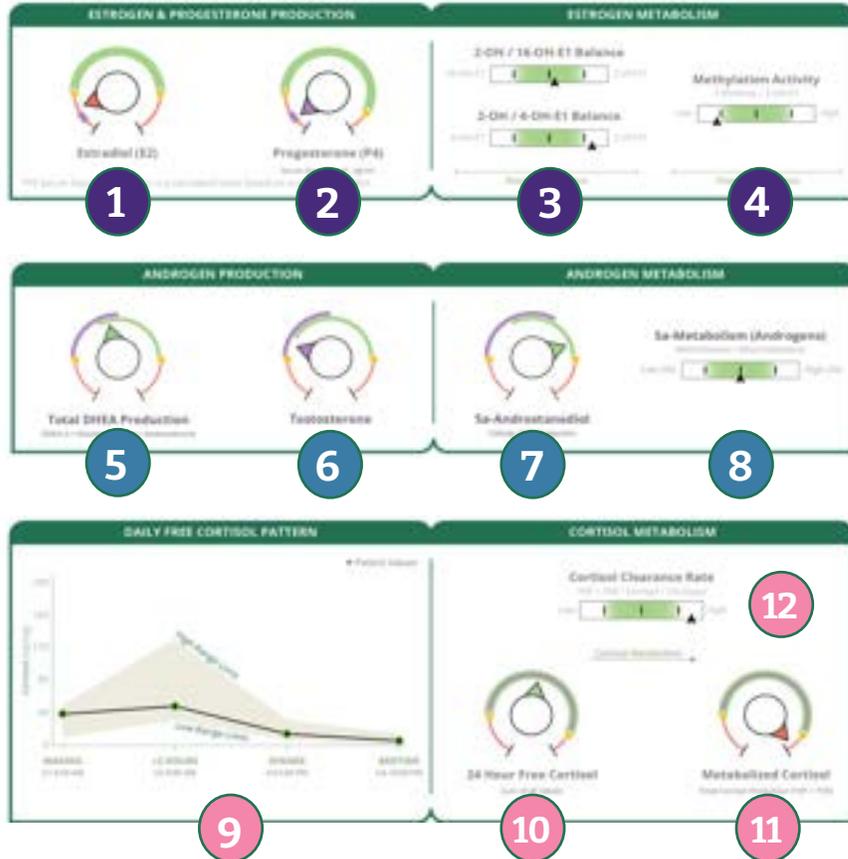
- **12 fundamental assessments** of the Hormone Testing Summary that allows clinicians to **understand their patients' DUTCH Test results quickly** and **develop targeted treatment plans faster**.

DUTCH Advanced Insights

- **12 advanced assessments** of the additional 5 pages of the DUTCH report that offer **additional clarity** and **a deeper understanding** of the DUTCH Test results.



The DUTCH Dozen



Estrogen Progesterone

- 1 Assess estrogen levels given the patient's reproductive status
- 2 Assess progesterone levels given the patient's reproductive status
- 3 Assess 2-OH preference in phase 1 estrogen metabolism
- 4 Assess methylation of 2-OH estrogens

Androgens

- 5 Assess adrenal androgen levels (Total DHEA)
- 6 Assess testosterone levels
- 7 Assess cellular production of 5a-DHT via 5a-androstanediol
- 8 Assess if there is a preference for the more potent alpha metabolism of the androgens

Cortisol

- 9 Assess the daily free cortisol pattern
- 10 Assess the daily total of free cortisol in circulation (24hr Free Cortisol)
- 11 Assess the total cortisol produced by the adrenal glands (Metabolized Cortisol)
- 12 Assess the rate of cortisol clearance from the body

DUTCH Advanced Insights

Estrogen Progesterone

- 1 Assess whether E1, E3, or Total Estrogen levels add more insight into overall estrogenic activity
- 2 Assess if there is a preference for alpha metabolism of progesterone
- 3 Assess estrogen clearance through phase 1 and 2
- 4 Assess whether any of the estrogen-related organic acids are out of range

Androgens

- 5 Assess if the DHEA-S is relatively lower than the Total DHEA
- 6 Assess the androgen pattern to determine if urine testosterone may not accurately reflect systemic levels (UGT2B17)
- 7 While 5a-androstanediol best represents **cellular** 5a-DHT production, assess if 5a-DHT offers additional insight into androgenic activity
- 8 Assess whether any of the androgen-related organic acids are out of range

Cortisol

- 9 Assess if cortisone (inactive) adds more insight to the free cortisol assessment
- 10 Assess if there is a whole-body preference for (inactive) cortisone or (active) cortisol
- 11 Assess for anabolic-catabolic balance
- 12 Assess whether any of the cortisol-related organic acids are out of range

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Purple boxes = Advanced Insights that provide additional information that will add to (but likely won't change) your DUTCH Dozen based conclusions

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Red boxes = Advanced Insights that may change your DUTCH Dozen based conclusions

DUTCH Complete Report

Ordering Provider:
Test Provider MD

PATIENT INFORMATION

DOB: 1976-01-01
Age: 45
Sex: Female
Last Menstrual Period: 2025-06-26

Accession # 01093510

Collection Dates:
2025-06-12 (U) (U)
2025-06-13 (U) (U)

Hormone Testing Summary

● Optimal Labetal Range
 ● Postmenopausal Range
 ● Out of Range
 ● Edge of Range

For an expanded view of results, see pages 2 through 6. For interpretive support, see About Your Results pages.

ESTROGEN & PROGESTERONE PRODUCTION

1.8 / 4.0 / 4.5

Estradiol (E2)

8.0 / 1.3 / 20.0

Progesterone (P4)

ESTROGEN METABOLISM

2-OH / 16-OH-E1 Balance

Methylation Activity

ANDROGEN PRODUCTION

500 / 1686 / 3000

Total DHEA Production

3.3 / 6.0 / 30.8

Sa-Metabolism (Androgens)

ADRENAL HORMONE METABOLISM

6.0 / 18.0 / 30.8

Sa-Androstenediol

CORTISOL PATTERN

CORTISOL METABOLISM

65 / 150 / 200

24 Hour Free Cortisol

2700 / 4870 / 8500

Metabolized Cortisol

Organic Acid Tests (OATs) Suggests the Following Possible Imbalances | see page 6 for details

● B12 Deficiency
 ● B6 Deficiency
 ● U2 Deficiency
 ● Malabsorption

PRECISION ANALYTICAL CORP. Precision Analytical Corp. Inc., Ph.D., Lab Director
3138 NE Rivergate Street, McKinville, OR 97128

Female Sample Report
Accession #: 01093510
Test Report #: 10/04/2025

Page 1 of 12
CLM Co. #3002947100
Report Version 1.0.0

Ordering Provider:
Test Provider MD

PATIENT INFORMATION

DOB: 1976-01-01
Age: 45
Sex: Female
Last Menstrual Period: 2025-06-26

Hormone Testing Summary

TEST	RESULT	UNITS	NORMAL RANGE
Progesterone (P4) - Serum	1.3	ng/mL	100 - 2000
Estradiol (E2) - Serum	1.8	pg/mL	10 - 100
Testosterone (T) - Serum	3.3	ng/mL	10 - 100
DHEAS - Serum	1686	ug/dL	500 - 3000
24 Hour Free Cortisol - Urine	65	ug/24hr	150 - 200
Metabolized Cortisol - Urine	4870	ug/24hr	2700 - 8500

Sex Hormones & Metabolites

TEST	RESULT	UNITS	NORMAL RANGE
Progesterone (P4) - Serum	1.3	ng/mL	100 - 2000
Estradiol (E2) - Serum	1.8	pg/mL	10 - 100
Testosterone (T) - Serum	3.3	ng/mL	10 - 100
DHEAS - Serum	1686	ug/dL	500 - 3000

Adrenal Hormones & Metabolites

TEST	RESULT	UNITS	NORMAL RANGE
Cortisol (C) - Morning	15	ng/mL	10 - 20
Cortisol (C) - 12 Hours	10	ng/mL	10 - 20
Cortisol (C) - Evening	5	ng/mL	10 - 20
Cortisol (C) - Bedtime	3	ng/mL	10 - 20
Cortisone (C) - Morning	100	ng/mL	100 - 200
Cortisone (C) - 12 Hours	100	ng/mL	100 - 200
Cortisone (C) - Evening	100	ng/mL	100 - 200
Cortisone (C) - Bedtime	100	ng/mL	100 - 200

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Organic Acid Tests (OATs)

TEST	RESULT	UNITS	NORMAL RANGE
Malic Acid - Urine	4.5	ug/mg	0 - 1.0
Malic Acid - Urine	1.2	ug/mg	0.2 - 1.2
Malic Acid - Urine	3.4	ug/mg	0.0 - 4.5
Malic Acid - Urine	1.5	ug/mg	0 - 10.5
Malic Acid - Urine	42.0	ug/mg	20 - 50
Malic Acid - Urine	118.0	ug/mg	0 - 100

Organic Acid Tests (OATs) Suggests the Following Possible Imbalances | see page 6 for details

● B12 Deficiency
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DUTCH Dozen Advanced Insights

DUTCH Fest 2026 – Schedule

Friday

Breakfast
7-8 am

**Morning
Interactive Lectures**

DUTCH Dozen
8am – 1pm

Lunch
1-2pm

**Afternoon
Collaborative Case Studies**

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Today's
"Mini DUTCH Fest"
will touch on
these!

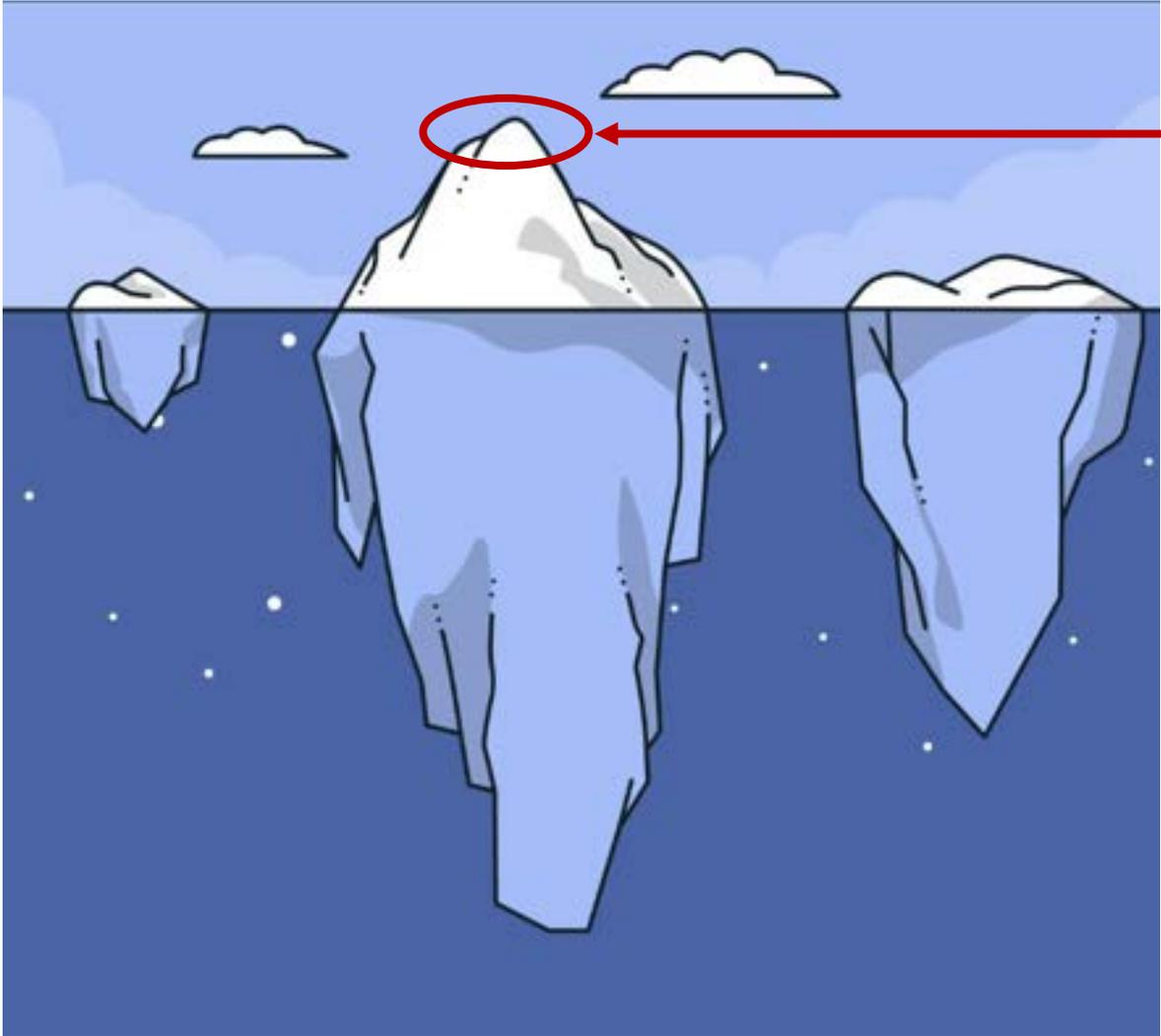
Thursday

**Welcome Kickoff
Party!**

Evening

Today's "Mini DUTCH Fest" is Just the Tip of the Iceberg

DUTCH Fest 2026

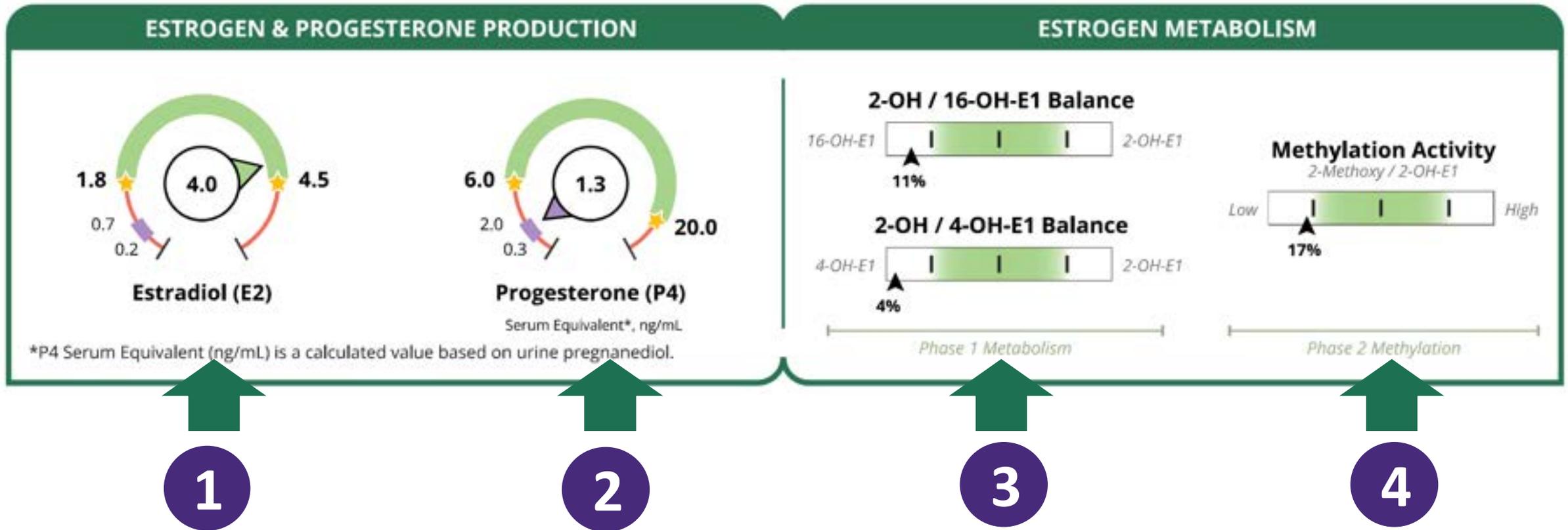


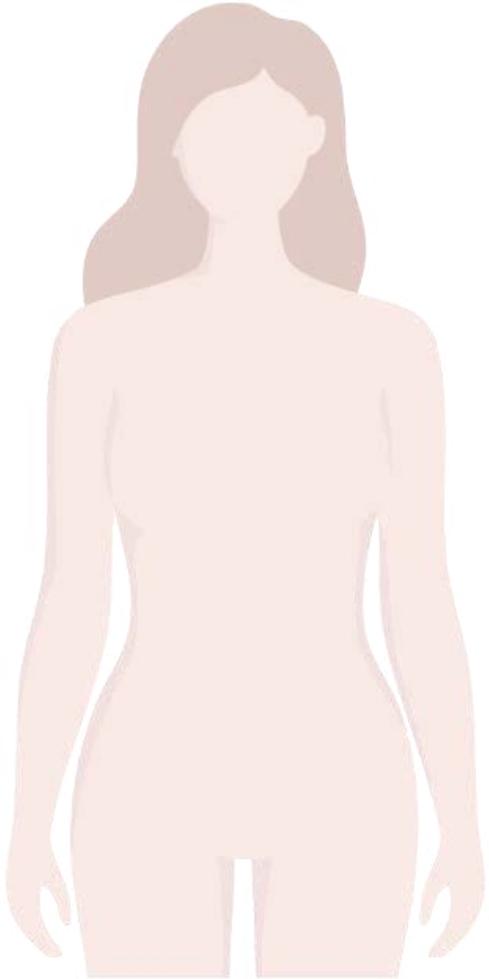
Today's
"Mini DUTCH Fest"



DUTCH Dozen: Estrogen & Progesterone

The DUTCH Dozen: Estrogen and Progesterone





Estrogen's Actions

- **Brain:** Mood, cognition, memory, and focus, thermoregulation, sleep, energy
- **Hair (scalp) growth**
- **Skin:** Elasticity, collagen, repair, moisture
- **Muscle mass**
- **Nervous system:** Parasympathetic balance
- **Joint health**
- **Bone density:** Inhibits bone resorption, increases vitamin D
- **Breast health:** Stimulates breast cell growth
- **Liver function:** Maintains healthy cholesterol, triglycerides
- **Weight management:** Increases metabolic rate, **Insulin sensitivity**
- **Uterine health**
- **Genitourinary system:** Elasticity, acidity, microflora, moisture, lubrication
- **Fertility:** Builds the endometrium
- **Cardiovascular:** Clotting homeostasis, vasodilation, lowers blood pressure, endothelial function, lowers LDL and increases HDL, lowers homocysteine

Contributors to Pre-Menopausal E2 Status



Postmenopausal (PMP)

0.2-0.7 ng/mg

Ovaries NOT Cycling Due To:

- Conditions & medications that **suppress** the HPO axis, including combo OCPs (1)
- Diminished ovarian reserve, POI, perimenopause
- Low androgens affecting follicle development
- Medically induced, such as in oophorectomy (3)
- Hypogonadism, Hypopituitarism



Very Low Below PMP

0.0-0.2 ng/mg

Ovaries NOT Cycling and Subphysiologic E2 Levels Due To:

- Low aromatase activity, such as with low body fat percentage (4)
- Very low DHEA (5)
- HPA axis suppressive medications, including glucocorticoids (7)
- Adrenal insufficiency, including Addison's Disease



Low

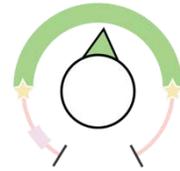
0.7-1.8 ng/mg

Ovaries Cycling but E2 is Low Due To:

- Incorrect timing of sample collection in the follicular phase (E2 reference range 1-2 ng/mg) (6)
- Conditions that impair (but do not fully suppress) the HPO axis (2)
- Low androgens affecting follicle development

Ovaries NOT Cycling but E2 Levels are Above the PMP Range Due To:

- High aromatase activity, typically obesity-related (8)



Normal

1.8-4.5 ng/mg

Ovaries Cycling and Producing Normal Luteal E2

Ovaries NOT cycling but E2 levels are in the luteal range due to:

- Profound aromatase activity, typically obesity-related (8)
- Hormone therapy (10)



High

>4.5 ng/mg

Ovaries Cycling but E2 is High Due To:

- Incorrect timing of sample collection in the ovulatory phase (E2 reference range 4-12 ng/mg) (16)
- Perimenopause
- Metabolic issues, including obesity (9)
- High aromatase activity, typically obesity-related (8)
- Suboptimal estrogen detoxification
- Hormone therapy (10)

Ovaries NOT cycling but E2 levels are above the luteal range due to:

- Hormone therapy (10)



Very High

Subphysiologic E2 Levels Due To:

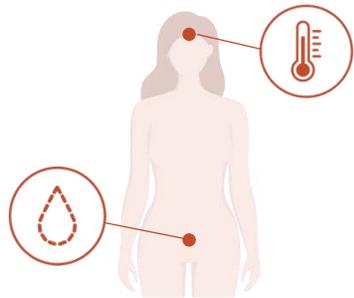
- Oral or sublingual estrogen therapy (1st pass affects urine metabolites only, not serum) (11)
- Pregnancy
- Hormone-producing neoplasms (rare)

Pre-Menopausal E2-Related Signs & Symptoms



PMP

0.2-0.7 ng/mg



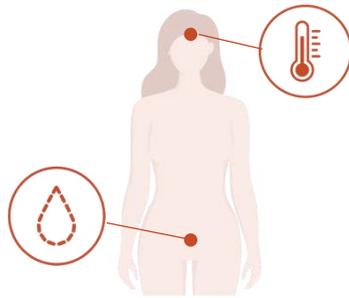
Low Estrogen Signs & Symptoms:

- Hot flashes and night sweats
- Vaginal dryness
- Mood disturbances (e.g., low mood or depression)
- Brain fog
- Low libido
- Insomnia
- Weight gain
- Joint pain
- Skin changes
- Decreased bone mineral density
- Increased cardiovascular risk



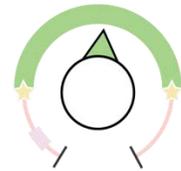
Low

0.7-1.8 ng/mg



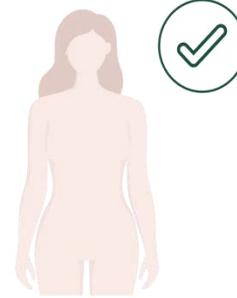
Mildly Low Estrogen Signs & Symptoms:

- May or may not experience symptoms of low estrogen. Symptoms may be subtle or absent.
- Vaginal dryness
- Mood changes, including low mood
- Reduced libido



Normal

1.8-4.5 ng/mg



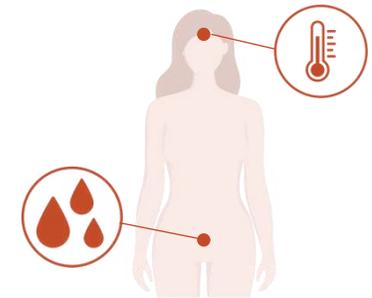
Normal Estrogen Levels are Associated With:

- Stable, positive mood
- Healthy energy levels
- Restorative sleep
- Normal sexual drive and function
- Weight management with a healthy lifestyle
- Healthy reproductive function
- Healthy cognition and memory
- Maintenance of bone mineral density, joint health, hair growth, skin elasticity, and more!



High

>4.5 ng/mg

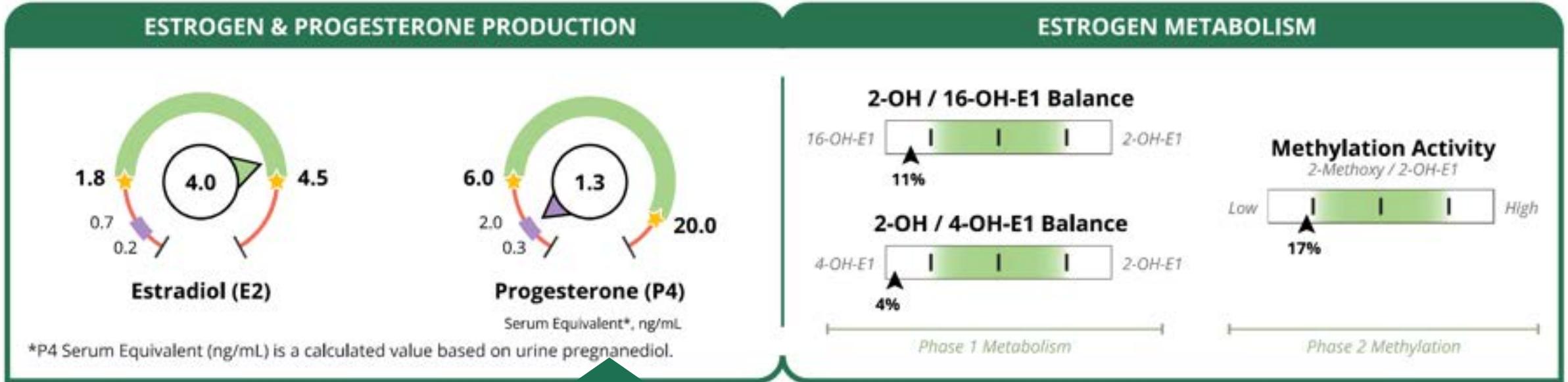


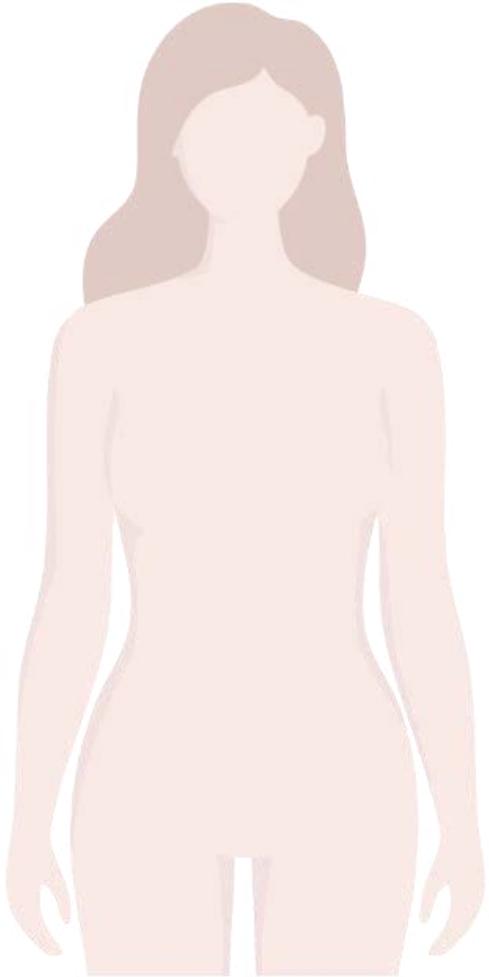
High Estrogen Signs & Symptoms*:

- Heavy bleeding or prolonged menstrual bleeding
- Breast tenderness or fibrocystic changes
- Uterine fibroid growth
- Gallstones
- Increased risk of endometrial hyperplasia or cancer, and breast tumors or cancer

*An appropriate dose of oral or sublingual estradiol taken near the time of testing may increase urinary estrogen metabolites due to first-pass metabolism, without reflecting serum estradiol levels or causing symptoms of estrogen excess.

The DUTCH Dozen: Estrogen and Progesterone

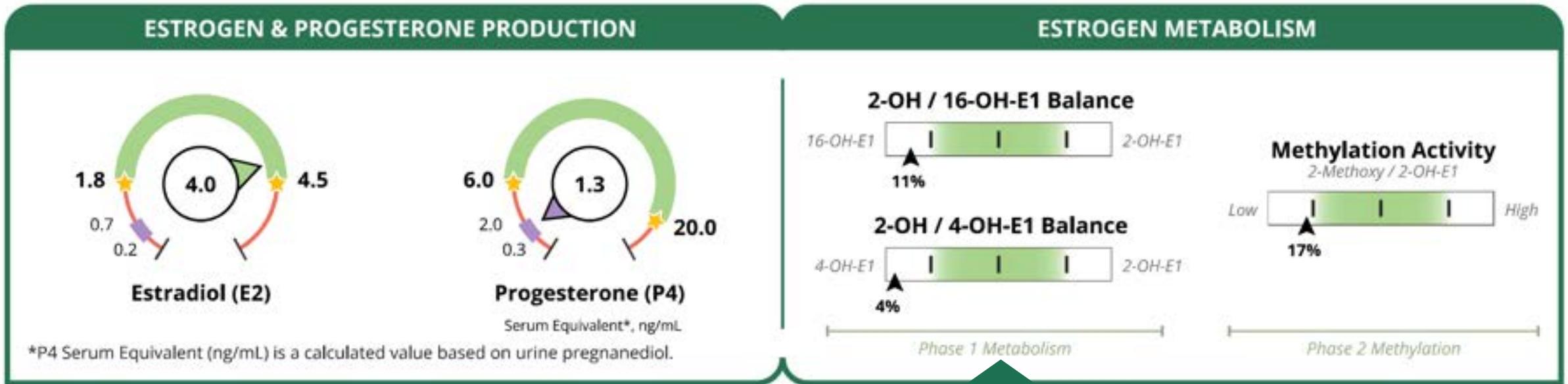




Progesterone's Actions

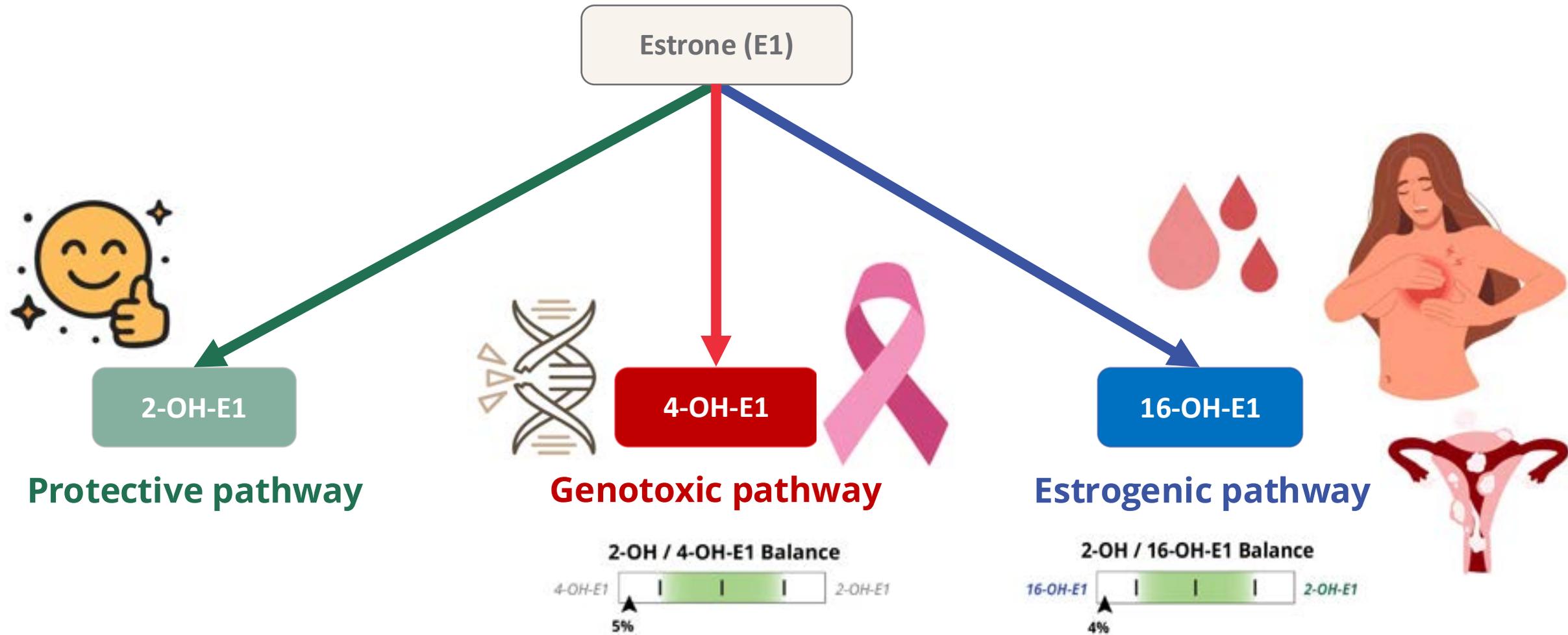
- **Brain:** Potential neuroprotective effects
- **Mood:** GABA agonist, calming
- **Sleep:** GABA agonist, promotes sleep
- **Hair:** Decreases conversion of testosterone to DHT at the hair follicle and suppresses LH, which may reduce androgen-driven hair loss.
- **Metabolism:** Increases metabolic rate (basal body temperature)
- **Bone density:** Promotes bone formation
- **Breast health:** Breast cell growth
- **Uterine health:** Stabilizes endometrium
- **Fertility**
- **Balances estrogen:** Downregulates ERs and induces enzymes for estrogen metabolism

The DUTCH Dozen: Estrogen and Progesterone



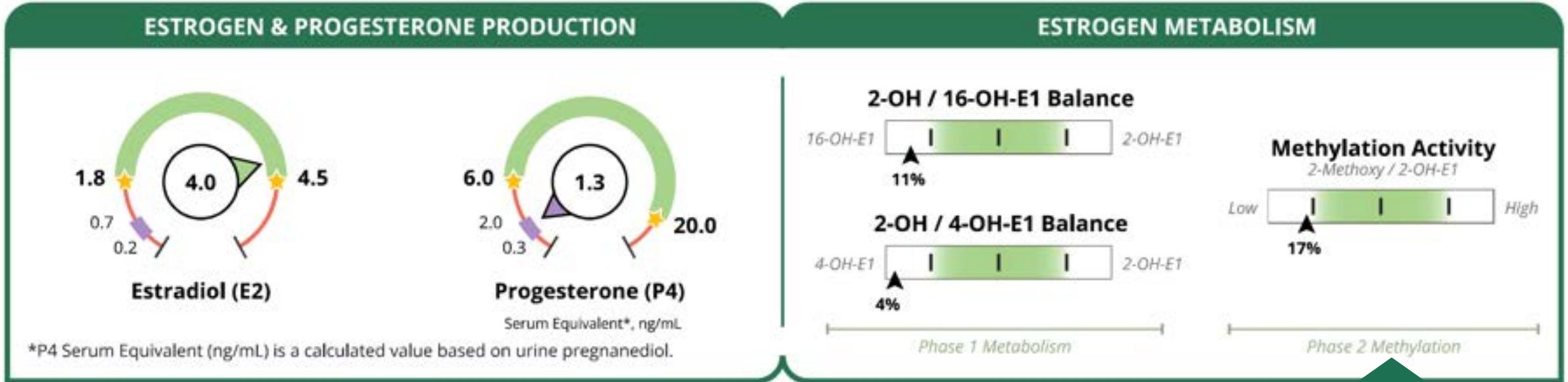
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The DUTCH Dozen: 2-OH Preference (Phase 1)



A low 2/4 or 2/16 percentage (below 20%–30%) may signal a need for intervention.

The DUTCH Dozen: Estrogen and Progesterone

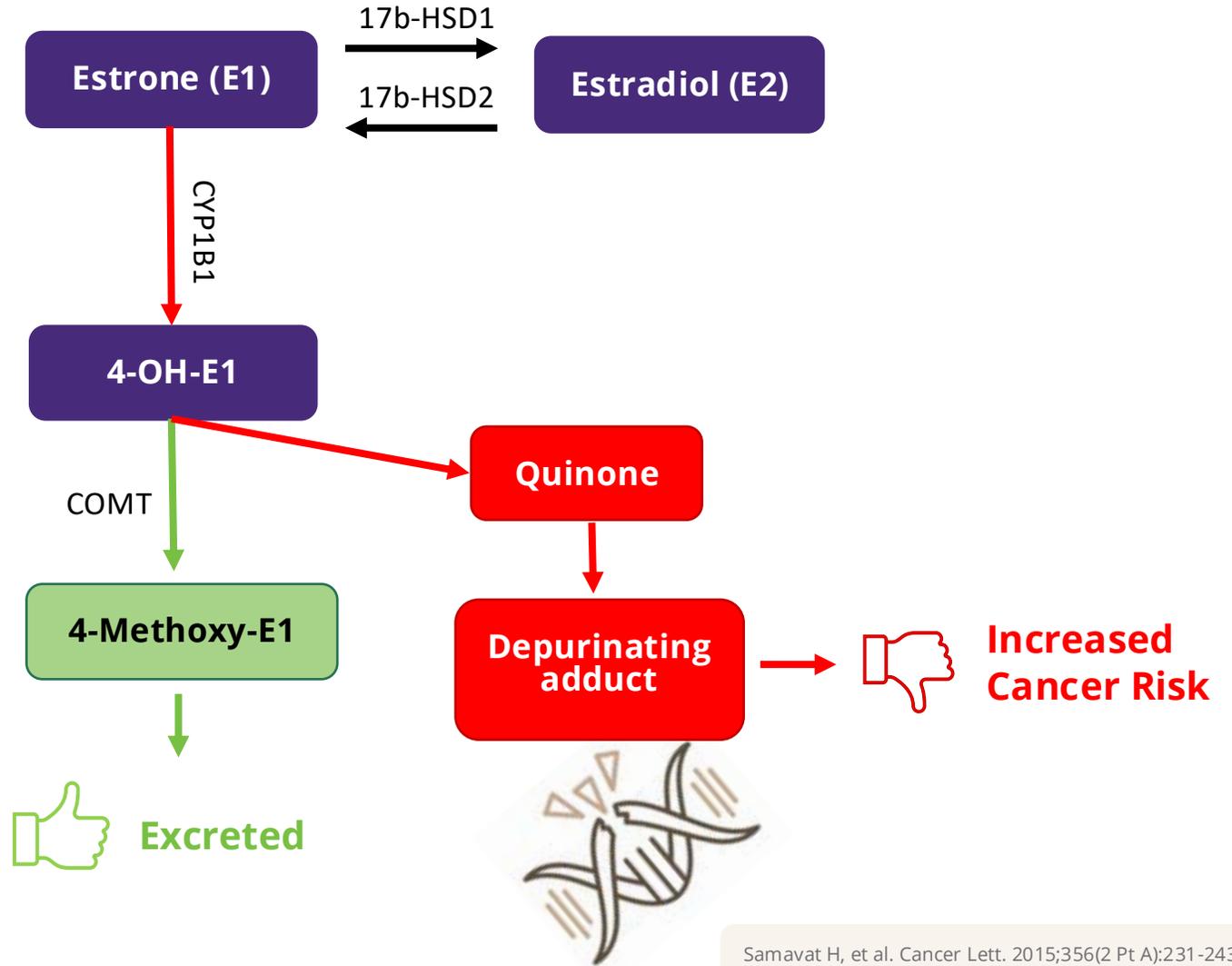


The DUTCH Dozen: Methylation Activity (Phase 2)

By deactivating the 4-OH metabolites (via methylation), COMT prevents them from causing DNA damage!

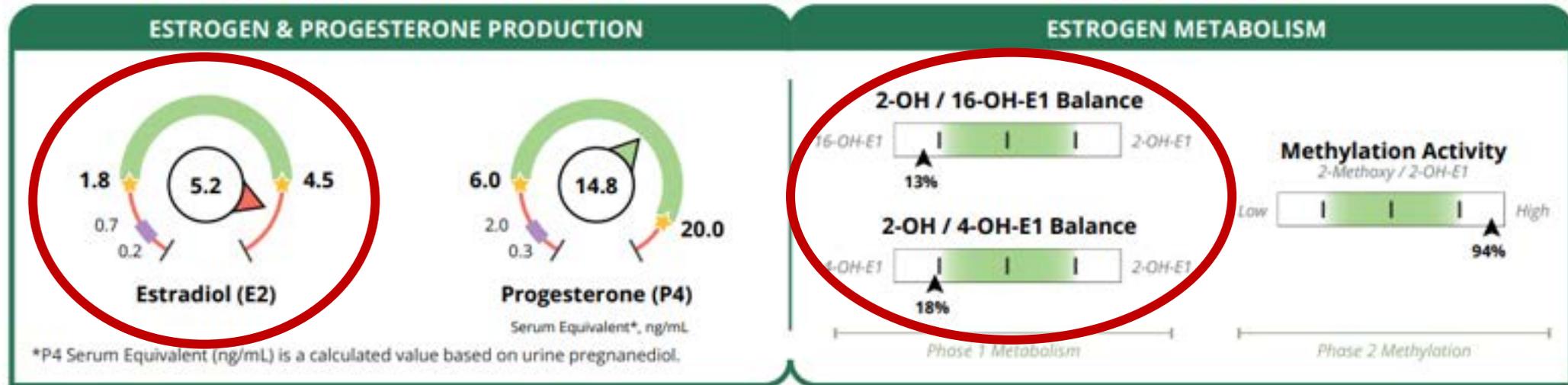


- Lower methylation activity (below 20%–30%) may indicate suboptimal detoxification.
- In some cases, methylation activity above 30% may be more beneficial to support safe estrogen clearance: for example, if 2-OH, 4-OH, E1, and E2 levels are elevated.

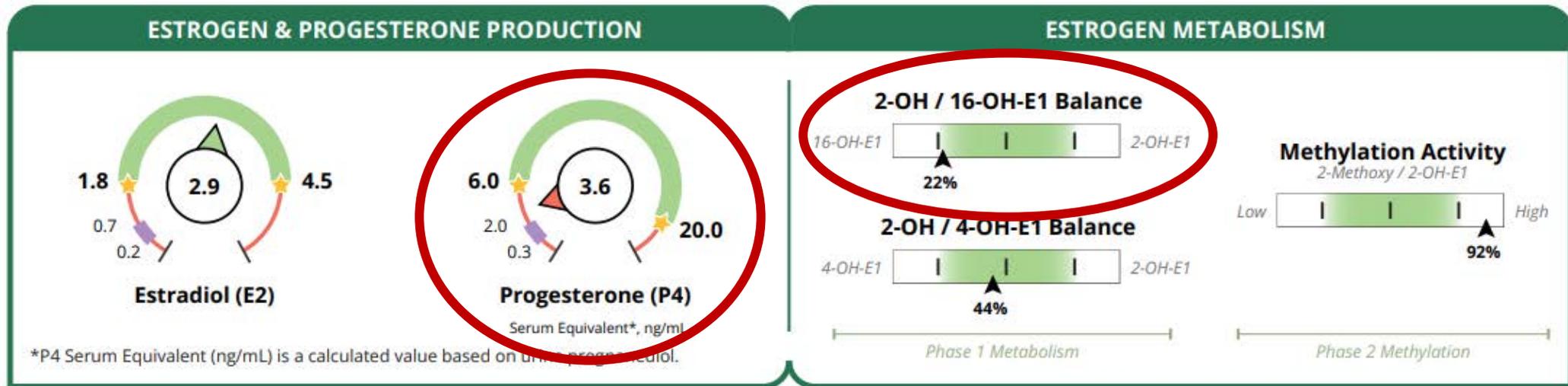


Samavat H, et al. Cancer Lett. 2015;356(2 Pt A):231-243.

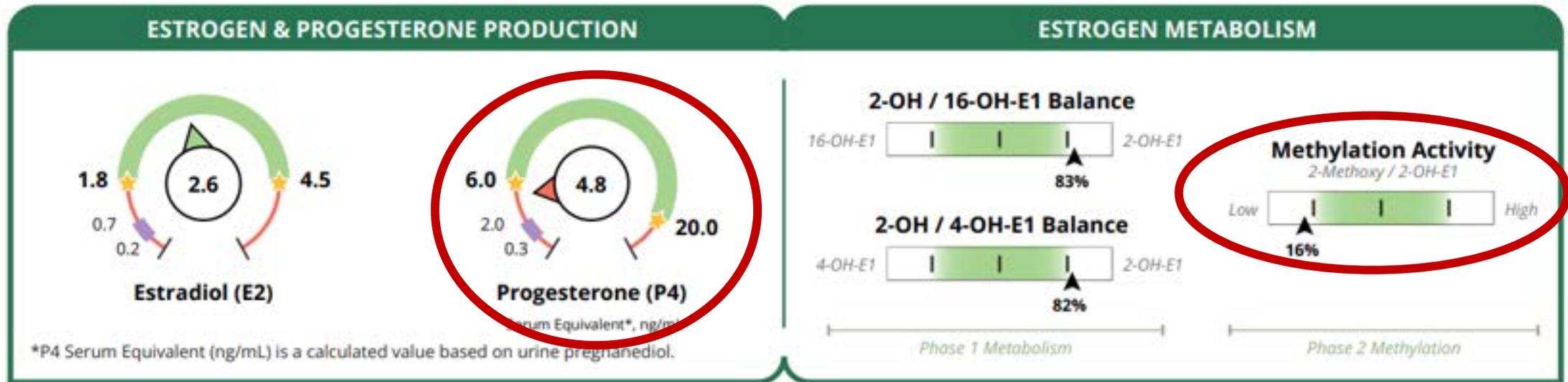
36-year-old female with heavy bleeding
What is concerning about these results?



36-year-old female with heavy bleeding What is concerning about these results?

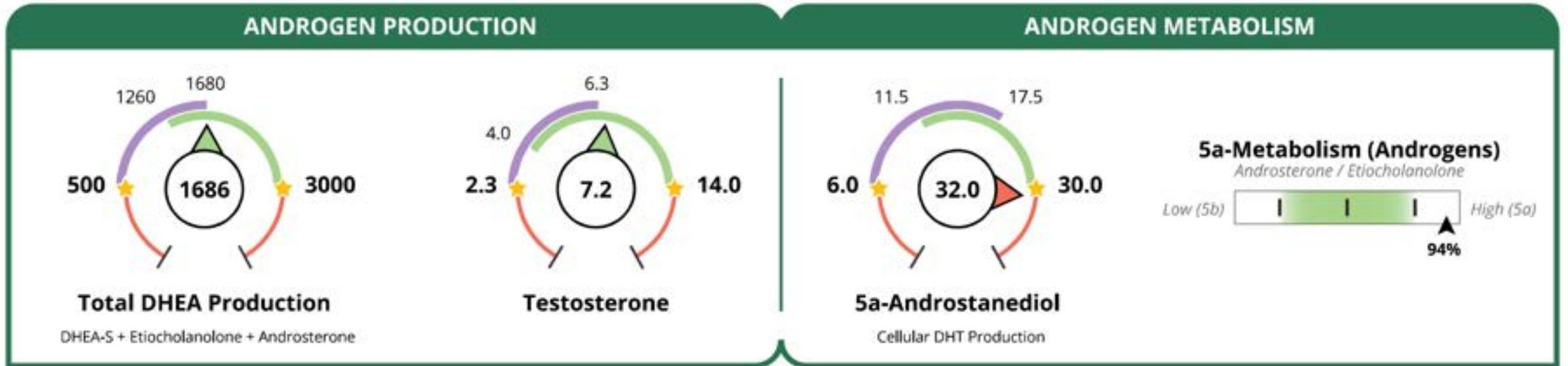


36-year-old female with heavy bleeding
What is concerning about these results?





DUTCH Dozen: Androgens

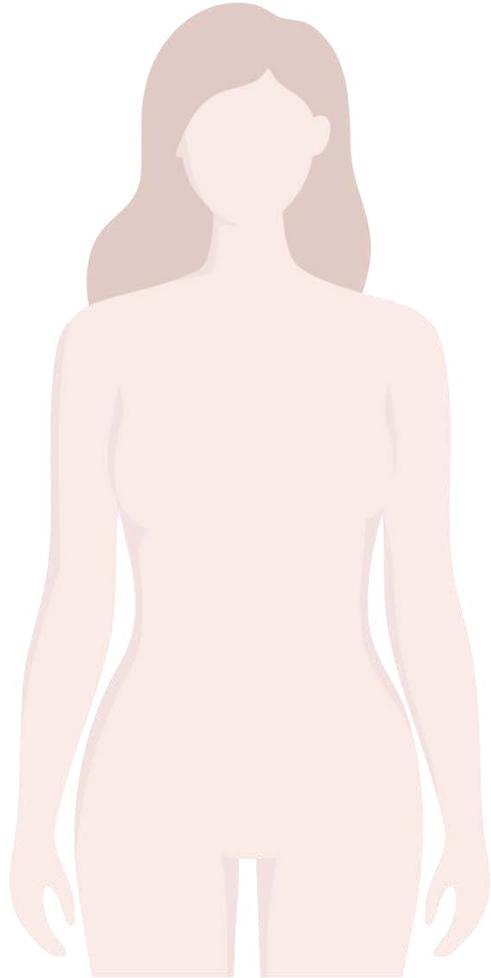


5

6

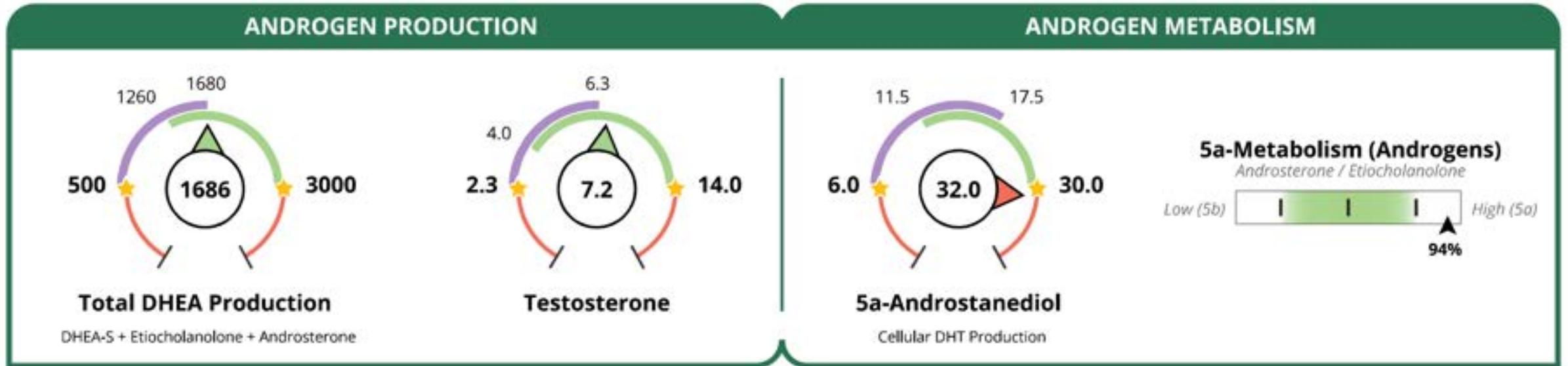
7

8



Androgen's Actions

- **Brain:** Mood, motivation, energy, sex drive, focus, sense of well-being
- **Bone density**
- **Insulin secretion**
- **Hair (body) growth**
- **Skin:** Moisture, elasticity, sebum production
- **Muscle mass:** Strength, Stamina, Recovery
- **Cardiovascular Health**
- **Immune function**
- **Sexual function:** Vasodilation, tissue elasticity, moisture
- **Fertility:** At optimal levels helps follicle growth



The DUTCH Dozen: Total DHEA Production

Where DHEA is Made in Women

ADRENALS

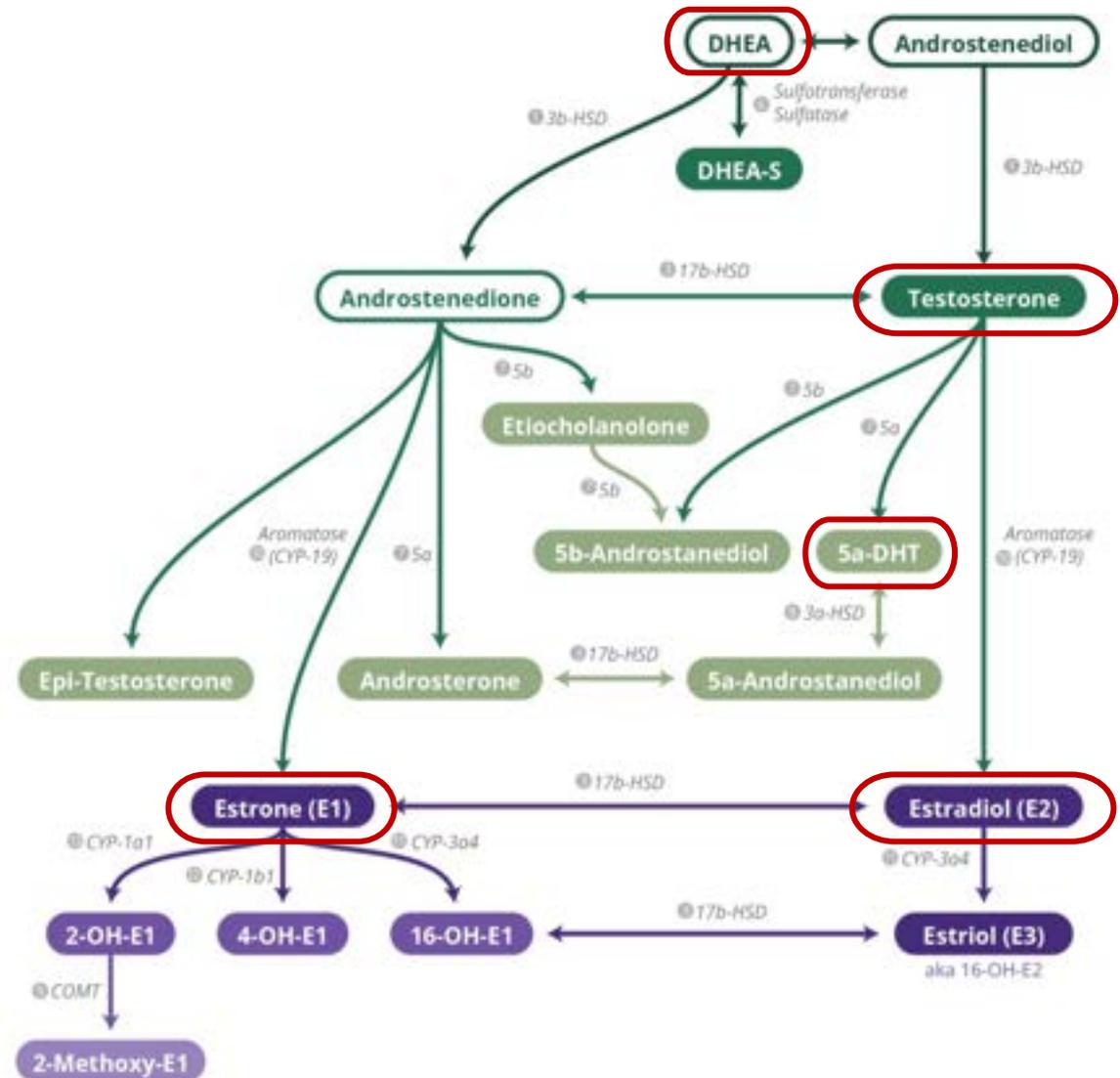
DHEA-S (100%)

DHEA (80%)

OVARIES

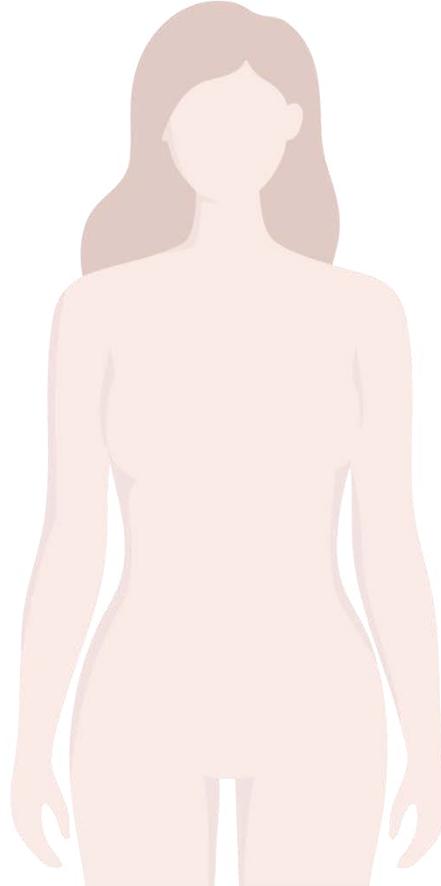
DHEA (20%)

DHEA-S (0%)



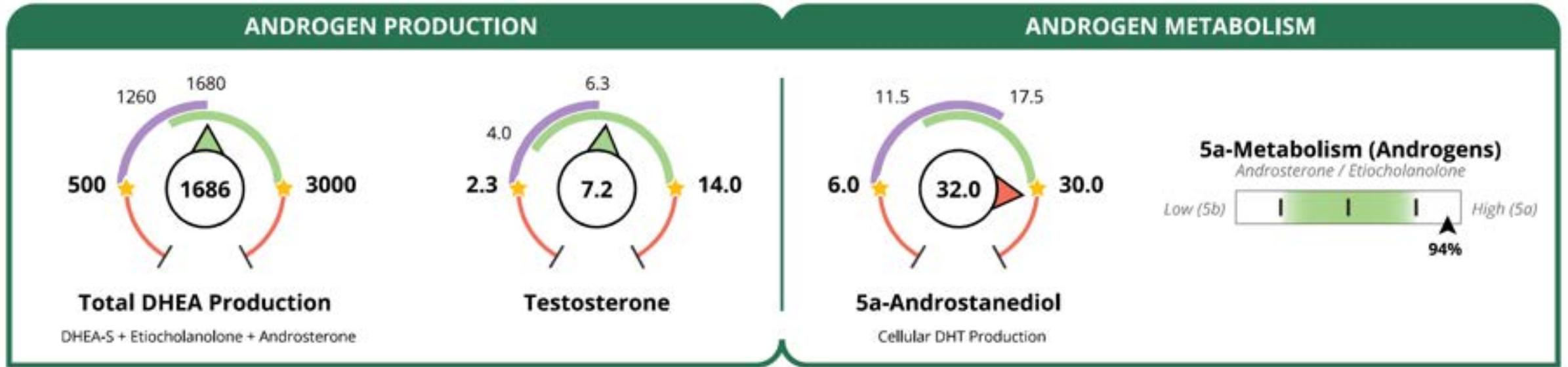
Estrogen's Actions

- **Brain:** Mood, cognition, memory, and focus, thermoregulation, sleep, energy
- **Hair (scalp) growth**
- **Skin:** Elasticity, collagen, repair, moisture
- **Muscle mass**
- **Nervous system:** Parasympathetic balance
- **Joint health & Bone density**
- **Breast health**
- **Liver function:** Healthy cholesterol
- **Insulin sensitivity**
- **Weight management**
- **Uterine health**
- **Genitourinary system:** Elasticity, microflora, moisture
- **Fertility**
- **Cardiovascular:** Endothelial function, etc.



Androgen Actions

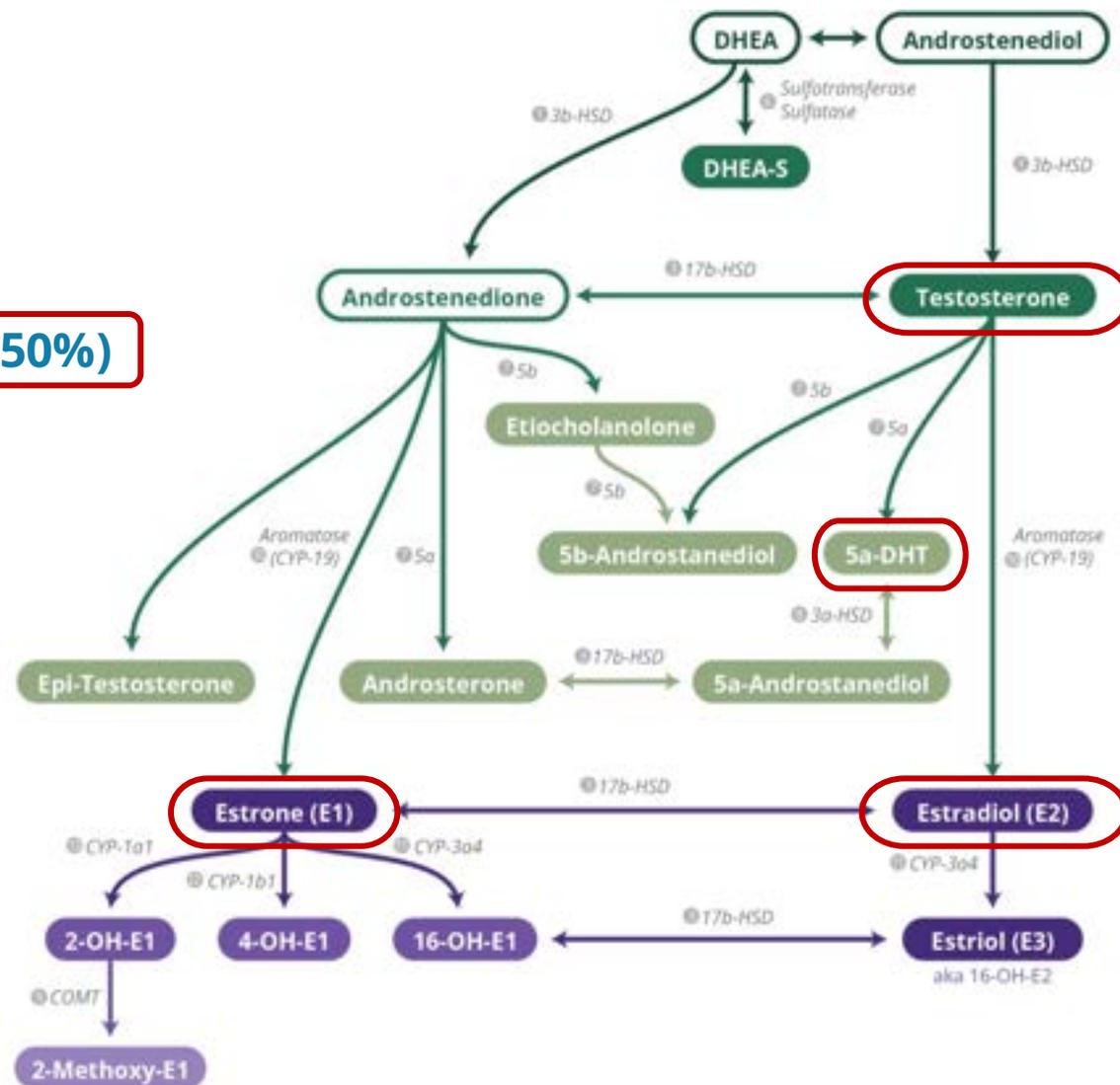
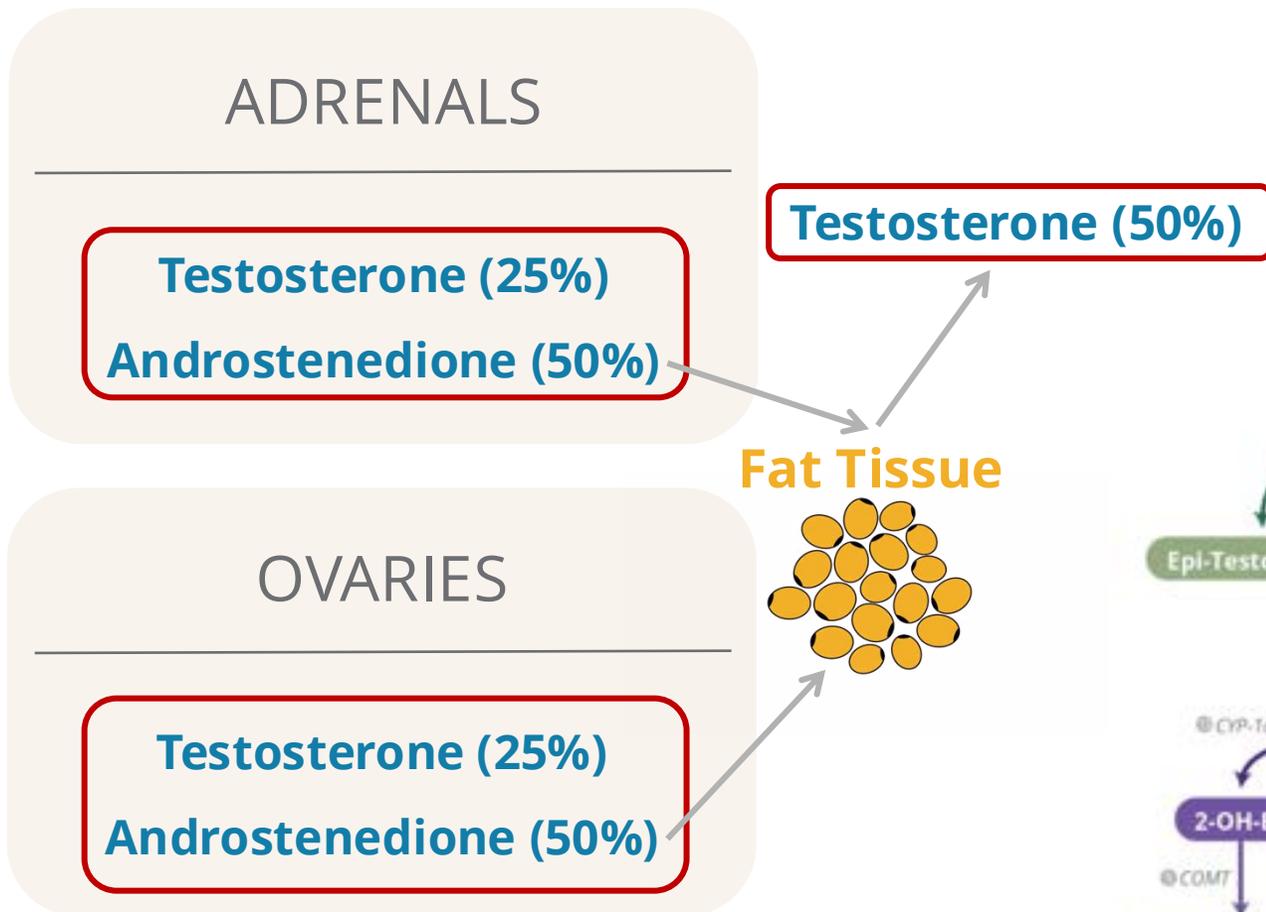
- **Brain:** Mood, motivation, energy, sex drive, focus, sense of well-being
- **Bone density**
- **Insulin secretion**
- **Hair (body) growth**
- **Skin:** Moisture, elasticity, sebum production
- **Muscle mass:** Strength, Stamina, Recovery
- **Cardiovascular Health**
- **Immune function**
- **Sexual function:** Vasodilation, tissue elasticity, moisture
- **Fertility:** At optimal levels helps follicle growth

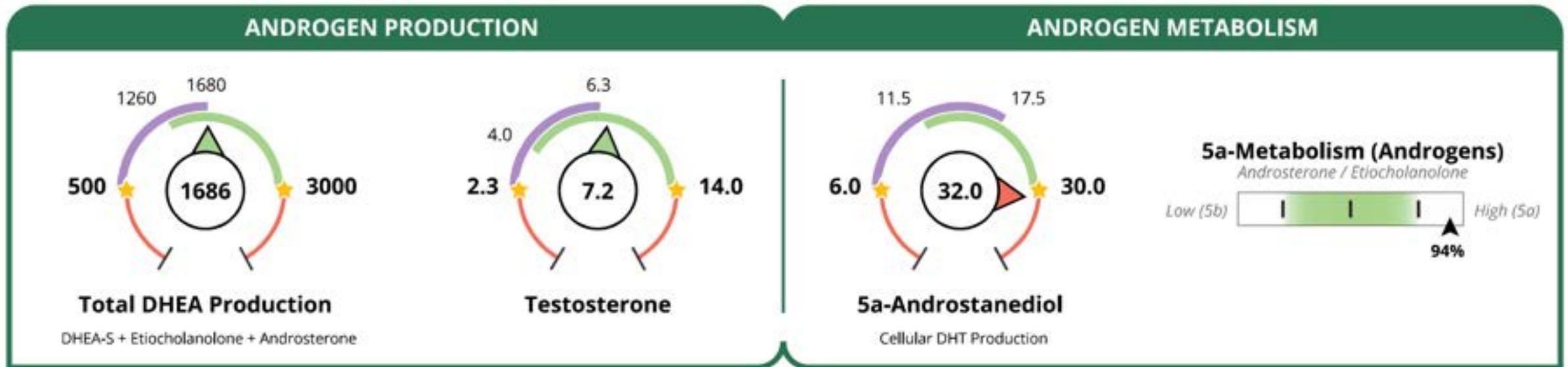




The DUTCH Dozen: Testosterone

Where T is Made in Women





Precision Analytical's published white paper "**5 α -Androstenediol: A Marker of Androgen Status in Women**"

CONCLUDING REMARKS

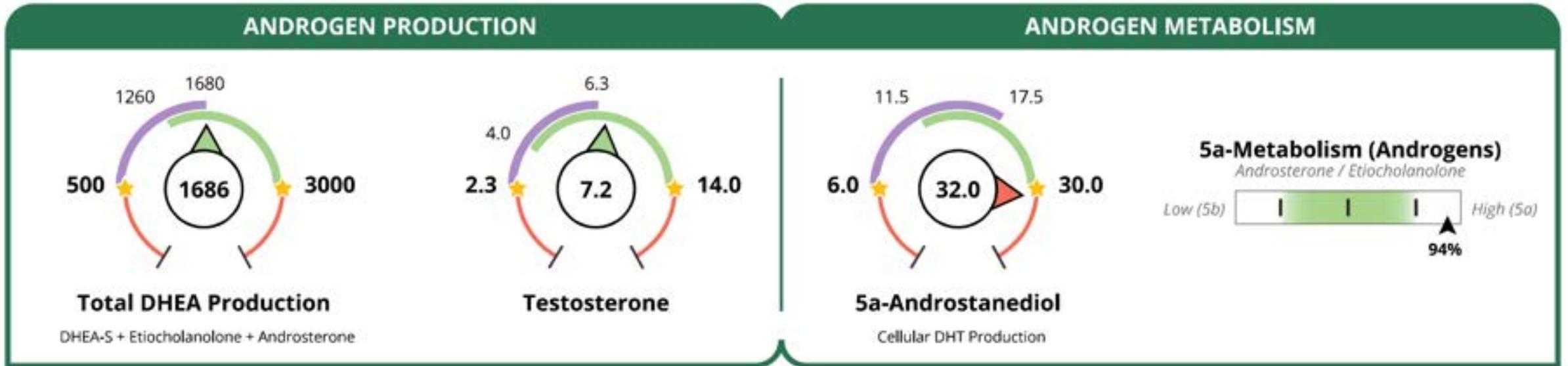
Summary of key research findings

Based on the research reviewed here on 5 α -androstenediol in women's health, the evidence suggests that:

1. 5 α -androstenediol levels reflect intracellular DHT activity and androgen metabolism in peripheral tissues.
2. 5 α -androstenediol levels are abnormally elevated in women with androgen excess symptoms, including male-pattern hair growth, scalp hair loss, acne, menstrual irregularities, and PCOS.
3. 5 α -androstenediol levels can be elevated even when testosterone levels are within normal range, as in the case of idiopathic hirsutism in women.
4. Elevations in 5 α -androstenediol levels resolve along with symptom improvement following treatment of androgen excess symptoms in women.



<https://dutchtest.com/research/5-a-androstenediol-a-marker-of-androgen-status-in-women>



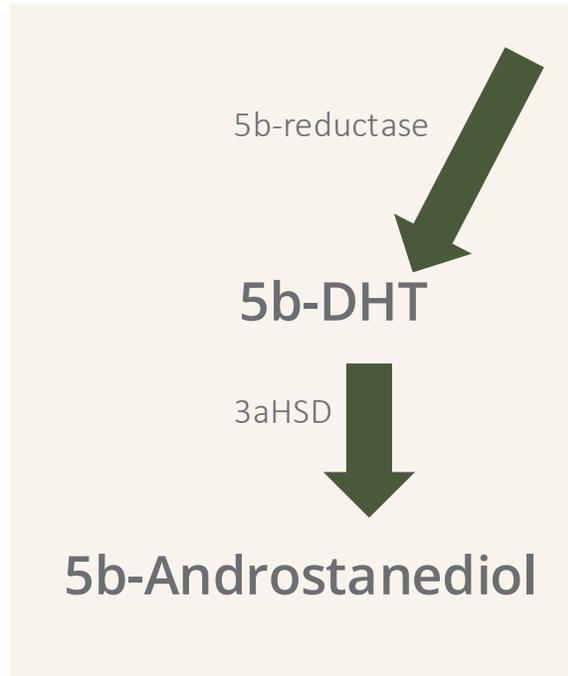
Testosterone



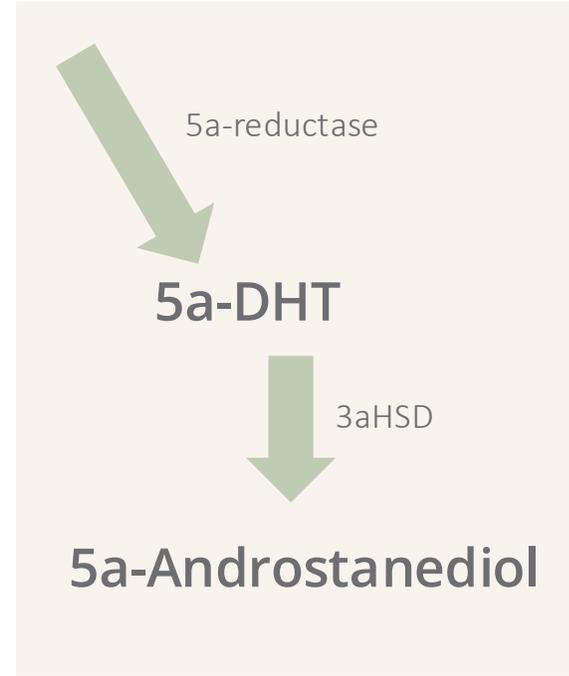
Low androgen levels *and* beta preference

Fatigue
Low libido
Poor muscle mass

Beta pathway



LESS potent



MORE potent



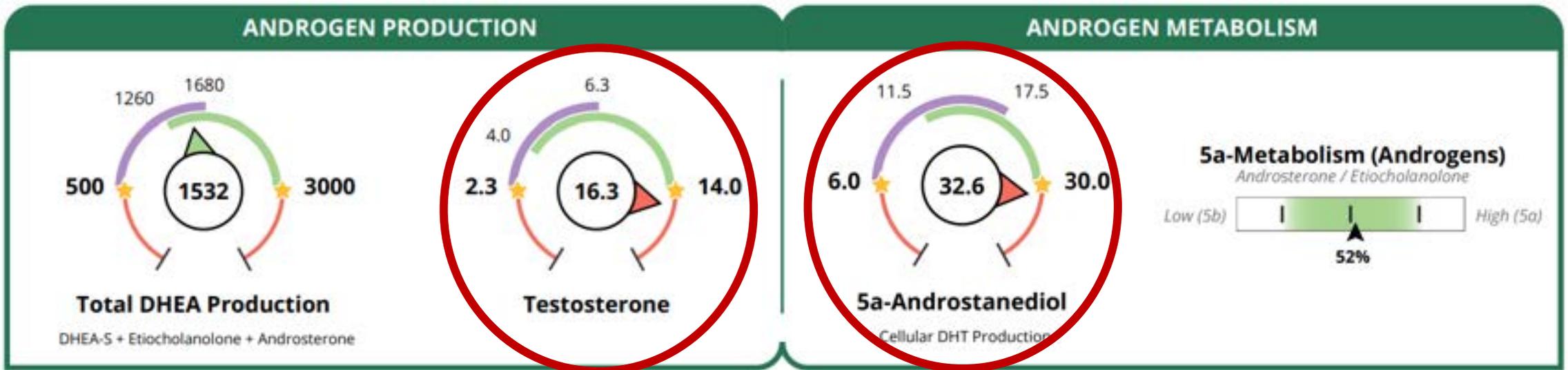
Alpha pathway



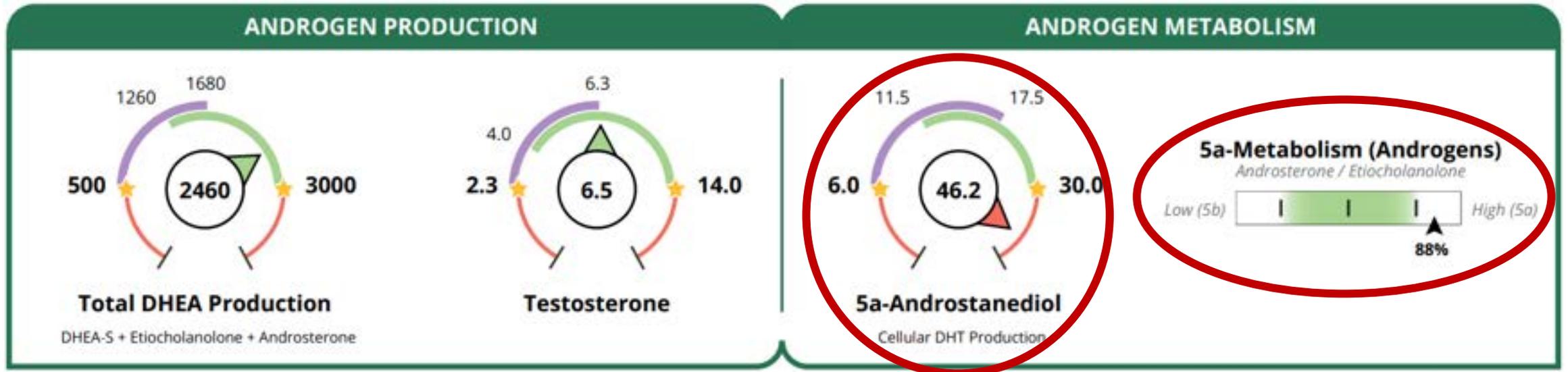
High androgen levels *and* alpha preference

Acne
Scalp hair loss
Facial hair

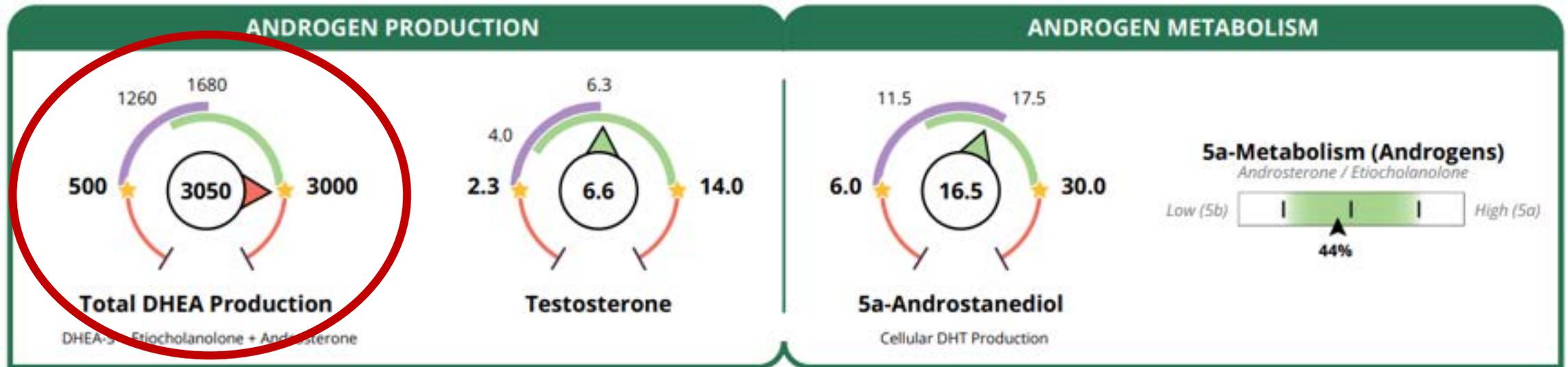
39-year-old female with PCOS and hair loss
What is concerning about these results?



39-year-old female with PCOS and hair loss What is concerning about these results?



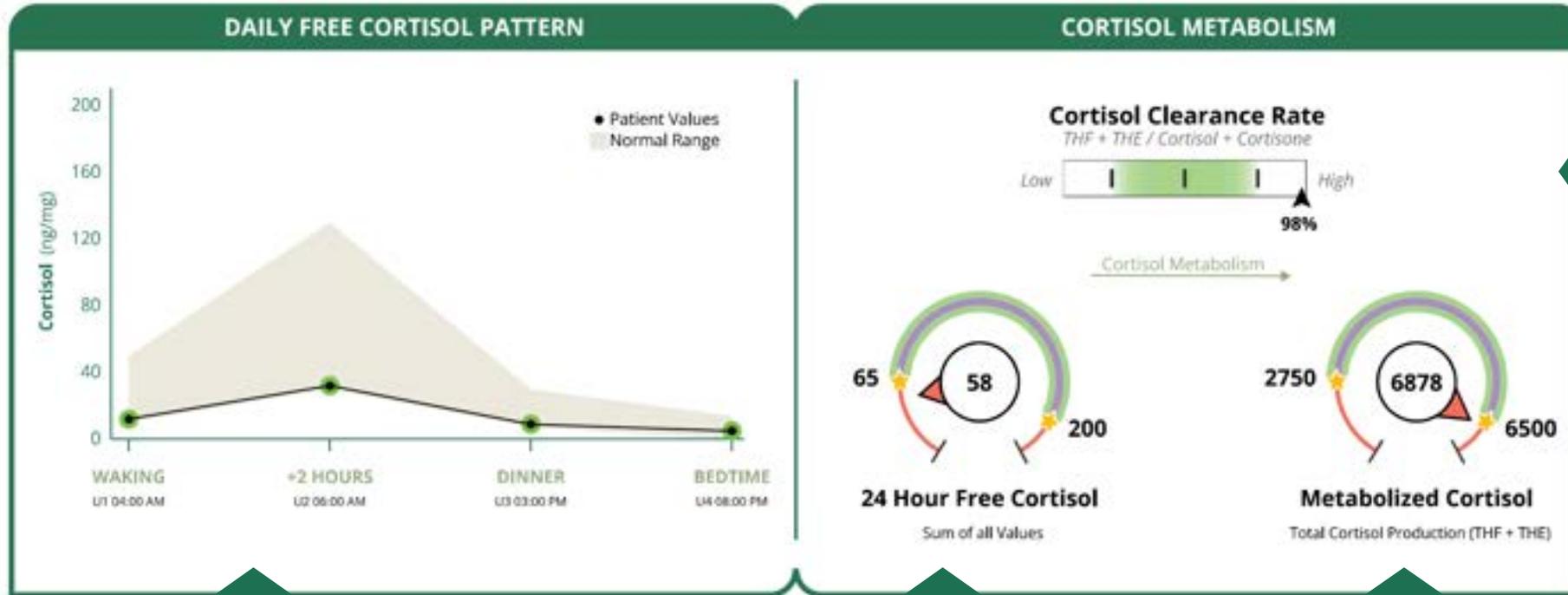
39-year-old female with PCOS and hair loss
What is concerning about these results?





DUTCH Dozen: Cortisol

The DUTCH Dozen: Cortisol



Assess the rate of cortisol clearance from the body

12

Assess the daily free cortisol pattern

9

Assess the daily total of free cortisol in circulation

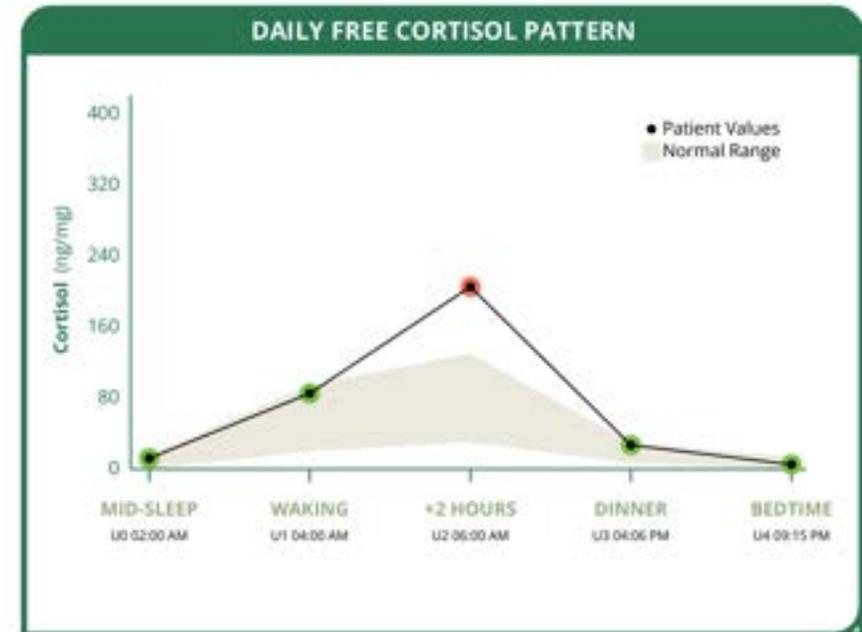
10

Assess the total cortisol produced by the adrenal glands (Metabolized Cortisol)

11

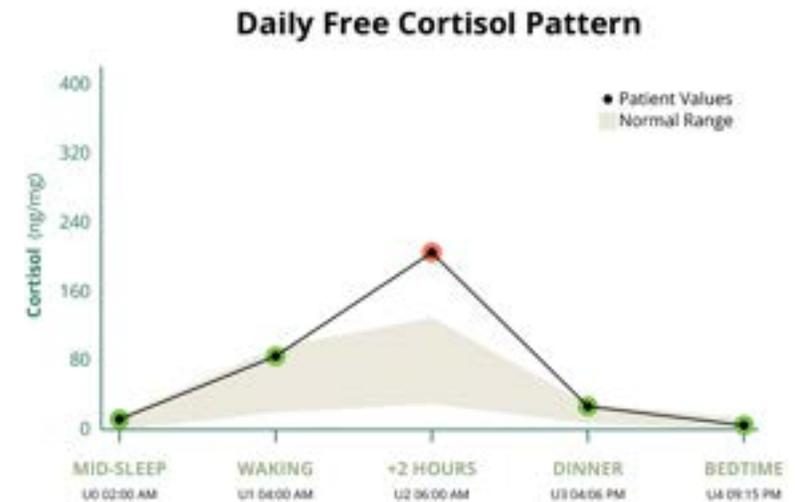
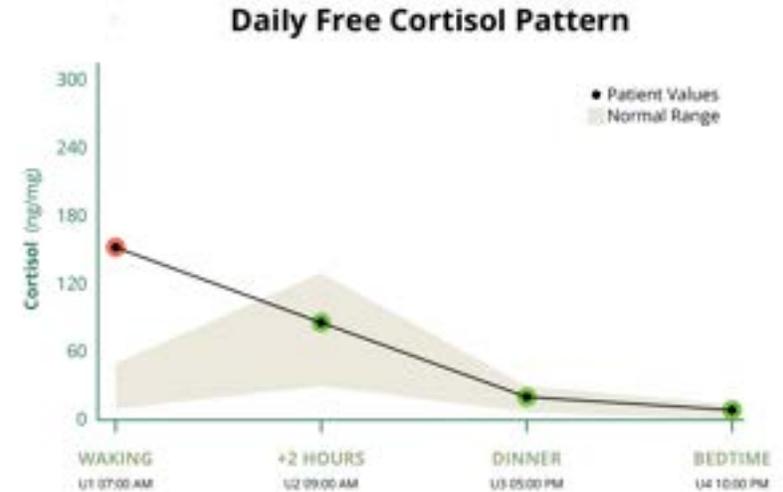
The DUTCH Dozen: Free Cortisol Pattern & 24-Hour Free Cortisol

- The **Daily Free Cortisol Pattern** is plotted from urine samples collected throughout the day.
- This pattern helps identify **disruptions in the diurnal cortisol rhythm**, which can affect energy, sleep, the stress response, and more.
- The **24 Hour Free Cortisol** is calculated by adding up the four urinary (or five salivary) free cortisol points on the graph.
- It is the best marker to assess **overall tissue exposure to cortisol** on the day of testing.

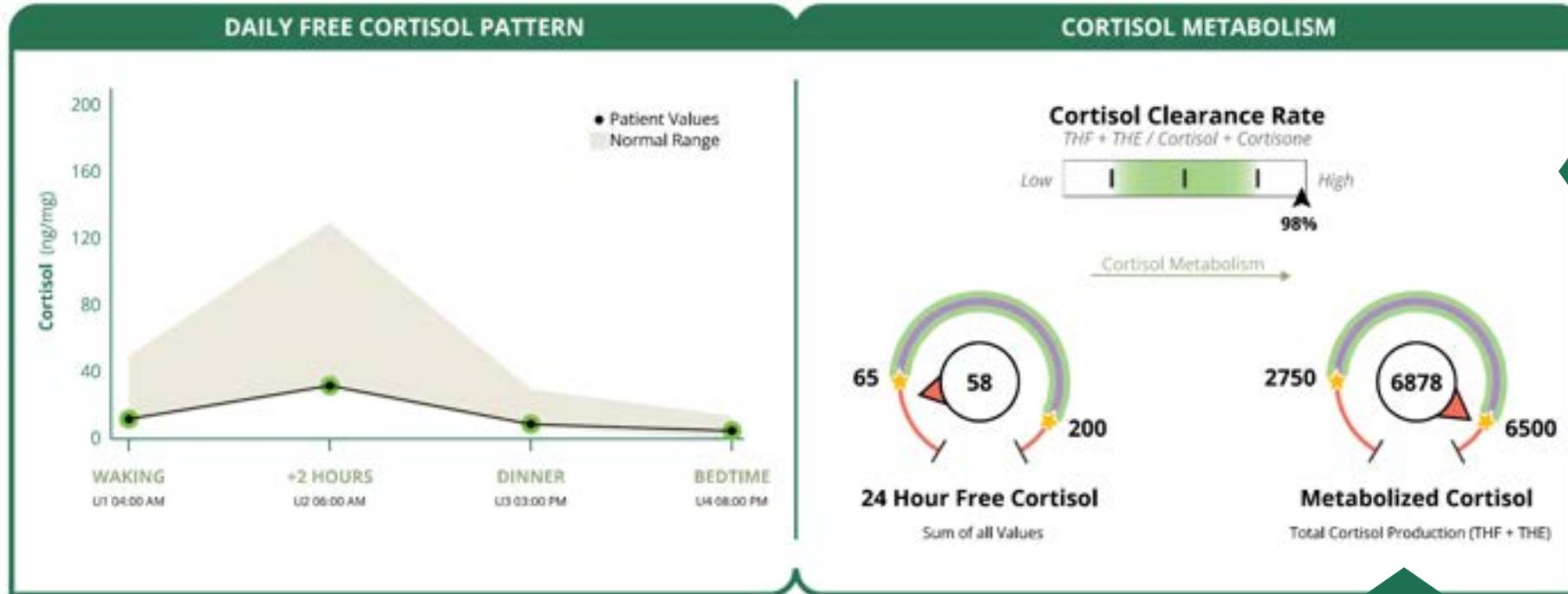


The DUTCH Dozen: Free Cortisol Pattern & 24-Hour Free Cortisol

- We want to make sure to look at **BOTH** the **Daily Free Cortisol Pattern** *and* the **24-Hour Free Cortisol**!
- For example, these patients have the **same** 24-Hour Free Cortisol, but based on their unique cortisol curves, the treatments would be very different.



The DUTCH Dozen: Cortisol



Assess the rate of cortisol clearance from the body

12

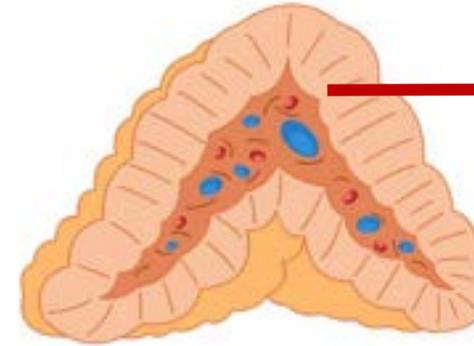
Assess the total cortisol produced by the adrenal glands (Metabolized Cortisol)

11

The DUTCH Dozen: Metabolized Cortisol & Cortisol Clearance Rate (CCR)



- **Metabolized Cortisol** is the sum of cortisol metabolites (a-THF, b-THF, b-THE) and reflects **how much cortisol the adrenals made and metabolized on the day of testing.**



How much cortisol was made & metabolized



- The **Cortisol clearance rate (CCR)** is calculated as the ratio of THF + THE (Metabolized Cortisol) to free cortisol + free cortisone and reflects **how quickly (or slowly) cortisol is being cleared from circulation.**



How quickly cortisol is cleared from circulation

The DUTCH Dozen: Metabolized Cortisol & Cortisol Clearance Rate (CCR)

Low CCR Contributors



Top Considerations:



Hypothyroidism (or insufficient thyroid medication)



Liver/Gallbladder Stasis



Anorexia

High CCR Contributors



Top Considerations:



Obesity



Insulin Resistance



Hyperthyroidism (or too much thyroid medication)



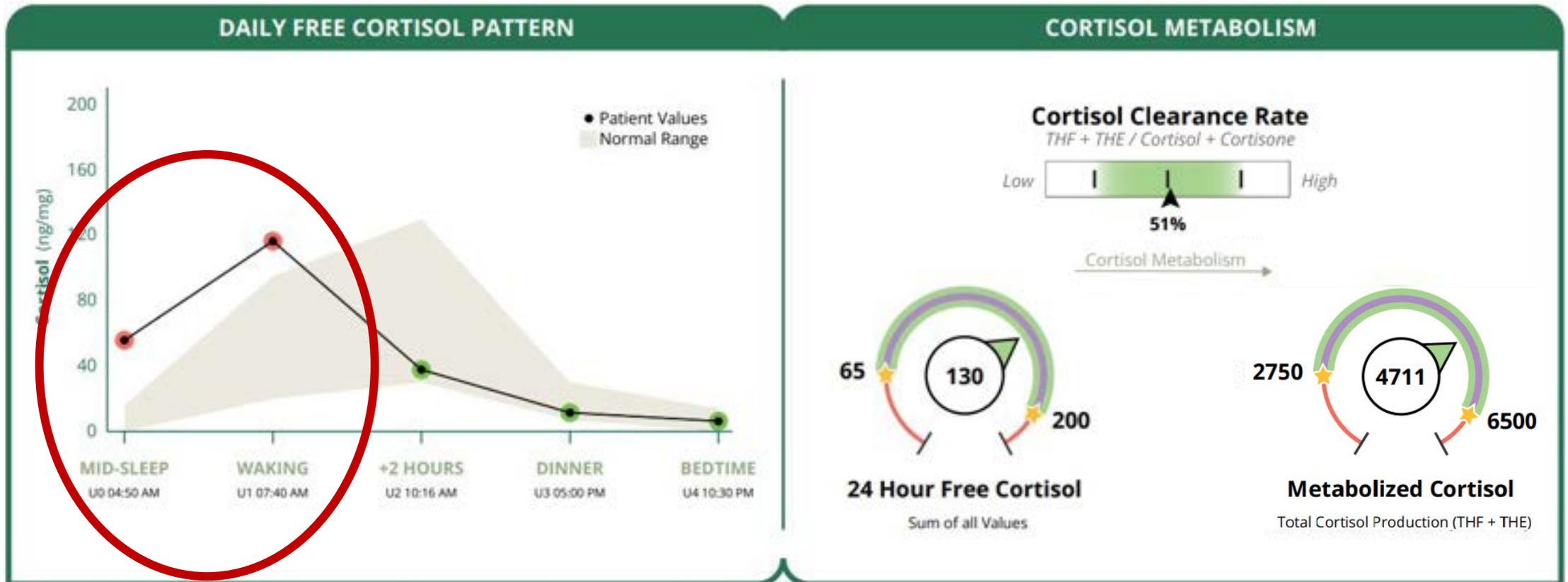
Fatty Liver



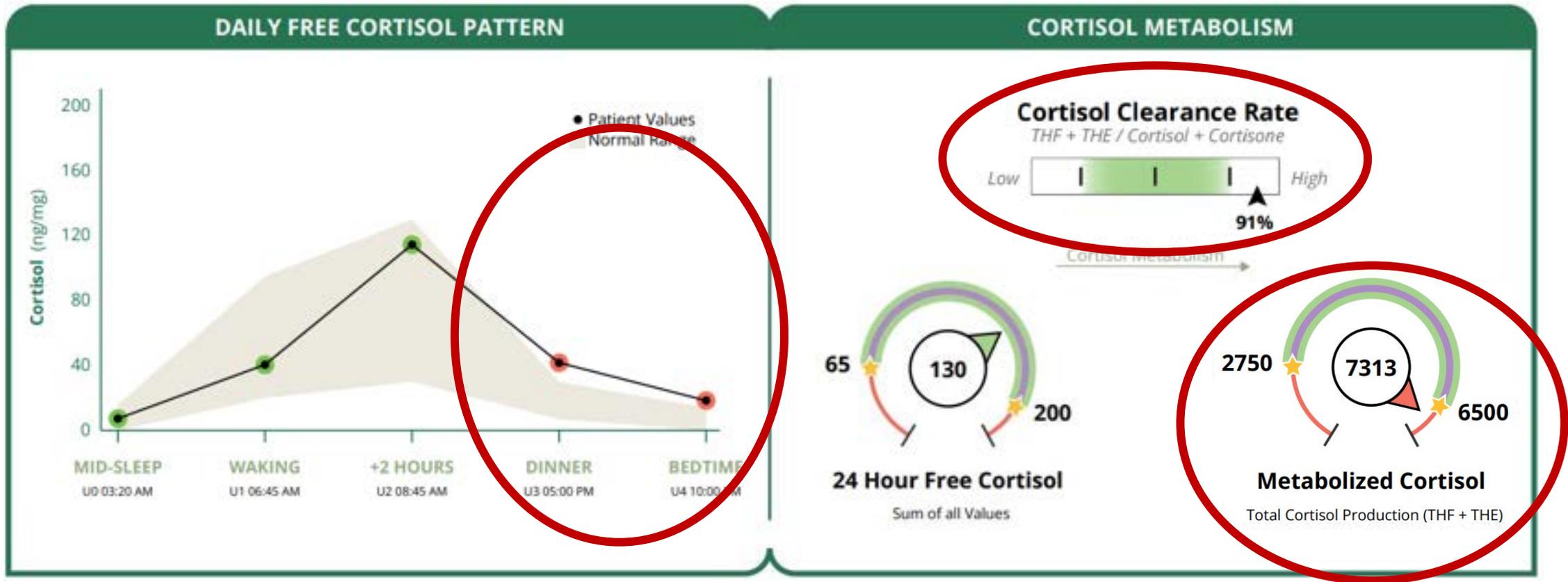
Inflammation

42-year-old female with insomnia and high BMI

What is concerning about these results?

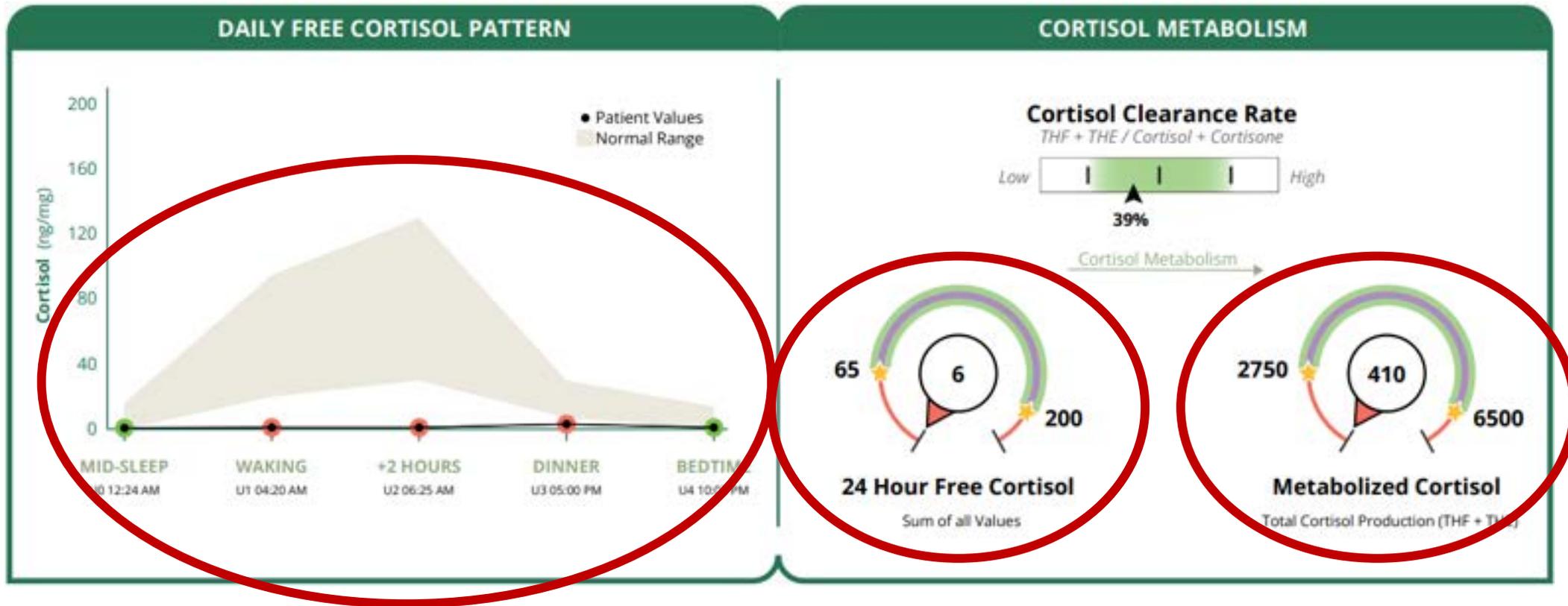


42-year-old female with insomnia and high BMI What is concerning about these results?



54-year-old female with Crohn's disease

What is concerning about these results?



Putting the DUTCH Dozen Together

Putting it All Together

39-year-old female with infertility

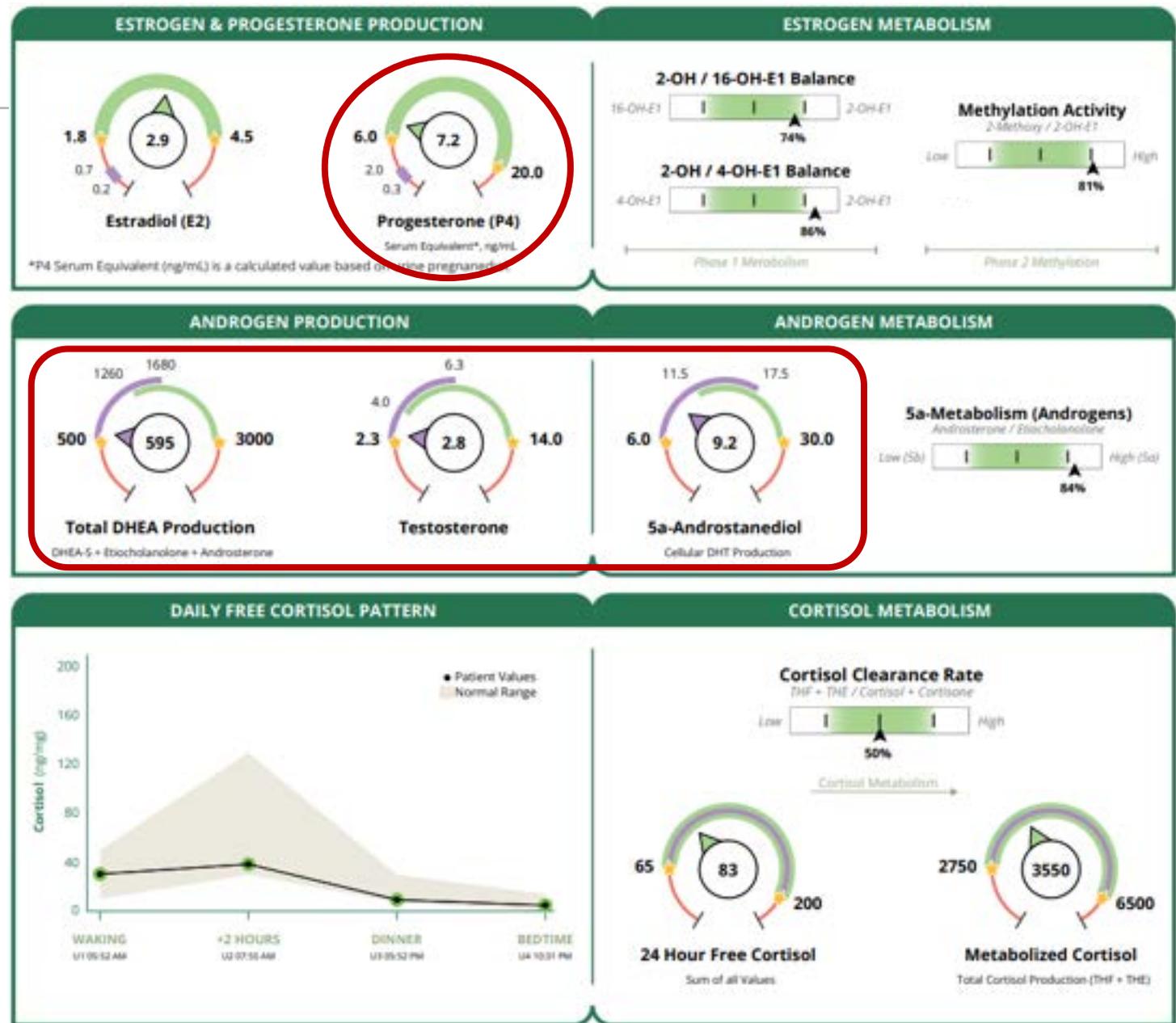
What is concerning about these results?

Low-normal progesterone

- Ovulating but poor production
- How's ovarian health?
- Low androgens contributing?

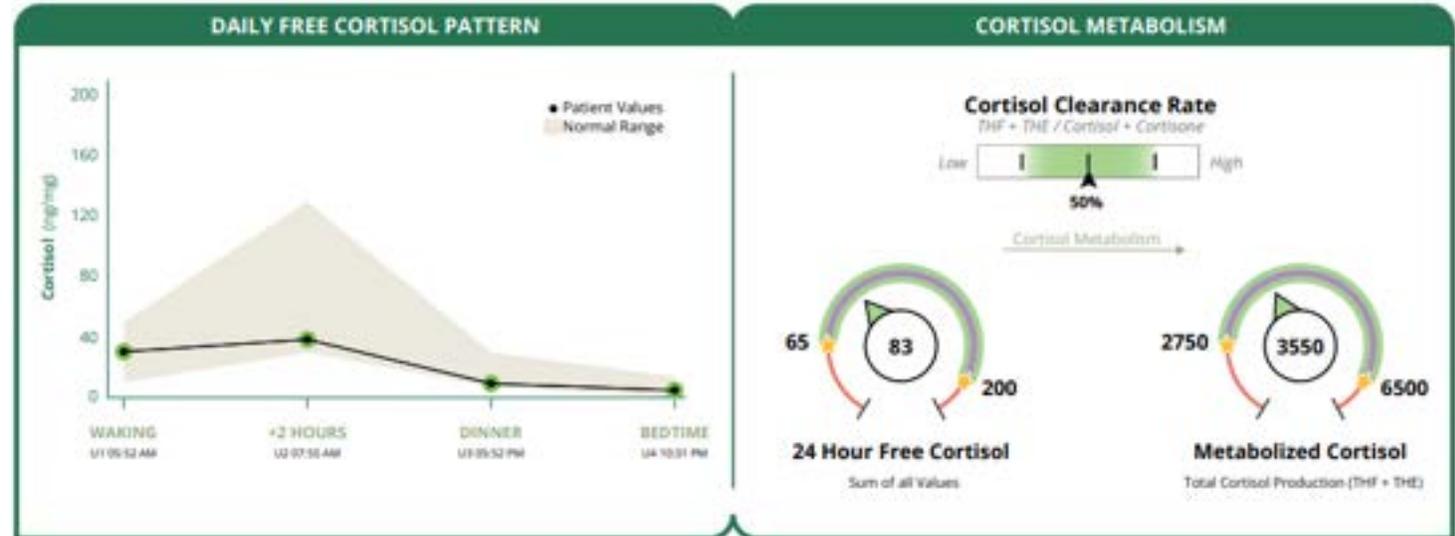
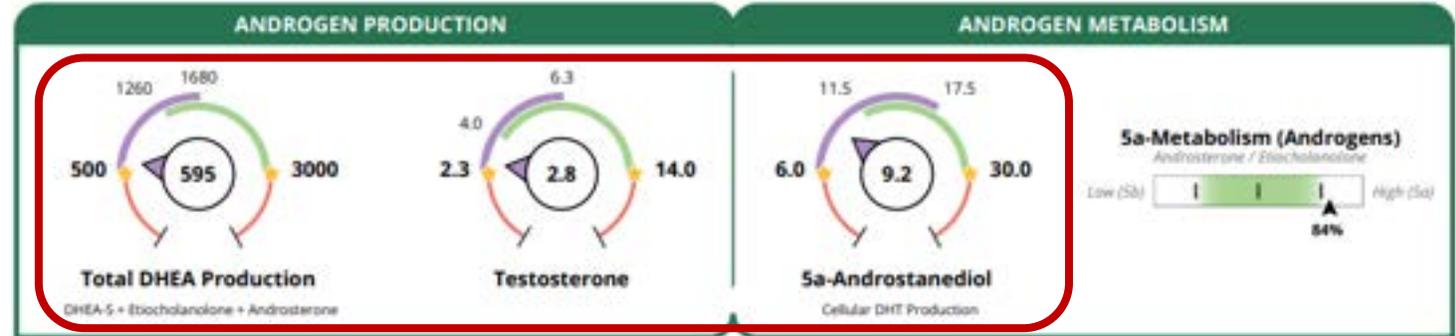
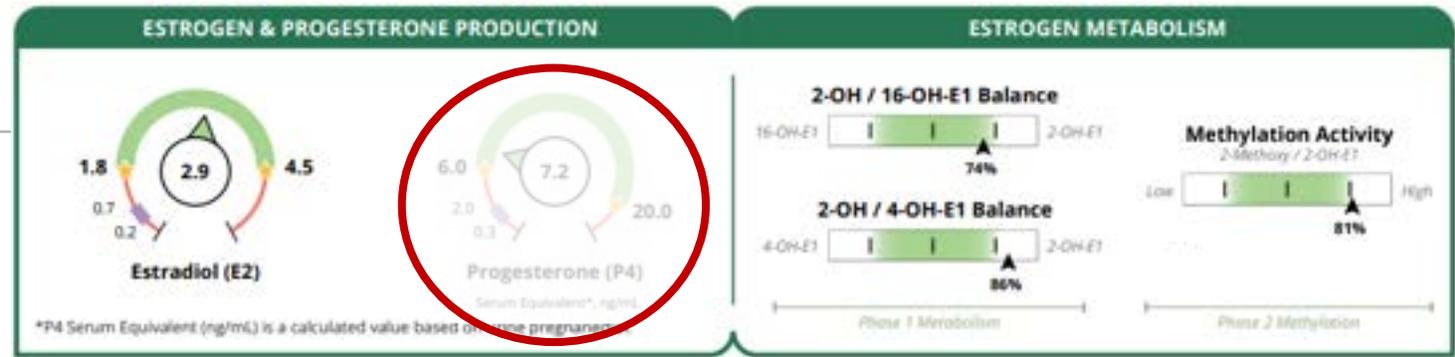
Low androgens

- HPO axis impairment?
- High SHBG?
- Normal-low adrenal output contributing?



Putting it All Together

39-year-old female with infertility



Putting it All Together

39-year-old female with infertility

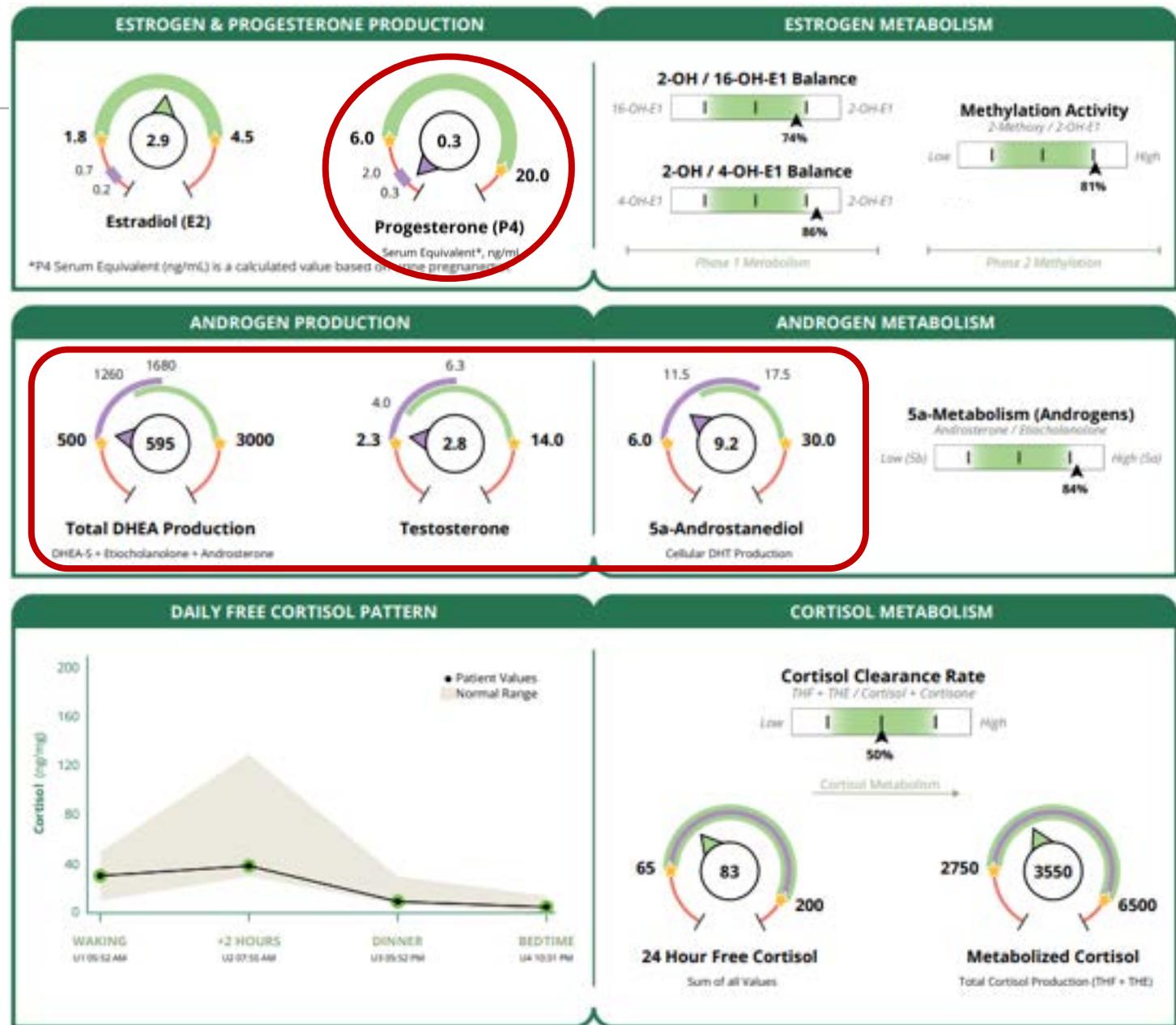
What is concerning about these results?

Low progesterone

- NOT ovulating
- More focus on ovulation!

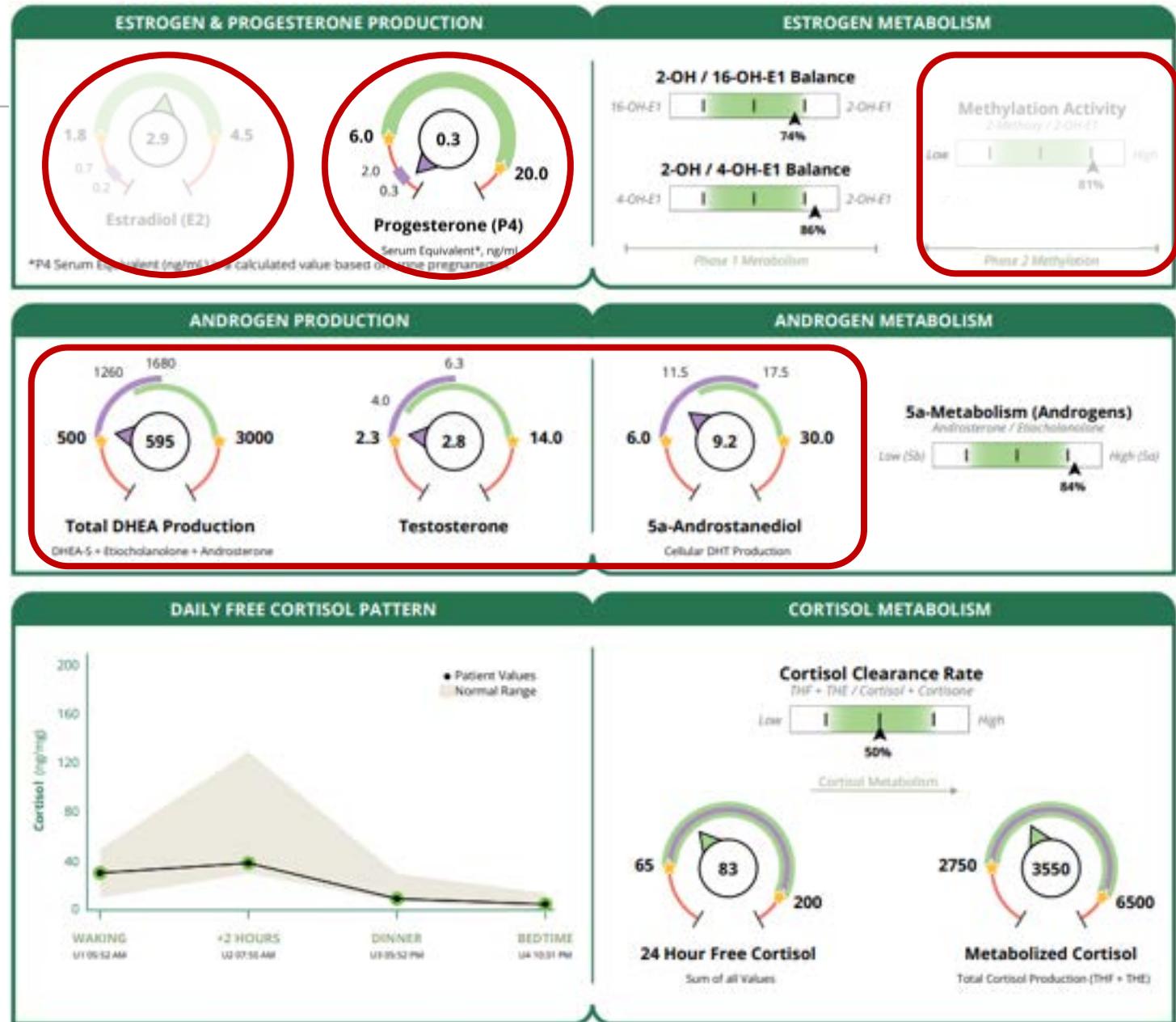
Low androgens

- More severe HPO axis impairment?
- High SHBG?
- Normal-low adrenal output contributing?



Putting it All Together

39-year-old female with infertility



Putting it All Together

39-year-old female with infertility

Low progesterone

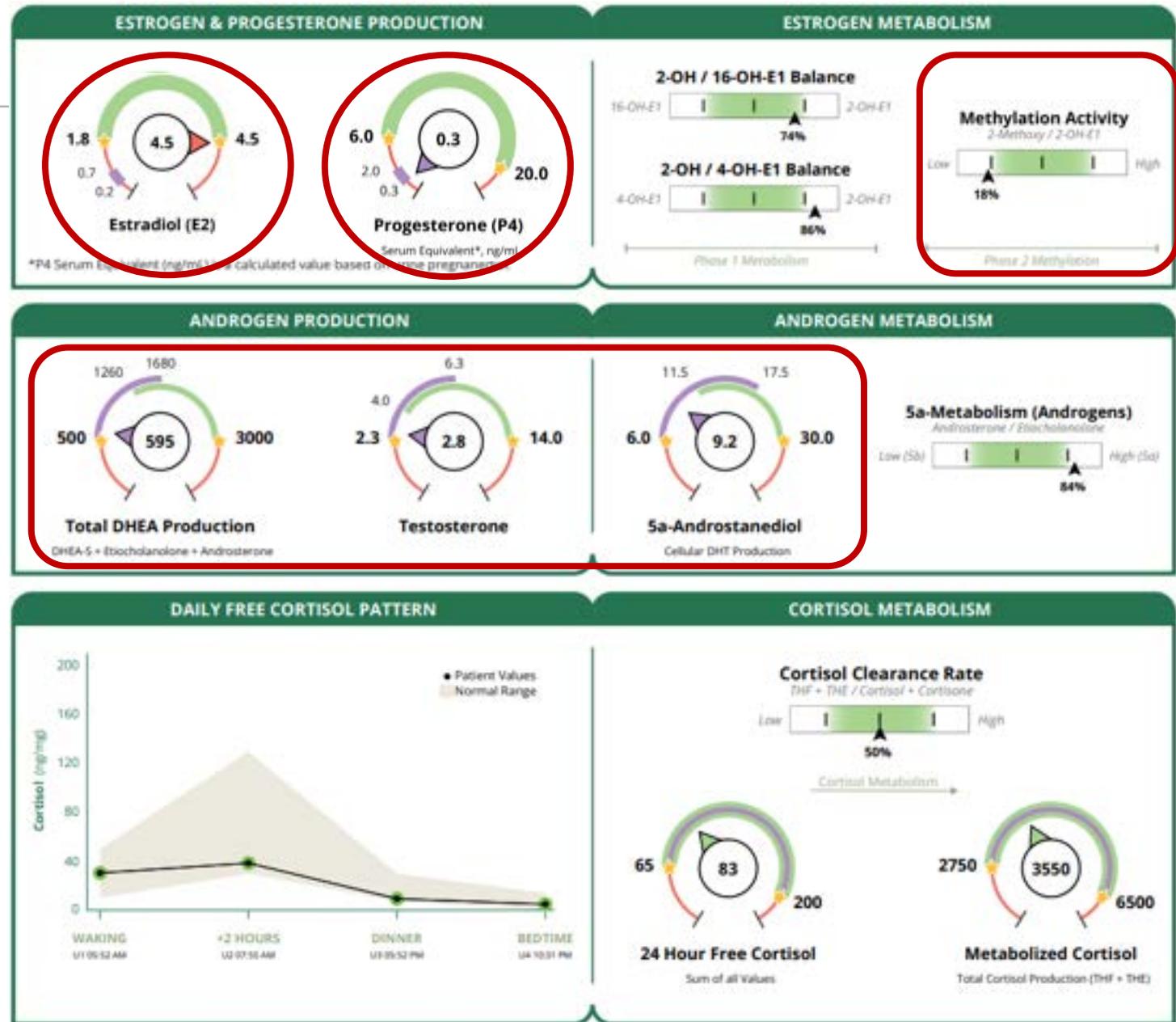
- NOT ovulating

Low androgens

- HPO axis impairment?
- High SHBG?
- Normal-low adrenal output contributing?

High estrogen

- Collect at right time in cycle?
- Ovarian health? Early perimenopause?
- Metabolic issues?
- Low methylation contributing?



Putting it All Together

39-year-old female with infertility



Putting it All Together

39-year-old female with infertility

Low progesterone

- NOT ovulating

Low androgens

- HPO axis impairment?
- High SHBG?
- **Low CCR contributing?**

High estrogen

- Collect at right time in cycle?
- Ovarian health? Early perimenopause?
- Metabolic issues?
- Low methylation contributing?

High Cortisol

- Significant stress?



Case Studies

Case 1: Anita, a 27-yo Female with Breast Tenderness

Chief Complaints

- Breast tenderness
- Constipation

PMHx

- Regular cycles (28-30 days)

Medications/Supplements

- Multivitamin

Physical Exam

- 5'6"; 167 lbs.; BMI 27.0
- BP 127/82 mm Hg
- Pulse 82

Pertinent Serum Labs

- High fasting glucose and insulin
- CBC, CMP, TSH WNL



Case 1: Anita, a 27-yo Female with Breast Tenderness

What is concerning about these results?

High estrogen

- Due to high BMI and blood sugar issues?
- Due to low methylation?
- Low 2/16 increasing estrogen activity?
- Due to GI dysbiosis (e.g., beta-glucuronidase)

High DHEA

- Contributing to high estrogen?
- Due to high adrenal output?

High Cortisol

- Stress?
- Blood sugar issues?
- Inflammation?



Case 1: Anita, a 27-yo Female with Breast Tenderness

Sample Treatment Plan:

Supplements

- **Start magnesium/TMG complex** po once daily
 - **To support methylation and bowel movements**
- **Continue** multivitamin (includes sufficient B-vitamins) 1 capsule po daily with breakfast

Diet

- **Increase** fiber to 30g per day, focusing on vegetable sources
 - **To improve estrogen (phase 3) detox**

Lifestyle

- **Start** walking 2x weekly for 20 minutes and resistance training 1x weekly for 20 minutes.
 - **To improve blood sugar regulation, insulin sensitivity, improve constipation**

Other

- **OURA Ring** to track stress & for mindfulness exercises
 - **To support healthy HPA axis function**

Case 2: Marge, a 49-yo Female with Hot Flashes

Chief Complaints

- Hot flashes
- Night sweats

PMHx

- LMP 10 months ago
- Overexercising

Medications/Supplements

- Melatonin 5mg for sleep

Physical Exam

- 5'7"; 117 lbs.; BMI 18.3
- BP 110/67 mm Hg
- Pulse 62

Pertinent Serum Labs

- CBC, CMP, TSH WNL
- HS E2 10 pg/mL



Case 2: Marge, a 49-yo Female with Hot Flashes

Sample Treatment Plan:

Medications

- **Start** E2 TD patch twice weekly
 - **To support estrogen levels, hot flashes, and more!**
- **Start** oral progesterone nightly
 - **To balance proliferative effects of estradiol on the uterus**

Diet

- **Focus** on getting 2,400 calories daily; calorie-dense, nutritious foods
 - **To increase BMI and support HPA axis**

Lifestyle

- **Incorporate** more low-intensity movements (e.g., walking, stretching) in place of daily long-distance running
 - **To increase BMI and support HPA axis**

Case 3: May, a 32-yo Female with Low Libido

Chief Complaints

- Low libido
- Fatigue

PMHx

- Weight-lifting 20 minutes/week

Medications/Supplements

- None

Physical Exam

- 5'2"; 115 lbs.; BMI 21.0
- BP 105/65 mm Hg
- Pulse 68

Pertinent Serum Labs

- Slight hypothyroid labs



Case 3: May, a 32-yo Female with Low Libido

What is concerning about these results?

Low Androgens

- Due to low CCR?
- Due to hypothyroidism?
- Impaired HPO axis?
- High SHBG?
- High aromatization?

Low Cortisol Clearance Rate (CCR)

- Chronic stress?
- Due to hypothyroidism?



Case 3: May, a 32-yo Female with Low Libido

Sample Treatment Plan:

Medications

- **Start** levothyroxine daily
 - **To support CCR and androgen levels**

Supplements

- **Start** maca daily
 - **To support androgen levels & libido**

Lifestyle

- **Increase weight-lifting** 30 minutes 3x/weekly
 - **To increase androgens, muscle mass, confidence, support libido**

Thank You!

Kelly Ruef, ND

February 25, 2026

DUTCH Test Interpretation & Real-World Case Studies

dutchwebinars