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Fertility Mentoring Program

The Baby
Maker Network

Presented by Stacey Roberts BScPhysio, Herbalist, Naturopath

PCOS and Fertility

- **Module 6**
- **Part 3**

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Medical Disclaimer Module 6

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Things To Consider From Our Education

- PCOS is not necessarily always an estrogen dominant condition
- We are often taught to address the estrogen dominance and androgen excess and don't always use our tools to address the underlying glucose metabolism issues and or insulin resistance.
- By addressing the insulin resistance with all steps of the 5 Step Fertility Solution this will by itself help to optimize the androgen excess, decrease inflammation, decrease stress on the system, optimize hormone balance

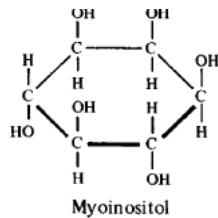
Addressing Insulin Resistance, Hyperinsulinemia and Glucose Metabolism: Naturopathic Options

- N-Acetyl Cysteine (Discussed in the last episode, not a first line for regulating IR, HI, GM)
- Myo-inositol
- Myo-inositol and folic acid
- Alpha Lipoic Acid
- Chromium
- Vitamin D
- Cinnamon
- Gymnema
- Maitake mushroom

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Myo-Inositol

- Structurally similar to glucose
- Present in cell membranes
- Rich in ovarian fluid and seminal fluid



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Myo-Inositol

Actions:

- Insulin sensitizer
- Precursor of inositol triphosphate (impacts/ regulates TSH, FSH and insulin signalling)

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Myo-Inositol (MI)

- Improvement in oocyte and embryo quality
- Treatment with MI on PCOS with oligomenorrhea, high testosterone, hirsutism cases showed, improvement ovarian function and metabolic and hormonal parameters
- The presence of high levels of MI can indicate the well being of the follicle

Myo-Inositol Uses

Effective in addressing

- Insulin resistance
- Hyper-androgenism
- Oligo-amenorrhea
- Metabolic syndrome
- Panic disorder
- Obsessive compulsive disorder
- Bipolar depression
- Improving thyroid function

Myo-Inositol

Dosage:

- 200-4000mg once a day
- 4g for improving TSH levels
- Powdered form or soft gelatin capsule
- Soft gelatin capsule showed similar effects compared with three times higher doses of MI powder

Myo Inositol and PCOS

- After myo-inositol treatment, ovulation was present in 29 women (61.7%) and 18 (38.3%) were resistant. Of the ovulatory women, 11 became pregnant (37.9%).
- The 18 myo-inositol resistant patients were then given clomiphene treatment, 13 (72.2%) ovulated. Of the 13 ovulatory women, 6 (42.6%) became pregnant.
- Myo-inositol treatment ameliorates insulin resistance and body weight, and improves ovarian activity in PCOS patients

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Myo Inositol and Folic Acid

- 50 overweight women with PCOS
- 2 groups
Myoinositol 4g and folic acid 200mcg
Folic acid only
- Given for 12 weeks

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Myo-inositol and Folic Acid

- Results in MI and FA group
- Plasma LH, Prolactin, Testosterone, Insulin and LH/FSH ratio all reduced
- Significant improvement in insulin sensitivity
- Menstrual cycle was restored in all women with amenorrhea or oligo-menorrhea
- None of these changes were noted in the folic acid alone group

Artini PG et al Gynecol. Endocrinol. - April 1, 2013; 29 (4); 375-9

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Myo Inositol and D-Chiro Inositol

- 50 women with diagnosis of PCOS
- 25 each group
- Group A Myo-inositol 4 g
- Group B D- Chiro-inositol 1 g
- 6 months

Myo-Inositol versus D-Chiro-Inositol

- Both groups experienced improvement in
- LH/FSH ratio
- Diastolic and systolic blood pressure
- LH
- Total and free testosterone
- Androstenedione
- Prolactin
- Insulin sensitivity
- Menstrual cycle regulation
- Increased SHBG

Conclusion

- Both forms of inositol are effective in women with PCOS
- Larger studies are necessary to obtain any statistically significant differences.

Myo Inositol, NAC and Folic Acid

- 2 groups One elevated HOMA index (indicator of insulin resistance) other - HOMA index
- 70 patients
- Both had Myoinositol 4g + 400g NAC + folic acid
- 12 months

Myo Inositol, NAC and Folic Acid

- Both groups experienced improvement in
- Insulin sensitivity
- # of menstrual cycles
- Free and total testosterone
- LH/FSH ratios
- Fasting glucose
- Fasting insulin
- HOMA index

Myo Inositol, NAC and Folic Acid

Conclusions:

- Inositol, NAC and folic acid combination are effective in helping to regular menstrual cycles of women with PCOS.
- Women with higher levels of insulin resistance had the greatest statistical improvement in HOMA index

Myo Inositol, NAC and Folic Acid

Drawback

- Both groups had the same combination so we don't know if myo-inositol and folic acid alone would have had the same result.
- Based on other studies parameters I would still consider myoinositol a first tier nutrient for women with PCOS and NAC a second tier nutrient.

Myo-Inositol versus Metformin

- 62 patients
- 2 groups
 - Group 1: Combo myoinositol and D-chiro-inositol
 - Group 2: Metformin
- 3 month duration

Inositol versus Metformin

- Myoinositol+D-chiroinositol yielded significantly better results in weight reduction, resumption of spontaneous ovulation, and spontaneous pregnancy compared with metformin in polycystic ovarian disease patients.

Myo-Inositol versus Metformin

- 100 women with PCOS
- Two groups
 - Group A given 2 g MI per day
 - Group B 1000mg of Metformin per day
- 6 months

Myo-Inositol versus Metformin

- Treatment with Myo-Inositol and Metformin both decreased body mass index, androgenic features, improved menstrual abnormalities and polycystic ovaries but the level of insulin resistance as measured by fasting insulin and homeostatic model assessment (HOMA) decreased only on treatment with Myo-Inositol.

Angik, Riju et al Int J Reprod Contracept Obstet Gynecol. 2015; 4(1): 189-194

Why Would Myo Inositol Help?

- Consider the patient with bipolar who is taking lithium and lithium's relationship to hypothyroidism.

Why Would Myo-Inositol Help?

- 48 women subclinical hypothyroidism (TSH elevated but normal T4)
- Combined Myo-Inositol 600mg and selenium 83mcg per day or selenium alone
- TSH decreased in combo group by 31% but no change in selenium only group

Why Would Myo-Inositol Help?

- Both groups showed decreased antibodies
- Selenium alone:
 - TPOAb 42%, TgAb 38%
- Myo-Inositol and selenium combo group:
 - TPOAb 44% and TgAb 48%

Why Would Myo-Inositol Help?

- If Myo-inositol helps support improved thyroid function and thyroid function directly relates to hepatic glucose metabolism, then indirectly or directly myo-inositol can help to improve glucose metabolism and insulin response making the PCOS patient more insulin sensitive.

Alpha Lipoic Acid (ALA) and PCOS

- 6 Non diabetic, lean patients
- 2 NOT on OCP
- BMI 18.5-26.6
- Oligomenorrhea
- Less than 5 spontaneous periods per year since menarche

Alpha Lipoic Acid and PCOS

- Low hirsutism scores (but on OCP or had taken spironolactone)
- No marked insulin resistance
- Less than 60 min of strenuous ex per week 16 weeks
- 600mg of ALA twice a day

Alpha Lipoic Acid and PCOS

- Results after 16 weeks
- Significant decrease in triglycerides
- Improvement in insulin sensitivity 13.5%
- No weight loss occurred (followed a weight maintaining diet)
- No Improvement in oxidative stress levels

Alpha Lipoic Acid and PCOS

- 2 participants not on the pill
- Increased menstrual regularity
 - Before study had 1.3 and 1.6 periods in the 4 months prior to the study.
 - During treatment had 3 and 4 periods respectively.

Umesh Masharani MD et al J Diabetes Sci Technol. 2010 Mar; 4(2): 359–364
PMCID: PMC2864173

Alpha Lipoic Acid and Myo-inositol

- 36 non obese women with PCOS
- Had previous underwent IVF
- Given Myo-inositol alone previously

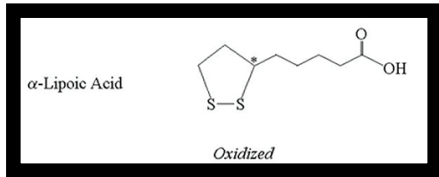
Alpha Lipoic Acid and Myo-inositol

- The next cycle combination ALA and MI
- No change in fertilization rate (ICSI)
- Increased number of grade 1 embryos
- Clinical pregnancy rate not statistically significant but a “trend” for a higher percentage of pregnancies for combination treatment
- Drawback: Only given the combination for one cycle.

PMID: 26753656

Alpha Lipoic Acid

- Also known as thiotic acid
- Naturally occurring in small amounts in plants and animals (including humans)
- Deficiency in humans has not been described.



Alpha Lipoic Acid

- Actions:
- Co factor for several mitochondrial enzymes complexes
- In some reactions binds to lysine (precursor to L Carnitine)
- Free radical scavenger (Invitro): is rapidly eliminated so not likely a lasting effect
- Reduces the oxidized form of Vit C, Glutathione, Vit E, Co Q 10, (Invitro)
- Decreases formation of Advanced glycation end products (AGE's)

Alpha Lipoic Acid

- In animal models inhibits excess iron and copper accumulation
- Increased glutathione levels in aged rats by up regulating enzymes necessary for its synthesis
- May increase insulin signaling and cellular glucose uptake. Small studies with Diabetes Type 2 subjects show promise but long term effects have not been established

Alpha Lipoic Acid

- Uses:
- Antioxidant
- Symptoms (Sx) of Diabetic neuropathy
- Sx of Intermittent claudication
- Insulin resistance
- Energy
- Metal Chelation
- Weight loss with very low caloric diet (wt loss was 5-7 pounds in 20 weeks in obese or overweight individuals)

Alpha Lipoic Acid

- Dosage
- Standard 300-600mg
- Better taken on empty stomach since poor absorption noted with food
- Peak and decline rapidly after ingestion

Oregon State University, Linus Pauling Institute

Chromium and PCOS

- 60 woman with PCOS were given either placebo or 200 μ g chromium picolinate for 8 weeks. Chromium reduced acne, hirsutism, and C-reactive protein and improved plasma total antioxidant capacity but no change in reproductive hormones (FSH, LH, prolactin, and free testosterone)

Jamilian M et al Biol Trace Elem Res. 2016 Jul;172(1):72-8. PMID: 26613790

Chromium

- Essential trace mineral
- Co factor related to potentiate the action of insulin
- Chromium deficiency associated with impaired glucose tolerance and Diabetes.

Chromium

- Actions:
- Enhance insulin signalling
- Improves glucose utilization

Adapted from Vincent, J.B. Nut Rev 2000, 58: 67-72

Chromium

- Uses:
- Enhances uptake of Vit C
- Impaired glucose utilization (Insulin resistance, DM) if chromium deficient
- Depression accompanied by obesity or overweight
- Sugar and carbohydrate cravings

Chromium

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Table 2. Some Food Sources of Chromium

Food	Serving	Chromium (µg)
Broccoli	½ cup	11.0
Green beans	½ cup	1.1
Potatoes (mashed)	1 cup	2.7
Grape juice	8 fl. ounces	7.5
Orange juice	8 fl. ounces	2.2
Beef	3 ounces	2.0
Turkey breast	3 ounces	1.7
Turkey ham (processed)	3 ounces	10.4
Waffle	1 (~2.5 ounces)	6.7
Bagel	1	2.5
English muffin	1	3.6
Apple w/ peel	1 medium	1.4
Banana	1 medium	1.0

Linus Pauling Institute, Oregon State University

Vitamin D and PCOS

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- Many women with PCOS show deficiency or insufficiency of Vitamin D
- The general population has been shown to be Vitamin D deficient or insufficient
- Obesity associated with or without PCOS is associated with being Vitamin D deficient or insufficient.

Vitamin D and PCOS

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- 50 women
- Double blind placebo controlled
- 50,000 IU orally once every 20 days for 2 months
- Compared to placebo in the Vitamin D group:
 - Vitamin D increased
 - No change in insulin sensitivity and insulin resistance

Hanna R Ardabili et al Nutrition Research, 2012-03-01, Volume 32, Issue 3, Pages 195-201

Vitamin D and PCOS

- 76 women: lean and overweight PCOS versus controls
- Vitamin D levels of both controls and PCOS women were either deficient or insufficient.
- Vitamin D levels in the overweight PCOS women were lower than controls
- Metabolic syndrome was associated with lower levels of Vitamin D in PCOS group compared to PCOS group without metabolic syndrome

Joham, A. E. et al .Mol. Nutr. Food Res., Jan 2016: Vol 60: 110–118

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Meta-analysis of Vitamin D and Weight Loss

Does losing weight improve Vitamin D status?

Marginally significant increase of 6.0 nmol/L in the amount of 25OHD for an average weight loss of 10 kg.

Poonam K et al Nutrition Research, 2016-03-01, Volume 36, Issue 3, Pages 201-213

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Vitamin D Supplementation and Weight Loss

- 400 obese individuals (not stated whether male or female)
- 3 groups, all given low calorie diet
- No vitamin d supplementation
- 25,000IU once a month
- 100,000 IU once a month
- 6 month duration

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Vitamin D Supplementation and Weight Loss

- Weight lost greatest in the group with 100,000 IU 11.9 pounds (25000 8.4, no vitamin D 2.6 pounds)
- Only the 100,000IU once a month reached sufficient levels

Luisella Vigna et al. "Vitamin D supplementation promotes weight loss and waist circumference reduction in overweight/obese adults with hypovitaminosis d." Presented at: European Congress on Obesity. May 6-9, 2015, Prague, Czechoslovakia

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Vitamin D and AmH

- Anti-mullerian hormone (AMH)
- Often elevated in women with PCOS
- Does Vitamin D regulate AMH?
- There is scant information about how Vitamin D effects AMH”

Seyehel Zahra Shahrokhi et al Clinica Chimica Acta Volume 455, 1 April 2016, Pages 33–38

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Reminder About AMH

- AMH is not necessarily representative of ovarian reserve
- AMH doesn't tell us whether a woman can get pregnant or not.
- Low AMH doesn't mean poor fertility.
- Normally elevated in women with PCOS
- If you aren't sure if patient has an issue with PCOS or glucose metabolism: AMH is a good test to do.

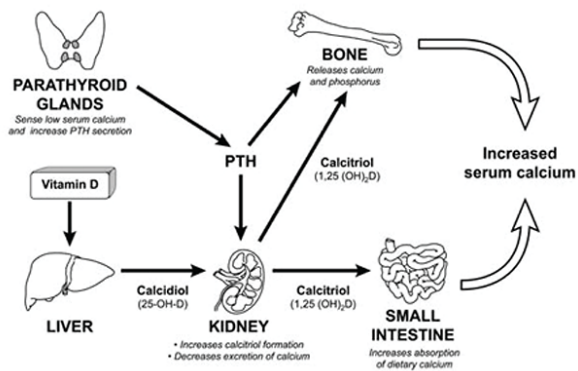
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Should We Be Concerned About Vit D

- If it isn't necessarily a first tier supplement for Insulin resistance or insulin sensitivity unless a person already has Diabetes Mellitus and pancreas is not producing insulin should we advise supplementation of Vitamin D for those with PCOS?

Vitamin D

Figure 2. The Vitamin D Endocrine System



Vitamin D

- Fat soluble nutrient
- Acts more like a hormone than a vitamin
- Body produces Vitamin D from cholesterol provided there is a adequate amount of UV light from sun exposure
- 2 forms
 - Vitamin D2 ergocalciferol
 - Vitamin D3 cholecalciferol
 - Vitamin D3 recommended currently over D2 due to D3 increasing 25 hydroxyvitamin D [25(OH)D] in blood

Vitamin D and Calcium in Pregnancy

- Increased need for calcium in pregnancy
- Vitamin D status effects both obtaining calcium from bones and reabsorption of calcium from the kidneys
- Calcium levels tend to decrease with breastfeeding and increased bone loss occurs
- Vitamin D is necessary to help women support and regulate calcium for mother and baby

Vitamin D, Calcium and Breastfeeding

- Prolonged breast-feeding <24 months seems to increase the risk of postmenopausal osteoporosis; however, its impact may not be definitive in women with sufficient vitamin D levels and calcium intakes. Therefore, sufficient calcium intakes and adequate vitamin D levels may be important to prevent osteoporosis in postmenopausal women that is derived from breast-feeding

Yun BH et al Osteoporos Int. 2016 Sep;27(9):2745-53 PMID: 27048389

Vitamin D

- Actions
- Decreases parathyroid hormone
- Bone support
- Mild association with lowering blood pressure
- An improvement in muscular and neural development in the elderly
- Supports immune function
- In children higher vitamin D associated with greater height

Vitamin D

- Uses
- Osteopenia or Osteoporosis (in combination with calcium, magnesium, boron)
- Children with Asthma
- Potential for blood pressure regulation
- Immune support
- Decrease breast cancer risk
- Diabetes Mellitus Type 1 and 2
- Decrease colorectal cancer risk
- Decrease risk of Multiple Sclerosis
- Decrease risk of developing preeclampsia, gestational diabetes mellitus and bacterial vaginosis

Vitamin D

- Dosage:
1000-4000IU per day to maintain adequate levels
- May have enhanced absorption when taken with meals or a source of fat such as Fish oil

Food Sources of Vitamin D

Table 2. Some Food Sources of Vitamin D			
Food	Serving	Vitamin D (IU)	Vitamin D (µg)
Pink salmon, canned	3 ounces	465	11.6
Mackerel, canned	3 ounces	211	5.3
Sardines, canned	3 ounces	164	4.1
Quaker Nutrition for Women Instant Oatmeal	1 packet	154	3.9
Milk, low-fat, fortified with vitamin D	8 ounces	98	2.5
Orange juice, fortified with vitamin D	8 ounces	100	2.5
Cereal, fortified	1 serving (usually 1 cup)	40-50	1.0-1.3
Egg yolk	1 large	37	0.9

Maitake mushrooms one cup dried 786 IU
Portabella mushrooms one cup dried 634 IU

Probiotics and PCOS

- In comparison to placebo over 8 weeks
- 36 women diagnosed with PCOS
- Used a multistrain probiotic
Lactobacillus casei, Lactobacillus acidophilus
Lactobacillus rhamnosus, Lactobacillus
bulgaricus
Bifidobacterium breve, Bifidobacterium longum
Streptococcus thermophiles

Probiotics and PCOS

- Serum insulin levels reduced significantly in the probiotic group

Shoaei T et al Int J Prev Med. 2015 Mar 24;6:27 PMID: 25949777

How Do I Know What To Choose?

- Based on data and clinical results
- Myo-inositol 2-4g prenatal especially if overweight and or thyroid issue, and or irregular cycles.
If low T4 levels (based on our optimal level) consider iodine first then if not change after 6 weeks introduce myo-inositol.
- If thyroid antibodies present follow our protocol from the thyroid module for selenium and iodine, but also use myo-inositol

How Do I Know What to Choose

- Then add NAC with pregnancy due to its impact on decreasing miscarriage rate
- or use NAC if due to SNP analysis you know they may have an issue with glutathione synthesis
- or use NAC if energy is not improved with the Myo-Inositol despite improve thyroid output or conversion.
- Have patients use alpha lipoic acid if they are occasionally going out and know they will have a high glycemic meal. Introduce this later in the treatment so it is not a crutch at first.

How Do I Know What to Choose

- Chromium: Always make sure included in prenatal multi or as an adjunct if thyroid conversion appears to be an issue
- Add by 200-250mcg increments if sugar cravings continue to persist despite weight loss and improvement in thyroid to our optimal ranges.

How Do I Know What to Choose?

- Vitamin D
- Always increase to optimal levels due to the secondary benefits for parent (male or female), the mother during and after pregnancy and the baby.
- Educate patient on adequate sun exposure

PCOS Herbal Intervention

- If you are a herbalist or patients prefer to take less tablets and need more support consider these herbs to support women with PCOS
- If you are not a herbalist be familiar with the herbs that your patients may have questions about or maybe taking as well as being on your protocol.

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Black Cohosh

- Discussed how Black Cohosh in combination with Clomid can be beneficial
- Is Black Cohosh valuable to women diagnosed with PCOS on its own when compared to Clomid?

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Black Cohosh

- 100 women diagnosed with PCOS
- 2 groups
 - Group A 100mg of Clomid for 5 days
 - Group B 20mg of Black Cohosh daily for 10 days
- 3 consecutive cycles

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Black Cohosh

- Group B (Black Cohosh group) significant improvement in LH and FSH/LH ratio
- Endometrial thickness was greater
- Pregnancy rate was higher (short duration of study likely contributed to this stat not being statistically significant)

Hany H. Kamel et al Eur Jrn of Ob & Gyne and Repro Bio, 2013-05-01, Volume 168, Issue 1, Pages 60-63

Black Cohosh

- Parts Used: Root

Black Cohosh

Actions:

- Anti-inflammatory
- Diuretic
- Spasmolytic
- Antihypertensive
- Decrease effect of excess androgens

Black Cohosh

USES:

- Interstitial cystitis
- Amenorrhea
- Anxiety
- Chronic pelvic pain
- Dysfunction uterine bleeding (DUB)
- Endometriosis
- Hypertension

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Black Cohosh

- USES:
- Osteoporosis prevention
- Musculoskeletal pain or spasms
- PMS
- Uterine fibroids
- Vasomotor complaints of perimenopause or menopause
- Vaginal dryness and atrophy

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Black Cohosh

Dosage:

- Dry herb (root) 20-40mg twice per day
- Tincture: .5ml per day

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Cinnamon versus Metformin

- Both interventions demonstrated significant improvements compared to controls at 15 days for measures of
- Testosterone ng/ml
Metformin 0.647 ± 0.027 ;
Cinnamomum cassia 0.625 ± 0.029 ;
- LH ng/ml
Metformin 6.873 ± 0.214 ;
Cinnamomum cassia 6.891 ± 0.221)
- Insulin resistance (HOMA-IR)
Metformin 7.067 ± 0.184
Cinnamomum cassia 8.772 ± 0.196)

Heibashy M et al J Am Sci. 2013;9(12):p54–p62.

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Cinnamon

- 15 patients
- Pilot study
- 8 weeks administration of cinnamon
1000mg extract per day
- Oral administration of cinnamon extract for
8 weeks was well tolerated and improved
insulin sensitivity in nondiabetic women
with PCOS

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Cinnamon

- Parts used: Bark

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Cinnamon

Actions:

- Astringent
- Carminative
- Insulin modulation
- Flavoring

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Cinnamon

Uses

- DUB (Dysfunction Uterine Bleeding)
- Menorrhagia
- Uterine fibroids

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Cinnamon

- Dosage
- Dried herb .5 - 1g, 3 times a day
- Tincture 2-4ml per day

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Gymnema and PCOS

- G. sylvestre ethanol extract effectively alleviates the deleterious effects produced by high fructose diet in diabetic rat

Kumar V. et al Indian J Pharm Sci. 2014 Jul-Aug; 76(4): 315–322.

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Gymnema

- Parts used: Leaf
- Ayurvedic herb

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Gymnema

Actions

- Anti-diabetic
- Hypoglycemic
- Lipid lowering
- Sweet/bitter suppression

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Gymnema

- Uses:
- Polycystic ovaries
- Laxative
- Cough suppressant
- Sugar cravings **
- The peptide _____ has been found to interfere with the ability of the taste buds to taste sweet and bitter.

Kanetkar, Parijat et al J Clin Biochem Nutr. 2007 Sep; 41(2): 77-81.

Gymnema

- Dosage:
- Dried herb 200mg 2-3 times a day
- Tincture 4-6 ml per day



Romm, Aviva Herbal Medicine for Women's Health 2009

Maitake Mushroom versus Clomid

- 78 women diagnosed with PCOS
- 26 given maitake mushroom (250mg dried MM powder and 18mg of SX fraction (patented) unique glycoprotein) 3 times daily between meals).
- 31 given Clomiphene 50mg days 5-9
- 12 week study

Maitake Mushroom versus Clomid

- Ovulation occurred in
- 42 % taking Maitake alone
- 70% taking Clomid
- Those who were resistant to Clomid and or Maitake then took them in combination: 13/15 or 87% ovulated.

Maitake Mushroom versus Clomid

- Pregnancies 3/11
“infertile” patients
became pregnant in
the 12 weeks
- 2 in the Maitake
mushroom
- 1 by combination
treatment after
Clomid resistance
prior

Maitake Mushroom

Actions:

- Immune
stimulating
- Lowers blood
sugar levels
- Slows growth of
some tumors
(animal studies)

Maitake Mushroom

Uses

- Cancer prevention and treatment
- Diabetes management
- Boost immune system

Maitake Mushroom

- Dosage
- 12-25 mg (dried) extract
- Dried 200-2500mg of whole powder

<https://www.drugs.com/npp/maitake.html>

Vinegar

- Vinegar can significantly improve insulin sensitivity in insulin-resistant subjects . . . thus, vinegar may create physiological effects similar to metformin.
- Dosage: 1 tblsp before meal

Johnson, Carol Dr. et al Diabetes Care 2004 Jan; 27(1): 281-282

Address Underlying Cause of The IR, HI, or GM

- Eating plan (always of primary importance, make sure your patient knows that without addressing this, the rest of your program is less likely to work).
- Assess thyroid function
- Assess adrenal function

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Thyroid Function and PCOS

- Our data confirm that the prevalence of subclinical hypothyroidism is increased in PCOS women. The presence of subclinical hypothyroidism is associated with endocrine and metabolic imbalances of PCOS, and the excessive body weight seems to promote this interplay.

Tagliaferri V et al Eur J Endocrinol. 2016 Aug 10. pii: EJE-16-0358 PMID: 27511825

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Assessing Thyroid Function

- Blood results for
 - TSH
 - FT4
 - FT3
 - Thyroid Antibodies
 - Reverse T3
- If any of these are out of the optimal ranges they must be addressed.

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Thyroid Function and Glucose Metabolism

- The findings suggest that thyroid hormone modulates regional glucose metabolism and psychiatric symptoms in the mature brain.

Bauer M, et al- J. Clin. Endocrinol. Metab. - August 1, 2009; 94 (8); 2922-9

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Thyroid and Glucose Metabolism

- In conclusion, our data indicate that not only overt hypothyroidism, but also subclinical hypothyroidism is associated with a deterioration of glucose metabolism.
- Administering T4 therapy to both groups improved glucose metabolism and insulin sensitivity and decreased stress on pancreatic cells.

Handisurya, A. et al Clinical Endocrinology, 2008 Vol 69: 963–969

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Thyroid and Inositol

- If Myo-inositol helps support improved thyroid function and thyroid function directly relates to hepatic glucose metabolism, then indirectly or directly myo-inositol can help to improve glucose metabolism and insulin response making the PCOS patient more insulin sensitive.

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Thyroid Nutrient Review

- Iodine: To assist with improve T4 levels
- Selenium, Zinc, Chromium: To assist with conversion of T4 to T3
- Review module 4 to go over use of selenium before iodine and why.
- Myo-Inositol for use with insulin resistance, hyperinsulinemia or poor glucose metabolism and to support thyroid function. Important and effective in those with Autoimmune Thyroid issues.

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Herbs For Thyroid Support

- Withania
- Bacopa
- Bladderwrack

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Assessing Adrenal Health

- When there is poor conversion of T4 to T3 and addressing the thyroid isn't producing results assessing adrenal health is imperative
- Review Module 4 about Adrenal health and thyroid conversion and the adaptogens that are effective in supporting adrenal health.

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Adrenal Testing

- Morning Cortisol (blood)
- DHEAS (blood)
- Saliva testing for Cortisol (Diurnal rhythm)

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Cortisol and PCOS

- Obese women with PCOS
- This study demonstrates equally increased cortisol production in PCOS women and obese healthy control women.

Roelfsema F et al - J. Clin. Endocrinol. Metab. - July 1, 2010; 95 (7); 3318-24

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Cortisol and PCOS

- Lean women with PCOS
- There is an increased production rate of cortisol and androgens as measured in vivo in lean PCOS women.

Tsilchorozidou T, Honour JW, Conway GS - J. Clin. Endocrinol. Metab. - December 1, 2003; 88 (12); 5907-13

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Why is Cortisol Elevated?

- Increased inflammation creates increased stress on the system. The body counteracts this by increasing cortisol
- Vicious cycle of additional inflammation from chronically elevated production of cortisol continues

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Can Cortisol Be Too Low

Yes

- Clinically with obesity or chronic insulin resistance in obese or lean women with PCOS cortisol can be low.
- This is when the adrenals are exhausted and poses a significant health threat.
- Trophorestorative herbs (Rehmannia) and adaptogens while strictly following the Five Step Fertility Solution

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Can Cortisol Be Too Low

- These are the patients often very resistant to weight loss despite a good low glycemic anti-inflammatory eating plan.
- Very low metabolic rate.
- Thyroid sluggish as well.
- Must start with the adrenals first then gently work on thyroid support.

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Addressing Hyperandrogenism

- Important for women who are presenting with excess androgens on bloods.
- Make sure E2 is looked at as well.
- If amenorrhea or irregular cycles you may not get a test on a day 2/3 or 7days post ovulation but test E2 anyway. Don't assume its elevated
- If E2 is low the following herbs may not address that issue.

Addressing Hyperandrogenism

- Black Cohosh
- White Peony
- Licorice
- Spearmint Tea

Note these herbs will tend to work more optimally if insulin resistance, glucose metabolism is addressed either first or along with addressing excess androgens.

White Peony and Licorice

- 8 women
- Dx with "infertility"
- Exhibited hyperandrogenism and oligomenorrhea
- Given for 2-8 weeks

White Peony and Licorice

- Decreased LH levels
- Ovulation increased
- Increased SHBG
- Decreased total and free testosterone
- 2 of 6 patients conceived

Yaginuma, T., R. et al Nihon Sanka Fujinka Gakkai Zasshi 34, no. 7 (1982): 939-944.

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White Peony

- Parts used: Root

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White Peony

- Actions
- Spasmodic
- Antioxidant
- Hepatoprotective
- Anti-atherosclerotic effects
- Anti-epileptic activity
- Platelet aggregation inhibition
- Immunomodulating effects in vitro

Alternative Medicine Review; 2001 Vol 6;(5) pt 495-499
Romm, Aviva. Botanical Medicine for Women's Health, 2009

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White Peony

- Uses
- Muscle cramps and dysmenorrhea
- Dysmenorrhea with fibroids
- PMS
- PCOS
- Amenorrhea
- Endometriosis
- Interstitial cystitis
- Iron deficiency anemia
- Threatened miscarriage

Alternative Medicine Review; 2001 Vol 6:(5) pt 495-499
Romm, Aviva. Botanical Medicine for Women's Health, 2009

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Licorice

- Very difficult to find studies with licorice alone due to its synergistic use in many Chinese formulations
- Small animal (rat) studies show ability to modulate testosterone
- Very commonly used with Peony

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Licorice

- Parts used: Root

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Licorice

- Actions:
- Adaptogen
 - Anti-inflammatory
 - Anti-viral
 - Laxative effects

Licorice

- Uses:
 - Constipation
 - HSV
 - Interstitial cystitis
 - Urinary Tract Infection
 - Adrenal Fatigue
-
- Contraindicated with blood pressure medications.

Spearmint Tea

- Forty two patients were recruited into the study and 41 completed the full 30 days. After 30 days treatment with the herbal teas the following results were obtained. Free and total testosterone levels were reduced sig-nificantly over the 30 day period in the spearmint tea group

Spearmint Tea

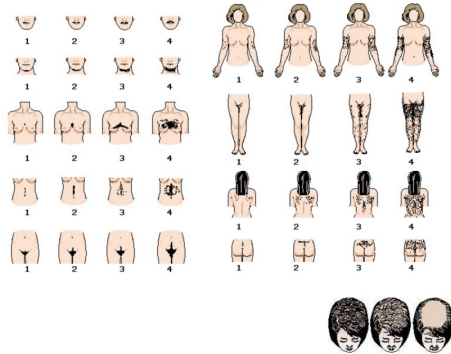
- The patient's subjective assessments of their degree of hirsutism were significantly reduced in the spearmint tea group
- There was, however, no significant reduction in the objective Ferriman-Gallwey ratings of hirsutism between the two trial groups over the trial duration.

Grant P et al Phytother Res. 2010 Feb;24(2):186-8.

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Objective Assessment of Hirsutism

Ferriman-Gallwey



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Common Tea Recommendation

My patients love this recipe

Mixture of

- Green tea
- Spearmint
- Cinnamon
- Licorice (optional)

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Reproductive Hormone Balance

- Chaste Tree
- Peonia (I avoid if normal or elevated estrogen due to min/no effect)
- Black Cohosh (can use with Clomid as discussed, or on its own if symptoms support use)
- Shatavari: Often beneficial for those with less than optimal estrogen levels (E2) but caution should be used with this if patients remains anovulatory with chronically low progesterone

Chaste Tree Berry

- Prolactin lowering effects (worked as well as Bromocriptine)
- Progestogenic effects
- Positive effects related to improving menstrual irregularity

Susan Arentz et al BMC Complementary and Alternative Medicine; Complementary Medicine Research (ISCMR)201414:511

Shatavari

Parts Used: Root

Shatavari

Actions

- Adaptogen
- Aphrodisiac
- Lactagogue
- Astringent
- Antibacterial

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Shatavari

Uses

- Decreased libido
- Depression
- Fatigue
- Fertility issues
- Oligomenorrhea
- Susceptibility to infection

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Shatavari

- It is an Ayurvedic herb and in Indian medicine was said to “give her capacity to have a hundred husbands.”

Dosage:

- Dried herb 20-30 g/day of dried root (Bone)
- Tincture 4-7ml 1-2 times per day (Romm)

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Herbal Recommendations

- While optimizing the eating plan use herbs and nutrients to address the underlying issue with glucose metabolism, hyperinsulinemia, or insulin resistance. PRIMARY Include assessment of thyroid and adrenals

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Herbal Recommendations

- Along side of the addressing IR, HI, GM, if hyper androgen sx are significant address the hyperandrogenism or as a second step if hyperandrogen symptoms are minimal add herbs for androgen excess, estrogen and or progesterone.

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Patient Education

- Let your patients know the supplements or herbs won't work effectively if they don't remove refined sugars from their diet, optimize the balance of complex carbs, proteins and good fats.
- Eating plan must be number one in the patient's (and your) mind.

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Five Step Fertility Solution

1. Optimal eating plan
2. Minimize toxic exposure
3. Optimal supplementation program
4. Optimal exercise
5. Minimize stress (stress management)

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Optimal Eating Plan

From the Nurses Health Study:

Infertility associated with ovulation disorders and gestational diabetes is largely preventable. Nearly half of the cases (46%) could be attributed to poor diet alone, and the majority of cases (66%) could be attributed to poor diet, inactivity, and overweight.

Chavarro, Jorge et al American Journal of Public Health: September 2016, Vol. 106, No. 9, pp. 1669-1676

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Number 1: Optimal Eating Plan For PCOS

- If this step is not taken seriously by the patient (and practitioner) less people will create viable pregnancies.
- Monitor with every consultation.
- Put in more than you take out.
- Refer out to trusted nutritionist if this is not your strength but keep tabs on it

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Patient Education

- Help patient understand that because they have a diagnosis of PCOS they can't look at what every one else with their eating plan.
- Help them understand that their ability to metabolize sugar is effected, and they likely have a predisposition to this genetically.
- Genetics loads the gun and for them sugar (synthetic or natural) pulls the trigger.

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Sugar Analogy for PCOS Patients

- Me: Have you ever heard of Superman?
- Patient: Yes of course
- Me: So then you know what Kryptonite is right?
- Patient: Yes I think so.
- Me or patient: It's the stuff that makes Superman "super" weak, tired and he can't do anything.
- Me: That's what sugar does to you.
- Patient: Oh...

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Patient Education

- Help patient understand that carbohydrates turn into sugar in the body.
- There body doesn't process that sugar well so the carbs need to be limited to low glycemic carbohydrates and balanced with good protein and good fat.
- A lot of education around good fat is necessary due to the general public still thinking fat is bad

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PCOS: No Fat, Low Fat, Full Fat?

- High intake of low-fat dairy foods may increase the risk of anovulatory infertility whereas intake of high-fat dairy foods may decrease this risk

Chavarro JE et al Hum. Reprod. - May 1, 2007; 22 (5); 1340-7

Instead of Dairy...

- Coconut or Almond Yogurt
- Fish
- Avocadoes
- Nuts/Seeds (if not sensitive)
- Olives
- Cheese (cow's, sheep or goat) Fermented so may be a good addition but check food allergies
- Nut cheeses

Good Carbs

- Vegetables
- Salads
- All different colors.
- Low GI and Low Glycemic load fruit
- Limit fruit to 1-2 pieces a day. Some might need to take fruit out all together for a short time.

Smoothies and Juices

- If patient doesn't like veggies and salads expose them to juicing and or green smoothies
- Make sure if they add fruit they have a protein source and fat source as well.

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Alternative to Whey Protein

- Rice Bran Protein
- Spirulina based protein powder
- Pea protein

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Good Protein

- Good fats and protein slow down the glucose response.
- If not vegetarian discuss conscientious farming practices and offer local products for patient to consider.
- Know what is available in your area

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Desserts

- Once a week
- Some patients may do great off the sugar and some may struggle.
- Use Gymnema drops to help curb sugar cravings.
- Discuss cinnamon, vinegar with patient to curb sugar cravings

Remove Any and All Sweeteners

- Natural or synthetic
- Honey (high glycemic, great for when sick but not on a regular basis)
- Agave Nectar (high glycemic, avoid)
- If bake try to get them to take a break from baking or decrease to only occasionally and use coconut sugar.
- Decrease the amount in the recipe by half and make sure it is not mixed with cane sugar

Five Step Fertility Solution

1. Optimal eating plan
2. Minimize toxic exposure
3. Optimal supplementation program
4. Optimal exercise
5. Minimize stress (stress management)

Artificial Sweeteners

- Linked to metabolic syndrome
- Weight gain

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Artificial Sweeteners and Gut Microbiome

- Effect the micro biome: Artificial sweeteners may effect the microbiome composition and function, which in turn may affect host metabolic homeostasis in subsets of individuals and in specific contexts.

Suez, J et al Gut Microbes 6:2, 149--155; March/April 2015

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Artificially Sweetened Beverages (ASB)

- The San Antonio Heart Study documented weight change in men and women over a 7–8-year period. As part of that study, Fowler reported that, among participants who were normal weight or overweight at baseline, risk of weight gain and obesity were significantly greater in those consuming ASB compared with those who did not consume ASB.

Susan E. Swithers Trends in Endocrinology & Metabolism, 2013-09-01, Volume 24, Issue 9, Pages 431-441

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Avoid Dietary Advanced Glycation End Products (AGEs)

- AGE's

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Dietary AGE's

- Dietary AGEs
- Induce inflammation in PCOS
- Activate the pro-Inflammatory receptor RAGE
- Cause ovarian dysfunction in PCOS
- Are associated with insulin resistance in PCOS
- Are associated with obesity in PCOS

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Highest Level AGE's

- The highest level of AGEs per gram of food is present in dry-heat processed foods such as chips, crackers, and cookies
- Due to the presence of oil, butter, cheese, nuts and eggs as ingredients in these foods Dry-heat processing also accelerates dietary AGEs' formation in lean red meats and poultry due to presence of reactive amino-lipids and reducing sugars

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Lowest AGE's content

- Fruits,
- Vegetables
- Salads
- Grains
- Legumes

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How To Avoid High AGE levels in Food Preparation

- Eat mostly raw foods
- Prepare foods at low temperature with high moisture and brief heating time
- Use acidic marinades such as lemon and vinegar

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Minimizing Toxic Exposure

- To endocrine disruptors
- Higher BPA levels in PCOS women compared to controls and a statistically significant positive association between androgens and BPA point to a potential role of this endocrine disruptor in PCOS pathophysiology
- This applied to both lean or overweight women with PCOS

<http://dx.doi.org.proxy.lib.mcw.edu/10.1210/jc.2010-1658#sthash.MrfY55RE.dpuf>

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Patient Education

- skindeep.com
- www.ewg.org

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Exercise PCOS

- Obese and overweight women diagnosed with PCOS
- 20 women with PCOS
- Standard heart foundation dietary recommendations
- Stopped all medications they were taking for HA or IR

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Exercise and PCOS

- 3 one hour sessions a week intensive aerobic exercise on treadmill
- One session was one hour of moderate intensity walk/jog
- Next session was high intensity intermitent exercise
- Alternated each for 12 weeks

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Exercise and PCOS

- BMI significantly reduced i women with PCOS
- Waist circumference decreased significantly in the non PCOS group
- Visceral fat decreased in the PCOS group but not in non PCOS group (VF at baseline higher in PCOS group)
- IR decreased by 16% in the PCOS (levels were higher at baseline)
- Androgens did not change
- Triglycerides decreased in the PCOS group

<http://dx.doi.org.proxy.lib.mcw.edu/10.1210/jc.2010-0828#sthash.smrbfVMz.dpuf>

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Yoga and PCOS

- 86 adolescents
- 12 week yoga session versus “conventional exercise”
- Conventional exercise was brisk walk 15 mins then calisthenics
- Both groups one hour a day

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Yoga and PCOS

- The changes in fasting insulin, fasting blood glucose, and HOMA of insulin resistance were significantly less in the yoga group.
- The changes in body mass index, waist circumference, hip circumference, and waist-to-hip ratio, however, were not significantly different

International Journal of Gynecology & Obstetrics, 2012-07-01, Volume 118, Issue 1, Pages 37-41

162

Minimize Stress

- All the previous steps contribute to decreasing insulin resistance and therefore decreasing physiological stress.
- What about minimizing emotional stress? Does it make a difference for the woman with PCOS?

163

PCOS and Mindfulness

- 38 women with PCOS
- 2 groups
 - Group A no intervention
 - Group B mindfulness stress management program
- 8 weeks

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PCOS and Mindfulness

- Post-intervention, between-group results revealed statistically significant reductions in stress, depressive and anxiety symptoms, as well as in salivary cortisol concentrations, along with an increase in Life Satisfaction and Quality of Life scores in the intervention group only.

Stefanaki, Charikleia et al Stress Vol 18, 2015 Issue 1 pges 57-66

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Thank you for your attention!

- That was a jam packed info session.
- Next episodes will include case studies and my clinical correlation with the current medically set Phenotypes!

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Phenotypes BMN

- Phenotype A and B
- Classic PCOS

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