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TREATMENT GUIDE

First Edition

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PRECISION ANALYTICAL INC.
CREATORS OF THE DUTCHTEST®

DUTCH Treatment Guide

This guide contains general information about treatment considerations and is not medical or treatment advice. This guide is not exhaustive. It is provided as an information resource only and should not be used or relied on for any diagnostic or treatment purposes. This medical information is for medical practitioners only and is not intended for patient education.

Please keep in mind this is not a protocol-driven guide. Functional medicine is about evaluating each patient individually, and tailoring a program based on their history, symptoms, causation, lifestyle, testing results, and needs. In most cases, other lab tests (thyroid hormones, CBC, CMP, vitamin D, etc.) besides the DUTCH Test will also be incorporated into the evaluation.

Moreover, research is dynamic. Some of the treatment considerations have a great deal of data behind them, while others are limited to a study or two. As a result, practitioners should do their own due diligence and research appropriately for their patients.

Any information and statements regarding dietary or herbal supplements have not been evaluated by the Food and Drug Administration (FDA) and are not intended to diagnose, treat, cure, or prevent any disease. We have chosen not to provide dosage ranges due to differences in forms (i.e. R-ALA vs. ALA), delivery methods (capsules, pills, tablets, lozenges, tinctures, etc.), extraction methods (for herbal medicines), and variability in dose recommendations depending on the condition being treated.

Please keep yourself and others safe. Exercise due diligence before recommending any supplements or herbs. Be aware of indications, contraindications, pharmacology, administration, therapeutic dosing vs. excessive (toxic) dosing, signs and symptoms of toxicity, interactions, adverse effects, and warnings.

Cover, illustrations, and book design by Catalina Soleil.

Edited by Kelly Ruef, Jaclyn Smeaton, Debbie Rice, Hilary Miller, and Mark Newman.

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Precision Analytical Inc.
3138 NE Rivergate St.
McMinnville, OR 97128

www.dutchtest.com

Introduction

The DUTCH Treatment Guide has been created to assist you in your evaluation of support considerations for patients based on comprehensive hormone analyses like the DUTCH Test®. This document has separate guides for families of hormones and their metabolites –progesterone, estrogen, testosterone, DHEA, and cortisol – and for DUTCH organic acids.

This guide is intended to be used in combination with the DUTCH Interpretive Guide, the DUTCH Mini Guides, and other DUTCH educational resources. We recommend using the DUTCH Interpretive Guide first to interpret the DUTCH Test results and learn about underlying causes (e.g., of low progesterone, high estrogen, high CAR, etc.). Then use the DUTCH Mini Guides and DUTCH Treatment Guide to evaluate support considerations.

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Progesterone

LOW PROGESTERONE IN FEMALES

In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for low progesterone in females include:

GABA Support

Alpha progesterone metabolites modulate GABA receptors. Therefore, when progesterone is low, some females report issues with sleep, anxiety, and irritability. Consider supporting GABA with:

- GABA
- Honokiol/Relora®
- L-theanine
- Vitamin B6
- See **page 57** for more GABA support considerations

HPA Axis Support

See the Cortisol section, starting on **page 32**.
Consider adaptogens that are:

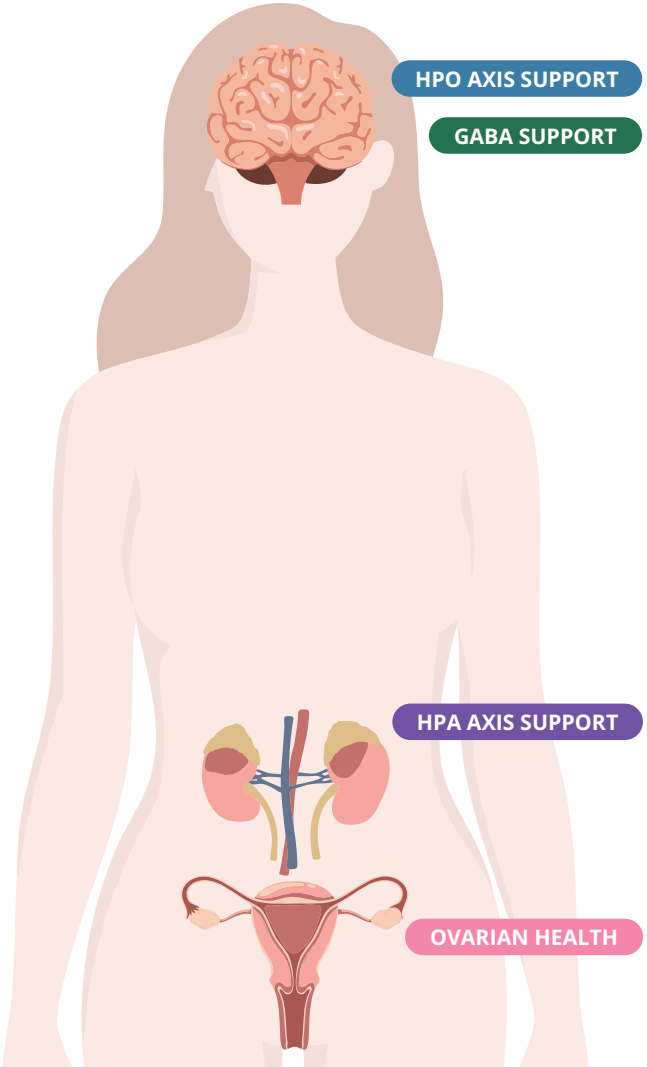
- HPO axis supportive
- Antioxidant-rich
- Anti-inflammatory
- GABA supportive
- See **page 36** for a list of adaptogenic herbs

Ovarian Health Support (Cycling Females)

- 5-MTHF
- Antioxidants - see **page 53**
- EPO/Borage oil
- Lutein/Lycopene
- Mitochondrial support
- Myo-inositol
- Minerals: Se, Mg, Zn, Iodine
- Omega-3 fatty acids
- Vitamins A, C, E
- See **page 59** for more ovarian health support considerations

HPO Axis Support (Cycling Females)

- Modulate LH/FSH: chaste tree berry, maca, etc.
- Treat energy deficit from anorexia, low calorie intake, low body weight, and/or extreme exercise.
- Optimize nutrition: B vitamins, choline, inositol, vit. D, and Zn.
- Reduce stress and support parasympathetic activity. See **page 63**.
- Optimize sleep and the circadian rhythm. See **page 60**.
- Consider phytoestrogen and phytoprogestogen support.
- Treat hyperprolactinemia. See **page 52**.
- Treat hypothyroidism. See **page 52**.
- Treat PCOS and metabolic disease.
- Avoid endocrine disrupting chemicals (EDCs). See **page 51**.
- Consider oil, seed, or herbal (i.e., biphasic tinctures) cycling.



Other considerations for low progesterone in females

Correct insulin resistance. See **page 54**.
Consider hormone therapy (HT), if appropriate. See the DUTCH HT Female Dosing Guide on **page 72**.

High Progesterone in Females and Males

The most common reason for elevated urinary progesterone metabolites in females and males is due to progesterone hormone therapy, however, oral pregnenolone can also increase these metabolites. See the DUTCH Interpretive Guide for signs and symptoms of high progesterone and potential root causes.

Cycling Females: High progesterone in cycling females is ***likely normal and not a concern*** and without other hormones being out of balance, is probably a benign finding. However, if symptoms of high progesterone are present, consider the following:

- If progesterone is high and PMS/mood issues are present, consider magnesium, vitamin B6, correcting insulin resistance (see **page 54**). reducing inflammation (see **page 53**), and reducing stress (see **page 63**).
- If progesterone is high and PMDD is present, consider 5a-reductase blockers (see **page 21** for a list) or oral progesterone in the luteal phase, along with the considerations above for PMS/mood issues.
- If progesterone is high and bloating and breast tenderness are present, consider decreasing water retention (reduce dietary intake of salt, caffeine, and fat, stay hydrated, consider a plant-based diet, engage in regular exercise, vitamin B6, magnesium, natural diuretics), and decreasing estrogen if elevated (see **page 14**).
- If progesterone is high with an immune/allergy presentation, consider decreasing estrogen if elevated (see **page 14**), supporting cortisol if low (see **page 38**), and utilizing immune modulating herbs (see **page 37**) and antihistamine supports (nettle leaf, ginger, quercetin, vitamin C, bromelain, luteolin).
- If progesterone is high and estrogen is low, support estrogen (see **page 10**).
- If progesterone is high and cortisol is high, decrease cortisol (see **page 38**) and reduce stress (see **page 63**).

Males and Postmenopausal Females: Besides progesterone and pregnenolone hormone therapy, high progesterone metabolites in males and postmenopausal females may be due to acute stress. Consider addressing any abnormal adrenal results and reducing stress (see **page 63**).

Phytoestrogens
(to modulate estrogen receptor activity in cycling females)

Phytoestrogenic herbs can be used when estrogen is low, and also when estrogen is high. They primarily bind Erβ receptors that increase estrogen activity when estrogen is low, but lower excessive estrogen activity and promote estrogen detoxification when estrogen is high.

- Alfalfa
- Dong quai
- EPO or borage oil
- Fennel
- Fenugreek
- Flaxseeds
- Fo-ti
- Gamma oryzanol
- Licorice[1]
- Red clover
- Resveratrol
- Sage
- Soy isoflavones

Phytoprogestogens
(to support progesterone in cycling females)

- Blue cohosh
- Chaste tree berry
- Fenugreek
- Sarsaparilla
- Wild Yam
- Yucca

LOW PROGESTERONE IN MALES

In males the effect of low progesterone is not well understood. It is plausible that low progesterone may signal low overall adrenal production and/or low testicular progesterone production.

Potential support considerations for low progesterone in males include:

- Hypothalamic-Pituitary-Testicular (HPT) axis support. See **page 18**.
- Gonadal support. See **page 18**.
- HPA axis support. See the Cortisol section in part 3 starting on **page 32**.

Low Estrogen

LOW ESTROGEN IN CYCLING FEMALES

In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for low estrogen in cycling females include:

HPO Axis Support

- Address PCOS, if present.
- Modulate LH/FSH: chaste tree berry, maca, etc.
- Consider oil, seed, or herbal (i.e., biphasic tinctures) cycling.
- Treat energy deficit from anorexia, low calorie intake, low body weight, and/or extreme exercise.
- Optimize nutrition: B vitamins, choline, inositol, vit. D, and Zn.
- Consider phytoestrogen and phytoprogestogen support.
- Reduce stress and support parasympathetic activity. See **page 63**.
- Optimize sleep and the circadian rhythm. See **page 60**.
- Treat hyperprolactinemia. See **page 52**
- Treat hypothyroidism. See **page 52**.

HPA Axis Support

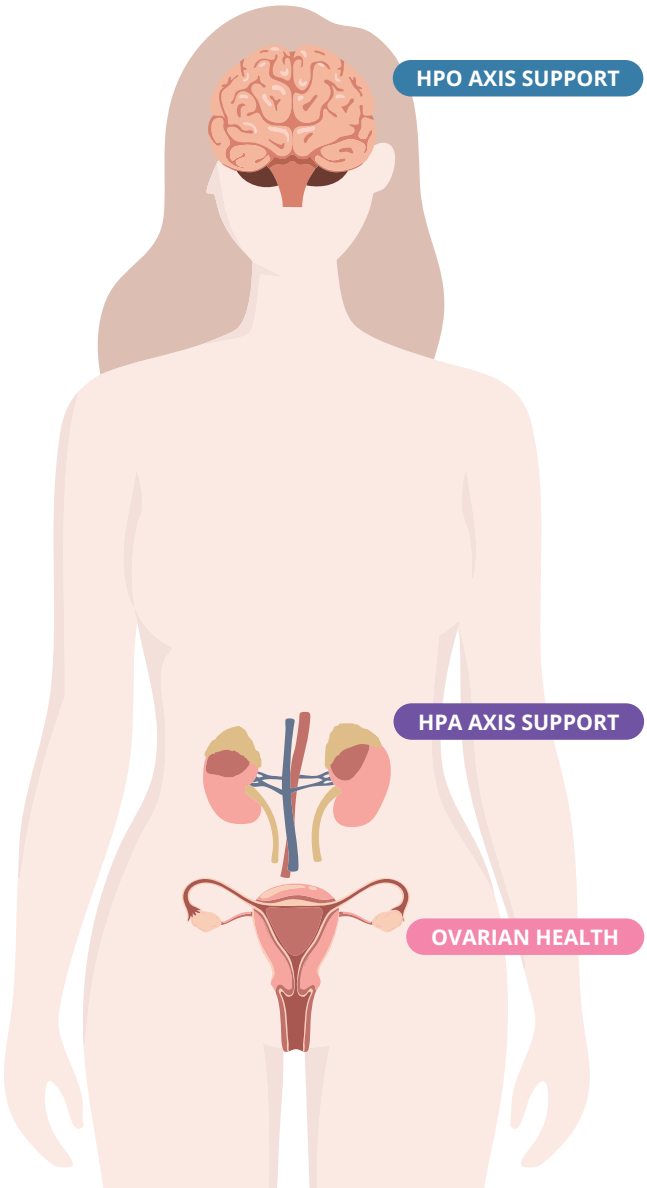
See the Cortisol section, starting on **page 32**

Consider adaptogens that are:

- HPO axis supportive
- Phytoestrogenic
- Mood supportive
- See **page 36** for a list of adaptogenic herbs

Ovarian Health Support

- 5-MTHF
- Antioxidants (see **page 53**)
- EPO/Borage oil
- Lutein/Lycopene
- Mitochondrial support
- Myo-inositol
- Omega-3 fatty acids
- Minerals: Se, Mg, Zn, Iodine
- Vitamins A, C, E
- See **page 59** for more ovarian health support considerations



Support Systems Negatively Affected When Estrogen is Low

Consider the following:

- Mood and cognition support
- Cardiovascular support
- Bone support
- Hot flash and vaginal dryness support
- See **page 13** for more information

Other considerations for low estrogen in cycling females

- Improve low androgens. See "Low Testosterone in Females" on **page 16** and Low "DHEA in Females and Males" on **page 24**.
- Correct insulin resistance. See **page 54**
- Upregulate aromatase activity if androgens are high. See **page 21**.
- Consider hormone therapy (HT) if appropriate. See the DUTCH HT Female Dosing Guide on **page 72**.

Phytoestrogens
(to modulate estrogen receptor activity in cycling females)

Phytoestrogenic herbs can be used when estrogen is low, and also when estrogen is high. They primarily bind Erβ receptors that increase estrogen activity when estrogen is low, but lower excessive estrogen activity and promote estrogen detoxification when estrogen is high.

- Alfalfa
- Dong quai
- EPO or borage oil
- Fennel
- Fenugreek
- Flaxseeds
- Fo-ti
- Gamma oryzanol
- Licorice[1]
- Red clover
- Resveratrol
- Sage
- Soy isoflavones

Phytoprogestogens
(to support progesterone in cycling females)

- Blue cohosh
- Chaste tree berry
- Fenugreek
- Sarsaparilla
- Wild Yam
- Yucca

Low Estrogen cont.

LOW ESTROGEN IN MALES AND POSTMENOPAUSAL FEMALES

In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for low estrogen in postmenopausal females and males include:

HPA Axis Support

Note that HPA axis support in postmenopausal females may help to bring estrogen into the postmenopausal range but will not raise it above the postmenopausal range. Estradiol hormone therapy may be needed to raise estradiol (E2) above the postmenopausal range.

- Correct HPA axis dysfunction. See the Cortisol section, starting on **page 32**.
- Reduce stress and support parasympathetic activity. See **page 63**.
- Optimize sleep and the circadian rhythm. See **page 60**.
- Correct insulin resistance. See **page 54**.
- Consider adaptogens that are:
  - Phytoestrogenic
  - Mood supportive
  - Androgen supportive (if low androgens)
  - See **page 36** for a list of adaptogenic herbs

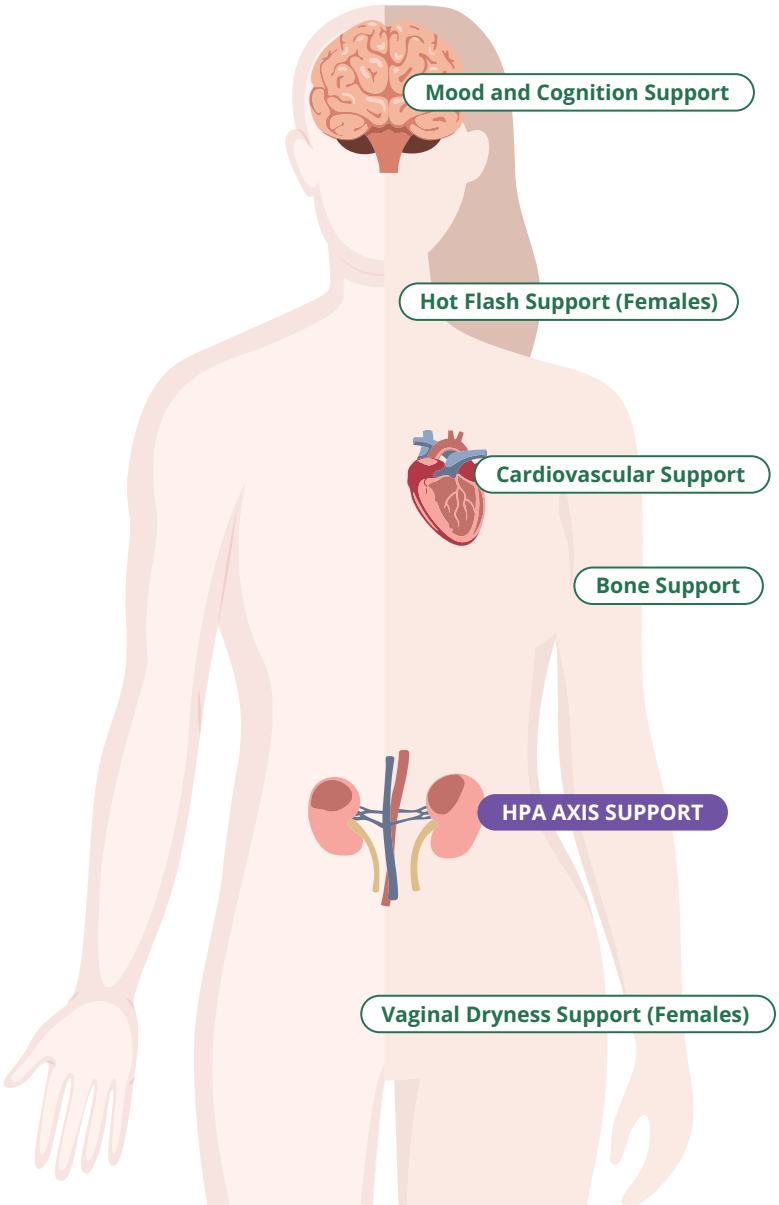
Other considerations for low estrogen in postmenopausal females and males

- Support low androgens.
  - See "Low Testosterone in Females" on **page 16**.
  - See "Low Testosterone in Males" on **page 18**.
  - See "Low DHEA in Females and Males" on **page 24**.
- Upregulate aromatase activity if androgens are high. See **page 21**.
- Consider hormone therapy (HT) if appropriate. See the DUTCH HT Female and Male Dosing Guides on **pages 72-73**.
- Avoid endocrine disrupting chemicals (EDCs). See **page 51**.

Phytoestrogens
(to support estrogen receptor activity)

Phytoestrogenic herbs can be used when estrogen is low, but also when estrogen is high. They primarily bind Erβ receptors that increase estrogen activity when estrogen is low, and lower excessive estrogen activity and promote estrogen detoxification when estrogen is high.

- Alfalfa
- Dong quai
- Fennel
- Fenugreek
- Flaxseeds
- Fo-ti
- Gamma oryzanol
- Licorice[1]
- Red clover
- Resveratrol
- Sage
- Soy isoflavones



Support Systems Negatively Affected by Low Estrogen and Low Androgens

Consider the following:

Mood and Cognition Support

See **page 57** for support considerations.

Cardiovascular Support

- B vitamins
- Butcher's broom
- Ca, K, Mg
- CoQ10
- D3/K2
- Fish oil
- Ginkgo
- Hawthorne
- L-carnitine
- Polyphenols
- Resveratrol
- Vitamin E

Bone Support

- B vitamins
- B, Mn, S, Si, Sr, V
- Black cohosh
- Ca, Mg, P
- Collagen/Cyplexinol®
- Comfrey
- D3/K2
- Glucosamine
- Horsetail
- Hydroxyapatite
- Nettle leaf
- Oatstraw
- Zn, Cu

Hot Flash Support (Females)

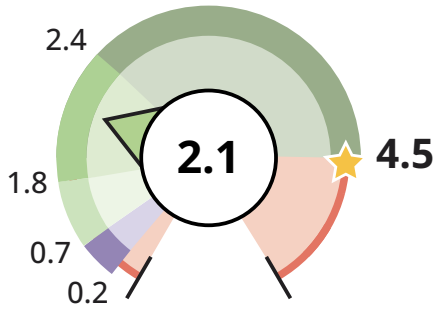
- Black cohosh
- Chaste tree berry
- Dong quai
- Hops
- Maca
- Milk thistle
- Rhapontic rhubarb
- St. John's wort[4]
- Vitamin E

Vaginal Dryness Support (Females)

- Calendula
- Hyaluronic acid
- Vitamin D
- Vitamin E

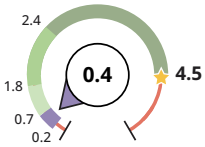
Estradiol Hormone Therapy for Postmenopausal Females

Estradiol Dial Modified to Include Observed Ranges for Females on Transdermal (TD) Estrogen Therapy (ET)

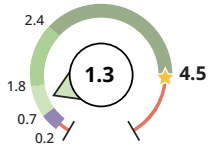


Estradiol (E2)

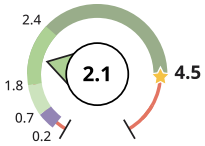
- Results within **High**-Dose ET range *(0.1mg patch or gel/cream equivalent)*
- Results within **Mid**-Dose ET range *(0.05mg patch or gel/cream equivalent)*
- Results within **Low**-Dose ET range *(0.025mg patch or gel/cream equivalent)*
- Results within **No**-Dose ET range *(traditionally postmenopausal)*
- Results out of range



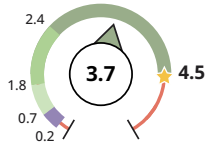
Estradiol (E2)
PMP Range



Estradiol (E2)
Low ET Range



Estradiol (E2)
Mid ET Range



Estradiol (E2)
High ET Range

Note that women with a uterus who are on estrogen therapy must also use concurrent progesterone therapy to protect against endometrial hyperplasia and cancer. See the DUTCH HT Female Dosing Guide on **page 72**.

High Estrogen

HIGH ESTROGEN IN FEMALES AND MALES

In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for high estrogen in females and males include:

HPO AXIS SUPPORT FOR CYCLING FEMALES

- Correct insulin resistance. See **page 54**.
- Encourage weight loss if appropriate. See **page 58**.
- Increase movement and exercise if sedentary.
- Reduce inflammation. See **page 53**.
- Reduce stress and support parasympathetic activity. See **page 63**.
- Optimize sleep and the circadian rhythm. See **page 60**.
- Support low luteal progesterone. See **page 8**.
- Treat elevated LH/FSH ratio (if found on serum testing): myo-inositol, berberine, etc.
- Avoid endocrine disrupting chemicals (EDCs). See **page 51**.

HPA Axis Support

- See the Cortisol section, starting on **page 32**.
- Consider adaptogens that are:
  - Blood sugar balancing
  - Anti-inflammatory and antioxidant-rich, especially if the 4-OH phase 1 metabolites are elevated
  - Phytoestrogenic
  - See **page 36** for a list of adaptogenic herbs
- Treat hyperprolactinemia to lower adrenal overproduction of androgens. See **page 52**.

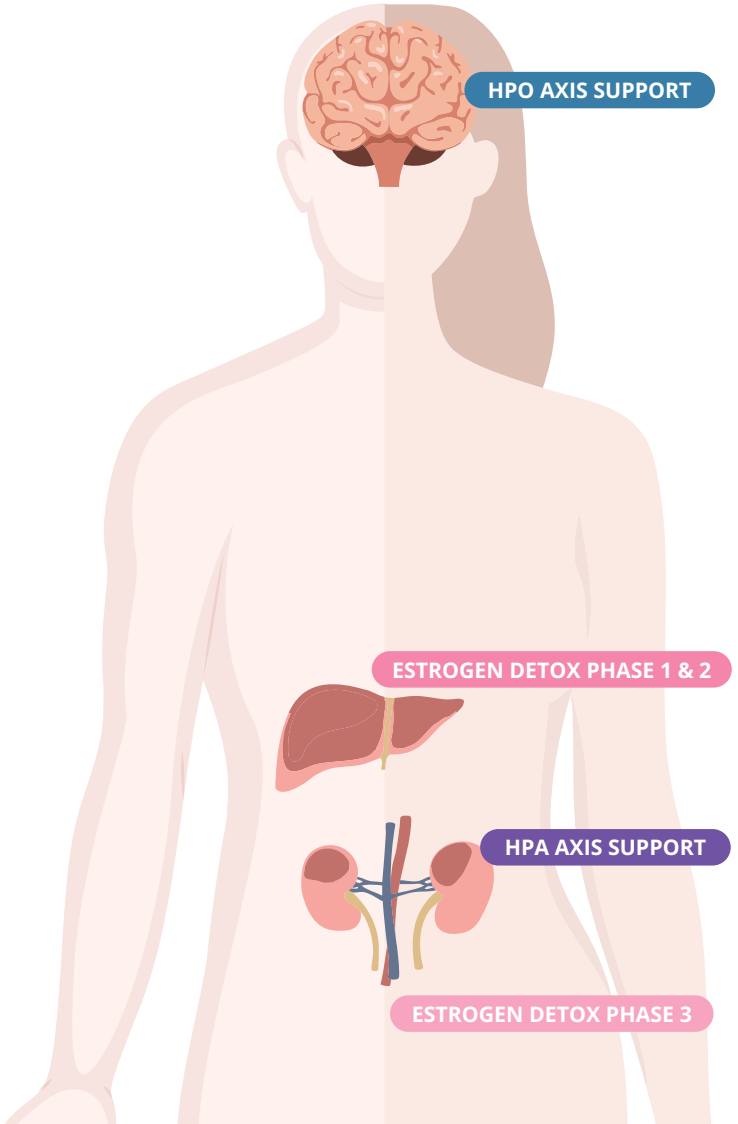
Estrogen Detox Phase 1 and 2 Support

- Phase 1 Support: if 4-OH preference, 16-OH preference, or low 2-OH - see **page 27**.
- Phase 2 Support: sulfation and glucuronidation (see **page 29**), methylation (see **page 30**), and glutathione conjugation (see "Support Glutathione" on **page 45**).
- Consider supporting overall liver function - see **page 55**.

Estrogen Detox Phase 3 Support

(Especially when accompanied by high indican, high B-glucuronidase levels in stool, and/or constipation, etc.)

- Increase physical activity
- Increase dietary fiber
- Eliminate dysbiosis and utilize Lactobacillus and Bifidobacterium probiotics
- Calcium-d-glucarate
- Ground flaxseeds
- Milk thistle
- See "Phase 3 Detoxification" on **page 27** for more information
- Consider supporting overall liver function - see **page 55**.



Decrease Androgens if Elevated

- Myo-inositol
- R-ALA (R-alpha lipoic acid)
- Sulforaphane
- See “High Testosterone in Females” on **page 20**
- See “High Testosterone in Males” on **page 21**
- See “High DHEA in Females and Males” on **page 22**

Lifestyle

- Lower stress and support parasympathetic activity. See **page 63**.
- Correct insulin resistance. See **page 54**.
- Encourage weight loss if appropriate. See **page 58**.
- Lower inflammation. See **page 53**.

Other considerations for high estrogen in females and males

- Support 17b-HSD Type 2 activity, which converts estradiol to estrone by improving luteal progesterone levels in cycling females. See “Low Progesterone in Females” on **page 8**.
- Decrease 17b-HSD Type 1 activity, which converts estrone to estradiol with Apiaceous vegetables (carrots, celery, parsley, parsnips, cumin, etc.) and avoiding a high carbohydrate diet.
- Downregulate aromatase, if androgens are low. See **page 19**.
- Consider phytoestrogens to lower estrogen activity on ER-alpha receptors and support estrogen detoxification. See **page 59** for a list of phytoestrogens.
- Progesterone therapy, if appropriate. See the DUTCH HT Female and Male Dosing Guides on **page 72**.
- Reduce exposure to xenoestrogens (e.g., BPA, phthalates, plastics, pesticides, etc.). See **page 51**.

Low Testosterone

LOW TESTOSTERONE IN FEMALES

In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for low testosterone in females include:

HPO Axis Support (Cycling Females)

- Treat energy deficit from anorexia, low calorie intake, low body weight, and/or extreme exercise.
- Optimize nutrition: B vitamins, choline, inositol, vit. D, and Zn.
- Reduce stress and support parasympathetic activity. See **page 63**
- Optimize sleep and the circadian rhythm. See **page 60**.
- Treat hyperprolactinemia. See **page 52**.
- Treat hypothyroidism. See **page 52**.
- In cycling females, if estrogen and progesterone are also low, consider phytoestrogen and phytoprogestogen support. See **page 59**.
- Avoid endocrine disrupting chemicals (EDCs). See **page 51**.

HPA Axis Support

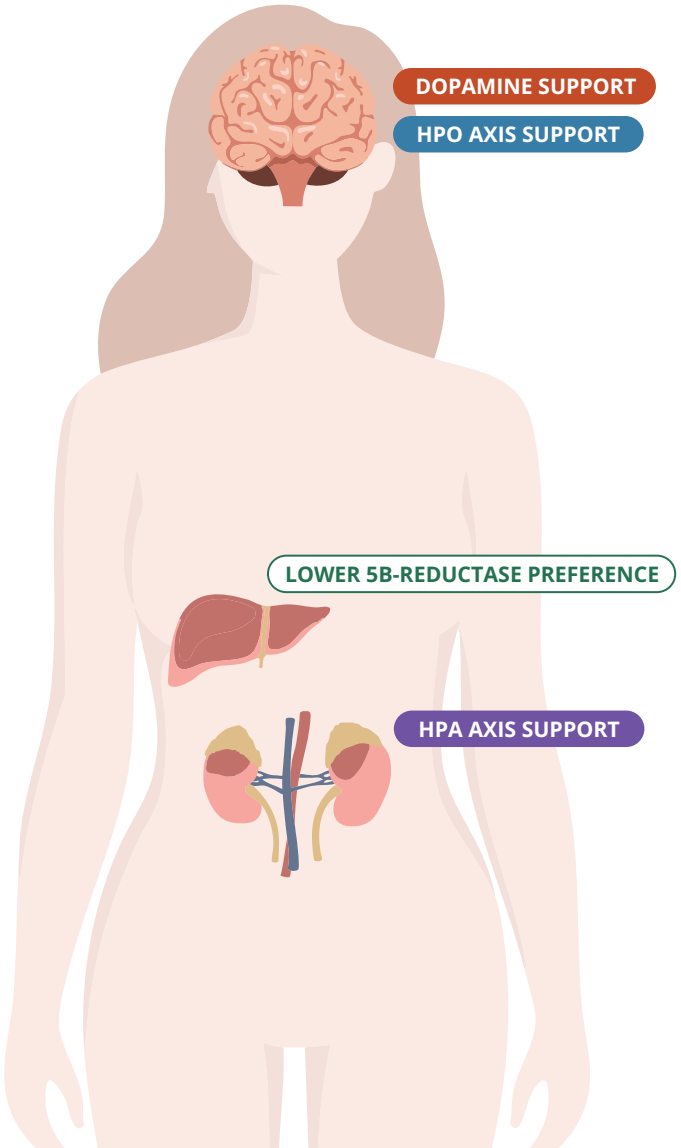
See the Cortisol section, starting on **page 32**.
Consider adaptogens that are:

- HPO axis supportive (cycling females)
- Androgen supportive
- Mood supportive
- See **page 36** for a list of adaptogenic herbs

Dopamine Support

Testosterone supports dopamine production. If symptoms of low dopamine, consider:

- Adequate dietary protein intake
- B vitamins
- D,L-phenylalanine (DLPA)[3]
- Mucuna[3] (contains L-DOPA)
- Tyrosine
- Vitamin C
- See Dopamine and Norepinephrine Support on **page 57**.



Lower 5b-Reductase Preference

If there is a 5b-reductase preference and alpha androgens are low (5a-DHT, 5a-androstanediol, androsterone), consider supporting a shift towards more 5a-reductase activity.

Support 5a-Reductase Activity

- Forskolin
- High intensity interval training (HIIT)
- Pine pollen
- Weight resistance exercises

Avoid 5a-Reductase Blockers

- Beta-sitosterol
- EGCG from green tea
- PUFAs
- Pygeum
- Reishi mushroom
- Saw palmetto
- Stinging nettle root
- Address zinc deficiency
- Rx: Finasteride[6]

Decrease SHBG if elevated

As SHBG binds testosterone and inactivates it, decreasing SHBG can increase the amount of free, active testosterone in circulation.

- Be aware of states that increase SHGB: HIV, liver disease, hyperthyroidism, high estrogen and oral estrogen, anticonvulsants, low testosterone, age, smoking, etc.
- Avoid oral or sublingual estrogens, if appropriate.
- Consider boron supplementation to lower the affinity of testosterone for SHBG.
- Consume healthy carbohydrates in moderation.
- Minimize or avoid smoking and alcohol use.
- Treat hyperthyroidism and avoid overmedicating with thyroid hormones.

Improve Androgen Deficiency Symptoms

Note that these may improve androgen deficiency symptoms without necessarily increasing androgen levels.

- Damiana
- Korean ginseng
- L-arginine
- Maca
- Optimize protein intake for muscle maintenance
- Shilajit
- Tribulus
- Weightlifting/resistance training
- Yohimbe

Other considerations for low testosterone in females

- Support systems negatively affected by low estrogen and low androgens. See **page 13**.
- Slow down aromatase activity, if estrogen is high. See **page 19**.
- Consider DHEA and/or testosterone therapy, if appropriate. Base testosterone therapy dosing on serum testosterone results. See the DUTCH HT Female Dosing Guide on **page 72**.

Low Testosterone cont.

LOW TESTOSTERONE IN MALES

In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for low testosterone in males include:

HPT Axis Support

- Herbal and nutrient support:
  - Fenugreek
  - Indian coleus
  - Korean ginseng
  - Mucuna[3]
  - Shilajit
  - Tongkat ali
  - Tribulus
  - Vitamin D
  - Zn (balance Cu)
- Metabolic support:
  - Correct insulin resistance. See **page 54**.
  - Eat a low glycemic and whole foods diet.
  - Exercise regularly.
  - Maintain healthy body weight. See **page 58**.
- Lower stress and increase parasympathetic activity. See **page 63**.
- Optimize sleep and the circadian rhythm. See **page 60**.
- Decrease inflammation. See **page 53**.
- Treat thyroid disorders if present. See **page 52**.
- Treat hyperprolactinemia if present. See **page 52**.

Avoid endocrine disrupting chemicals (EDCs). See **page 51**.

HPA Axis Support

See the Cortisol section, starting on **page 32**.

Consider adaptogens that are:

- Androgen supportive
- Blood sugar balancing
- Mood supportive
- Anti-inflammatory

See **page 36** for a list of adaptogenic herbs

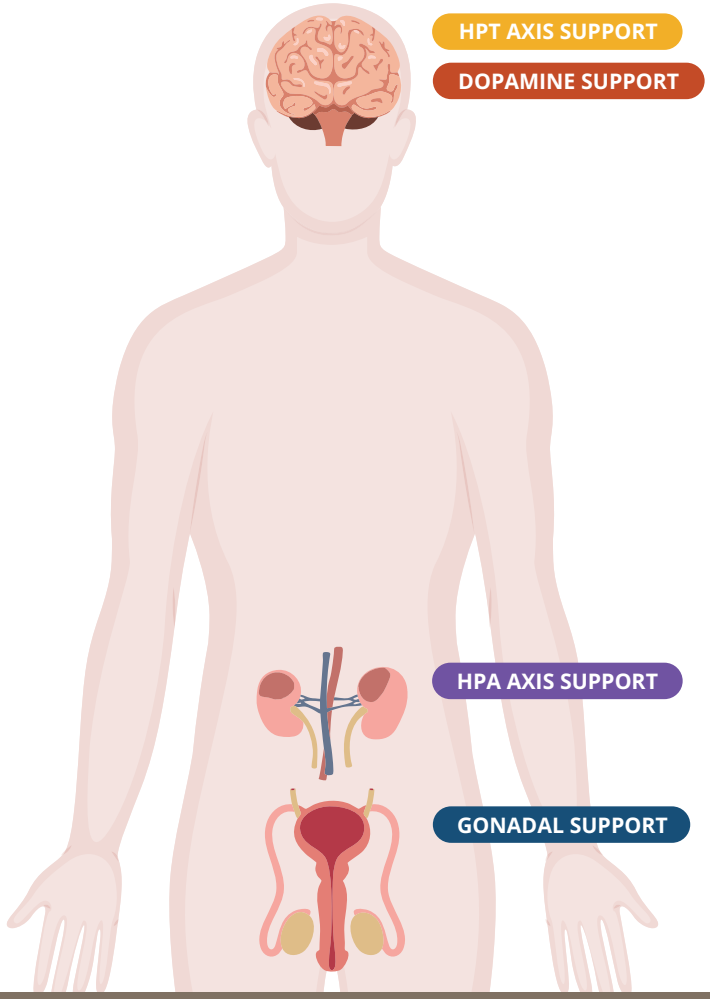
Dopamine Support

Testosterone supports dopamine production. If symptoms of low dopamine are present, consider:

- Adequate dietary protein intake
- B vitamins
- D,L-phenylalanine (DLPA)[3]
- Mucuna[3] (contains L-DOPA)
- Tyrosine
- Vitamin C
- See Dopamine and Norepinephrine Support" on **page 57**.

Gonadal Support

- Indian coleus
- Mucuna[3]
- Treat nutrient deficiencies



Improve Androgen Deficiency Symptoms

Note that these may improve androgen deficiency symptoms without necessarily increasing androgen levels.

- Exercise performance:
  - Korean ginseng
  - Maca
- Erectile function:
  - Arginine
  - Korean ginseng
  - Tribulus
  - Yohimbe
- Muscle mass:
  - Optimal protein consumption
  - Weightlifting

Downregulate Aromatase

Slow aromatase activity if estrogen is high.

- Apigenin
- Chrysin
- Damiana
- Enterolactone
- Genistein
- Grape seed extract (GSE)
- Normalize body fat percentage
- Red wine procyanidin dimers
- Resveratrol
- White button mushroom
- Rx: Anastrozole

Other considerations for low testosterone in males

- Decrease SHBG if elevated. See **page 17**.
- Support systems negatively affected by low estrogen and low androgens. See **page 13**.
- Consider phytoestrogens if estrogen is low. See **page 59**.
- Consider DHEA, testosterone, HCG, and/or clomiphene citrate, if appropriate. Base testosterone therapy dosing on serum testosterone results. See the DUTCH HT Male Dosing Guide on **page 73**.

High Testosterone

HIGH TESTOSTERONE IN FEMALES

In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for high testosterone in females include:

Calm the HPO Axis

- Reduce stress and support parasympathetic activity. See **page 63**.
- Correct insulin resistance (myo-inositol, etc.) See **page 54**.
- Encourage weight loss if appropriate. See **page 58**.
- Increase movement and exercise if sedentary.
- Reduce inflammation. See **page 53**.
- Optimize sleep and the circadian rhythm. See **page 60**
- Treat elevated LH/FSH ratio in cycling females (if found on serum testing): myo-inositol, berberine, etc.
- Avoid endocrine disrupting chemicals (EDCs). See **page 51**.

HPA Axis Support

See the Cortisol section, starting on **page 32**.
Consider adaptogens that are:

- Blood sugar balancing
- Anti-inflammatory
- Antioxidant-rich
- Mood supportive
- See **page 36** for a list of adaptogenic herbs

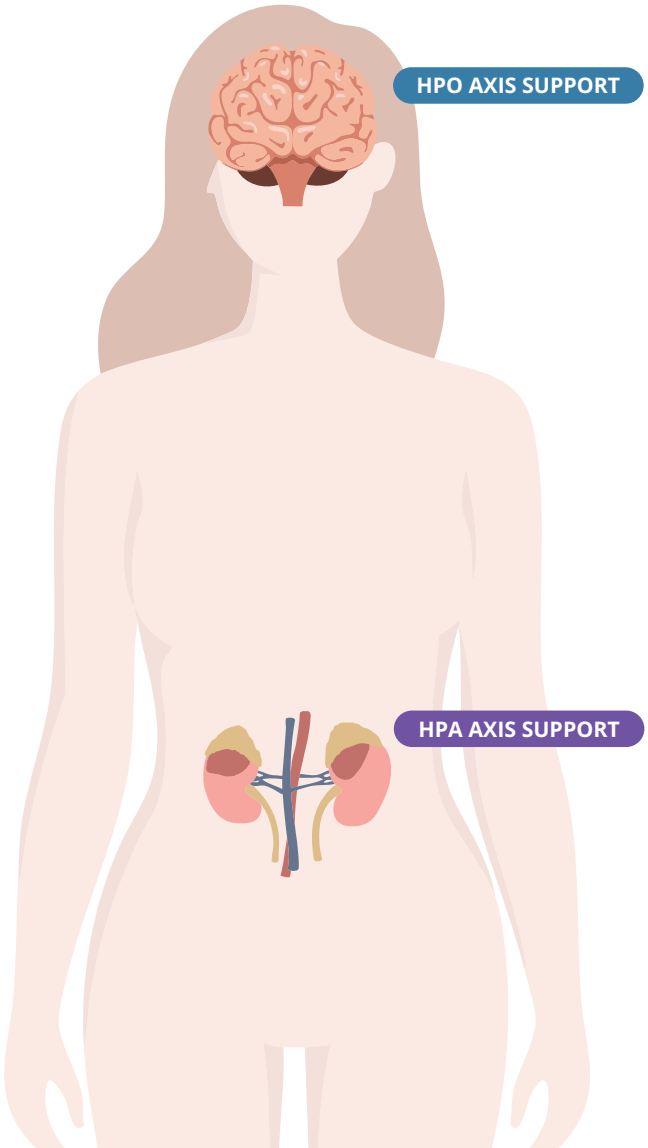
Treat hyperprolactinemia to lower adrenal production of androgens. See **page 52**.

Other considerations for high testosterone in females

- Decrease DHEA levels if elevated. See **page 22**.
- Avoid extreme exercise.

Improve Androgen Excess Symptoms

- See "Decrease 5a-Reductase Preference" on the next page
- Black cohosh
- Chamomile
- Chaste tree berry
- Cordyceps
- Licorice[1] if DHEA is elevated
- Rosemary
- Spearmint tea
- White peony
- Rx: Spironolactone



Decrease 5a-Reductase Preference

Decrease 5a-reductase activity if alpha metabolites are elevated (5a-DHT, 5a-androstanediol, androsterone).

- Use 5a-Reductase Blockers
  Note that 5a-reductase blockers may also lower a-pregnanediol levels.
  - Beta-sitosterol
  - EGCG from green tea
  - PUFAs
  - Pygeum
  - Reishi mushroom
  - Saw palmetto
  - Stinging nettle root
  - Zn (balance Cu)
  - Rx: Finasteride[6]
- Control Drivers of 5a-Reductase Activity
  - Correct insulin resistance. See **page 54**.
  - Encourage weight loss if appropriate. See **page 58**.
  - Reduce inflammation. See **page 53**.
  - Reduce stress and support parasympathetic activity. See **page 63**.

Increase Low SHBG

Sex hormone binding globulin (SHBG) binds free testosterone, inactivating it.

- Be aware of factors that lower SHBG: opioids, androgens, hypothyroidism, nephrotic syndrome, acromegaly, obesity (insulin resistance), PCOS, Cushing's disease, glucocorticoids, etc.
- Correct insulin resistance. See **page 54**.
- Encourage weight loss, if appropriate. See **page 58**.
- Eat a high fiber/low fat diet with low glycemic foods.
- Treat hypothyroidism. See see **page 52**.
- Increase moderate intensity aerobic exercise.
- Intermittent fasting if appropriate.
- Phytoestrogens that increase SHBG: isoflavones from kudzu, red clover, ground flaxseeds, soy, etc.

Upregulate Aromatase

Speed up aromatase activity if estrogen is low.

- Alpha lipoic acid (ALA)
- Forskolin
- Genistein
- Licorice[1]
- Myo-inositol
- Quercetin
- Rutin
- White peony

HIGH TESTOSTERONE IN MALES

Elevated endogenous testosterone in males may be normal, especially in young males. If there are hyperandrogenic symptoms associated with high 5a-reductase enzyme activity, consider lowering 5a-reductase activity. See "Decrease 5a-Reductase Preference".

DHEA

HIGH DHEA IN FEMALES AND MALES

In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for high DHEA in females and males include:

HPA Axis Support

See the Cortisol section, starting on **page 32**.

Consider adaptogenic herbs that are:

- Cortisol calming, if high cortisol
- Blood sugar balancing
- Anti-inflammatory
- Antioxidant-rich
- Mood supportive
- See **page 36** for a list of adaptogenic herbs

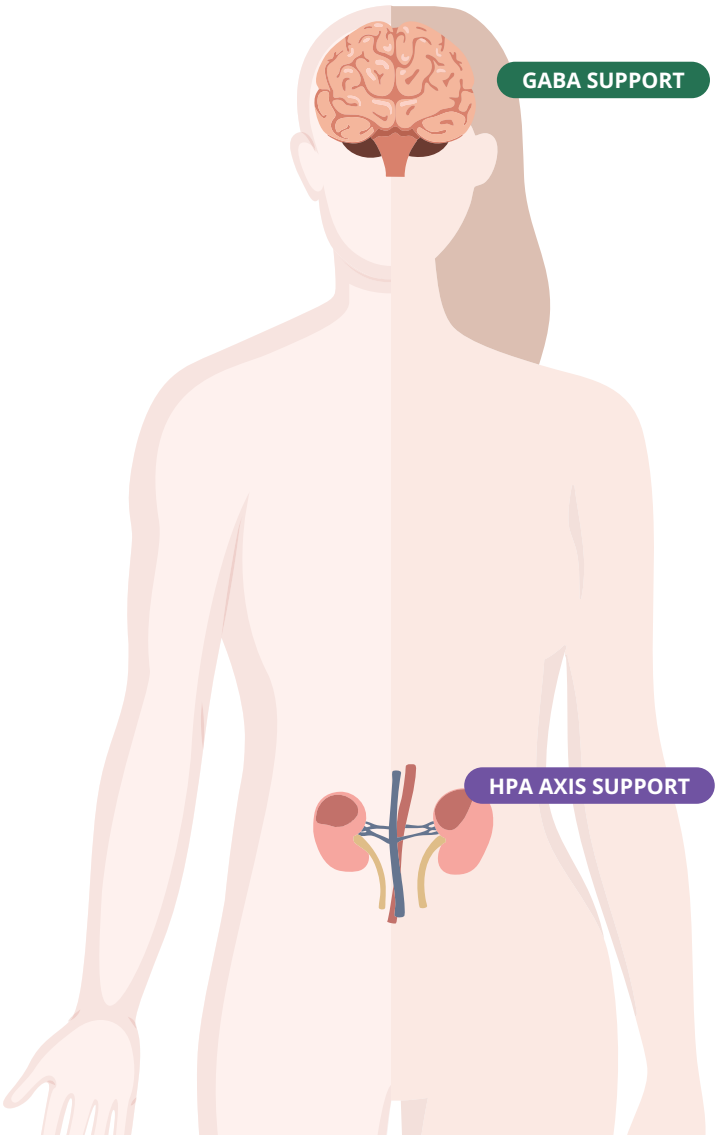
Other HPA Axis Support

- Correct insulin resistance - see **page 54**
- Reduce inflammation - see **page 53**
- Reduce stress and support parasympathetic activity - see **page 63**
- Manage acute and chronic pain
- Optimize sleep and the circadian rhythm - see **page 60**
- Treat hyperprolactinemia to lower adrenal production of androgens - see **page 52**
- Avoid endocrine disrupting chemicals (EDCs). See **page 51**.

GABA Support

Consider GABA support if high DHEA and high cortisol are due to sympathetic dominance (stress), especially if there are issues with sleep, irritability, and anxiety:

- GABA
- Honokiol/Relora©
- L-theanine
- Vitamin B6
- See **page 57** for more GABA support considerations



Body Weight and Exercise

- Avoid extreme exercise.
- Encourage weight loss if appropriate. See **page 58**.
- Increase movement and exercise if sedentary.

Improve Androgen Excess Symptoms

- Black cohosh
- Chamomile
- Chaste tree berry (females only)
- Cordyceps
- Licorice[1] if DHEA is elevated
- Lower 5a-reductase activity if alpha metabolites are dominant (5a-DHT, 5a-androstanediol, androsterone) - see **page 25**
- Rosemary
- Spearmint tea
- White peony
- Rx: Spironolactone

Other considerations for high DHEA in females and males

- Avoid caffeine, stimulants, and overmedication of thyroid hormones, which can all increase HPA axis activity.
- Decrease a 5a-reductase preference. See **page 25**.
- Increase low SHBG. See **page 21**.
- Upregulate "speed up" aromatase activity if estrogen is low. See **page 21**.

DHEA cont.

LOW DHEA IN FEMALES AND MALES

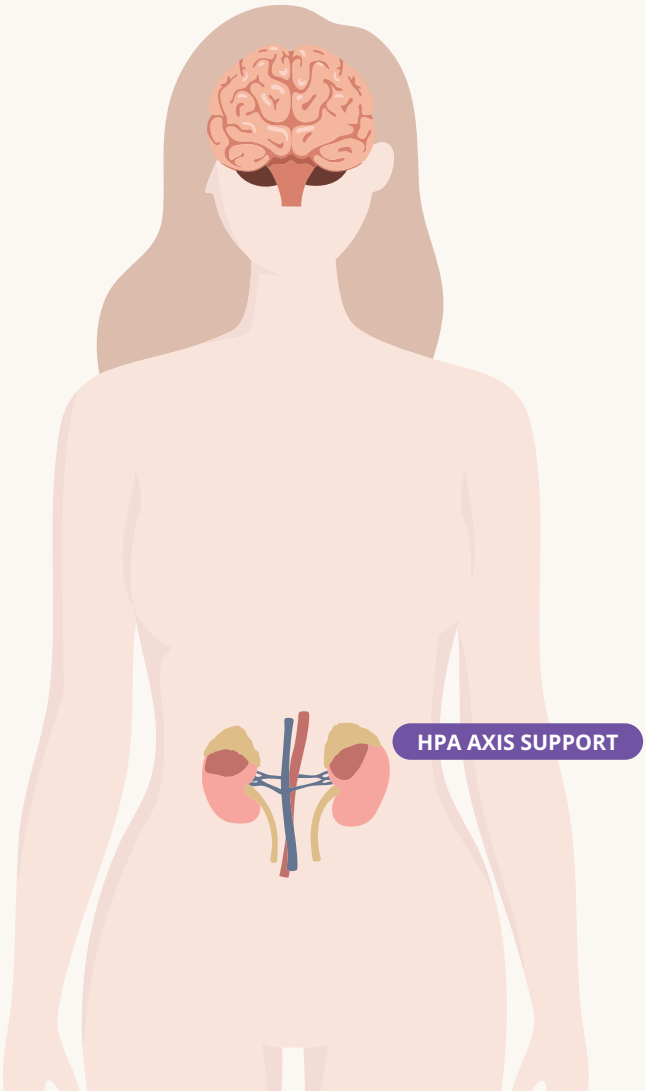
In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for low DHEA in females and males include:

HPA Axis Support

- See the Cortisol section, starting on **page 32**.
- Assess for HPA axis suppressive medications: glucocorticosteroids, opioids, budesonide inhalers, etc.
- Avoid endocrine disrupting chemicals (EDCs). See **page 51**.
- Consider adaptogens that are:
  - Androgen supportive
  - Cortisol stimulating and brain (hippocampal) supportive, especially if low cortisol/low CAR is also present
  - Mood supportive
  - See **page 36** for a list of adaptogenic herbs

Other considerations for low DHEA in females and males

- Decrease 5b-reductase activity and support 5a-reductase activity if alpha metabolites are low (5a-DHT, 5a-androstanediol, androsterone). See "Decreasing a 5b-Reductase Preference" on **page 25**.
- Decrease SHBG if elevated. See **page 17**.
- Support testosterone, if also low. See "Low Testosterone in Females" on **page 16** and "Low Testosterone in Males" on **page 18**.
- Consider DHEA therapy. See the DUTCH Female and Male HT Dosing Guides on **pages 72-73**.



Decreasing a 5a-Reductase Preference

In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for decreasing a 5a-reductase preference (and supporting more 5b-reductase activity) in females and males include:

Lifestyle and Diet

- Correct insulin resistance. See **page 54**.
- Encourage weight loss if appropriate. See **page 58**.
- Reduce inflammation. See **page 53**.
- Reduce stress and support parasympathetic activity. See **page 63**.

Use 5a-Reductase Blockers

- Beta-sitosterol
- Epigallocatechin gallate (EGCG) from green tea
- Polyunsaturated fatty acids
- Pygeum
- Reishi
- Saw palmetto
- Stinging nettle root
- Zinc (balance copper)
- Rx: Finasteride[6]

Decreasing a 5b-Reductase Preference

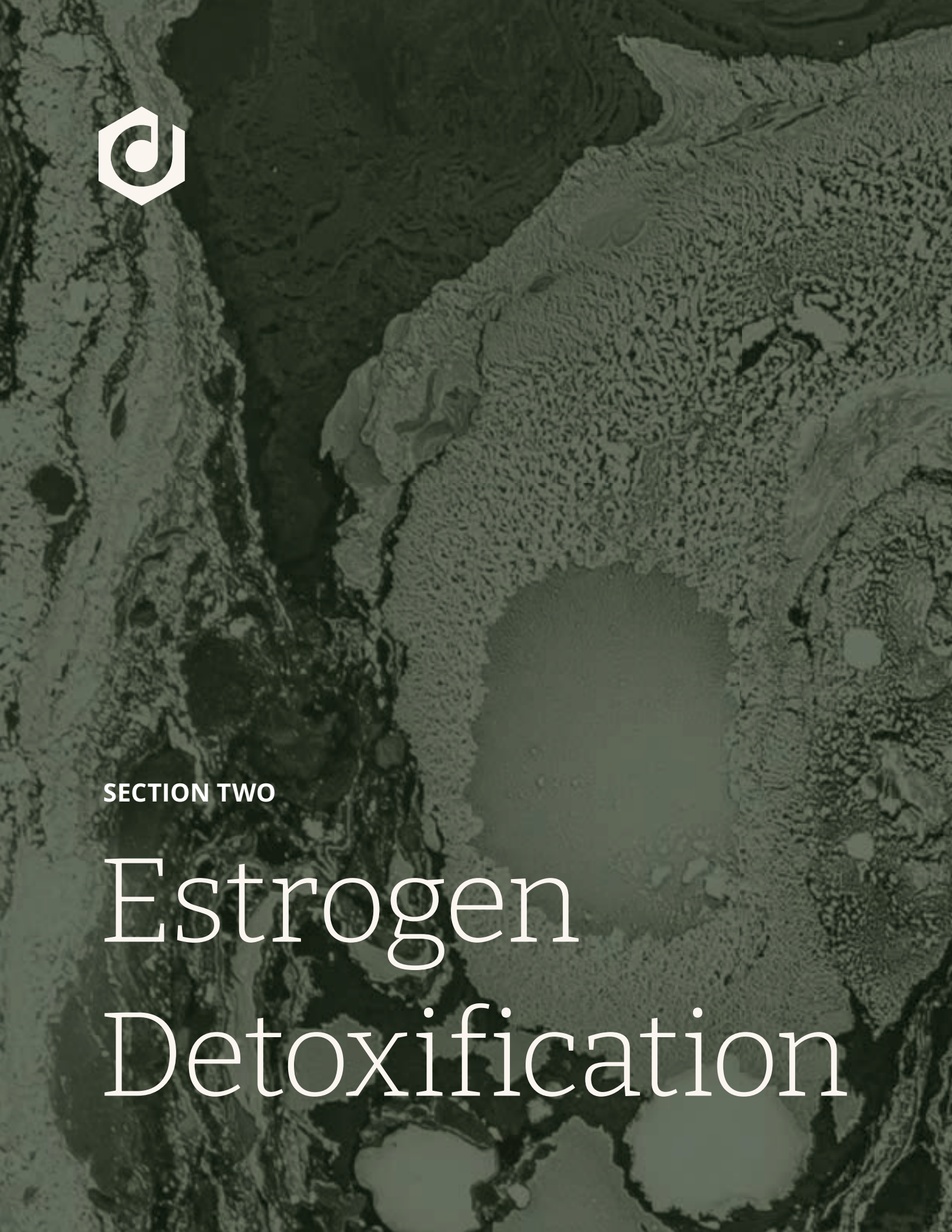
In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for decreasing a 5b-reductase preference (by supporting more 5a-reductase activity) in females and males include:

Lifestyle and Diet

- Forskolin
- High intensity interval training (HIIT)
- Pine pollen
- Weight resistance exercises

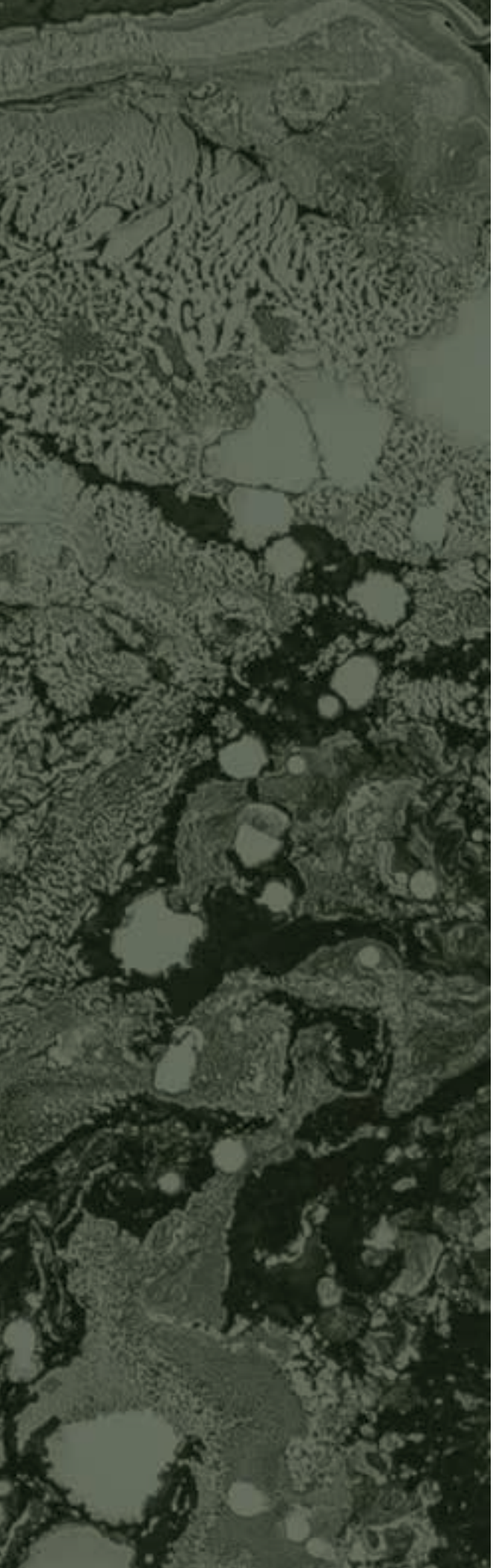
Avoid 5a-Reductase Blockers

- Beta-sitosterol
- Epigallocatechin gallate (EGCG) from green tea
- Polyunsaturated fatty acids
- Pygeum
- Reishi
- Saw palmetto
- Stinging nettle root
- Zinc (balance copper)
- Rx: Finasteride[6]



SECTION TWO

Estrogen Detoxification



Summary

4-OH Preference

Lower High Estrogen
Use CYP1B1 Inhibitors
Avoid CYP1B1 Inducers
Support Methylation
Minimize DNA Damage from Reactive Quinones
Support the 2OH Pathway

16-OH Preference

Lower High Estrogen
Use CYP3A4 Inhibitors
Avoid CYP3A4 Inducers
Support Sulfation
Support Glucuronidation
Support the 2OH Pathway
Lower β-Glucuronidase Enzymatic Activity

2-OH Preference is Low

Use CYP1A1 Inducers
Avoid CYP1A1 Inhibitors

Phase 2 Methylation

Support Methylation Precursors and Cofactors
Avoid Catechol-O-methyltransferase (COMT) Inhibitors

Phase 3 Detoxification

General phase 3 Support
Lower β-Glucuronidase Enzymatic Activity
If Indican is High

4-OH Preference

Potential support considerations to lower a 4-OH preference in females and males include:

Lower High Estrogen

- Diindolylmethane/Indole-3-carbinol[5] (DIM/I3C)
- For more information on lowering estrogen, see "High Estrogen in Females and Males" on **page 14**.

Use CYP1B1 Inhibitors

(To decrease estrogen metabolism down the 4OH pathway)

- Flavonoids (polyphenolic plant compounds naturally occurring in fruit, vegetables, chocolate, and tea)
- Resveratrol

Avoid CYP1B1 Inducers

(To decrease estrogen metabolism down the 4OH pathway)

- Inflammation
- Polycyclic aromatic hydrocarbons (PAHs). See **page 51**.

Support Methylation

(To improve phase 2 clearance of 4-OH)

- See "Phase 2 Methylation" on **page 30**.

Minimize DNA Damage from Reactive Quinones

- Alpha lipoic acid (ALA)
- Melatonin
- N-acetylcysteine (NAC)
- Resveratrol
- Sulforaphane
- Glutathione Support:
  - Glutathione (liposomal, intravenous, etc.)
  - See "Pyroglutamate" on **page 45**.
- Quinone reductase support (quinone reductase is an enzyme that "reduces" the reactive quinones back into their 4-OH estrogen catechol form):
  - NAC
  - Resveratrol
  - Soy isoflavones
  - Sulforaphane
- Other antioxidants to reduce oxidative damage: vitamins A/E/C, curcumin, green tea, lycopene, flavonoids, superoxide dismutase (SOD), catalase, etc. For a list of herbal antioxidants see "Antioxidant-Rich" under "Herbal Support Overview" on **page 36**.

Support the 2OH Pathway

- See "2-OH Preference is Low" on **page 30**

16-OH Preference

Here are potential support considerations to lower a 16-OH preference in females and males. Note that lowering a 16-OH preference in females and males with low estrogen may not be necessary. Refer to the DUTCH Interpretive Guide for more information.

Lower High Estrogen

- Diindolylmethane/Indole-3-carbinol5 (DIM/I3C)
- For more information on lowering estrogen, see "High Estrogen in Females and Males" on **page 14**.

Use CYP3A4 Inhibitors

(To decrease estrogen metabolism down the 16-OH pathway)

NOTE

Use caution with CYP3A4 inhibitors, as CYP3A4 is heavily involved in the phase 1 detoxification of many other compounds besides estrogen, including many pharmaceuticals. Inhibiting CYP3A4 may reduce excretion of these and affect dosing of sensitive medications.

- Cannabidiol (CBD)
- Grapefruit
- Peppermint
- Resveratrol
- Rosemary
- Wild yam

Avoid CYP3A4 Inducers

(To decrease estrogen metabolism down the 16-OH pathway)

- Caffeine and excess omega-6 fatty acid consumption
- Inflammatory cytokines (especially in the gut)
- Obesity - see **page 58**.
- "Polycyclic aromatic hydrocarbons (PAHs). See **page 51**.
- Smoking and alcohol
- St. John's wort[4]

Support Sulfation

(To improve phase 2 clearance of 16-OH-E1)

- Sulforaphane
- Provide sulfur donors and co-factors:
  - Eat raw or mildly steamed sulfurous vegetables to preserve the integrity of sulfur compounds.
  - Glutathione - see "Pyroglutamate" on **page 45**
  - Methionine
  - Methylsulfonylmethane (MSM)
  - Molybdenum
  - NAC
  - Sulfurous vegetables (asparagus, garlic, etc.)
  - Taurine
- Anti-inflammatories. See **page 53**.
- Reduce exposure to environmental chemicals that inhibit sulfotransferases (SULTs):
  - Parabens
  - Phthalates
  - Polychlorinated biphenyls (PCBs)
  - Avoid EDCs. See page **page 51**.

Support Glucuronidation

(To improve phase 2 clearance of 16-OH-E1)

- Sulforaphane
- Citrus fruits
- Quercetin
- Gymnema
- Calcium-d-glucarate

Support the 2OH Pathway

- See "2-OH Preference is Low" on **page 30**.

Lower β-Glucuronidase Enzymatic Activity

(to lower enterohepatic circulation of 16-OH-E1)

- See "Phase 3 Detoxification" on **page 31**.

2-OH Preference is Low

Potential support considerations for a low 2-OH preference in females and males include:

Use CYP1A1 Inducers

(To increase estrogen metabolism down the preferred 2OH pathway)

- Caffeine
- Cruciferous vegetables, such as broccoli, kale, brussels sprouts, cabbage, collard greens, cauliflower, arugula, etc.
- DIM/I3C[5]
- Fish oil from a reputable brand to avoid heavy metals and other contaminants
- Ground flaxseeds
- Rosemary
- Soy
- Thyroxine (T4), if appropriate

Avoid CYP1A1 Inhibitors

(To increase estrogen metabolism down the preferred 2OH pathway)

- High sugar diet
- Moderate alcohol consumption

Phase 2 Methylation

In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for sluggish phase 2 methylation in females and males include:

Support Methylation Precursors and Cofactors

- B vitamins - B2, B3, B6, B9 (folate, 5-MTHF or folinic acid), B12
- Choline
- Magnesium
- Methionine
- SAMe
- Trimethylglycine (TMG), a.k.a. “betaine” or “betaine anhydrous”

Avoid Catechol-O-methyltransferase (COMT) Inhibitors

- Catechin & epicatechins
- Catecholamines (dopamine, norepinephrine, epinephrine, etc.) – see “Stress and Parasympathetic Activity Support” on **page 63**
- High estradiol levels
- High sucrose diet
- Phthalate esters. See **page 51**.
- Quercetin
- Rhodiola

Phase 3 Detoxification

In addition to treating the underlying cause, other ways to support phase 3 detoxification in females and males include:

General phase 3 Support

- **Correct digestive issues:**
  - Hypochlorhydria - hydrochloric acid, apple cider vinegar, bitters
  - Low bile acid – bile acids, choline, taurine, glycine, Collinsonia root – see "Liver Support" on **page 55** for more information.
  - Pancreatic insufficiency - digestive enzymes, bitters
- **Ensure adequate bowel movements with:**
  - Adequate fiber
  - Adequate hydration
  - Movement/Exercise
  - Magnesium, vitamin C
  - Stress reduction, deep breathing
- **Nourish the gut lining:**
  - Deglycyrrhizinated licorice (DGL)
  - Glutamine
  - Okra
  - Slippery elm
- **Support a healthy microbiome/estrobolome:**
  - Optimize diet (Mediterranean, etc.)
  - Recolonize with probiotics and prebiotics
  - See "Lower β-Glucuronidase Enzymatic Activity" on this page
  - Support progesterone if low as it nourishes Bifidobacterium and L. reuteri, decreases gut permeability, offers enteric neuroprotection, and is anti-inflammatory - see Low Progesterone in Females" on **page 8**
  - Treat any current gut infections

Lower *β*-Glucuronidase Enzymatic Activity

(to lower enterohepatic circulation of 16-OH-E1)

- Avoid antibiotic use when possible
- Avoid high fat and protein diets
- Calcium-d-glucarate
- Dietary fiber
- Low-calorie and vegetarian diets
- Milk thistle
- Prebiotics and probiotics

If Indican is High

- If the Indican organic acid marker on the DUTCH Test is elevated, consider stool testing for further work-up.

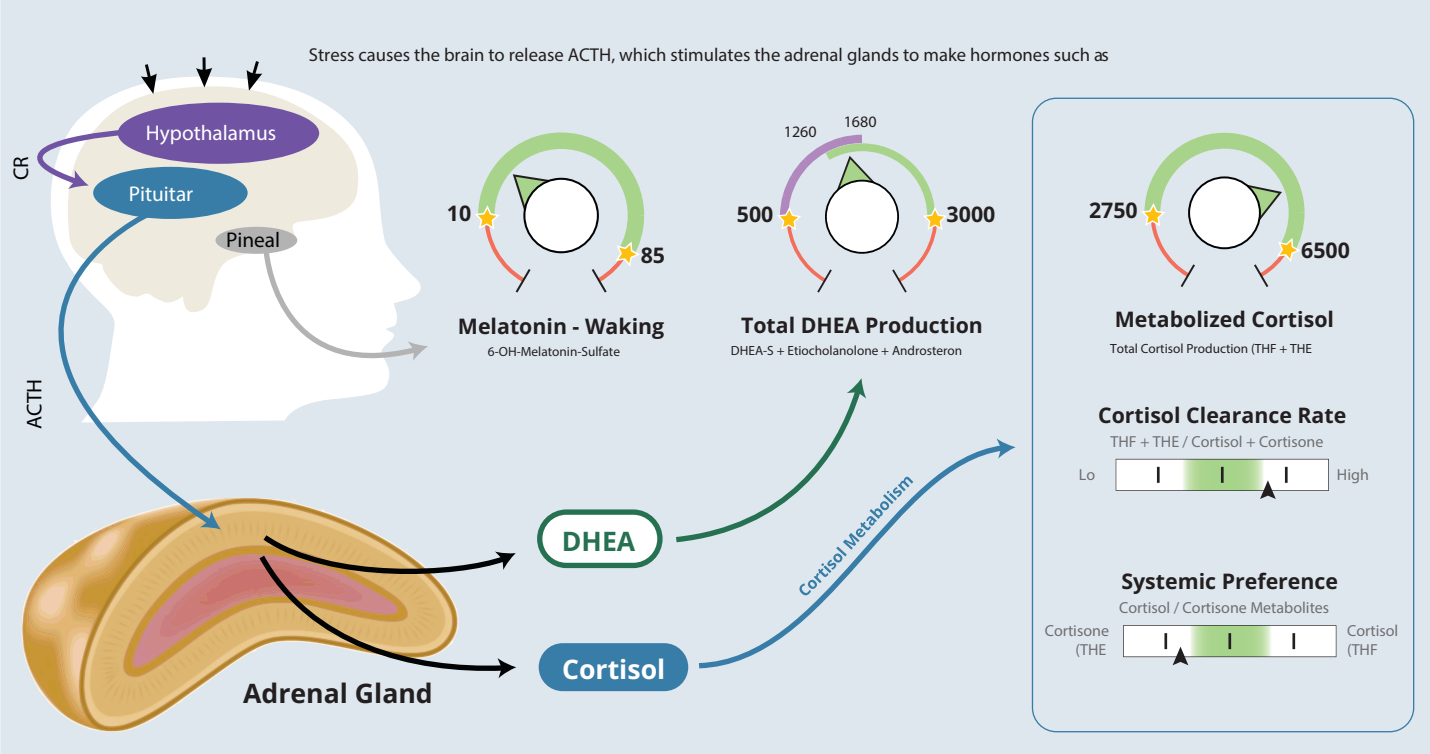
SECTION THREE

Cortisol

Summary

General HPA Axis Support

- Correct insulin resistance. See **page 54**.
- Encourage weight loss if appropriate. See **page 58**.
- Engage in regular aerobic exercise.
- Lower inflammation. See **page 53**.
- Lower stress and support parasympathetic activity. See **page 63**.
- Manage acute and chronic pain.
- Manage chronic infections.
- Minerals, including magnesium and zinc (balance copper).
- Nutritional and herbal adaptogens (see next page).
- Optimize sleep and the circadian rhythm. See **page 60** for more information.
- Probiotics such as Bifidobacterium longum 1714 and Lactobacillus plantarum PS128
- Vitamins, including B vitamins and vitamin C



The Hypothalamic-Pituitary-Adrenal (HPA) Axis. Stress causes the hypothalamus to secrete corticotropin-releasing hormone (CRH). CRH stimulates the pituitary to release adrenocorticotropic hormone (ACTH). ACTH signals the adrenal glands to secrete cortisol from its zona fasciculata and DHEA from its zona reticularis.

Adaptogens

Adaptogens are herbs, roots, and other plant substances (like mushrooms) that help the body respond to stress.

Common Name	Latin Name
Ashwagandha	*Withania somnifera*
Astragalus	*Astragalus spp.*
Bacopa	*Bacopa monnieri*
Cordyceps	*Cordyceps sinensis or militaris*
Fo-ti	*Polygonum multiflorum*
Gotu kola	*Centella asiatica*
Holy basil	*Ocimum tenuiflorum*
Jujube	*Ziziphus jujuba*
Korean Ginseng	*Panax ginseng*
Licorice root[1]	*Glycyrrhiza glabra*
Maca	*Lepidium spp.*
Magnolia bark	*Magnolia officinalis*

Common Name	Latin Name
Maitake	*Grifola frondose*
Mimosa	*Albizia julibrissin or lebbeck*
Rehmannia	*Rehmannia spp.*
Reishi	*Ganoderma lucidum*
Rhodiola	*Rhodiola rosea*
Schisandra	*Schisandra chinensis*
Shatavari	*Asparagus racemosus*
Shiitake	*Lentinula edodes*
Siberian Ginseng	*Eleutherococcus senticosus*
Skullcap	*Scutellaria lateriflora*
Turmeric	*Curcuma longa*

Herbal Support Overview

Herbs, roots, and mushrooms used in botanical medicine often target more than one organ system. For example, adaptogens often affect the immune-neuro-endocrine system and the HPA axis. Below, various herbs, roots, and mushrooms are categorized alphabetically by their use. **Adaptogenic herbs are marked with an "(A)" in purple**.

Please keep yourself and others safe. Exercise due diligence before recommending any herbs, roots, mushrooms, or supplements. Be aware of indications, contraindications, pharmacology, administration, therapeutic dosing vs. excessive (toxic) dosing, signs and symptoms of toxicity, interactions, adverse effects, and warnings.

Androgen Supportive

- **Ashwagandha (A)**
- Damiana
- Epimedium
- Fenugreek
- Indian coleus
- **Korean Ginseng (A)**
- **Maca (A)**
- Mucuna[3]
- Sarsaparilla
- **Shatavari (A) (Females)**
- Tongkat Ali
- Tribulus
- Yohimbe

Anti-Inflammatory

- Boswellia
- Ginger
- Green tea
- **Maitake (A)**
- **Reishi (A)**
- Rosemary
- **Shiitake (A)**
- **Turmeric (A)**

Antioxidant-Rich

- **Astragalus (A)**
- Ginger
- Ginkgo
- Green tea
- **Korean ginseng (A)**
- Milk thistle
- Propolis

Antioxidant-Rich cont.

- Rosemary
- **Schisandra (A)**
- Shilajit
- **Siberian ginseng (A)**
- Thyme
- **Turmeric (A)**

Blood Sugar Balancing

- Bitter melon
- Cinnamon
- Fenugreek
- Garlic
- Green tea
- Gymnema
- **Holy basil (A)**
- **Korean ginseng (A)**
- Oregano
- **Turmeric (A)**

Brain (Hippocampal) Supportive

- **Bacopa (A)**
- **Cordyceps (A)**
- Ginkgo
- **Lion's mane (A)**
- **Maca (A)**
- **Rhodiola (A)**
- Rosemary
- **Turmeric (A)**

Cortisol Calming

- **Ashwagandha (A)**
- **Bacopa (A)**
- California poppy

Cortisol Calming cont.

- Catnip
- Chamomile
- **Gotu kola (A)**
- **Holy basil (A)**
- Hops
- Jujube
- Kava
- Lavender
- Lemon balm
- **Magnolia bark (A)**
- Mily oats
- Mimosa
- Passionflower
- **Skullcap (A)**
- Valerian

Cortisol Stimulating

- **Cordyceps (A)**
- Echinacea
- **Korean Ginseng (A)**
- **Licorice[1] (A)**
- **Reishi (A)**
- **Rhodiola (A)**
- **Schisandra (A)**
- **Siberian ginseng (A)**

HPO Axis Supportive

- Chaste tree berry
- Dong quai
- **Licorice[1] (A)**
- **Maca (A)**

Immune Modulating

Use caution with autoimmune conditions.

- Andrographis
- **Ashwagandha (A)**
- **Astragalus (A)**
- **Cordyceps (A)**
- Echinacea
- Ginger
- Goldenseal
- **Licorice[1] (A)**
- **Maitake (A)**
- **Rehmannia (A)**

Immune Modulating cont.

- **Reishi (A)**
- **Schisandra (A)**
- **Shiitake (A)**
- **Skullcap (A)**

Mood Supportive

Dopamine/Norepinephrine Supportive

- **Ashwagandha (A)**
- **Bacopa (A)**
- **Korean ginseng (A)**
- Mucuna[3]
- **Rhodiola (A)**
- Saffron

Serotonin Supportive

- Black cohosh
- **Holy basil (A)**
- Lavender
- Lemon balm
- Saffron
- St. John's wort[4]
- **Turmeric (A)**

GABA Supportive

See "Cortisol Calming"

Phytoestrogens

Phytoestrogenic herbs can be used when estrogen is low, but also when estrogen is high. They primarily bind Erβ receptors that increase estrogen activity when estrogen is low, but lower excessive estrogen activity and promote estrogen detoxification when estrogen is high.

- Alfalfa
- Dong quai
- Fennel
- Fenugreek
- **Fo-ti (A)**
- Hops
- **Licorice[1] (A)**
- **Maca (A)**
- Red clover
- Sage

Cortisol Metabolites: THE vs THF Preference

Cortisone Metabolite (THE) Preference

In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for a THE (cortisone metabolite) preference in females and males include:

- Treat chronic adrenal stressors.
- Treat hypothyroidism. See **page 52**.
- Use licorice[1] to decrease deactivation of cortisol to cortisone, if total free cortisol is low.

Cortisol Metabolite (THF) Preference

In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for a THF (cortisol metabolite) preference in females and males include:

- Reduce stress and support parasympathetic activity. See **page 63**.
- Correct insulin resistance. See **page 54**.
- Encourage weight loss if appropriate. See **page 58**.
- Reduce inflammation. See **page 53**.
- See "CAR is High" on **page 40** if total free cortisol is high and/or there is an elevated cortisol awakening response (CAR).

Total Free Cortisol

Total Free Cortisol is High

In addition to treating the underlying cause and associated conditions (see the DUTCH Interpretive Guide), the potential support considerations for a **high total free cortisol** in females and males are similar to those for a **high cortisol awakening response (CAR)**. See "CAR is High" on **page 40**.

Total Free Cortisol is Low

In addition to treating the underlying cause and associated conditions (see the DUTCH Interpretive Guide), the potential support considerations for a **low total free cortisol** in females and males are similar to those for a **low cortisol awakening response (CAR)**. See "CAR is Absent/Low" on **page 41**.

Cortisol Clearance Rate (CCR)

CCR is Slow

In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for a slow cortisol clearance rate (CCR) in females and males include:

If Hypothyroidism is Contributing

See "Hypothyroidism Support" on **page 52**.

If Low Caloric Intake is Contributing

Consider an individualized refeeding strategy.

If Mitochondrial Dysfunction is Contributing

See "Mitochondrial Support" on **page 56**.

If Sluggish Liver Function and/or Low Bile Acids Are Contributing

See "Liver Support" on **page 55**.

If Iron Deficiency is Contributing

- Restore iron levels using oral (bisglycinate form may be less constipating), injectable, or intravenous (IV) iron supplementation.
- Use synergizing nutrition:
  - Adress zinc deficiency
  - Beef liver capsules
  - Magnesium
  - Vitamin B6
  - Vitamin C
- Blood building herbs
  - Dandelion root
  - Nettle leaf
  - Yellow dock
- Increase low gastric pH before meals:
  - Apple cider vinegar (ACV) in water
  - Bitters
  - Gentian root
  - Hydrochloric acid (HCL)/pepsin, titrated dosing

CCR is Fast

In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for a fast cortisol clearance rate (CCR) in females and males include:

If Hyperthyroidism is Contributing

- Treat according to standard of care for diagnosis
- Glutathione - see "Pyroglutamate" on **page 45**
- Lemon balm
- Lycopus
- Magnesium
- Motherwort
- N-acetylcysteine (NAC)
- Selenium
- Rx: Low-dose naltrexone (LDN), if appropriate

If Immune Activation is Contributing

(Use caution with autoimmune conditions)

- Andrographis
- Astragalus
- Berberine
- Cordyceps, Lion's Mane, Reishi, Shiitake, and Maitake mushrooms
- Garlic
- Ginger
- Licorice[1]
- Plant sterols
- Rehmannia
- Skullcap
- Sulforaphane

If Metabolic Syndrome is Contributing

- Use 11BHSD1 (activates cortisone to cortisol) inhibitors:
  - Bitter melon
  - Cinnamon
  - Curcumin
  - Epigallocatechin gallate (EGCG) from green tea
  - Gymnema
- See "Insulin Resistance" on **page 54**.
- See "Obesity" on **page 58**.

Other

- Reduce inflammation. See **page 53**.

Cortisol Awakening Response (CAR)

CAR is High

In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for a high CAR in females and males include:

Calming Support

- GABA
- L-theanine
- Phosphatidylserine (lowers cortisol)
- Hormone therapy that may be calming (pregnenolone, progesterone, etc.) if appropriate
- See "Cortisol Calming" in the "Herbal Support Overview" on **page 36**
- See "Stress and Parasympathetic Activity Support" on **page 63**

Herbal Adaptogens

- Consider calming adaptogens:
  - Ashwagandha
  - Bacopa
  - Gotu kola
  - Holy basil
  - Magnolia bark
  - Skullcap
- If suboptimal immune function, consider immunomodulating adaptogens (use caution with autoimmune conditions):
  - Ashwagandha
  - Astragalus
  - Cordyceps, Lion's Mane, Maitake, Reishi, and Shiitake mushrooms
  - Rehmannia
  - Schisandra
  - Skullcap
- Consider adaptogens that also nourish and repair the hippocampus, as the hippocampus plays a central role in the regulation of the CAR:
  - Bacopa
  - Cordyceps
  - Lion's mane
  - Maca
  - Rhodiola
  - Turmeric

Nutritional Support

- B vitamins (B5, B6)
- Choline
- Fish oil (DHA/EPA)
- Magnesium
- Vitamin C, especially if CAR is elevated due to elevated reactive oxygen species (ROS)
- Zinc (balance copper)

Body Weight and Exercise

- Consider restorative exercises.
- Encourage weight loss if appropriate. See **page 58**.
- Light movement (e.g., tai chi, qigong, yoga) on waking.
- Relaxation practices (e.g., meditation, qi gong, yoga) before bedtime.

Lifestyle and Diet

- Correct insulin resistance. See **page 54**.
- Reduce inflammation. See **page 53**.
- Reduce stress and support parasympathetic activity. See **page 63**.
- Optimize sleep and the circadian rhythm. See **page 60**.

CAR is Absent/Low

In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for an absent or low CAR in females and males include:

Light Exposure Upon Waking

- 30 minutes minimum outdoors, preferably in the morning, without sunglasses, windows, or windshields.
- Light therapy lamp indoors
  - 20-30 minutes a day before 9 am
  - LED
  - UV-free
  - 10,000 Lux
  - 11-15 inches from the head

Herbal Adaptogens

- Consider adaptogens that also nourish and repair the hippocampus, as the hippocampus plays a central role in the regulation of the CAR:
  - Bacopa
  - Cordyceps
  - Lion's mane
  - Maca
  - Rhodiola
  - Turmeric
- If total cortisol is low, consider simulating adaptogens:
  - Cordyceps
  - Korean Ginseng
  - Licorice[1]
  - Reishi
  - Rhodiola
  - Schisandra
  - Siberian ginseng
- If androgens are low, consider androgen supportive adaptogens:
  - Ashwagandha
  - Korean Ginseng
  - Maca
  - Shatavari (females)
- If suboptimal immune function, consider immunomodulating adaptogens (use caution with autoimmune conditions):
  - Ashwagandha
  - Astragalus
  - Cordyceps, Lion's Mane, Maitake, Reishi, and Shiitake mushrooms
  - Licorice[1]
  - Rehmannia
  - Schisandra
  - Skullcap

Nutritional Support

- Adrenal cortex bovine/porcine glandulars
- B vitamins (B5, B6)
- Essential fatty acids (EFAs)
- Mitochondrial combination formulas
- Para-aminobenzoic acid (PABA)
- Vitamin C

Brain (Hippocampal) Support

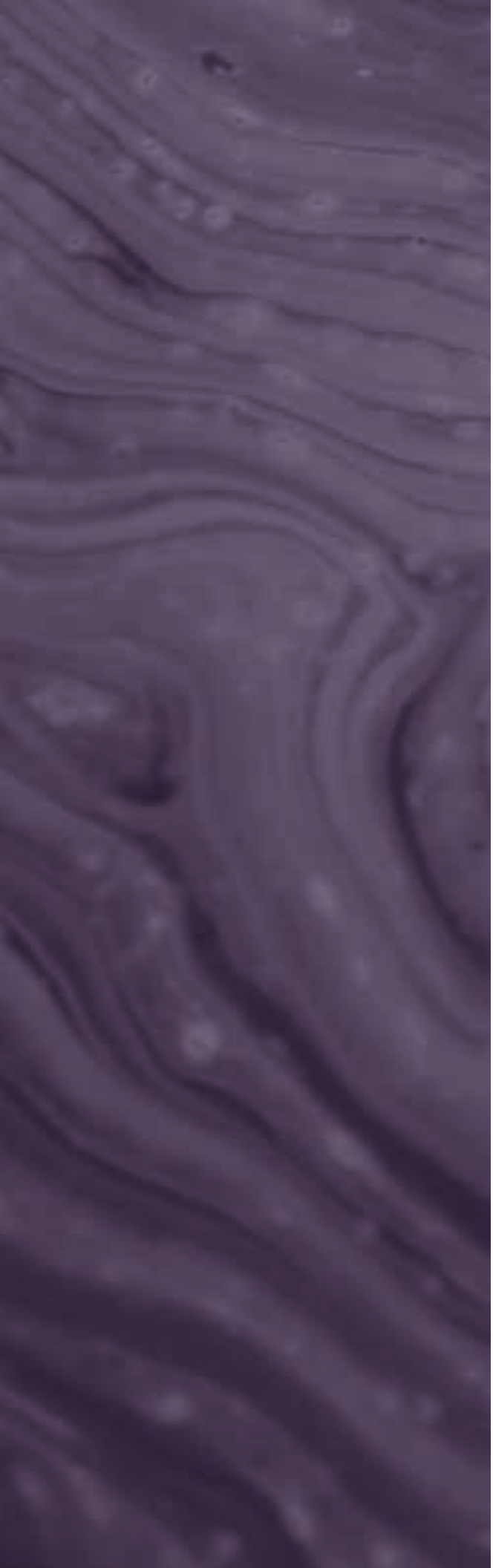
- Improve Blood Flow to the Brain
  - Exercise/movement
  - Inversion poses
  - Smoking cessation
  - Treat anemia, hemochromatosis, and sleep apnea
- Herbal/Nutrient Support
  - Bacopa
  - Cordyceps
  - Fish oil
  - Ginkgo
  - Maca
  - Nutrient-rich diet
  - Rosemary
  - PQQ
- Therapies:
  - Acupuncture therapy
  - Chiropractic therapy
  - Craniosacral therapy
  - Dynamic neural retraining system (DNRS)
  - Hyperbaric oxygen therapy (HBOT)
  - Neurofeedback
- Optimize sex hormone levels
  - See **Section 1**

Lifestyle and Diet

- Correct insulin resistance. See **page 54**.
- Light movement (e.g., tai chi, qi gong, yoga) on waking.
- Relaxation practices (e.g., meditation, qigong, calming yoga) before bedtime.
- Restorative exercises.

SECTION FOUR

Organic Acids (OATs)



Summary

Nutritional Organic Acids

Methylmalonate (MMA) - Vitamin B12 Marker

Xanthurenate and Kynurenate - Vitamin B6 Markers

b-Hydroxyisovalerate - Biotin Marker

Pyroglutamate - Glutathione Marker

Indican - Gut Marker

Neuro-Related Markers

Homovanillate (HVA) and Vanilmandelate (VMA) - Dopamine and Norepinephrine/Epinephrine Markers

Quinolinate - Neuroinflammation Marker

Additional Markers

6-OH-Melatonin Sulfate - Melatonin Marker

8-Hydroxy-2-deoxyguanosine (8-OHdG) - Oxidative Stress Marker

Nutritional Organic Acids

Methylmalonate (MMA) - B12 Marker

In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for a high MMA in females and males include:

Increase Vitamin B12 Dietary Intake

- Eggs
- Grass-fed beef and beef liver
- Lamb
- Nutritional yeast
- Sardines
- Wild caught salmon

Supplement with Active Forms of Vitamin B12

- Adenosylcobalamin
- Hydroxycobalamin
- Methylcobalamin
- Consider sublingual or injectable B12 if the individual has low stomach acid or pernicious anemia.

Xanthurenate and Kynurenate - Vitamin B6 Markers

In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for a high Xanthurenate and Kynurenate in females and males include:

Increase Vitamin B6 Dietary Intake

- Avocado
- Chicken
- Grass-fed beef
- Pinto beans
- Pistachios
- Sesame seeds
- Sunflower seeds
- Turkey breast

Support Vitamin B6 Cofactors

- Adenosine triphosphate (ATP)
- Lysine
- Vitamin B2
- Zinc (balance copper)

Other

- Supplement with the active form of vitamin B6, pyridoxine-5-phosphate (P5P).
- If elevated Kynurenate is due to inflammation, lower inflammation. See **page 53**.

b-Hydroxyisovalerate - Biotin Marker

A common reason for elevated b-Hydroxyisovalerate is due to β-Hydroxy β-methylbutyric acid (HMB) supplementation. HMB is often used in supplements formulated for athletic performance, recovery, and the prevention of age-related muscle loss. If HMB is used the day before and/or the day of testing, elevated b-hydroxyisovalerate will not be indicative of low biotin status.

In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for a high b-Hydroxyisovalerate in females and males include:

Increase Dietary Biotin Intake

- Barley
- Carrots
- Cauliflower
- Egg yolks
- Legumes
- Lentils
- Mushrooms
- Organ meats
- Peas
- Seafood
- Sunflower seeds

Other

- Supplement with biotin.

Pyroglutamate - Glutathione Marker

In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for high Pyroglutamate in females and males include:

Support Glutathione

- Adequate dietary protein
- Alpha lipoic acid (ALA)
- B vitamins (B2, B6)
- Brassica and allium vegetables
- Curcumin
- Fruit and vegetable juices
- Glycine
- Green tea
- Liposomal/Intravenous glutathione
- NAC
- Salmon
- Selenium
- Vitamin C
- Vitamin E
- Whey protein
- Zinc (balance copper)

Support Enzymatic Free Radical Scavenger Activity

- Catalase
- Superoxide dismutase (SOD)

Support with Other Antioxidants

- Colorful fruits and vegetables
- Herbal antioxidants - see “Antioxidant-Rich” under “Herbal Support Overview” on **page 36**
- Magnesium
- Resveratrol
- Sulforaphane
- Taurine

Other

- Encourage healthy estrogen detoxification to minimize 4-OH conversion to DNA-damaging reactive quinones. See Section 2.

Indican - Gut Marker

In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for a high indican in females and males include:

Support Gut Health

- Adequate chewing and time to eat
- Ensure daily bowel movements
  - Adequate fiber
  - Adequate hydration
  - Incorporate movement throughout the day that includes pelvic tilts
- L-glutamine
- Lower stress and support parasympathetic activity. See **page 63**.
- Optimize stomach acid production
- Probiotics and prebiotics
- Support the HPA axis. See **page 32**.
- Unprocessed whole foods diet
- Consider stool testing and treating dysbiosis if present
- See “Phase 3 Detoxification” and “Liver Support” on **page 31** and **page 55**, respectively, for more information.

Neuro-Related Markers

Homovanillate (HVA) and Vanilmandelate (VMA) - Dopamine and Norepinephrine/ Epinephrine Markers

Note that urinary neurotransmitter metabolite levels are dependent upon neurotransmitter levels in the body, but also neurotransmitter metabolism and clearance from the body. Therefore, for example, low HVA may be due to low dopamine in the body or low metabolism and clearance of dopamine from the body.

In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for out-of-range HVA and VMA in females and males include:

If Both HVA and VMA are Low and Patient Presents with Symptoms of Low Dopamine, Norepinephrine, and Epinephrine

- Treat chronic HPA axis stressors
- Support dopamine, NE, and EPI precursors and cofactors
  - Adequate dietary protein
  - B vitamins
  - Biopterin
  - DLPA[3]
  - Iron, if appropriate
  - Mucuna[3] (contains L-DOPA)
  - Tyrosine
  - Vitamin C

If Both HVA and VMA are High and Patient Presents with Symptoms of High Dopamine, Norepinephrine, and Epinephrine

- Treat acute HPA axis stressors.
- Support detoxification of dopamine, NE, and EPI:
  - Support COMT methylation – see "Phase 2 Methylation" on **page 30**
  - Support MAO activity:
    - B vitamins (B2, B3, B6)
    - Lithium orotate[7]
    - Magnesium
    - Optimizing iron and ferritin
- Raise a low progesterone to estrogen (P/E) ratio, if needed.
- If patient with slow COMT genetics presents with symptoms of high dopamine, norepinephrine, and epinephrine, but HVA and VMA are both low, support methylation. See **page 30**.

If HVA is High and VMA is Low

- Support dopamine beta-hydroxylase (DBH) cofactors: vitamin C and copper.
- Treat *C. difficile* infection, if present.
- Also see suggestions under "If HVA and VMA are high," to the left.

If HVA is Low and VMA is High

- Support dopamine's conversion to HVA:
  - B vitamins (vitamin B2, B3, and B6)
  - Copper
  - Magnesium
  - SAMe
- Also see suggestions under "If Both HVA and VMA are High and Patient Presents with Symptoms of High Dopamine, Norepinephrine, and Epinephrine," on this page.

Quinolinate - Neuroinflammation Marker

In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for a high quinolinate in females and males include:

If Inflammation is Contributing

- Lower systemic inflammation. See **page 53**.
- Support glutathione. See "Pyroglutamate" on **page 45**.

Other

- Supplement with niacin (vitamin B3), if appropriate.
- Support serotonin, if appropriate
  - Adequate dietary protein
  - Tryptophan[2]
  - 5-HTP[2]
  - Vitamin B6
  - See "Serotonin Support" under "Mood Supportive" in the "Herbal Support Overview" on **page 37** for herbal serotonin support.
- If infection is contributing, treat the infection.

Additional Markers

6-OH-Melatonin Sulfate - Melatonin Marker

In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for an out-of-range 6-OH-Melatonin Sulfate in females and males include:

Low Melatonin

Support Melatonin

- Supplement with melatonin
- Support precursors and cofactors of melatonin
  - 5-HTP[2]
  - Tryptophan[2]
  - Vitamin B6

HPA Axis Support

- Lower high cortisol (especially in the afternoon, bedtime, and middle-of-the night). See "CAR is High" on **page 40** for ideas on how to lower cortisol.
- Lower stress and support parasympathetic activity. See **page 63**.
- Optimize sleep and the circadian rhythm. See **page 60** for more information.
- See "Cortisol Calming" in the "Herbal Support Overview on **page 36**.
- See "GABA Support" under "Mood and Cognition Support" on **page 57**.

Other

- The melatonin metabolite on the DUTCH Test (6-OH-Melatonin Sulfate) is dependent on sulfation. A low melatonin result may signify poor sulfation. See "Sulfation Support" under "16-OH Preference" on **page 29**. Note that sulfation support is not intended to improve endogenous melatonin production.

High Melatonin

- Assessing for gastrointestinal inflammation. If the Indican organic acid is elevated, see **page 45**.
- Rule out oral melatonin supplementation taken around the time of testing.

8-Hydroxy-2-deoxyguanosine (8-OHdG) - Oxidative Stress Marker

In addition to treating the underlying cause (see the DUTCH Interpretive Guide), other potential support considerations for a high 8-OHdG in females and males include:

Increase Antioxidant Support

- Alpha lipoid acid (ALA)
- B vitamins
- Colorful fruits and vegetables
- Curcumin
- Glutathione - see "Pyroglutamate" on **page 45** for ways to support glutathione
- Green tea
- Magnesium
- NAC
- Resveratrol
- Selenium
- Sulforaphane
- Taurine
- Vitamin C
- Vitamin E
- Zinc (balance copper)

HPA Axis Support

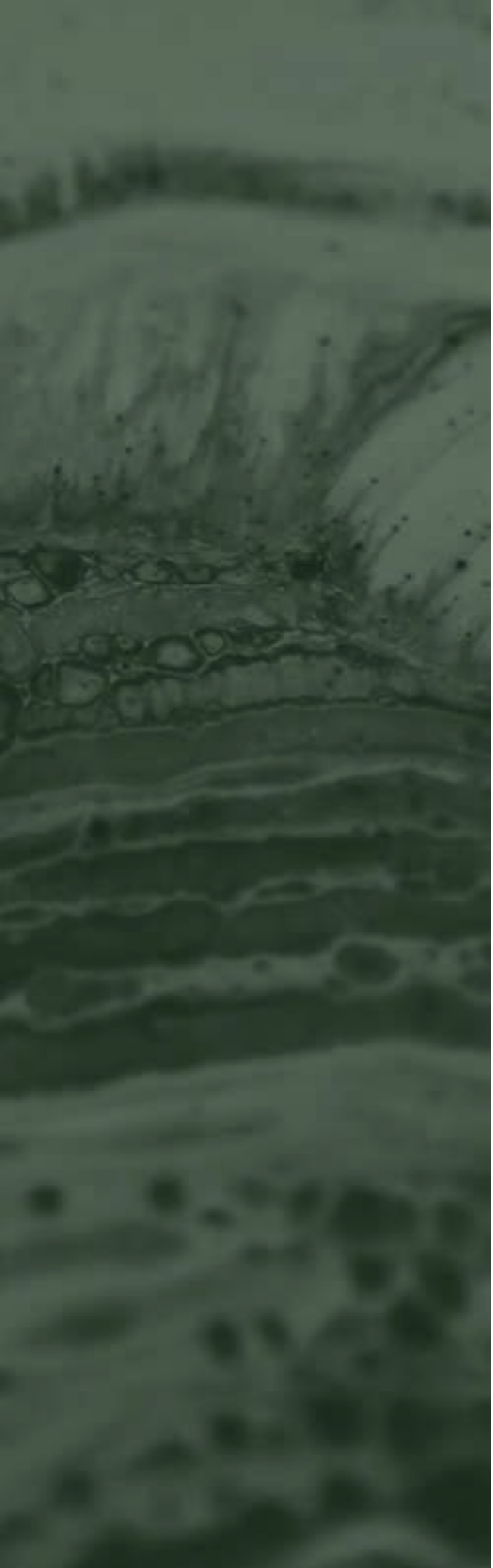
- Lower cortisol, if high cortisol is present, and treat HPA axis stressors. See "Cortisol Calming" in the "Herbal Support Overview on **page 36** and "CAR is High" on **page 40** for ideas on how to lower cortisol.
- Lower stress and support parasympathetic activity. See **page 63**.
- Optimize sleep and the circadian rhythm. See **page 60** for more information.

Other

- Treat chronic and acute diseases and conditions.

SECTION FIVE

Foundational Health



Summary

Bone Support

Nutritional Bone Support

- B vitamins
- Boron
- Calcium
- Collagen/Cyplexinol®
- Copper
- Glucosamine
- Hydroxyapatite
- Magnesium
- Manganese
- Phosphorus
- Silicon
- Strontium
- Sulfur
- Vanadium
- Vitamin D3
- Vitamin K2
- Address zinc deficiency

Herbal Bone Support

- Black cohosh
- Comfrey
- Horsetail
- Nettle leaf
- Oatstraw

Cardiovascular Support

Nutritional Cardiovascular Support

- B vitamins
- Calcium
- CoQ10
- Fish oil
- L-carnitine
- Magnesium
- Polyphenols
- Potassium
- Resveratrol
- Vitamin D3
- Vitamin E
- Vitamin K2

Herbal Cardiovascular Support

- Butcher's broom
- Ginkgo
- Hawthorne

Endocrine Disrupting Chemicals (EDCs)

EDCs are natural or synthetic chemicals that can disrupt the regular functioning of the hormone system, contributing to fertility issues, obesity, neurological issues, and more. They are found in our food, water, and many consumer products.

EDCs of High Concern

- Bisphenol A (BPA) and BPA alternatives
- Dioxin
- Fire retardants
- Glycol ethers
- Heavy metals, including lead, arsenic, and mercury
- Parabens
- Per- and polyfluoroalkyl substances (PFAs)
- Perchlorate
- Pesticides, including atrazine and organophosphates
- Phthalates
- Polychlorinated Biphenyls (PCBs)

General Recommendations for Lowering Exposure to EDCs

- Avoid heating plastics and especially avoid plastics with recycle numbers 3, 6 & 7.
- Avoid nonstick cookware and opt for stainless steel, cast iron, glass, and wood instead.
- Avoid plastic water bottles and choose stainless steel or glass bottles instead.
- Avoid products with “fragrance.” “Unscented” products might still contain fragrance chemicals to hide other smells!
- Avoid touching store receipts as they contain BPA.
- Avoid vinyl; For example, swap out your vinyl shower curtain for a fabric one.
- Avoid candles that are not 100% soy or beeswax.
- Avoid conventional dryer sheets, air fresheners, perfume, cologne, etc.
- Buy organic fruits and vegetables when possible, especially for produce that tends to have higher amounts of pesticide residues (see the Environmental Working Group’s (EWG’s) Dirty Dozen). Wash fruits and vegetables before consumption.
- Choose clothing, furniture, carpeting, and curtains that have not been treated with stain- and water-resistant finishes or fire-retardants.
- Consider replacing skincare, haircare, household cleaners, etc. with EWG-certified products https://www.ewg.org/skindeep/.
- Dust and vacuum (with a HEPA filter) frequently and use an air purifier indoors.
- Eat fresh, unpackaged, unprocessed whole foods when possible. Choose frozen produce over canned produce.
- Eat less dairy and meat, as these can accumulate EDCs. Choose organic, grass fed and/or pasture raised when possible.
- Filter your water.
- Limit fast food, processed meals, plastic wrapped, and canned foods (mac & cheese in a box, spaghetti in a can, etc.).
- Limit smoked, grilled, charred, and fried foods and nitrites

If Hypothyroidism is Contributing, See column to the right.

Hyperprolactinemia Support

Some of these support considerations are not appropriate if hyperprolactinemia is due to a prolactinoma. Be aware of factors that can increase prolactin: hypothyroidism, chronic kidney disease, certain medications, pregnancy and breastfeeding, stress, overexercising, Cushing's disease, PCOS, etc.

Lifestyle

- Reduce stress
- Avoid overexercising
- Treat hypothyroidism

Herbal Support

- Ashwagandha (night shade)
- Chaste tree berry
- German Chamomile
- Licorice[1]
- White peony

Male Specific Support

- Testosterone replacement will often be needed which will also increase estrogens. See the DUTCH HT Male Dosing Guide on **page 73**.

If Low Dopamine is Contributing

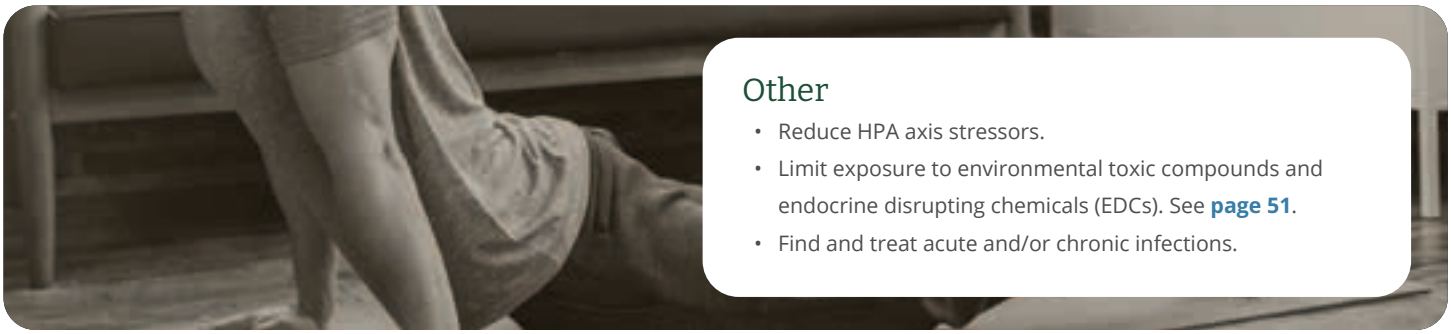
Support Dopamine:

- Adequate dietary protein intake
- Ashwagandha
- B vitamins, especially B6 (P5P)
- Bacopa
- DLPA[3]
- Iron, if appropriate
- Korean ginseng
- Mucuna[3] (contains L-DOPA)
- Rhodiola
- Saffron
- Tyrosine
- Vitamin C

Hypothyroidism Support

Use thyroid hormone replacement according to the standard of care.

- **Herbal and Nutritional Support**
  - Thyroid hormone replacement as standard of care for diagnosis
  - Ashwagandha
  - Iodine therapy if low dietary intake
  - L-tyrosine
  - Rhodiola
  - Thyroid/Pituitary glandulars
  - Vitamins A, C, E
- **T4 to T3 Conversion Support**
  - B vitamins
  - Guggul extract
  - Iron, if appropriate
  - Selenium
  - Zinc
  - Copper



Other

- Reduce HPA axis stressors.
- Limit exposure to environmental toxic compounds and endocrine disrupting chemicals (EDCs). See **page 51**.
- Find and treat acute and/or chronic infections.

Inflammation Support

Anti-inflammatories

- Herbal anti-inflammatories:
  - Boswellia
  - Ginger
  - Green tea (EGCG)
  - Maitake
  - Reishi
  - Rosemary (Rosemarinic acid)
  - Shiitake
  - Turmeric
- Fish oil (EPA/DHA)
- Quercetin
- Systemic enzyme therapies (bromelain, etc. on an empty stomach)
- Rx: Low-dose naltrexone (LDN), if appropriate

Antioxidants

(If oxidative damage is contributing)

- Alpha lipoic acid (ALA)
- Flavonoids
- Lycopene
- Melatonin
- NAC
- Resveratrol
- SOD, catalase
- Sulforaphane
- Support glutathione - see "Pyroglutamate" on **page 45**
- Vitamins A, E, C
- Herbal antioxidants:
  - Astragalus
  - Ginger
  - Ginkgo
  - Green tea
  - Korean ginseng
  - Milk thistle
  - Propolis
  - Rosemary
  - Schisandra
  - Shilajit
  - Siberian ginseng
  - Thyme
  - Turmeric

If Poor Detoxification is Contributing

- Avoid or limit things that impede detox pathways: alcohol, smoking, toxic chemical compounds, sugar, refined carbohydrates, additives, etc. See "EDCs" on **page 51**.
- See Section 2 Estrogen Detoxification.
- See "Liver Support" on **page 55**.

Diet and Exercise

- Aerobic exercise regularly to reduce CRP, TNF-α, and IL-6.
- Choose unprocessed, whole foods.
- Correct insulin resistance. See **page 54**.
- Eat vegetables with every meal.
- Encourage exercise and movement in moderation.
- Encourage weight loss, if appropriate. See "Obesity" on **page 58**.
- Improve omega 3: omega 6 ratio with diet choices. Foods rich in omega 3 fatty acids include:
  - Anchovies
  - Chia seeds
  - Cod liver oil
  - Flaxseeds
  - Herring
  - Mackerel
  - Oysters
  - Salmon
  - Sardines
  - Soybeans
  - Walnuts
- Increase fiber intake.
- Increase intake of foods and/or supplements high in polyphenols and bioflavonoids.
- Optimize diet – consider an anti-inflammatory diet, autoimmune protocol (AIP) diet, or Mediterranean diet.

Insulin Resistance Support

Insulin Sensitizers

- Berberine
- Chromium
- D-pinitol
- EGCG from green tea
- Fish oil (EPA/DHA)
- Magnesium
- Myoinositol (can be given with D-chiro inositol in a 40:1 myo- to D-chiro-inositol ratio)
- NAC
- R-Alpha lipoic acid (R-ALA)
- Zinc
- Rx: Metformin, Thiazolidinediones, etc.

Herbal Blood Sugar Support

- Bitter melon
- Cinnamon
- Green tea
- Gymnema
- Holy basil
- Fenugreek
- Garlic
- Korean ginseng
- Oregano
- Turmeric

HPA Axis Support

- Decrease cortisol, if high cortisol is present, and treat HPA axis stressors. See "CAR is High" on **page 40**.
- Blood sugar balancing adaptogens:
  - Holy basil
  - Korean ginseng
  - Turmeric

Body Weight and Exercise

- Encourage weight loss, if appropriate. See **page 58** "Obesity."
- Increase movement and exercise if sedentary.
- High intensity interval training (HIIT).
- Resistance training, concentrating on large muscle groups – hamstrings, quads, and glutes.

Lifestyle and Diet

- Consider time-restricted eating/intermittent fasting, if appropriate.
- Increase fiber, healthy fats, and protein intake.
- Limit refined carbohydrates and high glycemic foods.
- Lower stress and support parasympathetic activity. See **page 63**.
- Lower inflammation. See **page 53**.
- Optimize sleep and the circadian rhythm. See **page 60**.

Liver Support

Dietary Support

- Allium family
- Artichokes
- Beets
- Broccoli sprouts
- Cruciferous vegetables
- Root vegetables
- Turmeric

Nutritional/Supplemental Support

- Butyrate
- Glutathione – see “Pyroglutamate” on **page 45**
- Humic/fulvic acids
- Methionine
- Molybdenum
- MSM
- NAC
- Sulforaphane
- Taurine

Herbal Liver Support

- Burdock
- Dandelion
- Licorice[1]
- Milk thistle
- Reishi
- Skullcap
- Turmeric
- Yellow dock

Bile Acid Support

- Bile acids
- Choline
- Collinsonia root
- Decrease elevated estrogen - see **page 14**
- Support melatonin production - see **page 30**
- Taurine and glycine
- Treat hypothyroidism - see **page 52**
- Vitamin C
- Vitamin D

Other

- Avoid environmental toxins and endocrine disrupting chemicals (EDCs). See **page 51**.

Mitochondrial Support

Nutritional Support

- Astaxanthin
- B vitamins (B1, B2, B3, B5, B7, B12)
- Copper
- CoQ10/Ubiquinol
- Curcumin
- Glutathione (see "Pyroglutamate" on **page 45** for ways to support glutathione)
- L-Carnitine
- Magnesium
- Manganese
- Melatonin
- NAC
- Nicotinamide adenine dinucleotide (NADH)
- PQQ
- Quercetin
- R-Alpha lipoic acid (ALA)
- Resveratrol
- Rhodiola
- Selenium
- Vitamin C
- Vitamin E

Physical Medicine

- Cryotherapy
- Other cold exposure (e.g., ending showers with 30 seconds of cold water)
- Hyperbaric oxygen therapy (HBOT)

Diet and Exercise:

- Improve a standard American diet (SAD).
- Limit alcohol intake.
- Intermittent fasting and fasting mimicking diets.
- Resistance training.

Other

- Limit exposure to environmental toxic compounds and endocrine disrupting chemicals (EDCs). See **page 51**.
- Treat chronic and acute disease and infections.
- Optimize sleep and the circadian rhythm. See **page 60** for more information.

Mood and Cognition Support

Mood Support

Dopamine and Norepinephrine Support

- Adequate dietary protein intake
- Ashwagandha
- B vitamins, especially B6 (P5P)
- Bacopa
- DLPA[3]
- Iron, if appropriate
- Korean ginseng
- L-DOPA[3]
- Mucuna[3] (contains L-DOPA)
- Rhodiola
- Saffron
- Tyrosine

Serotonin Support

- 5-HTP[2]
- Adequate dietary protein intake
- Black cohosh
- Holy basil
- Lavender
- Lemon balm
- Saffron
- St. John's wort[4]
- Tryptophan[2]
- Turmeric

GABA Support

- Adequate dietary protein intake
- Ashwagandha
- Bacopa
- California poppy
- Catnip
- Chamomile
- GABA
- Gotu kola
- Holy basil
- Hops
- Jujube
- Kava
- Lavender
- Lemon balm
- L-theanine
- Magnolia bark
- Magnolia bark/Honokiol/ Relora®
- Milky oats
- Mimosa
- Passionflower
- Skullcap
- Valerian
- Vitamin B6

Cognitive Support

- B vitamins
- Bacopa
- Choline
- Cordyceps
- EFAs
- Ginkgo
- Gotu kola
- Lion's mane
- Maca
- PQQ
- Rhodiola
- Rosemary
- Turmeric

Obesity Support

Diet and Exercise

- Incorporate anaerobic exercise, such as resistance training.
- Balance caloric intake with basal metabolic rate (BMR) and activity level.
- Avoid excess dieting and caloric restriction.
- Choose unprocessed, whole foods.
- Limit refined carbohydrates and high glycemic foods.
- Ensure adequate protein intake during weight loss to prevent loss of muscle mass.
- Increase fiber.
- Correct insulin resistance. See **page 54**.

If Leptin Resistance is Contributing

Leptin is measured in the morning via a fasting serum (blood) draw.

- Acupuncture
- Alpha lipoic acid (ALA)
- Consider intermittent fasting and fasting mimicking diets
- Curcumin
- Engage in regular exercise
- Ensure proper breathing (including evaluation for sleep apnea)
- Improve sleep quality
- Melatonin
- Minimize fructose and sucrose intake
- Optimize zinc (balance copper)
- Reduce triglycerides

HPA Axis Support

- Decrease cortisol, if high cortisol is present, and treat HPA axis stressors. See “CAR is High” on **page 40**. Rule out Cushing’s disease.
- Lower stress and support parasympathetic activity. See **page 63**.
- Optimize sleep and the circadian rhythm. See **page 60** for more information.
- Consider adaptogens that are:
  - Anti-inflammatory
  - Antioxidant-rich
  - Blood sugar balancing
  - Cortisol calming
  - See **page 36** for a list of adaptogenic herbs

Other

- Treat hypothyroidism. See **page 52**.
- Limit exposure to environmental toxic compounds and endocrine disrupting chemicals (EDCs). See **page 51**.
- Support mitochondrial function. See **page 56**.
- Lower inflammation. See **page 53**.

Ovarian Health Support

Ovarian Health Support

- Antioxidants, such as NAC and melatonin. See "Antioxidants" under "Inflammation" on **page 53**.
- Myo-inositol, especially if there is blood sugar dysregulation and high androgens.
- Evening primrose oil (EPO) or borage oil to provide gamma-linolenic acid (GLA).
- Phytoestrogens during the follicular phase.
- Treat any frank or subclinical nutrient deficiencies, especially around vitamins A/C/E, folate, selenium, magnesium, iodine, and zinc (balance copper).
- Lutein/Lycopene
- Support mitochondrial function within the follicle. See **page 56**.
- Treat high or low estrogen, if appropriate. See **page 14** and **page 10**, respectively.
- Treat low androgens (e.g., testosterone and DHEA), if appropriate. See **page 16** (testosterone) and **page 24** (DHEA).

Phytoestrogens and Phytoprogestogens

Phytoestrogens

Phytoestrogens are naturally occurring, plant-derived chemicals (phytochemicals) with estrogen modulating effects. They can be used when estrogen is low, but also when estrogen is high. They primarily bind Erβ receptors that increase estrogen activity when estrogen is low, but lower excessive estrogen activity and promote estrogen detoxification when estrogen is high.

- Alfalfa
- Dong quai
- Fennel
- Fenugreek
- Flaxseeds
- Fo-ti
- Gamma oryzanol
- Licorice[1]
- Red clover
- Resveratrol
- Sage
- Soy isoflavones

Phytoprogestogens

Phytoprogestogens are naturally occurring, plant-derived chemicals (phytochemicals) with progesterone modulating effects.

- Chaste tree berry
- Blue cohosh
- Fenugreek
- Sarsaparilla
- Wild Yam
- Yucca

Sleep and Circadian Rhythm Support (day)

Upon waking

- Support the cortisol awakening response (CAR) with light exposure:
  - 30 minutes minimum outdoors, preferably in the morning, without sunglasses, windows, or windshields (glasses/contacts are okay)
- Light therapy lamp indoors:
  - 20-30 minutes a day before 9 am
  - 10,000 Lux
- Enjoy caffeine (if desired and appropriate) before 12 pm.

During the day

- Practice time-restricted eating:
  - Eat during daylight hours.
  - Stop eating by 7 pm.
  - Keep to a 12-hour eating window.
  - Eat earlier in the day rather than later, as insulin sensitivity is best in the morning.
- Regular exercise:
  - Moderate intensity aerobic exercise.
  - Mind-body exercise such as yoga, tai chi, and qi gong.

Sleep and Circadian Rhythm Support (evening)

In the evening

- Minimize blue light exposure:
  - Avoid blue/white light and screens 2 hours before bedtime.
  - Dim household lights with the sunset.
  - In the evening use lamps (low-angle light) instead of bright overhead lighting.
  - Intrinsically photosensitive retinal ganglion cells (ipRGCs) are more easily activated by blue light than red light so you can either use red wavelength lighting </= 10 lux (such as Philips Hue or similar smart bulbs) or wear blue blockers in the evening paired with dim lighting.
  - Utilize f.lux app for computers and Night Shift for iPhone which reduces blue light.

- Support parasympathetic activity and keep cortisol low:
  - Avoid alcohol and sugar before bed.
  - Avoid stimulatory exercise in the evening.
  - Enjoy a snack before bed if waking up from low blood sugar elevating cortisol.
  - Keep to a regular schedule. Go to bed at the same time and wake up at the same time.
  - Start winding down 1-2 hours before bedtime.
  - Create bedtime rituals: favorite book, tea, face mask, bath, journal, meditate, pray, etc.
  - Clear your mind. Keep a bedside journal to jot down notes.
  - Support methylation to improve detoxification of stimulating catecholamines such as dopamine and epinephrine. See "Phase 2 Methylation" on **page 30**.

- Consider choosing botanicals and sleep-building supplements before "sleeping pills."
  - Chamomile tea
  - Lavender essential oil (diffuser, in bath, on a pillow)
  - Lion's mane
  - Melatonin
  - Phosphatidylserine

- Support GABA
  - GABA
  - Hormone therapy that may be calming (pregnenolone, progesterone, etc.) if appropriate.
  - Lemon balm
  - L-theanine
  - Magnolia bark/Relora®/Honokiol
  - Passionflower
  - Skullcap
  - Valerian
  - Vitamin B6
  - See "GABA Support" under "Mood and Cognition Support" on **page 57**.

Sleep and Circadian Rhythm Support (night)

At night

- Minimize light exposure:
  - Blue light signals “day” to our brains. Block it at night with blackout curtains and an eye mask
  - Bathroom nightlight
- Create a sleep sanctuary:
  - Ear plugs
  - Cotton sheets
  - Weighted blanket
  - Keep the bedroom cool (60-67 degrees F)
- Consider how pets, children, noises, partner’s snoring, streetlights, etc. may be affecting sleep.
- Avoid large meals 3 hours before bedtime.
- Consider a sleep study to evaluate for sleep apnea or other sleep disorders.
- Look into the possibility of medications affecting sleep.

Stress and Parasympathetic Activity Support

Lifestyle

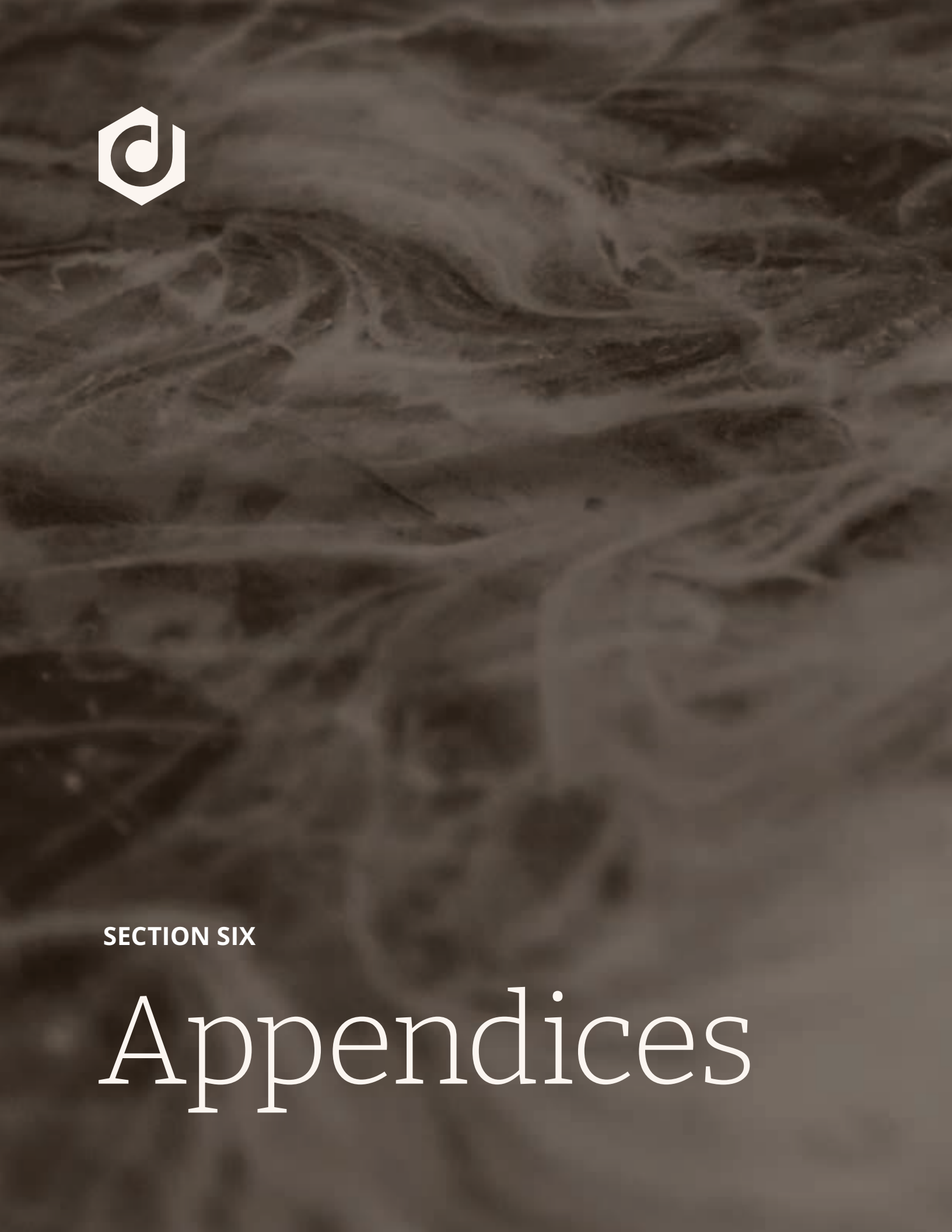
- Deep breathing
  - 4,7,8 breathing
  - 4x4 breathing
  - Alternate nostril breathing
- Ending showers with cold water for 30 seconds up to a few minutes
- Gratitude
- Grounding practices
- Journaling
- Medication, if necessary
- Meditation
- Prayer
- Regular exercise and movement
- Social connection, laughter
- Vagal nerve stimulation: humming, singing, chanting, gargling
- Walks in nature
- Yoga, tai chi, qigong

Therapies

- Acupuncture/acupressure therapy
- Biofeedback
- Cognitive Behavioral Therapy (CBT)
- Craniosacral therapy
- Emotional Freedom Technique (EFT) – tapping
- Eye Movement Desensitization and Reprocessing (EMDR)
- Massage therapy
- Psychotherapy, counseling
- Somatic therapy

Calming Support

- Ashwagandha
- Bacopa
- GABA
- Holy basil
- Jujube
- Lemon Balm
- L-theanine
- Magnolia bark/Relora®/Honokiol
- Milky oats
- Mimosa
- Passionflower
- Phosphatidylserine (lowers cortisol)
- Skullcap
- Valerian
- Hormone therapy that may be calming (pregnenolone, progesterone, etc.) if appropriate.
- See “GABA Support” under “Mood and Cognition Support” on **page 57**



SECTION SIX

Appendices

Summary

Appendix A: Annotations

1. Licorice

Licorice root (not DGL) limits the deactivation of free cortisol into free cortisone. Use caution in individuals with high cortisol. Also use caution in individuals with hypertension, as licorice root can worsen hypertension. Always monitor blood pressure and electrolyte balance when using licorice root.

2. Serotonin-Supporting Supplements (like 5-HTP and tryptophan)

Use caution with serotonin-supporting supplements like tryptophan and 5-hydroxytryptophan (5-HTP) when antidepressant SSRI or SNRI medications are used due to the possibility of serotonin syndrome.

3. Mucuna (*Mucuna pruriens*) and D,L-phenylalanine (DLPA)

Use caution with Mucuna and DLPA when antidepressant medications are being used and avoid DLPA in people with phenylketonuria (PKU).

4. St. John's Wort

Note that St. John's wort induces ("speeds up") CYP3A4, the enzyme that converts E2 to E3 and E1 to 16-OH-E1.

5. Diindolylmethane (DIM) and Indole-3-Carbinol (I3C)

DIM and I3C are sometimes used to induce CYP-1a1 (the preferred pathway towards 2-OH), however be mindful that they also tend to lower E1 and E2 which may not be appropriate for every person. When using DIM and/or I3C, it is important that phase 2 detoxification is well supported so that the phase 1 metabolites do not build up in the body and increase propensity for oxidative damage. If on estrogen therapy (ET), a relatively higher dose of estrogen may be needed when used in combination with estrogen-lowering compounds such as DIM and/or I3C to achieve desired clinical outcomes. If on Tamoxifen, note that DIM and I3C may render Tamoxifen less effective.

6. Finasteride

In males and females, finasteride may cause irreversible sexual dysfunction and infertility. Finasteride should not be taken during pregnancy, as it can cause birth defects.

7. Lithium Orotate

Lithium orotate contains micro doses of lithium, however, it is prudent to make sure thyroid and kidney function are normal before starting. Also consider checking a baseline electrocardiogram (ECG) before starting lithium orotate.

Appendix B: Educational Resources

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1. American Botanical Council – HerbMedPro

herbalgram.org

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2. Linus Pauling Institute

lpi.oregonstate.edu

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3. Mountain Rose Herbs

mountainroseherbs.com

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4. Memorial Sloan Kettering Cancer Center – About Herbs

mskcc.org/cancer-care/diagnosis-treatment/symptom-management/integrative-medicine/herbs/about-herbs

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5. Natural Standard NatMedPro

naturalmedicines.therapeuticresearch.com

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6. Nutri Advanced Aisle 7 Health Notes

nutriadvanced.co.uk/healthnotes

Appendix C: Abbreviations

Abbreviation	Meaning
5-HTP	5-Hydroxytryptophan
5-MTHF	5-Methyltetrahydrofolate
8-OHdG	8-Hydroxy-2-deoxyguanosine
ACV	Apple cider vinegar
AIP	Autoimmune protocol
ALA	Alpha lipoic acid
ATP	Adenosine triphosphate
B	Boron
BPA	Bisphenol A
CAR	Cortisol awakening response
CBD	Cannabidiol
CBT	Cognitive behavioral therapy
CCR	Cortisol clearance rate
COMT	Catechol-O-methyltransferase
CoQ10	Coenzyme Q10
Cr	Chromium
Cu	Copper
D3/K2	Vitamin D3/Vitamin K2 (Menaquinone-4)
DBH	Dopamine beta-hydroxylase
DGL	Deglycyrrhizinated licorice
DIM/I3C	Diindolylmethane/Indole-3-Carbinol
Cr	Chromium
Cu	Copper
DLPA	D,L-phenylalanine
DNRS	Dynamic neural retraining system
EDCs	Endocrine disrupting chemicals
EFT	Emotional freedom technique
EGCG	Epigallocatechin gallate (from green tea)

Abbreviation	Meaning
EMDR	Eye movement desensitization and reprocessing
EPA/DHA	Eicosapentaenoic acid/Docosahexaenoic acid (DHA)
EPI	Epinephrine
EPO	Evening primrose oil
ET	Estrogen therapy
FSH	Follicle stimulating hormone
GABA	Gamma-aminobutyric acid
GSE	Grape seed extract
HA	Hyaluronic acid
HBOT	Hyperbaric oxygen therapy
HCG	Human chorionic gonadotropin
HCl	Hydrochloric acid
HIIT	High intensity interval training
HLA	Hyaluronic acid
HMB	β-Hydroxy β-methylbutyric acid
HPA Axis	Hypothalamic-Pituitary-Adrenal Axis
HPO Axis	Hypothalamic-Pituitary-Ovarian Axis
HPT Axis	Hypothalamic-Pituitary-Testicular Axis
HT	Hormone Therapy
HVA	Homovanillate
I	Iodine
IR	Insulin resistance
K	Potassium
LDN	Low-dose naltrexone
L-DOPA	Levodopa
LH	Luteinizing hormone
MAO	Monoamine oxidase
Mg	Magnesium

Appendix C: Abbreviations

Abbreviation	Meaning
MMA	Methylmalonic acid
Mn	Manganese
MSM	Methylsulfonylmethane
NAC	N-acetylcysteine
NE	Norepinephrine
OATs	Organic acids
P	Phosphorus
P5P	Pyridoxine-5-phosphate
PABA	Para-aminobenzoic acid
PAHs	Polycyclic aromatic hydrocarbons
PCBs	Polychlorinated biphenyls
PFAs	Per- and polyfluoroalkyl substances
PQQ	Pyrroloquinoline quinone
PUFAs	Polyunsaturated fatty acids
R-ALA	R-alpha lipoic acid
S	Sulfur
SAD	Standard American diet
SAMe	S-adenosyl-L-methionine
Se	Selenium
Si	Silicon
Sr	Strontium
SULTs	Sulfotransferases
T3	Triiodothyronine
T4	Thyroxine
THE	Tetrahydrocortisone
THF	Tetrahydrocortisol
TMG	Trimethylglycine
TSH	Thyroid stimulating hormone
TTh	Testosterone Therapy
V	Vanadium
VMA	Vanilmandelate
Zn	Zinc

Appendix D: Botanical Names (Common to Latin)

Common Name	Latin Name
Alfalfa	*Medicago sativa*
Andrographis	*Andrographis spp.*
Artichoke	*Cynara scolymus*
Ashwagandha	*Withania somnifera*
Astragalus	*Astragalus spp.*
Bacopa	*Bacopa monnieri*
Bitter melon	*Momordica charantia*
Black cohosh	*Cimifuga racemosa*
Blue cohosh	*Caulophyllum thalictroides*
Boswellia (Frankincense)	*Boswellia serrata*
Burdock	*Arctium lappa*
Butcher's broom	*Ruscus aculeatus*
Calendula	*Calendula officinalis*
California poppy	*Eschscholzia ssp.*
Catnip	*Nepeta Cataria*
Chamomile	*Matricaria chamomilla*
Chamomile (German)	*Matricaria recutita*
Chaste tree berry	*Vitex agnus castus (females only)*
Chrysin	*Oroxylum indicum*
Cinnamon	*Cinnamomum spp.*
Comfrey	*Symphytum officinale*
Cordyceps (mushroom)	*Cordyceps sinensis or militaris*
Curcumin	*Derived from Curcuma longa*
Damiana	*Turnera diffusa*
Dandelion	*Taraxacum officinalis*
Dong quai	*Angelica sinensis*
Echinacea	*Echinacea spp.*

Common Name	Latin Name
Epimedium	*Epimedium grandiflorum*
Fennel	*Foeniculum vulgare*
Fenugreek	*Foenum graecum*
Flaxseeds	*Linum usitatissimum*
Fo-ti	*Polygonum multiflorum*
Gentian root	*Gentiana spp.*
Ginger	*Zingiber officinale*
Ginkgo	*Ginkgo biloba*
Goldenseal	*Hydrastis canadesis*
Gotu kola	*Centella asiatica*
Green tea	*Camellia sinensis*
Gymnema	*Gymnema sylvestre*
Hawthorne	*Crataegus spp.*
Holy basil	*Ocimum tenuiflorum*
Hops	*Humulus lupulus*
Horsetail	*Equisetum arvense*
Indian coleus	*Coleus forskohlii*
Jujube	*Ziziphus jujuba*
Kava	*Piper methysticum*
Korean Ginseng	*Panax ginseng*
Kudzu	*Pueraria montana*
Lemon balm	*Melissa officinalis*
Licorice root[1]	*Glycyrrhiza glabra*
Linden Flower	*Tilia spp.*
Lion's Mane (mushroom)	*Hericium erinaceus*
Maca	*Lepidium meyenii or peruvianum*
Magnolia bark	*Magnolia officinalis*

Appendix D: Botanical Names (Common to Latin)

Common Name	Latin Name
Maitake (mushroom)	*Grifola frondose*
Milky oats	*Avena sativa*
Mimosa	*Albizia julibrissin or lebbeck*
Mucuna	*Mucuna pruriens*
Oatstraw	*Avena sativa*
Passionflower	*Passiflora incarnata*
Pygeum	*Prunus africana*
Red clover	*Trifolium pratense*
Rehmannia	*Rehmannia spp.*
Reishi (mushroom)	*Ganoderma lucidum*
Rhapontic Rhubarb	*Rheum rhaponticum L*
Rhodiola	*Rhodiola rosea*
Rosemary	*Rosmarinus officinalis*
Saffron	*Derived from the flower of Crocus sativus*
Sage	*Salvia officinalis*
Saw Palmetto	*Serenoa repens*
Schisandra	*Schisandra chinensis*
Shatavari	*Asparagus racemosus*
Shiitake (mushroom)	*Lentinula edodes*
Siberian Ginseng	*Eleutherococcus senticosus*
Skullcap	*Scutellaria lateriflora*
Spearmint	*Mentha spicata*
Stinging nettle root	*Urtica dioica*
St. John's wort	*Hypericum perforatum*
Stone root	*Collinsonia canadensis*
Tongkat ali	*Eurycoma longifolia*
Tribulus	*Tribulus terrestris*

Common Name	Latin Name
Turmeric	*Curcuma longa*
Sarsaparilla	*Smilax officinalis*
Valerian	*Valeriana officinalis*
Wild yam	*Dioscorea villosa*
White peony	*Paeonia lactiflora*
Yellow dock	*Rumex Crispus*
Yohimbe	*Pausinystalia johimbe*
Yucca	*Yucca schidigera*

Appendix E: DUTCH HT Dosing Guides

DUTCH TESTING & HT GUIDE - WOMEN

	Why	Common Dosing Strategies	How to Monitor with DUTCH
Oral Progestrone	Effective at balancing ET, but clinical effects are due largely to metabolites formed in the gut. A good option when postmenopausal women struggle with sleep. A different ROA may be better for premenopausal women. 100-200mg has been shown to balance concurrent ET in postmenopausal women. Perimenopausal women may benefit from higher dosing (100-400mg) especially in the early menopausal transition when estrogen excess may occur.	**Low:** 25 - 50 mg **High:** >200 mg **Most Common:** 100 - 200 mg **Premenopausal dosing:** 50-400 mg *Consider taking sequentially or continuously.*	DUTCH results only show which metabolites are preferred. Evaluate which pathway is dominant (alpha or beta).
Estradiol Patch	Patches offer consistent hormone dosing over time and are very effective at managing hot flashes. Even low doses may increase bone mineral density (BMD) in some women.	**Low:** 0.014 - 0.025 mg **High:** 0.1 mg **Most Common:** 0.05 mg *Usually used continuously. Typically changed 1-2 times per week.*	**Monitoring Estrogen Therapy (ET)** Typical on-therapy values between the top of the postmenopausal range (0.7ng/mg for estradiol) and within the first third of the premenopausal range (about 2.4ng/mg). The specific target for a patient depends on the patient's history and symptoms as well as the patient and provider's comfort level with the risks for too much (breast cancer, etc.) and too little (osteoporosis, etc.) estrogen. It is recommended to closely monitor phase I metabolites to ensure that too many 4-OH metabolites are not formed. Methylation should also be evaluated and supported if inadequate. DUTCH OATs may also be helpful to ensure that a nutrient deficiency is not present. ET may induce vitamin B6 deficiency. Proper metabolism requires B6, B12, and glutathione. For testosterone pellets, premenopausal levels are often targeted and patient symptoms monitored. Evaluate 5a-reductase activity before dosing with testosterone to ensure there isn't excessive 5a metabolism.
Estradiol Cream/Gel	Increases serum and urine levels and may improve hot flashes and BMD at the right dose. Transdermal E2 is attractive because it is easy to use and bypasses first pass metabolism. Estriol often given in doses 1 - 4 times higher than estradiol.	**Low:** 0.1 - 0.25 mg Estradiol 0.1 - 1.0 mg Estriol **High:** 1.0 - 2.5 mg Estradiol 2.0 - 5.0 mg Estriol **Most Common:** 0.25 - 0.5 mg Estradiol 0.25 - 2.5 mg Estriol *Usually taken continuously.*	
Testosterone or Estradiol Pellet	Pellets offer consistent hormone dosing over time for testosterone and estradiol. Research is limited on effects on hot flashes and BMD. Because serum/urine E2 levels match or exceed those seen in patches, E2 pellets are likely to help with hot flashes and BMD.	**Low:** <5 mg Estradiol 20 - 50 mg Testosterone **High:** >12 mg Estradiol >125 mg Testosterone **Most Common:** 5 mg Estradiol 100 mg Testosterone *Inserted every 3 - 4 months*	
Vaginal Estrogen or Testosterone	Low doses increase local tissue levels while higher doses also increase systemic levels. Placing in the top 1/3 of the vagina significantly increases uterine levels. Estriol often given in doses 1 - 4 times higher than estradiol. Studies have found that some FDA-approved low dose vaginal E2 formulations (e.g., 0.01 mg E2 insert) may be safe to use without progesterone in a woman with a uterus. Doses higher than this may require concomitant progesterone therapy to prevent endometrial hyperplasia and cancer.	**Low:** 0.01 mg Estradiol 0.25 mg Testosterone **High:** 0.5 mg Estradiol 2 mg Testosterone **Most Common:** 0.1 mg Estradiol 0.25 - 1.0 mg Estriol 0.25 - 1.0 mg Testosterone *Usually used 2-3 times per week at night but may be used nightly.*	Levels above the postmenopausal range imply systemic uptake. For localized (vaginal) effects only, results should not exceed the postmenopausal range.
Testosterone Cream/Gel	Transdermal testosterone can be used to correct low T and improve sex drive and muscle mass.	**Low:** 0.5 - 2.0 mg **High:** 10 - 20 mg **Most Common:** 1 - 5 mg *Taken daily, at waking or bedtime*	It is optimal if levels of T (as well as metabolites) are in range. A lower dose may be needed if the 5a-reductase pathway is favored. Monitor patient for excess androgen symptoms (e.g., scalp hair loss, facial/body hair growth, acne, etc.)
DHEA	Sublingual or oral DHEA will increase systemic levels and also contribute to downstream androgens (testosterone) and estrogens.	**Low:** 1 - 5 mg **High:** 25 - 50 mg **Most Common:** 5 - 10 mg *Usually taken daily*	Monitor conversion to testosterone, E2 and metabolites of both. DHEA and testosterone metabolites may be artificially elevated if the patient doesn't skip the dose of DHEA the day of and day before the test (as described in the test instructions).

ET, especially with an intact uterus, should be balanced with adequate progesterone (vaginal or oral preferred).

Transdermal progesterone, oral estrogen and sublingual hormones, are not well monitored by DUTCH and are not represented on this form along with a few other less commonly used HT options.

Appendix E: DUTCH HT Dosing Guides

DUTCH TESTING & HT GUIDE - MEN

	Why	Common Dosing Strategies	How to Monitor with DUTCH
Testosterone Pellets	Testosterone pellets offer consistent hormone dosing over time. Most pellet doses tend to suppress endogenous testosterone production. They can be given with aromatase inhibitors if conversion to estrogen is a concern.	**Low:** 400 mg **High:** 1600 - 2000 mg **Most Common:** 800 - 1200 mg *Inserted every 4-6 months*	Urine testosterone levels are often supraphysiological in the days following an injection and in the first three months of pellet therapy. With 1200 mg testosterone pellets, results are expected to be 90-220ng/mg over this period (reference range 25-115ng/mg). Monitor testosterone along with its metabolites to assess 5a-DHT production and evaluate potential need for blocking 5a-reductase. Patients on TTh should also be evaluated for aromatization of testosterone to estradiol by monitoring estradiol and its metabolites. In men who are not on TTh, epi-testosterone is expected to be found in similar concentrations as testosterone. When gonadal production of hormones is suppressed by TRT, epi-testosterone may be a good indicator of this suppression. Typically levels below 10ng/mg indicate suppression (and especially if <5ng/mg). While correlating data has not been generated, these levels may parallel serum LH levels. Both LH and epi-testosterone are suppressed by most doses of injections and pellets.
Testosterone Injections	The most frequently used testosterone injections are testosterone cypionate (8 day half-life) and testosterone enanthate (4-5 day half-life). Injections provide robust testosterone levels for 1-2 weeks typically. Bi-weekly dosing (with lower dosing than weekly injections) may offer improved steady state and less highs and lows.	**Low:** 25 - 100 mg **High:** >300 mg **Most Common:** 100 - 250 mg *Administered biweekly, or every one to two weeks*	
Transdermal Testosterone	Testosterone creams and gels are the most popular TRT formulation but can be challenging to dose and monitor effectively. Doses between 50 and 150mg are commonly used in studies in order to see improvements in muscle mass and other clinical parameters. Application is convenient, but patients must also be careful to avoid transference (to partners, children, or pets).	**Low:** 25 - 75 mg **High:** 150 - 250 mg **Most Common:** 50 - 100 mg *Typically applied daily*	Doses proven to increase muscle mass (25-100mg) in most recipients typically push DUTCH testosterone levels to levels matching the reference range for young, healthy men (50-115ng/mg). Monitoring 5a-DHT and its metabolite will assist in evaluating if 5a-blockers may be appropriate. Epi-testosterone levels will often be only partially suppressed (not below 10ng/mg), which implies that endogenous production (and likely pituitary LH secretion) is only partially suppressed. Monitor estrogen conversion and metabolism as well.
DHEA	Even though testosterone is downstream from DHEA, very little testosterone is made from circulating DHEA. The testes make testosterone directly (from cholesterol), so do not give DHEA expecting significant increases in testosterone. Oral or sublingual DHEA is often used. The latter may absorb directly in the mouth and bypass gut/liver metabolism, which may result in less estrogen production.	**Low:** 5 - 10 mg **High:** >100 mg **Most Common:** 10 - 25 mg *Typically taken daily*	Oral DHEA must be stopped 48 hours prior to DUTCH sample collection to avoid hormone elevations from 1st pass metabolites. Monitor androgen metabolism pathways (alpha vs beta), conversion to estrogens, along with estrogen metabolism. Be aware that DHEA can form testosterone metabolites without necessarily making testosterone itself. Transdermal DHEA may be used on the day of testing and overall DHEA levels can be monitored by looking at the total DHEA (DHEA-S + Androsterone + Etiocholanolone).
HCG or Clomiphene	Human chorionic gonadotropin (hCG) acts as an LH analog and stimulates the Leydig cells to produce testosterone. Clomiphene citrate, a selective estrogen receptor modulator (SERM) can also be used for secondary hypogonadism. By blocking negative feedback of estrogen receptors, it increases gonadotropin levels, indirectly increasing testosterone production. These two options are not advised for primary hypogonadism.	**HCG:** 100 - 250 ug (2000 - 5000 IU) *Taken 2 - 3 times/week* **Clomiphene:** 25 mg *Taken every other day*	Providers may want to target young, healthy testosterone levels (50-115ng/mg) with these therapies. 50-150% increases are common in (non-primary) hypogonadal men. Metabolites of testosterone (including DHT production) should all be monitored along with estrogen production and metabolism. Estradiol conversion will often exceed physiological levels with hCG use. Clomiphene citrate and hCG will not compromise fertility in a male patient, unlike testosterone therapy.

Thank You!

We know that every sample received by our lab comes from a real person, *with a real story.*

We are incredibly thankful for the opportunity to serve healthcare practitioners and their patients around the world, and we love hearing stories about how the DUTCH Test profoundly changes lives. This is why we do what we do!

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3138 NE Rivergate St, McMinnville, OR 97128
info@dutchtest.com
503.687.2050