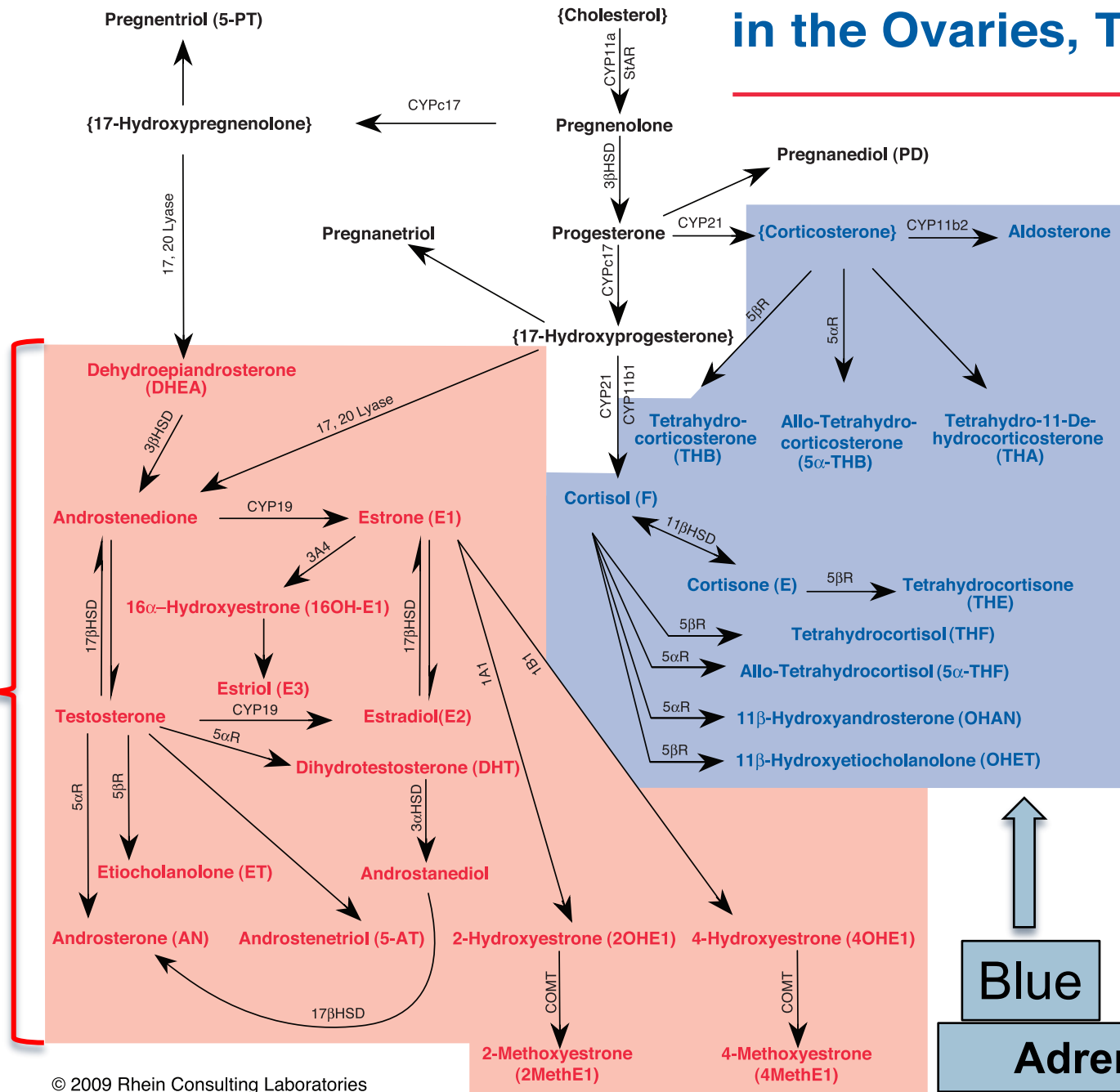


24 hr Comprehensive Urine Hormone Profile

**Frequently Encountered Issues
and Questions**

Biosynthesis and Metabolism of Steroid Hormones as Produced in the Ovaries, Testes and Adrenals



Enzymatic Steps:

- 3 β HSD:** 3 - beta - Hydroxysteroid dehydrogenase
- 5 α R:** 5 - alpha - Reductase
- 5 β R:** 5 - beta - Reductase
- 11 β HSD:** 11 - beta - Hydroxysteroid dehydrogenase
- 17 β HSD:** 17 - beta - Hydroxysteroid dehydrogenase
- 17,20 Lyase:** 17,20 - Desmolase
- CYP11a:** Cholesterol side chain cleavage
- StAR:** Steroidogenic acute regulatory protein
- CYP11b1:** 11 - beta - Hydroxylase
- CYP11b2:** 18 - Oxidase
- CYPc17:** 17 - alpha - Hydroxylase
- CYP19:** Aromatase
- CYP21:** 21 - Hydroxylase

Estrogen Metabolism:

- 1A1:** Cytochrome p450 1A1 (CYP1A1)
- 1B1:** Cytochrome p450 1B1 (CYP1B1)
- 3A4:** Cytochrome p450 3A4 (CYP3A4)
- COMT:** Catechol-O-Methyl-transferase

Sex Hormones
Red

Blue

Adrenal (Corticosteroid) Hormones

Frequently Encountered Issues and Questions

**68 y.o. Post-M Female: On HRT
Effects of Dosing with Oral Pg over 2 yr period**

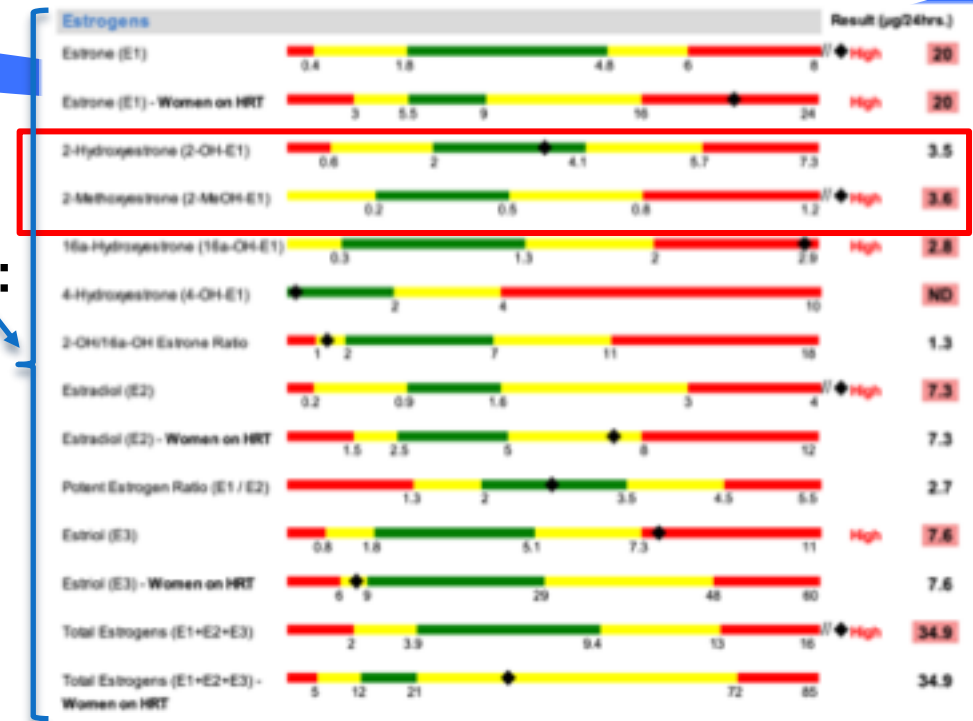
**I have an individual on HRT and I suspect that the instructions for hormone administration are not being followed.
What should one look for in the report to confirm that suspicion?**

68 y.o. Post-M: On HRT

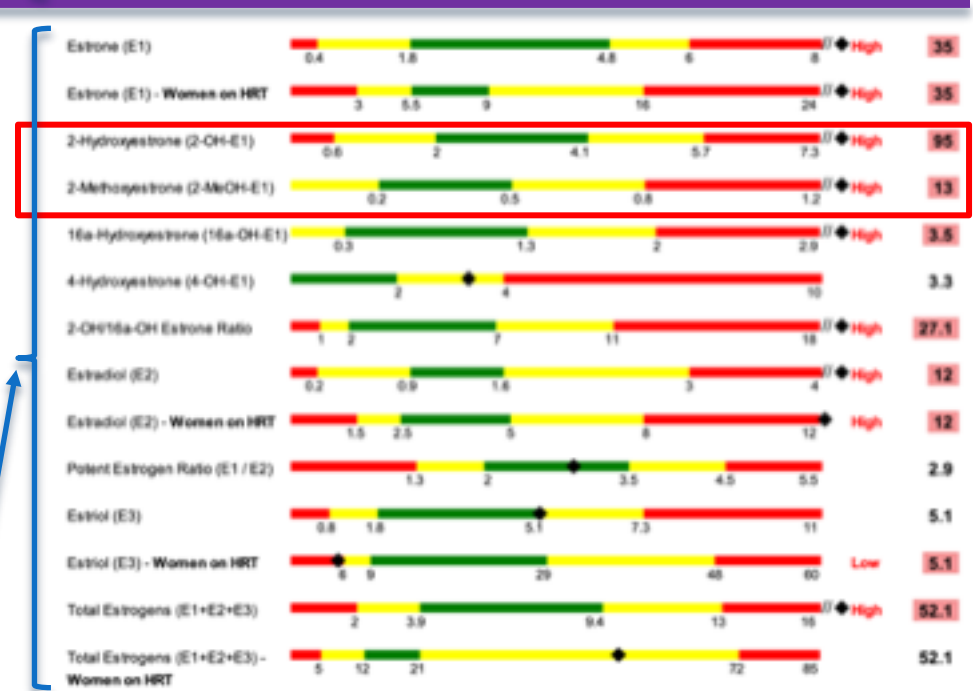
Effect of Oral Pg over 2 yrs

- Given **topical** E^s & Androgens, but **oral** Pg
- 1st Test: E^s elevated, & 2 yrs later even > elevation, though dosing was constant between 2 tests
 - As age, metabolism slows. Combined with E^s buildup in tissues, especially in the fat, leads to high E^s levels
- Significant ↑ in 2-OH & 2-MeOH-E1, d/o saturation of enzyme-mediated conversion of 2-OH to the 2-MeOH-E1 end product, leading to buildup of that 2-OH-E1 derivative

1st Test:



2nd Test:
2 yrs later



68 y.o. Post-M: on HRT_Effect of Oral Pg over 2 yrs

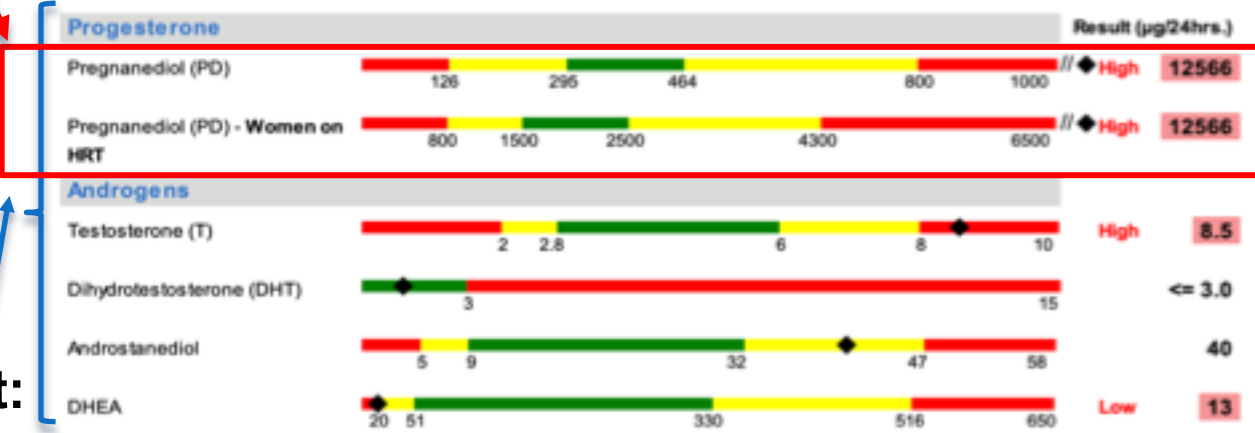
Results: PD in the 2nd test, after 2 years

- Very High. On oral HRT, & did not discontinue Pg dose the day before & day of collection
- Level in line with Pg dose of 100 mg
- High excretion level due to hepatic **'first-pass'** metabolism, an effect seen with **orally** administered steroids

1st Test:



2nd Test:
2 yrs later





Frequently Encountered Issues and Questions

46 y.o. Male

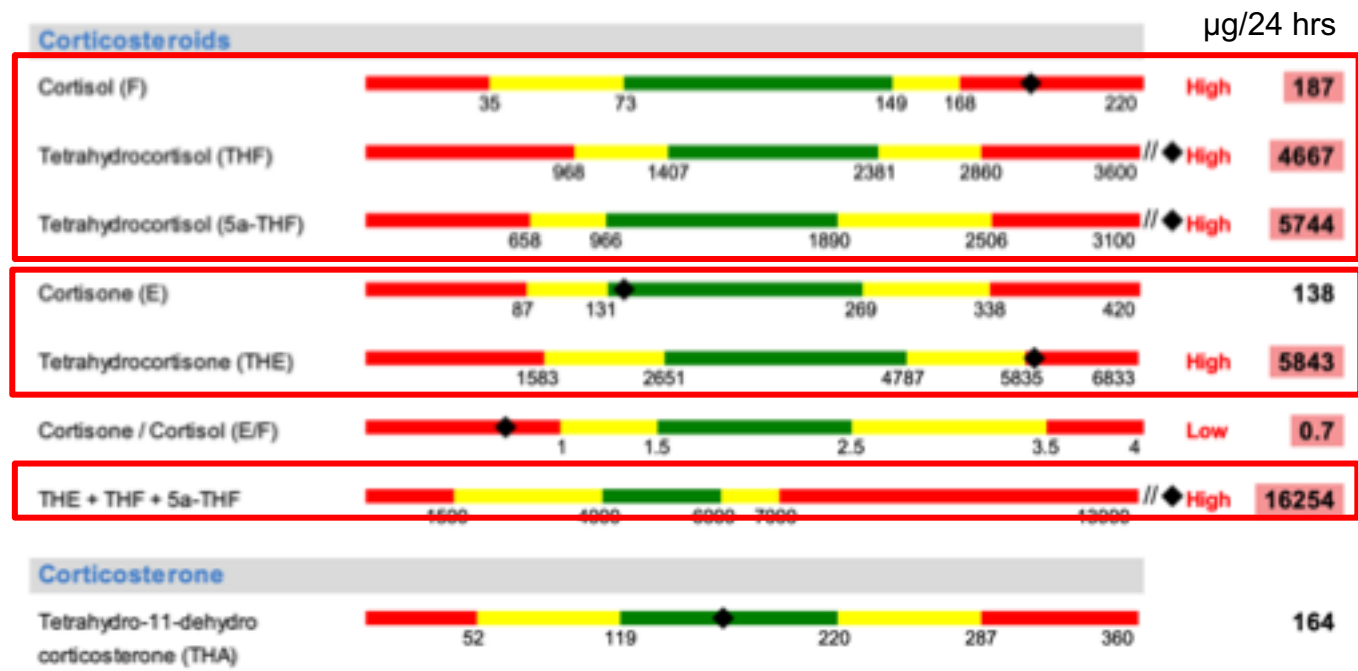
How does one use the 24 hr Urine Hormone Profile to confirm Adrenal Pathology?

46 y.o. Male: Adrenal Pathology?

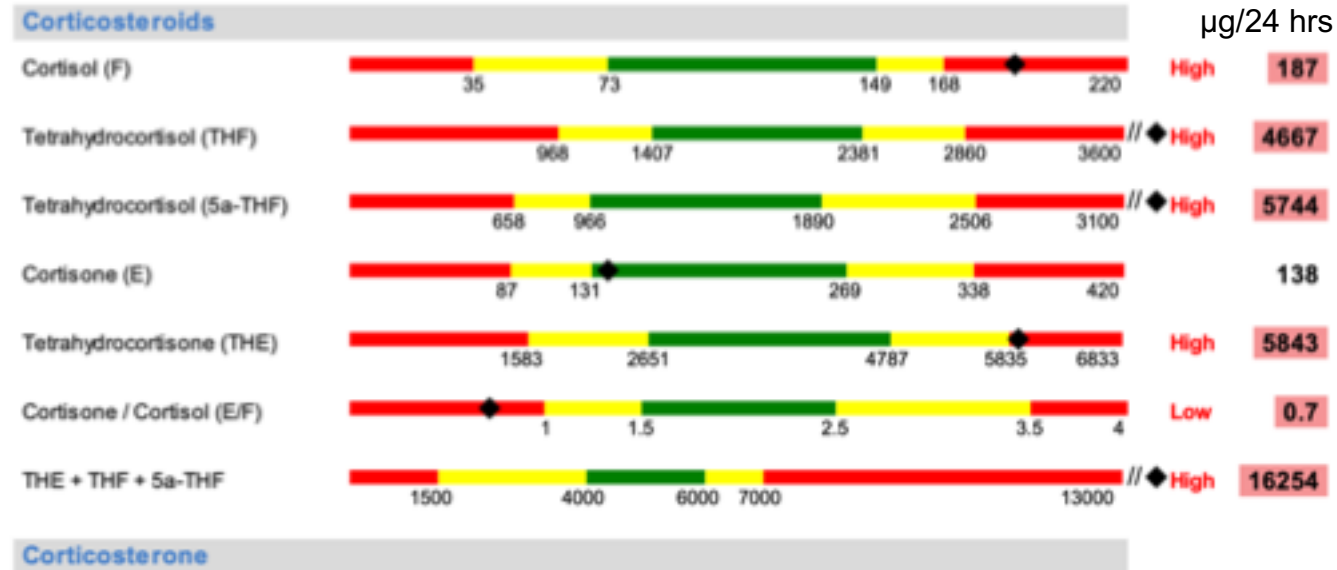
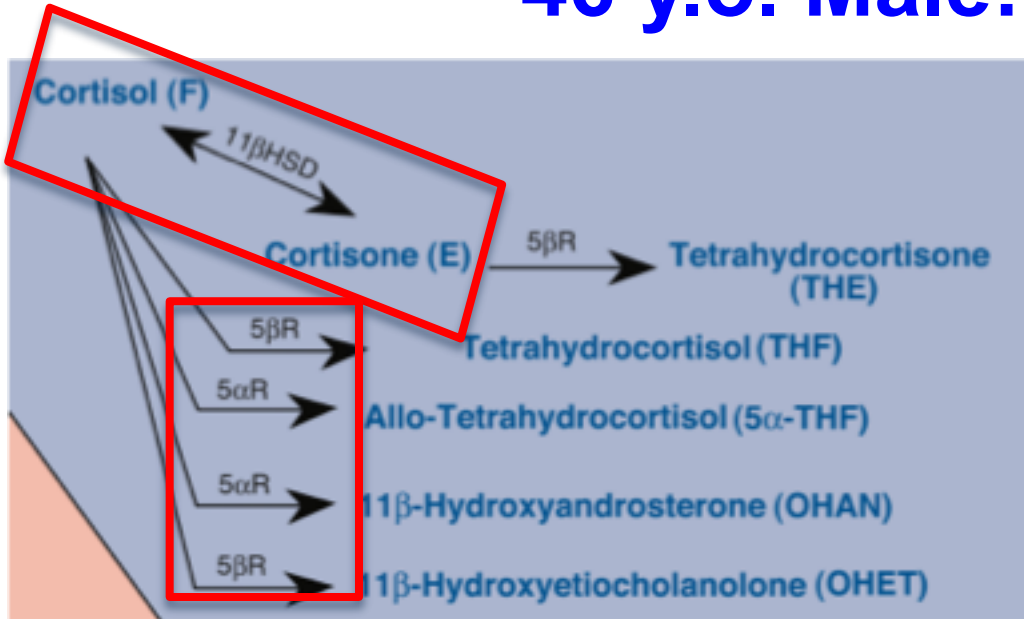
- **History:** Unspecified cerebral hemorrhages
 - **Imaging:** Numerous brain microbleeds, without neurological deficit
 - **BP:** significantly elevated. No other pathology apparent
-
- Possible causes of the clinical condition uncertain
 - 24 hr Comprehensive Urine Hormone Profile considered, to determine if **adrenal pathology** could be an underlying cause

46 y.o. Male: Adrenal Pathology?

- ↑ Cortisol, as well as THF & 5a-THF (the metabolites)
 - Both 5a-R products. 2 x normal range
- Cortisone in normal range, with THE being only slightly elevated
- Sum of THE+THF+5a-THF > twice normal range: ~ 16,000 µg/24 hrs**



46 y.o. Male: Adrenal Pathology?

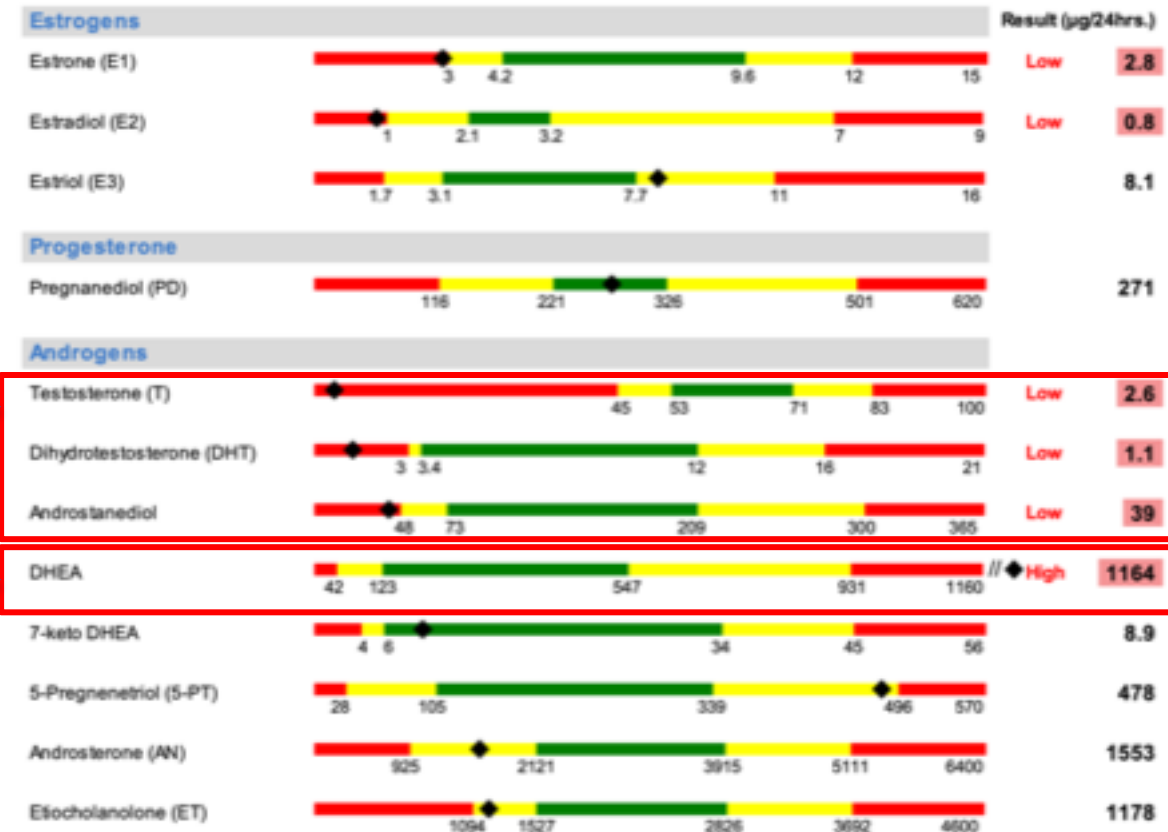


- Adrenals were imaged: No lesions, but significant **adrenal hyperplasia**
- Hyperplasia may also explain ↑ BP, since **Aldosterone** involved in control of BP
- Abnormality may exist in the F deactivation to E via the 11-*B*HSD* enzyme system, leading to high the build up of high F levels
- The F deactivation pathways, via 5α-R & 5β-R, also run out of ability to metabolize the greater than normal existing F substrate, resulting in overall high F levels

46 y.o. Male: Adrenal Pathology?

Results:

- **Testosterone:** Free T level significantly low, with accompanying low levels of DHT & Androstenediol
- **DHEA:** Elevated. Also synthesized by the adrenals, although at a locus anatomically different from where Cortisol is produced
 - DHEA: Generally metabolized preferentially via the 5 β -R to Etiocholanolone (ET). This pathway also seems to be metabolizing at a lower level.





Frequently Encountered Issues and Questions

42 y.o. Male

Oral testosterone is always contraindicated in men. What is the reason for that, and how does it affect results on a 24 hr Urine Profile?

42 y.o. Male: Effect of Oral Testosterone Therapy

History: Never tested pre Jan '20.

- Serum tests: Total T – 568; Free T - 11.3 (8.7-25). –
- Both values slightly below mid-range
- Would normally not be T replacement candidate, but still given script for T
- Feb '23: Taking high doses of DHEA & a low dose of topical T. Not known if cream (poorly absorbed) or alcoholic gel

Feb '23

				µg/24 hrs
Testosterone	µg/24hrs	Low	44	45 – 83
Dihydrotestosterone (DHT)	µg/24hrs		5.2	3 – 16
Androstenediol	µg/24hrs		137	48 – 300
DHEA	µg/24hrs	High	4297	42 – 931
7-keto DHEA	µg/24hrs		43	4.0 – 45
Androsterone (AN)	µg/24hrs	High	8890	925 – 5111
Etiocholanolone (ET)	µg/24hrs	High	6838	1094 – 3692
Androstenetriol (5-AT)	µg/24hrs	High	786	61 – 726
5-Pregnenetriol (5-PT)	µg/24hrs		452	28 – 496
Androstenedione (Ref. Range not established)	µg/24hrs		7.7	

- Subsequently, was prescribed a liposomal formulation of T, which he took orally
- The proponent of this formulation claims that liposomal form by-passed the liver. **Not factual**
- **Oral T always contraindicated in men, due to its hepatotoxicity.**
- The liposomal preparation is no longer available, presumably due to FDA intervention

42 y.o. Male: Effect of Oral Testosterone Therapy

Results:

- **Testo:** Level dangerously elevated
- **DHEA:** Extremely high androsterone & etiocholanolone levels observed in Feb '23 primarily d/o high doses of DHEA he was taking
- He cut down on the dose leading up to the Nov '23 test. Effect of the lower DHEA dose was masked by the high dose of oral Testosterone he was taking at that time
- Not known whether this person followed directions & discontinued oral Testo the day before & day of urine collection
 - Therefore, a fraction of the observed level may be due to first pass metabolism.

Nov '23

µg/24 hrs

Testosterone	µg/24hrs	High	323	45 – 83
Dihydrotestosterone (DHT)	µg/24hrs		9.2	3 – 16
Androstanediol	µg/24hrs		152	48 – 300
DHEA	µg/24hrs		783	42 – 931
7-keto DHEA	µg/24hrs		15	4.0 – 45
Androsterone (AN)	µg/24hrs	High	5663	925 – 5111
Etiocholanolone (ET)	µg/24hrs	High	7991	1094 – 3692
Androstenetriol (5-AT)	µg/24hrs		436	61 – 726
5-Pregnenetriol (5-PT)	µg/24hrs		169	28 – 496
Androstenedione (Ref. Range not established)	µg/24hrs		4.2	

Feb '23

Testosterone	µg/24hrs	Low	44	45 – 83
Dihydrotestosterone (DHT)	µg/24hrs		5.2	3 – 16
Androstanediol	µg/24hrs		137	48 – 300
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Frequently Encountered Issues and Questions

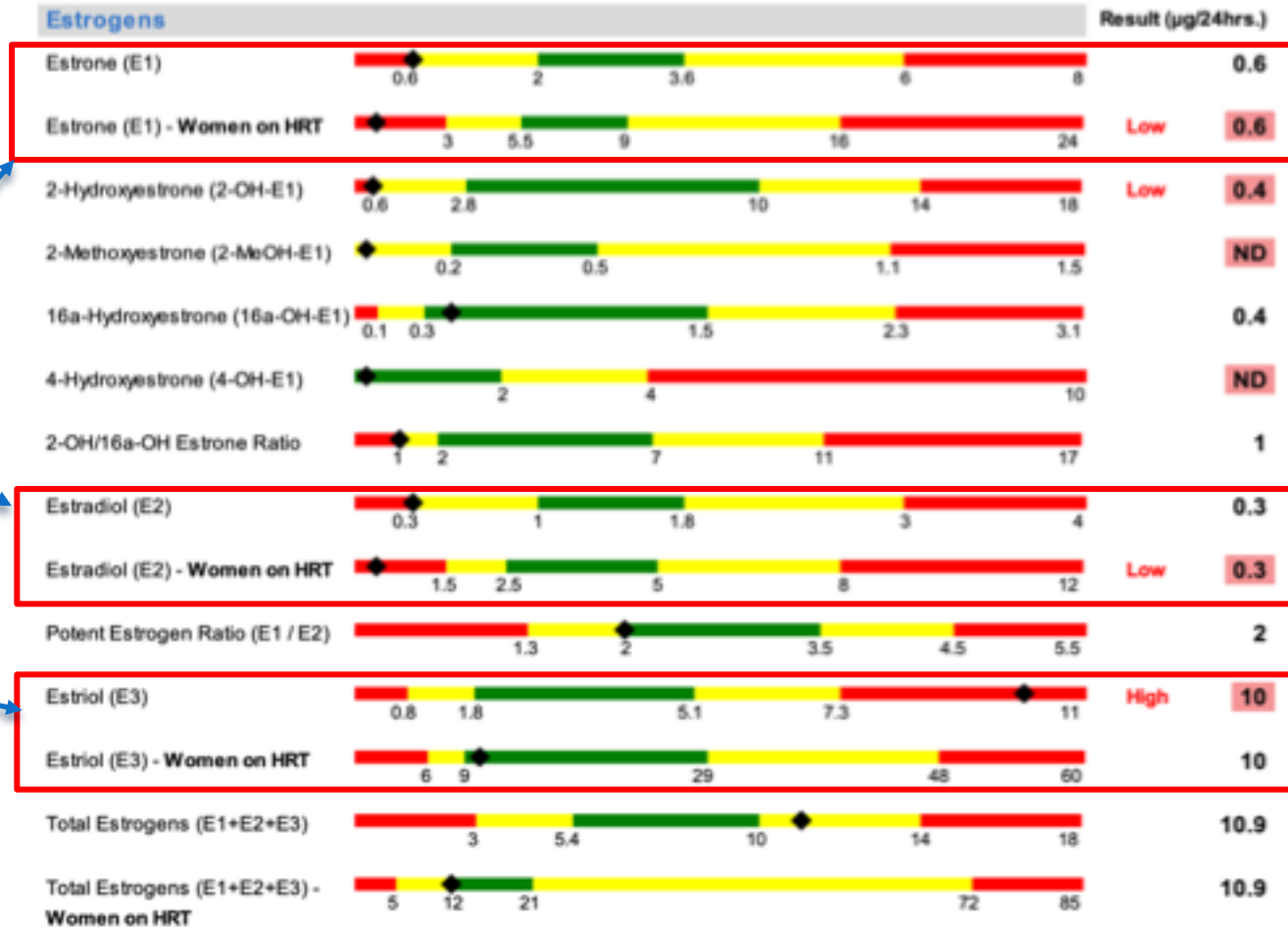
57 y.o. Female

When a post-menopausal female is receiving Estriol (E3) hormone therapy, does that affect levels of Estrone (E1) and Estradiol (E2)?

57 y.o. Post-M Female: E3 affects on E1 & E2

Results:

- Tx only with **E3**, applied intravaginally
- **E1 & E2**: Potent estrogens are at baseline for this Post-M female
- **E3**: Present in significant amounts d/o therapy she is receiving.
 - E3 not converted back to E1 or E2

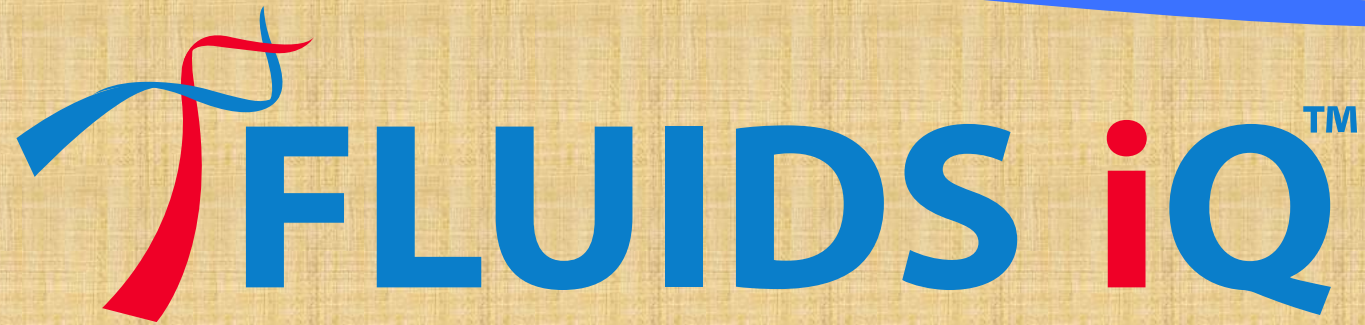


57 y.o. Post-M Female: E3 affects on E1 & E2

Results:

- Low levels of T, DHT & Androstanediol
- Low Androsterone & Etiocholanolone in line with low T & Androstanediol, which is a sensitive marker for DHT, since DHT levels in women are often not detectable





24 hr Comprehensive Urine Hormone Profile

**Frequently Encountered Issues
and Questions**