Estrogen Metabolism

INFORMATION SHEET

Biocidin Botanicals™

Estrogen metabolism and elimination are intimately intertwined with the microbiome. The gut microbiome comprises an estimated average of 39 trillion microbes.[1] It is a diverse group of bacteria, fungi, protozoa, archaea, and viruses.

The estrobolome is a specific collection of bacteria from the enteric microbiome whose products are capable of influencing estrogens. It serves to metabolize and modulate the body's circulating estrogen, which in turn affects weight, mood, libido, and accumulation of lifetime exposure to estrogens.[2]

Unfortunately, microbial imbalances (aka dysbiosis) are a common result of contemporary lifestyle and diet choices. Dysbiosis can result in bacterial overgrowth, parasites, impaired digestion, leaky/inflamed tight junctions, elevated b-glucuronidase levels, and hormonal imbalance.

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Estrogen metabolizes physiologically in numeric order – Phase 1, Phase 2, Phase 3. But we need to address it in reverse – Phase 3, Phase 2, Phase 1.

Phase 1: Hydroxylation

This phase occurs in the liver. There, estrogen has three metabolic pathways by which it can be metabolized: CYP1A1, CYP1B1, and CYP3A4. This process results in three forms of hydroxylated estrogens: 2-OH-E1, 4-OH-E1, and 16-OH-E1.[3]

Phase 2: Conjugation

This step also takes place in the liver. Estrogens become deactivated – specifically through sulfation, glucuronidation, and methylation – before they are eliminated. This process requires certain nutrients and enzymes in the body, namely COMT and MTHFR.[4]

Phase 3: Elimination

In the final stage, the deactivated estrogens from Phase 2 are packaged up and eliminated from the body through the stool. Bile is also necessary to facilitate this process. Things like inflammation, dysbiosis, and overall intestinal health can all impact how smoothly this process occurs. It is now clear that if Phase 3 is working inefficiently, estrogen metabolism backs up and slows down entirely.

This explains the importance of addressing Phase 3 first!

[1]Barko, P., McMichael, M., Swanson, K., & Williams, D. (2017, November 24). The Gastrointestinal Microbiome: A Review. Retrieved August 20, 2021, from https://onlinelibrary.wiley.com/doi/pdf/10.1111/jvim.14875

[2]Kho, Z. Y., & Lal, S. K. (0001, January 01). The Human Gut Microbiome – A Potential Controller of Wellness and Disease. Retrieved August 20, 2021, from https://www.frontiersin.org/articles/10.3389/fmicb.2018.01835/full

[3]Tsuchiya, Y., Nakajima, M., & Yokoi, T. (2005) Cytochrome P450-mediated metabolism of estrogens and its regulation in human. Cancer letters, 227(2), 115-124. Retrieved September 15, 2021, from https://pubmed.ncbi.nlm.nih.gov/16112414/

[4]Yasuda, M.T., Sakakibara, H. & Shimoi, K. Estrogen- and stress-induced DNA damage in breast cancer and chemoprevention with dietary flavonoid. Genes and Environ 39, 10 (2017). https://doi.org/10.1186/s41021-016-0071-7

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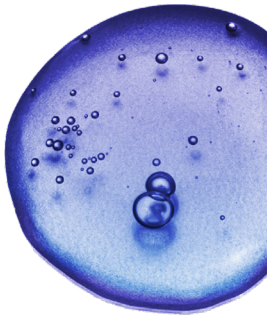
Gut Dysbiosis and Hormonal Imbalance

The health of the microbiome influences hormonal health in a few ways.

Suppression of ovarian hormone production

Dysbiosis and its resulting metabolites cause inflammatory damage to the gut lining and increase systemic inflammation, which can suppress hormone production.



Impaired Phase 3 support

Dysbiosis can result in slowed transit time and/or constipation and reabsorption/recirculation of toxins.

Elevated b-glucuronidase levels

In Phase 3 of estrogen detoxification, the liver and intestines bind toxins and steroid hormones for elimination. These toxins and hormones are bound by glucuronic acid, allowing them to be excreted in the stool. B-glucuronidase is an enzyme that breaks that tight bond between glucuronic acid and toxins and hormones in the intestines.[5] The problem? Elevated b-glucuronidase leads to estrogen excess.[6]

> B-glucuronidase is produced by intestinal epithelium and certain intestinal bacteria.[7] High levels (detected in most diagnostic stool studies) are not desirable. Higher levels have been associated with higher circulating estrogens and lower excretion in women. Lower levels are currently not of much clinical significance. High levels are commonly seen with an imbalanced microbiome.

Common symptoms associated with elevated b-glucuronidase:		
Heavy periods	Headaches	Anxiety
Clotting	Mood Swings	Irregular Menses
Cramping	Weight Gain	Infertility
Fibrocystic Breasts	Fatigue	Brain fog

Biocidin Botanicals™ products work to restore healthy balance to the GI tract, supporting Phase 3 – elimination. It may also reduce the inflammatory load on the liver, liberating nutrients needed for Phases 1 and 2 of estrogen metabolism.

[5]Beta-Glucuronidase; stool. (n.d.). Retrieved August 20, 2021, from https://www.doctorsdata.com/beta-glucuronidase-stool/

[6]Briden, D. L. (2020, February 24). How your gut affects your hormones. Retrieved August 20, 2021, from https://helloclue.com/articles/cycle-a-z/how-your-gut-affects-your-hormones

[7]Ervin SM; Li H; Lim L; Roberts LR; Liang X; Mani S; Redinbo MR; (n.d.). Gut microbial β-glucuronidases reactivate estrogens as components of the estrobolome that reactivate estrogens. Retrieved August 20, 2021, from https://pubmed.ncbi.nlm.nih.gov/31636122/

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Therapeutic Plan Suggestions

Let's review how truly simple it can be to address this complex scenario with your patients.
We must first rebalance the microbiome!

Biocidin Botanicals™ Please see **Usage Guide** for Dosing	
Product	**Key Activities** (see Product Sheets for ingredient-specific actions)
Biocidin® Liquid	Broad-spectrum microbiome balancing*, disrupts biofilms*, immunomodulatory*, antioxidant*
GI Detox™ +	Binds and eliminates biofilm components*, supports detoxification and cleansing*, reduces gas and bloating*
Proflora™ 4R	Antioxidant*, immunomodulatory*, healthy elimination*, healthy GI flora*, healthy microbial balance*
Biotonic™	Adaptogenic, elimination of unhealthy elements*, digestive stimulant*, hepatoprotective*, healthy microbial balance*
Olivirex® Add for complex cases or when there is significant overgrowth	Healthy virome balance*, hepatoprotective*, immunomodulatory*, healthy inflammatory response*, healthy microbial balance*

Additional Products

Calcium-D-Glucarate

Specifically hinders and lowers the enzyme beta-glucuronidase

Butyrate

If the patient needs specific post-biotic, short-chain fatty acid support

Liver Nutrients

Methylated B vitamins, amino acids, minerals, N-Acetyl-L-Cysteine, Glutathione

*These statements have not been evaluated by the Food and Drug Administration. These products are not intended to diagnose, treat, cure or prevent any disease.

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Biocidin Botanicals™

Resources From Dr. Carrie Jones:

Functional Microbiome Testing Companies on Rupa Health:

Diagnostic Solutions (DSL) GI Map

Diagnostic Solutions laboratory
RESEARCH. TECHNOLOGY. RESULTS.

Genova Diagnostics GI Effects or CDSA

GENOVA DIAGNOSTICS

Microbiome Labs BiomeFX

MICROBIOME LABS

Vibrant Wellness Gut Zoomer

VibrantWellness

Doctor's Data GI 360 or Comprehensive Stool Analysis

DOCTOR'S DATA INC.

Example of an elevated beta-glucuronidase on a report:

GI Markers	Result		Normal
b-Glucuronidase	3906	High	<2486 U/mL

Papers on the estrobolome and estrogen:

https://pubmed.ncbi.nlm.nih.gov/28778332/

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5017946/

https://www.jbc.org/article/S0021-9258(20)30413-0/fulltext

https://www.frontiersin.org/articles/10.3389/fmicb.2020.578007/full (The Endobolome)