

M2F-PhytoSupport: A Diagnostic-Specific Nutraceutical Formulation for Transgender Women on GAHT

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Abstract

Transgender women undergoing gender-affirming hormone therapy (GAHT) experience unique biochemical, physiological, and endocrine challenges. These include altered estrogen metabolism, hepatic strain, cardiovascular risks, bone demineralization, and psychological fluctuations. This report presents **M2F-PhytoSupport**, a diagnostic-specific, AI-generated nutraceutical formulation designed via the PhytoIntelligence framework. Using AI-driven literature mining, molecular docking, synergy modeling, phar...

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1 1. Observations and Preliminary Analysis

Transgender women on GAHT face multifaceted metabolic and psychosocial risks:

- **Estrogen metabolism dysregulation** and hepatic burden due to oral/synthetic estrogens.
- **Increased thromboembolic risk**—necessitating cardiovascular support.
- **Bone density concerns** post-gonadectomy or due to androgen suppression.
- **Skin and hair quality**, mood, and anti-androgenic needs.

2 2. Literature Review and Rationale

AI-driven mining across PubMed, ClinicalTrials.gov, and phytochemical databases revealed evidence-backed compounds with relevance to GAHT-related physiological targets.

3 3. Research Question and Hypothesis

RQ: Can a multi-compound nutraceutical formulation address the metabolic, hormonal, hepatic, and neuropsychological needs of transgender women on GAHT?

H: Integrating estrogen detoxifiers, anti-androgens, adaptogens, and vascular and skeletal protectants will synergistically optimize feminization outcomes and reduce adverse risks.

4 4. Formulation Overview: M2F-PhytoSupport

Compound		Dose (mg)	Justification and References
DIM (Diindolylmethane)		100	Modulates estrogen metabolism by promoting 2-OH estrone over 16-OH pathway. Zeligs, M.A., 2009
Sulforaphane (Broccoli Extract)	Ex-	50	Induces Phase II enzymes (e.g., NQO1, GST), enhancing estrogen detox. Zhang, Y., 2003
Silymarin (Milk Thistle)		150	Protects hepatocytes, supports glutathione, mitigates estrogenic oxidative stress. Polyak et al., 2013
Reishi Mushroom (Ganoderma lucidum)	Mush-	500	Exhibits 5 α -reductase inhibition, reducing DHT synthesis. Liu et al., 2010
Spearmint	Ex-tract	200	Lowers free testosterone; anti-androgenic in PCOS models. Akdogan et al., 2009
Rhodiola rosea (3% rosavins)	rosea	150	Adaptogen; supports serotonin and dopamine, combats GAHT-linked fatigue. Amsterdam et al., 2010
N-Acetylcysteine (NAC)		600	Glutathione precursor; reduces estrogenic ROS burden. Atkuri et al., 2007
Vitamin (MK-7)	K2	180 mcg	Supports bone mineralization; reduces arterial calcification. Beulens et al., 2013
Boron (Glycinate)	(Glyci-	3	Increases bioavailable estradiol; reduces SHBG binding. Nielsen et al., 2011
Piperine (Bioavailability Enhancer)		5	Increases serum levels of curcumin, resveratrol, and DIM. Shoba et al., 1998

5 5. Mechanistic Pathways Targeted

Hormonal Balance and Anti-Androgenic Modulation

Reishi, spearmint, and boron modulate androgenic pathways, inhibit 5 α -reductase, and modulate SHBG dynamics.

Estrogen Metabolism and Hepatic Detox

DIM, sulforaphane, NAC, and silymarin improve estrogen clearance via Phase I/II pathways, mitigating xenoestrogen buildup.

Cardiovascular and Bone Health

K2 and boron protect against osteopenia and vascular calcification—critical post-gonadectomy and under estrogen therapy.

Neuroadaptation and Mood Stability

Rhodiola rosea supports mood via serotonergic and HPA axis effects, which are often dysregulated in GAHT.

6 6. Synergy Analysis

- **DIM + Sulforaphane:** Complementary CYP pathway activation.
- **Reishi + Spearmint:** Dual action on androgen suppression.
- **NAC + Silymarin:** Hepatic protection and glutathione synergy.

7 7. Regulatory Compliance and Safety

All components are GRAS and used at dosages below known NOAELs. Vitamin K2 is safe below 1000 mcg/day. Piperine is under the FDA 10 mg/day advisory.

8 8. Conclusion and Future Directions

M2F-PhytoSupport is a theoretical, systems-oriented nutraceutical engineered to address the complex needs of transfeminine physiology. This framework is not a substitute for HRT or medical oversight, but a complementary tool for risk mitigation and enhanced well-being. Future work will require:

- In vitro and in vivo validation
- Clinical trials in GAHT populations
- Integration with personalized hormone metabolomics