NUTRITION FOR PCOS: MEAL PLANNING AND SUPPLEMENTS

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Disclosure

Retailer:
• Ovasitol by Theralogix
• Fish oil by Nordic Naturals
• PCOS Nutrition Center Supplements
Why Take Supplements For PCOS?

- Help to improve labs (insulin, cholesterol, triglycerides)
- Improve ovulation and egg quality
- Replace nutrients that are missing in your diet
  - Deficiency due to malabsorption
  - Diet avoidance
- Optimize nutrient levels
Supplements: First Things To Consider

- Supplements are not a replacement for a healthy diet & are not weight loss pills
- Discuss dosage and be monitored by a healthcare professional
- What's the evidence
- Look for Medical-grade quality supplements
- Independently tested:
  - NSF or USP seal
- Take consistently
- If possible try one at time to check for adverse effects
- Evaluate effectiveness
Long-term Metformin Use and B12 Deficiency: Results from DDPOS

- Diabetes Prevention Program Outcomes Study (DDPOS)
- Impaired Glucose Tolerance, Average age 52
- Metformin 850 mg BID (n=1073) vs. Placebo (n=1082) for 3.2 years
- PLA and MET B12 levels assessed at 5 years [n=857, n=858] and 13 years [n=756, n=764]

- Low vitamin B12 ≤ 203 pg/ml
- Borderline low levels 204 – 298 pg/ml,
B12 Levels at 5 and 13 years in Metformin and Placebo

5 YEARS

<table>
<thead>
<tr>
<th>Condition</th>
<th>Metformin</th>
<th>Placebo</th>
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<tbody>
<tr>
<td>Low B12</td>
<td>4.3</td>
<td>2.3</td>
</tr>
<tr>
<td>Low/Borderline B12</td>
<td>19</td>
<td>9.5</td>
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13 YEARS

<table>
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<tr>
<th>Condition</th>
<th>Metformin</th>
<th>Placebo</th>
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<tbody>
<tr>
<td>Low B12</td>
<td>7.4</td>
<td>5.4</td>
</tr>
<tr>
<td>Low/Borderline B12</td>
<td>20.3</td>
<td>15.6</td>
</tr>
</tbody>
</table>
Over 4.3 years, **metformin reduced vitamin B12 concentration by 19%**, increased homocysteine concentration by 5%, and was associated with an 11-fold increased risk in low vitamin B12 levels compared to placebo.


**33% of individuals who took metformin were deficient in Vitamin B12**


**2015 systematic review and meta analysis involving 29 studies and 8,015 patients:**

“metformin treatment is significantly associated with an increase in incidence of B12 deficiency and reduced serum VB12 levels.”

The higher the metformin dose, the more deficient people were in vitamin B12. The effect of metformin on vitamin B12 levels was nearly the same in patients with type 2 diabetes and PCOS.

Metformin reduced vitamin B12 concentration in both long (≥3 years) and short (<3 years) term.


Serum B12 levels declined and reached significant lower levels after just six months of treatment in women with PCOS taking 1.5-2.5 grams of metformin daily.

- Greibe E et al. Metformin lowers serum cobalamin without changing other markers of cobalamin status: a study on women with polycystic ovary syndrome. Nutrients. 2013 Jul 5;5(7):2475-82.
Metformin and Vitamin B12

- Metformin may cause alterations of the vitamin B12-intrinsic factor complex in ileum
- B12 deficiency is progressive over time in metformin users
- Consequences of decreases in vitamin B-12 concentrations—such as macrocytic anemia, permanent nerve damage, and mental changes—can be profound.
- Recommend PCOS patients who take metformin have their vitamin B12 levels checked annually and supplement their diets with vitamin B12
  - Optimal levels > 400
- Sublingual Methylcobalimum best absorbed
N-Acetylcysteine (NAC)

- **What is it?**
  - Antioxidant and amino acid
  - Derivative of L-cysteine, a precursor to glutathione
- **Purported use:** insulin resistance, infertility, inflammation, androgen-lowering, dyslipidemia, oxidative stress, bronchitis, immune support
- **Recommended dosage:** 1.6 to 3 g/day
- **Side effects:** minimal
NAC: Systematic Review of Randomized Trials

- 8 randomized controlled trials with 910 PCOS women
- NAC improved BMI, total testosterone, insulin, and lipid levels
- “NAC had significant improvement in pregnancy and ovulation rate as compared to placebo.”
- NAC showed similar benefits to metformin for improving pregnancy rate, spontaneous ovulations, menstrual regularity, insulin resistance, and cholesterol


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Infertile PCOS women had a higher number of dominant follicles and improvements in menstrual regularity when taking metformin + Vitamin D compared with metformin alone.


Infertile women with PCOS who underwent clomid stimulation had more mature follicles (57%) and were more likely to get pregnant (26.4%) with higher vitamin D levels.


In VD deficient women with PCOS, Vitamin D supplementation lowers the abnormally elevated serum AMH levels

Benefits Of Fish Oil

- Improves:
  - TG levels
  - Non-alcoholic fatty liver disease
  - Fertility
  - Depression
  - Skin and hair health
- Maintains cardiovascular health
- Decreases inflammation
- Supports a healthy pregnancy
- Recommended amount: 1 to 4 grams daily
- Purchase high quality, independent tested brands
Myo-Inositol (MYO) AND D-Chiro-Inositol (DCI)

- **What is it?**
  - Pseudovitamins. Relatives of the B-complex vitamins
  - Found in foods (fruits, beans, cereals, buckwheat, etc)
  - Inositol-phosphoglycan (IPG) mediators “secondary messengers”
  - Regulates activities of hormones including FSH, TSH and insulin

- **Purposed uses:** insulin resistance, dyslipidemia, androgen-lowering, infertility, hypertension, weight loss, reducing gestational diabetes risk, and improving egg quality in PCOS

- **Recommended dosage MYO to DCI 40:1 ratio** (2 to 4 g/day Myo and 50 to 100 g DCI); take with meals

- **Side effects:** Hypoglycemia

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MYO Improves Ovulation And Metabolic Factors in PCOS

Results of 2, double-blind, placebo-controlled RCTs showed MYO (4 g/day) in PCOS:

- **Increased insulin sensitivity** (2.80 to 5.05), **decreased Triglycerides** (195 to 95), **Cholesterol** (210 to 171), testosterone (99.5 to 34.8) and systolic and diastolic blood pressure

- **16 (69.5%)** out of **23 women** of Myo-inositol group ovulated

- **MYO improved ovulation** (25% vs. 15%), **significant increase HDL**, **reduction BMI**

- **More than 70% of women** established normal ovarian rhythm

- **Obese women** showed similar number ovulations (1.5) as **leaner women**
Women who received 2g/day of MYO had more follicles and oocyte maturation.


MYO rather than DCI improved oocyte quality in PCOS women


Increasing DCI dosage (600 mg to 2400 mg) worsens egg quality and ovarian response in on-obese and non-insulin resistant PCOS women.

DCI Paradox

- Majority of tissues have Myo to DCI ratio 40:1; in ovaries and reproductive tissues may be 100:1

- Myo-inositol can convert into D-chiro-inositol in the body via insulin-dependent epimerase

- Ovaries in PCOS have an enhanced MYO to DCI epimerization leading to DCI overproduction and MYO depletion. Possibly causing poor oocyte quality and impaired FSH signaling.
  
  - Heimark D. Decreased myo-inositol to chiro-inositol (M/C) ratios and increased M/C epimerase activity in PCOS theca cells demonstrate increased insulin sensitivity compared to controls. *Endocr J.*, 2014;61(2):111-7
Combination MYO and DCI in 40:1 Ratio Better Than MYO or DCI Alone

- Combined therapy **MYO+DCI**, rather than DCI improved IVF outcomes in PCOS women

- Combined therapy of MYO+DCI (40:1) for 6 months reduced T. Chol, LDL (3.5 ± 0.8 versus 3.0 ± 1.2, p = 0.03); TG (2.0 ± 1.5 mmol/L versus 1.75 ± 1.9 mmol/L p < 0.05), fasting insulin, glucose; Increase HDL (1.1 mmol/L ± 0.3 versus 1.3 mmol/L ± 0.4 p < 0.05)

- 50 overweight PCOS women who took MYO or MYO+DCI (40:1) for 6 months saw improvement metabolic parameters. **MYO+DCI significantly reduced glucose and insulin concentrations more than with MI alone**

- All ovulated. MYO+DCI restored hormonal and metabolic parameters earlier (3 months) treatment with MI alone
Other Possible Supplements for PCOS?

- Magnesium
- Chromium
- Cinnamon
- Alpha-lipoic acid
- Melatonin
- Berberine
- Vitex
- Chasteberry
In Conclusion

- Supplement use is common in PCOS population.
- Nutrition supplements when added to a healthy diet and lifestyle can offer health benefits and aid in improving ovulation.
- Women with PCOS may be at risk or have a deficiency in certain nutrients.
- PCOS is very heterogeneous. More RCTs are needed to determine benefits of supplement use in different women with PCOS.
- Women with PCOS should discuss the health benefits/risks of supplement use, appropriate dosage, and be monitored by a healthcare professional.
MEAL PLANNING FOR A HEALTHY PCOS DIET
Obstacles to Meal Planning

- Boring
- Time consuming
- Stressful
- Overwhelming

“When you fail to plan, you plan to fail. “

Half of Americans don’t know what they will be doing for dinner when they wake up in the morning
Benefits of Meal Planning

- Improves the nutrition quality of your diet
- Cuts down on food waste
- Saves money
- Reduces cooking & cleaning time
- Eliminates stress
- Never have to ask “What’s for dinner?”
Where To Start

- Do Inventory
  - Refrigerator
  - Pantry
  - Freezer

- Find Inspiration
  - Your inventory
  - Local farmers market
  - Cookbooks, magazines, blogs
  - The Internet-Pinterest, Instagram

- Check the calendar
  - Who is home and when?
  - Quick and easy or more time to cook?
<table>
<thead>
<tr>
<th>Week Three</th>
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<tbody>
<tr>
<td><strong>Monday</strong></td>
</tr>
<tr>
<td>Breakfast: Slow Cooker Pumpkin Pie Steel Cut Oats</td>
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<tr>
<td>Snack: Coconut Almond Bar</td>
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<tr>
<td>Lunch: Five Layer Turkey Sandwich with Caramelized Spread Spinach Salad with Cinnamon Orange Vinaigrette</td>
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<tr>
<td>Snack: Banana 1 tablespoon nut butter</td>
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<tr>
<td>Dinner: Tempura Tofu Stir-Fry</td>
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<tr>
<td><strong>Tuesday</strong></td>
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<tr>
<td>Breakfast: Chocolate Peanut Butter Smoothie</td>
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<td>Snack: 1 ounce cheese 8 whole grain crackers</td>
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<tr>
<td>Lunch: Egg Salad Sandwich 1 cup carrots 2 tablespoons hummus</td>
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<tr>
<td>Snack: 1 cup blueberries 1 cup cashews</td>
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<tr>
<td>Dinner: Pork with Apples and Carrots Garlic Rosemary Cauliflower Butter Lettuce with Apple Cider Vinaigrette</td>
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<tr>
<td><strong>Wednesday</strong></td>
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<tr>
<td>Breakfast: California Veggie Omelet 1 slice sprouted grain bread 1 cup strawberries</td>
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<td>Snack: 1/4 cup pita chips Rice</td>
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<tr>
<td>Lunch: Sesame Veggie Burger Chipotle Avocado Salsa</td>
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<tr>
<td>Snack: Greek yogurt 1/4 cup bead apple granola</td>
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<tr>
<td>Dinner: Mediterranean Tuna Stew Black Eyed Peas Roasted Asparagus</td>
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<tr>
<td>Snack: 1 ounce dark chocolate</td>
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<tr>
<td><strong>Thursday</strong></td>
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<tr>
<td>Breakfast: Harvest Apple Oatmeal</td>
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<tr>
<td>Snack: Tropical Green Smoothie</td>
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<tr>
<td>Lunch: Vegetarian Taco Salad</td>
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<tr>
<td>Snack: 1/4 cup low fat cottage cheese 1 cup blueberries</td>
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<tr>
<td>Dinner: Pineapple Chicken Kebobs</td>
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<tr>
<td>Snack: 3 cups popcorn</td>
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<tr>
<td><strong>Friday</strong></td>
</tr>
<tr>
<td>Breakfast: Broiled Red Pepper and Tofu Egg Sandwich</td>
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<tr>
<td>Snack: Apple 2 tablespoons nut butter</td>
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<tr>
<td>Lunch: Super-Fast Noodle Noodle Salad Clementine</td>
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<tr>
<td>Snack: Kale</td>
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<tr>
<td>Dinner: Shrimp Tacos</td>
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<tr>
<td><strong>Saturday</strong></td>
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<tr>
<td>Breakfast: Coconut Almond Bar 1 cup strawberries</td>
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<tr>
<td>Snack: Greek yogurt Mango</td>
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<tr>
<td>Lunch: Thai Style Coconut Shrimp Soup Clementine</td>
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<tr>
<td>Snack: 1/4 cup pita chips 1 cup cherries</td>
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<tr>
<td>Dinner: Marinated Flank Steak Citrus-Glazed Carrots Glazed Spinach</td>
</tr>
<tr>
<td>Snack: 1 ounce dark chocolate</td>
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<tr>
<td><strong>Sunday</strong></td>
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<tr>
<td>Breakfast: Butternut Pancakes with Blueberry Sauce</td>
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<tr>
<td>Snack: Coconut Almond Bar</td>
</tr>
<tr>
<td>Lunch: Moroccan Vegetable Shawarma Orange</td>
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<tr>
<td>Snack: 1/4 cup gouda cheese 1/4 cup cashews</td>
</tr>
<tr>
<td>Dinner: Slow Cooker Stuffed Peppers Parmesan Herb Spaghetti Squash</td>
</tr>
</tbody>
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*The PCOS Nutrition Center Cookbook: 100 Easy & Delicious Whole Food Recipes to Beat PCOS*
Next Steps

- Write it out
  - Paper, phone, app (PepperPlate)
  - Weekly PCOS Menu Planner
    - [www.PCOSnutrition.com/MealPlanning](http://www.PCOSnutrition.com/MealPlanning)
  - Don’t forget snacks
- Make a shopping list
  - Keep in kitchen for needed items
- Coupons
- Grocery shop
- Start prepping and cooking!
Meal Planning Tips

- KISS: Keep It Simple Sunshine!
- Doesn’t have to be all-or-nothing
- Start small
- Allow for flexibility
- Quick and easy meals can be healthy
  - Omelet and salad
  - Soup and salad
  - Stir-fry (chicken, shrimp, tofu)
Batch cooking!

- Cook once, use 3 times
- Examples: 10 chicken breasts, 1 dozen eggs, pot of quinoa, lentils, roasted veggies
- Add different spices, herbs, condiments for variety and flavor
- Cook for a large crowd
- Freeze in air-tight, labeled containers
- Use the crockpot!
- Be patient and open to practicing
Planning A Healthy PCOS Diet

- Start the day with high protein breakfast
- Eat regular meals and snacks throughout the day
- Include protein, fat, and carbohydrates at meals and snacks
- Focus on unprocessed whole foods
- Include a rainbow of fruits and vegetables
- Keep carbs to one-quarter of plate:
  - Fruits & vegetables
  - Grains and starchy veggies
  - Beans & lentils
  - Yogurt & milk
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www.PCOSnutrition.com

- The PCOS Workbook
- The PCOS Nutrition Center Cookbook
- Nutrition Coaching
- Recipes, Nutrition Tips & Information
- PCOS Supplements

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