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CONTRIBUTING FACTORS

Next to each arrow on the steroid pathway chart is the name of the protein responsible for moving each hormone further downstream.

These proteins are important because they can be targeted with lifestyle changes and supplementation to improve symptoms associated hormone imbalances.

Use the corresponding number next to a protein to find the list of contributing factors that may be affecting the results of a DUTCH Test.



LEARN MORE

Scan the QR code for access to our references and additional information.

1 3b-HSD

May be increased by: Fenugreek¹, high ACTH/hyperadrenalism², PCOS³.

May be decreased by: Isoflavonoids/phytoestrogens⁴, phthalates, organochlorines, BPA⁵, ketoconazole⁵, finasteride, dutasteride.

2 11b-HSD

May push to cortisone: EGCG²⁰, PCOS⁸, curcumin²¹, 7-keto-DHEA¹⁹, progesterone¹⁹, coffee²², holy basil²³, bitter melon²⁴, hyperthyroidism^{19, 26}, high estrogens¹⁹, glucocorticoids¹⁹.

May push to cortisol: Insulin resistance, obesity⁶, inflammation¹⁸, hypothyroidism²⁵, licorice root¹⁹, phthalates, organotins, alkylphenols¹⁹, mother's diet during pregnancy¹⁹.

3 17b-HSD

May be increased by: Rutin³⁹, alcohol⁴¹, abdominal obesity⁴², bioflavonoids⁴³.

May be decreased by: Licorice^{4, 34, 35}, apigenin^{4, 38}, phytoestrogens^{4, 43}, atrazine⁴⁵.

4 17-HYDROXYLASE

May be increased by: Hyperglycemia²⁷, hyperinsulinemia²⁸.

May be decreased by: Ketoconazole²⁹, spironolactone³⁰, apigenin, polyphenols^{31, 32}.

5 17, 20 LYASE

May be increased by: PCB exposure³³, DHEA supplements⁷, obesity³⁴.

May be decreased by: Licorice root^{34, 35}, spironolactone³⁷, azole antifungals³⁸, hyperglycemia²⁷, apigenin^{31, 38}.

6 DHEA & DHEA-S

DHEA converts to DHEA-S with hydroxysteroid sulfotransferase while DHEA-S converts to DHEA with steroid sulfatase; these interconvert in different locations within the body.

DHEA-S may be increased by: Spironolactone⁸⁴, dexamethasone⁸⁵, bile acid⁸⁶, St. John's Wort⁸⁴, forskolin⁸⁷.

DHEA-S may be decreased by: Low cysteine⁸⁸, inflammation⁸⁸, LPS⁸⁹, ketoconazole⁸⁸, progesterin⁸⁸, licorice⁹⁰.

7 5a-REDUCTASE & 5b-REDUCTASE

5a-Reductase is best known because it makes androgens like testosterone more potent. It is also responsible for metabolizing progesterone and cortisol. If up-regulated, it may cause high androgen symptoms in men (thinning hair, prostate) and women (as in PCOS, thinning hair, acne, facial hair growth). 5b-Metabolites are less androgenic (weaker). 5b-Reductase may be affected by some of the listed things for 5a as well (often to a lesser degree). This same enzyme also metabolizes cortisol, see 8 for more detail.

5a may be increased by: Insulin resistance and obesity⁶, DHEA supplementation⁷, PCOS⁸.

5a may be decreased by: Saw palmetto and beta-sitosterol⁹, reishi¹⁰, nettle root¹¹, pygeum africanum¹², PUFA and EGCG¹³.

5b may be increased by: Insulin resistance, high triglycerides¹⁴, PCOS¹⁵.

5b may be decreased by: Licorice¹⁶.

8 CORTISOL METABOLISM/CLEARANCE

Cortisol is metabolized by 5a/5b-reductase (and 3a-HSD) to a/b-THF & THE for excretion. This same enzyme metabolizes testosterone, androstenedione, and progesterone, see 7 for more detail.

May be increased by: Obesity, high insulin and hyperthyroid.

May be decreased by: Hypothyroidism, anorexia, cholestasis, or poor liver function.

9 COMT

May be increased by: SAM-e, magnesium, choline, B⁶, B¹², folate, betaine/TMG (cofactors).

May be decreased by: Estradio⁸⁰, phthalate esters⁸¹, rhodiola rosea, quercetin, catechin and epicatechin⁸³.

10 AROMATASE (CYP-19)

May be increased by: Obesity and inflammation⁴⁶, high insulin⁴⁷, forskolin⁴⁸, quercetin, genistein (bioflavonoids)⁴⁹, white peony and licorice root⁵⁰, atrazine⁵¹, rutin³⁹.

May be decreased by: Enterolactone, apigenin, genistein, chrysin and other flavonoids⁵², white button mushrooms⁵³, grape seed extract, red wine procyanidin dimers⁵⁵, PCOS⁵⁶, antifungal medications⁵⁷, metformin⁵⁸, glyphosate⁵⁹, aromatase inhibitors (letrozole, anastrozole).

11 CYP-3a4

Many common medications induce CYP3A4, including but not limited to, phenobarbital, phenytoin, rifampicin, and glucocorticoids.

Many common medications interfere with or competitively inhibit CYP3A4, including but not limited to, cimetidine, tamoxifen, quinolones, and fluoxetine.

May be increased by: St. John's Wort⁷⁴, pesticides⁷⁵, caffeine⁶², smoking⁶², PAHs⁷⁴, moderate alcohol consumption⁶⁸, obesity⁶⁸.

May be decreased by: Grapefruit⁶⁰, resveratrol⁶⁰, rosemary⁶⁵, wild yam⁷⁷, peppermint oil⁷⁸, azole antifungals⁷⁹.

12 CYP-1b1

May be increased by: Inflammation⁷⁰, smoking⁷¹, PAHs⁶⁹.

May be decreased by: Flavonoids⁷³, resveratrol⁷¹.

13 CYP-1a1

May be increased by: Cruciferous vegetables⁶⁰, DIM/IC³⁶¹, caffeine⁶², soy⁶³, fish oil⁶⁴, rosemary extract⁶⁵, thyroxine⁶⁶, flaxseed⁶⁷.

May be decreased by: High sugar diet⁶⁷, moderate alcohol consumption⁶⁸, resveratrol and pterostilbene⁶⁹.