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Estrogen Metabolism

Estrogen metabolism includes breaking down and eliminating unwanted estrogen through various pathways in your body. If estrogen is too high, out of balance with other hormones, or improperly broken down, that could interfere with reproductive health and increase the risk of certain cancers.

STRATEGIES TO SUPPORT ESTROGEN METABOLISM

- Follow a healthy food plan
- Get plenty of fiber
- Support gut microbiome balance, such as by eating fermented foods
- Eat cruciferous vegetables
- Enjoy antioxidant-rich foods
- Include omega-3 fats
- Get regular physical activity
- Maintain a healthy weight
- Manage stress
- Prioritize sleep
- Take targeted supplements (such as DIM), if advised by your practitioner
- Use natural body care and home products
- Limit alcohol intake

Understanding Estrogen

Estrogen is an umbrella term for a family of hormones or signaling agents. The three main types of estrogen are estrone (E1), estradiol (E2), and estriol (E3). Estradiol is the most active form.[1] For simplicity, all forms of the hormone will be referred to as estrogen here.

Estrogen is well-known to play vital functions in women's health, but it also has important roles in men's health.[2] Though most often thought of as a reproductive hormone, estrogen is active throughout the body, including your bones, brain, and thyroid gland.[3-5]

Why Does Estrogen Metabolism Matter?

When your body is done using estrogen, much of it is transported to your liver to be broken down (metabolized). As your liver processes the hormone, estrogen metabolites or by-products are created. These metabolites travel via bile through your gut. Some metabolites are excreted in your stools or urine, and some are reabsorbed.[6] These processes help maintain hormone balance.

Sometimes we don't eliminate enough estrogen. When estrogen is too high compared to other sex hormones, particularly progesterone, it's called "estrogen dominance."[7] This can worsen hormone-related conditions such as endometriosis (painful, abnormal growth of uterine tissue), premenstrual syndrome (PMS), premenstrual dysphoric disorder (a more severe form of PMS), and polycystic ovarian syndrome (PCOS; a top cause of infertility).[7]

Disruptions in estrogen metabolism pathways can also promote DNA damage. This damage increases the risk of hormone-related cancers. Elevated levels of some estrogen metabolites have been linked with a higher risk of breast, ovarian, and prostate cancer.[1,8]

Maintaining Estrogen Balance

Many factors, including nutrition, stress, toxin exposure, and genetics, affect estrogen metabolism.[1,9-11] In addition, estrogen metabolism may impact or be

impacted by various health conditions, such as metabolic syndrome, anorexia nervosa, hypothyroidism, autoimmunity, and gut dysbiosis (an imbalance of gut microbes, such as bacteria).[6,12-15]

Several aspects of a healthy eating plan and lifestyle may support proper estrogen metabolism, including:

- **Fiber** can bind harmful estrogen metabolites and estrogen-mimicking toxins in your gut so they can be carried out in your stools.[16] Studies have shown a decreased risk of breast cancer with higher amounts of fiber in the diet.[17,18] Generally, women should aim for at least 25 grams, and men should aim for at least 38 grams of fiber per day.[19] Drink plenty of water to support healthy elimination, too.
- **Gut microbiome support,** such as eating a variety of fiber-rich plant foods and consuming fermented foods like yogurt, aims to maintain a healthy balance of gut bacteria. That's important because a subset of the gut microbiome (called the estrobolome) supplies enzymes that metabolize unwanted estrogen, sometimes putting it back into circulation rather than eliminating it as desired.[20] Studies suggest a balanced gut microbiome helps keep estrogen levels in check.[21,22] For tips on supporting gut microbiome balance, ask your functional medicine provider about IFM's **Eating for Your Microbiome** and **Probiotic and Prebiotic Foods** handouts.
- **Cruciferous (brassica) vegetables** are those in the broccoli family. These vegetables provide plant compounds that may support estrogen metabolism and reduce the risk of certain hormone-related cancers.[23,24] Ask your functional medicine provider about IFM's **Food Sources of Cruciferous Vegetables** handout for more information.
- **Antioxidant-rich foods** are linked with a lower risk of certain cancers, including breast cancer.[25,26] Antioxidants help neutralize free radicals (damaging molecules), such as those produced in the liver during estrogen detoxification.[27] IFM's **Phytonutrient Spectrum** handouts contain antioxidant-rich, brightly colored fruits and vegetables, green tea, herbs, and spices. Eating a "rainbow of colors" is an easy way to remember to get your daily antioxidants.
- **Omega-3 fats,** which are abundant in fish oil and certain fish, may help reduce inflammation and support healthy estrogen metabolism.[28,29] Wild-caught salmon, sardines, herring, and anchovies are all excellent omega-3 sources and low in mercury.[30] Farm-raised fish tend to be higher in PCBs (polychlorinated bisphenols) and other pollutants that should be avoided because they can disrupt estrogen metabolism.[31,32] Flaxseed is a plant source of omega-3 fat but is less potent than the omega-3s in fish oil. However, flaxseed also contains lignans, which are plant compounds that may support healthy estrogen metabolism.[33]
- **Healthy lifestyle factors,** such as being physically active, maintaining a healthy weight, getting enough sleep, and managing stress, are sometimes overlooked. However, such factors may support healthy estrogen levels and help reduce the risk of some cancers, such as breast cancer.[1,34-37]

- **Certain dietary supplements** may support healthy estrogen metabolism, sex hormone balance, and reproductive health. Following are a few supplements to consider. Talk to your functional medicine provider for tailored supplement advice, including the type, brand, and dosing.
    - **Diindolylmethane (DIM) and indole-3-carbinol (I3C)** are related compounds that support healthy estrogen metabolism and may help reduce the risk of certain cancers.[38,39] I3C is a phytonutrient from cruciferous vegetables and can be converted to DIM (and other beneficial compounds) in your gut.[40,41] Supplements supplying I3C or DIM individually, as well as in combination, are available.
    - **N-acetyl cysteine (NAC)** is an antioxidant and anti-inflammatory compound. It also supports your body's production of glutathione, a top antioxidant that protects your body's cells and DNA.[42] In addition, taking NAC has been linked with improvement in some painful inflammatory conditions related to estrogen dominance, such as endometriosis.[43-45]
    - **Melatonin** is a hormone best known for helping with sleep. However, studies suggest it has many other roles in the body, including acting as an antioxidant and supporting healthy sex hormone levels.[46,47] Scientists are exploring how melatonin supplements might help with PCOS, among other conditions related to sex hormone imbalance.[48,49] Preliminary human studies are encouraging, but more are needed.

Minimizing Disruptions in Estrogen Metabolism

Following are several factors that can interfere with estrogen metabolism. Though you can't control all of them, you can manage or minimize them.

- **Xenoestrogens** are compounds that can mimic estrogen in the body and may disrupt healthy estrogen metabolism.[50,51] Many personal care and home products contain manufactured xenoestrogens, such as bisphenol A (BPA) and phthalates.[52] You may also be exposed to xenoestrogens from nature, such as zearalenone, a toxin produced by *Fusarium* mold.[53,54] *Fusarium* can contaminate water-damaged buildings and some crops, such as corn. Ask your functional medicine provider about IFM's handouts to limit exposure to toxins and mold. For more information on choosing safer body and home-care products, visit the Environmental Working Group website.
- **Variants in certain genes** related to detoxification (such as COMT, MTHFR, CYP1A1, CYP1B1, and GST) can impact estrogen metabolism.[55,56] Dietary modifications or certain supplements, such as methylated B vitamins, may be supportive if you have certain genetic variants.[27,57] Talk to your functional medicine provider or a genetic counselor if you'd like to find out how genetics may impact your hormonal and overall health.
- **Alcohol** is metabolized in the liver, as is estrogen. Higher intakes of alcohol can disrupt estrogen metabolism and increase breast and overall cancer risk.[1,58] In general, women should limit alcohol to 1 drink or less per day (and avoid it entirely if pregnant or trying to become pregnant). Men should

limit alcohol to 2 drinks or less per day.[19] That said, even light to moderate drinking is linked with increased cancer risk, especially breast cancer.[59] Ask your functional medicine provider to individualize alcohol recommendations for you based on your personal risk factors.

- **Insulin resistance and obesity** can disrupt estrogen balance.[60] On the other hand, healthy estrogen levels support weight control and insulin sensitivity.[61-63] Adopting sustainable healthy habits that promote insulin sensitivity and weight control supports healthy estrogen metabolism and may reduce estrogen-related cancer risk.[64,65] Some healthy habits include getting regular physical activity, choosing low-glycemic foods that are gentler on blood sugar, eating mindfully, seeking community support, and managing stress.
- **Certain medications,** including birth control pills and some forms of hormone replacement therapy (HRT) used for menopause, influence estrogen metabolism and may increase your risk of hormone-related cancers.[66-68] Discuss the benefits and risks of birth control pills and different forms of HRT with your functional medicine provider.

Taking the Next Steps

Your functional medicine provider may recommend hormone testing to evaluate hormonal status and estrogen metabolism. Hormones can be tested in the blood, urine, or saliva. Each method has advantages and limitations. Talk to your provider to determine if hormone testing is right for you.

The recommendations in this document should be followed under the supervision and guidance of a qualified healthcare practitioner.

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