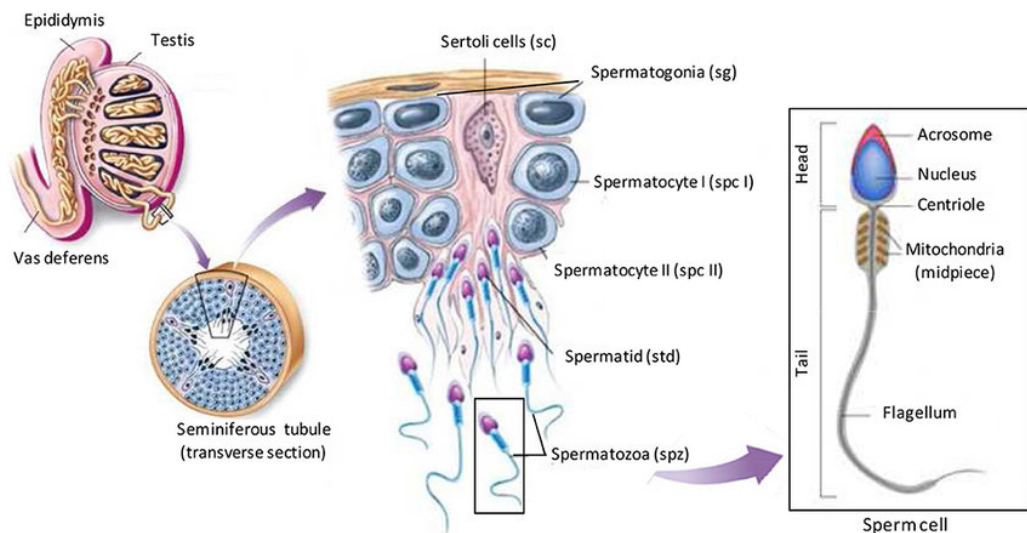


About one-third of infertility cases are caused by male infertility. There are many causes of male infertility, including low sperm production, abnormal sperm function, or blockages that prevent the delivery of sperm. Sperm quality is measured by several different factors that include the production of healthy sperm, transportation of sperm into semen, quantity of sperm in the semen, and sperm motility.

Symptoms of male infertility include the inability to conceive a child and, in some cases, is the only symptom. Others can also experience hormonal imbalances, erectile dysfunction, pain or swelling in the testicles, abnormal breast growth, decreased facial or body hair, or low sperm count (fewer than 15 million sperm per mL of semen).

Male reproduction, development, and maintenance of male sexual characteristics are principally governed by the hypothalamic-pituitary-testicular (H-P-T) axis. The three glands release multiple hormones which have multiple widespread and localized effects on the body. These hormones include Gonadotropin-Releasing Hormone (GnRH) produced by hypothalamus, luteinizing hormone (LH) and follicle-stimulating hormone (FSH) produced by pituitary gland, and testosterone produced by gonads. GnRH is the central regulator of the male reproductive hormonal cascade and levels of reproductive hormones are maintained through a closed-loop feedback mechanism. The H-P-T axis is an important part of the endocrine system that regulates testicular function. Both LH and FSH are vital to proper sperm production and low levels of these two hormones can be at least partly responsible for low sperm count.

Sperm production occurs in the testicles. Seminiferous tubules are tiny tubes in the testicles which house the germ cells. Hormones including FSH and LH can cause the germ cells to divide and change until they resemble tadpoles with a head and short tail and turn into sperm. The tails push the sperm into a tube behind the testes called the epididymis. For about five weeks, the sperm travel through the epididymis, completing their development. Once out of the epididymis, the sperm move to the vas deferens.



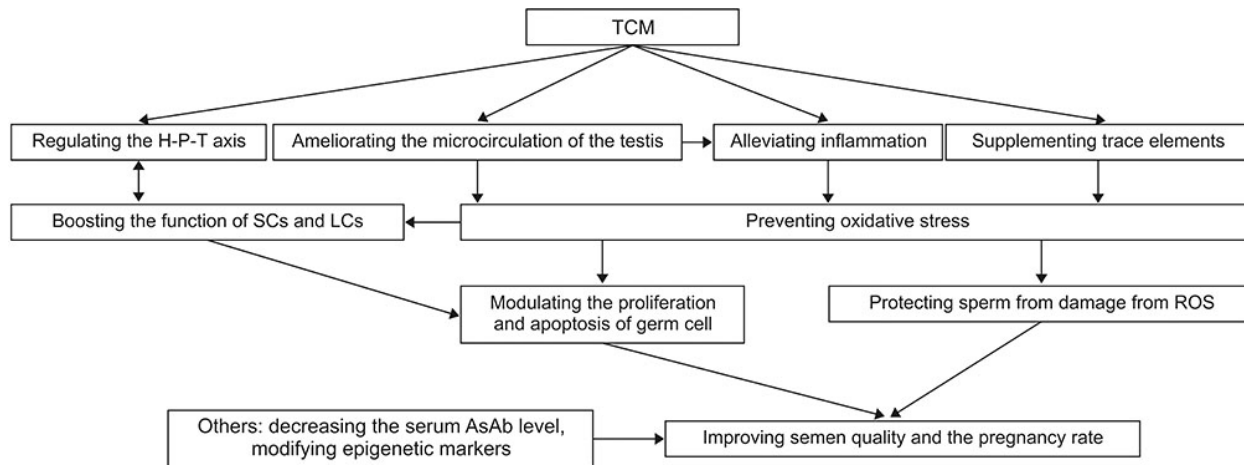
When a man is stimulated for sexual activity, the sperm are mixed with seminal fluid, a whitish liquid produced by the seminal vesicles and the prostate gland to form semen. As a result of the stimulation, the semen, which contains up to 500 million sperm, is pushed out of the penis (ejaculated) through the urethra.

A kidney deficiency, in TCM, is the fundamental pathogenesis of male infertility. It has been shown that a kidney deficiency often coincides with an impaired structure of the hypothalamic-pituitary-testicular (H-P-T) axis.<sup>1</sup> The H-P-T axis is an important part of the endocrine system that regulates testicular function. Many experiments have shown that formulas that support the kidneys could repair the structure and restore the function of the H-P-T axis and regulate hormone levels and improve the quality and of semen.<sup>1</sup>

Oxidative stress is an important factor in the development of male infertility. The rate of cell division and mitochondrial oxygen consumption as well as unsaturated fatty acids in testicular tissue are a lot higher than that in other tissues. The level of oxygen pressure on the other hand is low due to the weakness of the testicular artery. Therefore, the testicular tissue and male reproductive system are particularly susceptible to oxidative stress.

Individual's genetics and metabolic process, environmental factors such as diet, pollutants, and chemicals can affect the body's capacity to produce antioxidants to neutralize free radicals and prevent harmful complications.<sup>6</sup>

Oxidative damage can attack the membrane of the sperm cells leading to decreased fluidity. Oxidative damage can also cause cellular injury leading to an increase in germ cell apoptosis. Spermatozoa are highly vulnerable to oxidative stress owing to limited levels of antioxidant defense and a single, limited DNA-damage detection and repair mechanism. Reactive oxygen species promote peroxidation of lipids, resulting in intracellular oxidative burden. The sequence of events involves lipid peroxidation, loss of membrane integrity with increased permeability, reduced sperm motility, structural DNA damage, and apoptosis. The increased oxidative stress is also viewed as a kidney deficiency in TCM. Herbal ingredients that nurture kidney Yin can lower oxidation and increase antioxidants in the testicles and help to protect the sperm and increase semen quality.



## Wellness Recommendation

The wellness recommendation for male infertility includes MI with LC Balancer, Xcel, and KS. MI nurtures the kidneys and male reproductive organs. It helps nurture the reproductive organs and improve sperm quality and enhance fertility. The herbal ingredients in MI have been shown to increase hormones necessary for sperm production as well as reduce oxidative stress to enhance sperm quality and quantity. Fructus Lycii (Gouqizi, Barbary Wolfberry Fruit), in MI Formula, has been shown to increase follicle-stimulating hormone (FSH) and luteinizing hormone (LH).<sup>2</sup> FSH and LH are both gonadotropins which stimulate the gonads and increase sperm production. Fructus Lycii also has been shown to increase superoxide dismutase levels and reduce malondialdehyde in the testes to protect sperm from oxidative stress.<sup>3</sup> Fructus Rubi (Plumleaf Raspberry Fruit, Fu Pen Zi), another herbal ingredient in MI, improves male fertility by enhancing spermatogenesis through increasing epididymal sperm count and sperm motility. It also has strong anti-inflammatory effects.<sup>4</sup>

LC Balancer, Xcel and KS are also recommended to improve kidney and adrenal function and reduce kidney inflammation. *Rehmannia glutinosa* (Rehmannia Root, Sheng Di Huang), an herbal ingredient in Xcel, not only preserves kidney structure and renal function, but also improves the viability of Leydig cells (LCs) and can stimulate them to secrete testosterone.<sup>5</sup> LCs are the primary source of testosterone or androgens in males. Three months of the protocol is recommended for significant improvement and sustained results. Patients should take a sperm count analysis test before and after treatment to confirm the results.

## References:

1. Zhou SH, Deng YF, Weng ZW, Weng HW, Liu ZD. Traditional Chinese Medicine as a Remedy for Male Infertility: A Review. World J Mens Health. 2019 May;37(2):175-185. <https://doi.org/10.5534/wjmh.180069>
2. Luo Q, Li Z, Huang X, Yan J, Zhang S, Cai YZ. Lycium barbarum polysaccharides: protective effects against heat-induced damage of rat testes and H2O2-induced DNA damage in mouse testicular cells and beneficial effect on sexual behavior and reproductive function of hemicastrated rats. Life Sci 2006;79:613– 621.
3. Shi GJ, Zheng J, Wu J, Qiao HQ, Chang Q, Niu Y, et al. Beneficial effects of Lycium barbarum polysaccharide on spermatogenesis by improving antioxidant activity

4. Oh MS, Yang WM, Chang MS, Park W, Kim DR, Lee HK, Kim WN, Park SK. Effects of *Rubus coreanus* on sperm parameters and cAMP-responsive element modulator (CREM) expression in rat testes. *J Ethnopharmacol.* 2007 Dec 3;114(3):463-7. doi: 10.1016/j.jep.2007.08.025. Epub 2007 Aug 19. PMID: 17889470.
5. Sun, D., Cui, Y., Jin, B., Zhang, X., Yang, X., & Gao, C. (2012). Effects of the yangjing capsule extract on steroidogenesis and apoptosis in mouse leydig cells. *Evidence-based complementary and alternative medicine : eCAM*, 2012, 985457. <https://doi.org/10.1155/2012/985457>
6. Turner TT, Lysiak JJ. Oxidative stress: a common factor in testicular dysfunction. *J Androl.* 2008 Sep-Oct;29(5):488-98. doi: 10.2164/jandrol.108.005132. Epub 2008 Jun 20. PMID: 18567643.