Oocyte SAP

Science-based female fertility support

Female infertility is a contributing factor for about one third of infertility cases. The cause of female infertility is linked to ovulation problems and damage to fallopian tubes, which indicates lack of health of the reproductive system in general. These symptoms are mainly reflected in the quality and number of oocytes, which are diminished in an impaired reproductive system. Oocytes have the highest number of mitochondria and mitochondrial DNA copies of any cell. The status and function of mitochondria is crucial to oocyte quality, fertilization of oocyte, and embryo development. Poor oocyte quality is one of the leading causes of failed in vitro fertilization (IVF). Other fertilization techniques such as intrauterine insemination (IUI) are also heavily dependent on ovulation cycles and oocyte quality. Disorders in reproductive system are also characterized by further complications such as polycystic ovary disease (PCOS), accompanied by hyperandrogenism, insulin resistance, abnormal lipid profile, and oxidative stress. Oocyte health impacts reproductive and overall health beyond fertility. Previous treatments for infertility and PCOS with clomiphene citrate and gonadotropins are not without their own complications, and a natural and safe alternative is required to improve oocyte quality.

Oocyte SAP is a synergistic formulation of key evidence-based nutraceuticals that can help improve egg quality in patients trying to conceive, undergoing fertility treatment, or with PCOS. By supporting cell health and improving mitochondrial function and oocyte microenvironment, **Oocyte SAP** aims at improving overall reproductive health. Ingredients in this unique formulation can help reduce oocyte mitochondrial DNA damage, attenuate oxidative stress, and improve insulin sensitivity and blood lipid profiles, thereby providing a wholesome therapeutic approach to enhance reproductive health. NFH also offers **Male Fertility SAP**, a cofactor science-based formula designed to support sperm production and longevity.

ACTIVE INGREDIENTS

Each non-GMO vegetable capsule contains:

PO_{10} (emulsified coenzyme O_{10}) 50) mg
Acetyl-1-cornitine hydrochloride	mg
	ning
N-Acetyl-L-cysteine	mg
R–alpha-Lipoic acid) mg
<i>myo</i> -Inositol) mg
Mixed tocopherols concentrate (from sunflower) 25	i mg
Vitamin C) mg

OTHER INGREDIENTS: Pea protein, vegetable magnesium stearate, and silicon dioxide in a vegetable capsule composed of vegetable carbohydrate gum and purified water.

Contains no: Gluten, soy, wheat, corn, eggs, dairy, citrus, preservatives, artificial flavour or colour, starch, or sugar.

This product is non-GMO and vegan friendly.

Oocyte SAP contains 120 capsules per bottle.

DIRECTIONS FOR USE

Adult women: Take 2 capsules twice daily with meals or as directed by your healthcare practitioner.

INDICATIONS

Oocyte SAP can help improve:

- Oocyte quality in patients with PCOS and infertility.
- · Symptoms associated with PCOS and aid in the regularization of menstrual cycles in PCOS patients.
- Plasma lipid profile, improve insulin sensitivity, and regulate glucose metabolism.
- and promote:
 Oocyte health, as well as improve ovulation and overall reproductive health.

Mitochondrial function associated with oocyte quality.

CAUTIONS AND WARNINGS

Consult a healthcare practitioner prior to use if you are pregnant or breast-feeding; if you are taking bloodpressure medication or blood thinners; if you have kidney stones; or if you have diabetes. Do not use this product if you are taking antibiotics or nitroglycerin. For adult use only. Consult a healthcare practitioner prior to use to ensure the timely treatment of a serious cause of infertility. Do not use if seal is broken. Keep out of reach of children.

PURITY, CLEANLINESS, AND STABILITY

All ingredients listed for each **Oocyte SAP** lot number have been tested by an ISO 17025–accredited third-party laboratory for identity, potency, and purity.



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NFH

Oocyte SAP

Female Reproductive Health

Santé reproductive féminine

Ingredients have been tested by a third-party laborator for identity, potency, and purity Tous les ingrédients ont été testés par un laboratoire externe pour l'identité, la puissance et la pureté

NPN 80080809

120 CAPSULES

Scientific Advisory Panel (SAP): adding nutraceutical research

to achieve optimum health

Oocyte SAP

FEMALE FERTILITY

Infertility is a medical concern worldwide, affecting 60-80 million couples (15% of couples of reproductive age). Female infertility is a contributing factor in about 50% of infertility cases, and is the focus of diagnosis in one-third of these cases.^[1] A number of factors can contribute to female infertility, including obesity, psychological stress, environmental and occupational exposures, alcohol, and caffeine.^[2] On a physiological level, abnormal levels of lipoproteins-such as an increase in low-density lipoprotein (LDL) cholesterol levels and a decrease in high-density lipoprotein (HDL) cholesterol levels—have been associated with reduced fecundability.^[3] In addition to abnormal lipid profiles, an increase in oxidative stress is observed in patients suffering from PCOS, with higher levels of malondialdehyde (MDA) and superoxide dismutase (SOD).^[4]

In more than 50% of infertile case diagnosis, ovulatory defects and unexplained causes are the most common etiologies.^[5] Chronic anovulation, hyperandrogenism (clinical or biological), and polycystic ovaries are the main characteristics of PCOS, which is the most common endocrine disorder of reproductive-aged women.[6][7] PCOS has been inked to low-grade inflammation; disorders of glycolysis, pyruvate, and amino-acid metabolism; and abnormal lipid profile in follicular fluids.^[8] Oocytes have the highest number of mitochondria and mitochondrial DNA copies of any cell.^{[9][10]} Oocytes depend on energy produced by mitochondria via oxidative phosphorylation. Oocyte quality is largely determined by the status and function of mitochondria, and is crucial to the fertilization of the oocyte and development of the embryo. Specifically, low mitochondrial DNA negatively impacts oocyte quality in women suffering from ovarian insufficiency.^{[9][10]} Continued embryogenesis and implantation is observed in embryos that develop from oocytes with higher ATP content.[11] Along with anovulation, PCOS is also characterized by ovulatory dysfunction, which correlates with an increased risk of endometrial hyperplasia and endometrial cancer.^[7]

Treatments for ovulation, including administration of clomiphene citrate and induction of ovulation with gonadotropins, have their own disadvantages, such as high cost, need for constant monitoring, and further health complications.^[12] There is hence a need for a more natural and effective therapeutic approach.

NUTRACEUTICALS IN THE MANAGEMENT OF FEMALE INFERTILITY

Coenzyme Q₁₀ (CoQ₁₀) and PQ₁₀

Coenzyme Q_{10} is an antioxidant that scavenges free radicals, preventing oxidation of lipids and proteins in cells, and supporting cellular energy production.^[13] Supplementation with CoQ₁₀ in a rat animal model has been associated with preventing reduction of insulin receptor substrate-1 and p110-β, while inhibiting increase in IL-6.[14] In a randomized, double-blind, placebo-controlled trial of 40 women diagnosed with PCOS, administration of 100 mg/d of COQ_{10} for 12 weeks improved gene expression related to insulin, lipid metabolism, and inflammation.^[15] Similarly, other studies have corroborated the beneficial effects of COQ_{10} on serum LDL cholesterol levels, glucose metabolism, and improvement in ovulation. Supplementation with 100 mg/d of COQ_{10} in 30 women for 12 weeks resulted in a decrease in serum fasting glucose and improved insulin sensitivity, as well as altered total cholesterol and serum LDL cholesterol concentrations.^[16] When 60 mg/d of CoQ_{10} was administered to 51 patients for 82 ovulation cycles, it was observed that CoQ_{10} worked synergistically with clomiphene citrate in improving ovulation and clinical pregnancy rates, as opposed to clomiphene citrate alone.^[12]

The pea-emulsified CoQ_{10} form (PQ₁₀) is prepared by blending CoQ_{10} with an unique emulsifier—a specific pea protein. This protein is ideal for blending with CoQ₁₀, as it has both hydrophobic and hydrophilic components. The PQ_{10} form can help improve the absorption of CoQ10.

Acetyl-L-Carnitine

Acetyl-L-carnitine is a known antioxidant, and has shown protective effects on growing embryos by scavenging free radicals.^[17] Addition of acetyl-L-carnitine to embryo cultures challenged by oxidative stress triggers, such as hydrogen peroxide, has shown a reduction in DNA damage and an improvement in chromosomal structure and development of blastocysts.^[18] Acetyl-L-carnitine is crucial for transporting long-chain fatty acids across the inner mitochondrial membrane for the process of β-oxidation. Acetyl-L-carnitine supplementation significantly reverses the age-associated decline of mitochondrial membrane potential, ameliorating oxidative mitochondrial decay and improving mitochondrial abnormalities.^{[19][20]} Supplementation with acetyl-L-carnitine has also improved the cytoplasmic volume, and altered the lipid profile as well as the vesicle size of lamb oocytes.^[21] A study observing serum total t-carnitine levels in 27 nonobese PCOS women found significantly low levels of t-carnitine and sex hormonebinding globulin (SHBG) in PCOS patients compared to healthy women, and low levels of L-carnitine were associated with hyperandrogenism and insulin resistance in PCOS patients.^[22] In a randomized, controlled, double-blind clinical trial, 85 clomipheneresistant PCOS patients who were administered 3 g of L-carnitine in addition to 250 mg clomiphene citrate daily showed improved ovulation, pregnancy rates, body mass index, and lipid profile compared to their counterparts who received only clomiphene citrate.[23]

N-Acetylcysteine

N-Acetylcysteine (NAC), naturally derived from L-cysteine, is known to improve insulin sensitivity and is a safe and effective treatment for PCOS. It acts by increasing secretion of insulin and improving insulin sensitivity.^[24] NAC is a precursor to glutathione synthesis, which protects cells from oxidative damage and plays an important role in the development of embryos and cell proliferation.^[25] A dose of 600 mg of NAC administered three times a day to 15 patients compared to metformin showed improvement in oocyte quality in a randomized, double-blinded, placebo-controlled trial carried over a period of six weeks.^[26] Insulin sensitivity response was significantly improved in 31 lean and obese PCOS subjects administered with 1.8 g/d and 3 g/d of NAC over five or six weeks.[27]

Research Monograph

R-alpha-Lipoic Acid

alpha-Lipoic acid has been linked with increased glucose uptake via increase in levels of adenosine monophosphate-activated protein kinase (AMPK), and has thus been used in therapeutic strategies for the management of endocrine disorders and diabetes. In a group of 32 PCOS obese patients administered 400 mg/d of alpha-lipoic acid for 12 weeks, an improvement in metabolic parameters such as body mass index and insulin sensitivity index was observed.^[28] In another trial, use of *alpha*-lipoic acid in conjunction with myo-inositol in 36 obese PCOS patients improved metabolic parameters.^[29] In addition, alpha-lipoic acid has shown a synergistic effect with myo-inositol in improvement of oocyte quality after three months of treatment.[29]

mvo-Inositol

The benefits of *myo*-inositol in alleviating endocrine imbalances occurring in PCOS has been well-established.^{[30][31]} Supplementation for 12 weeks with 2 g/d of *myo*-inositol in 50 overweight PCOS patients reduced hyperinsulinemia, improved insulin sensitivity, and restored balance in the levels of luteinizing hormone, prolactin, and testosterone.^[30] An improvement in oocyte quality was observed in 175 IVF participants who were supplemented 4 g/d of myo-inositol from day 1 of their cycle to 14 days after embryo transfer. Pregnancy rates in groups supplemented with myo-inositol or myo-inositol plus melatonin were 36.7% and 41.4%, respectively, compared to the controls without myo-inositol, where the pregnancy rate was 31%.[31]

Mixed Tocopherols Concentrate

Vitamin E is a fat-soluble antioxidant that protects sensitive cell membranes by neutralizing free radicals.^[32] Supplementation with vitamin E for women above 35 years of age has shown an improvement in the time to pregnancy for infertile couples over a range of doses, with an average of 37 mg/d from the time of conception up to live birth $^{\rm [33]}$ Vitamin E has also been associated with ovarian egg numbers and size, with the number and size of eggs increasing with higher antioxidant supplementation in animal models.^[34]

Vitamin C

Vitamin C is a water-soluble antioxidant and a key cofactor in various biochemical processes necessary for the synthesis of biocomponents.^[31] In a study looking at nutritional deficiencies of 54 women diagnosed with PCOS, over 70% of participants were found to have insufficient intake of vitamin C in their diets, among other vitamins.^[35] Supplementation with 0.2 g vitamin C twice a day for three months, synergistically with other vitamins such as vitamin E, improved the symptoms of PCOS and aided in the regularization of menstrual cycles in PCOS patients.[36]

SYNERGISM FOR OPTIMAL EFFICACY

Evidence presented by systematic reviews suggests that supplementing a combination of key nutraceuticals such as acetyl-L-carnitine, N-acetylcysteine, vitamin C, vitamin E, CoQ10, myo-inositol, and alpha-lipoic acid can effectively improve oocyte quality and embryo development, alleviate symptoms of PCOS, and maintain overall ovarian function.[16][25][29][34]

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