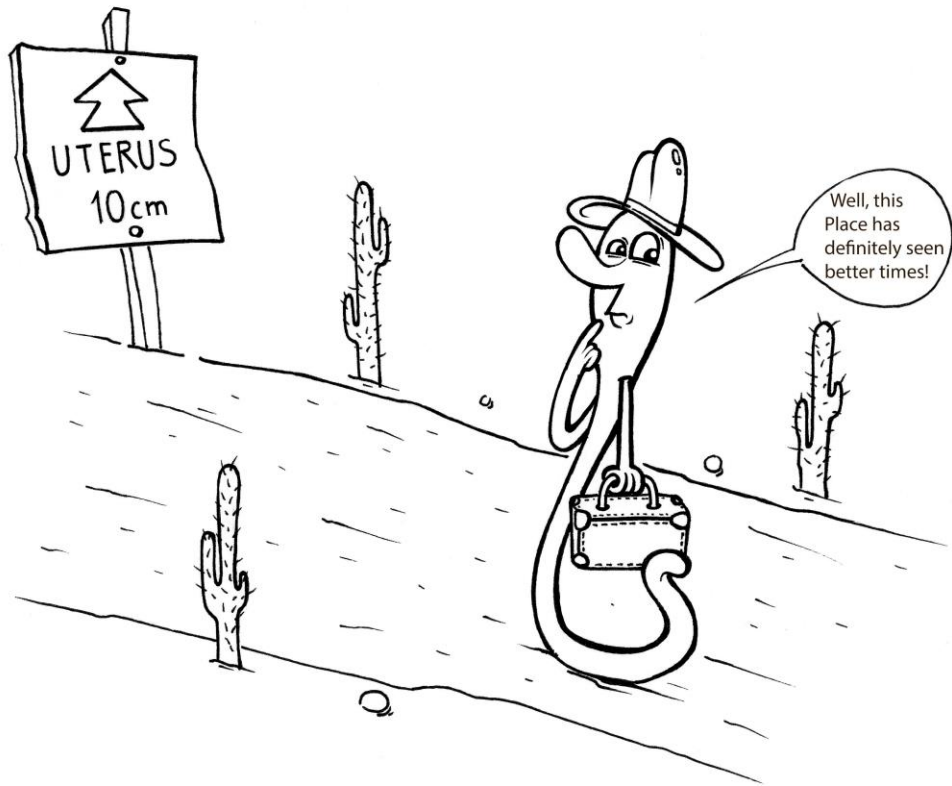




Causes of male infertility-clinical treatment strategies with CM

ACT London 9/24

Dr. OLIVIA POJER , MD

Graz, Austria

About me:

Medical doctor
(Medical university of Graz-Austria)

TCM education in Austria and China (Nanjing&Wuhan)

Specialized in fertility-mainly male fertility

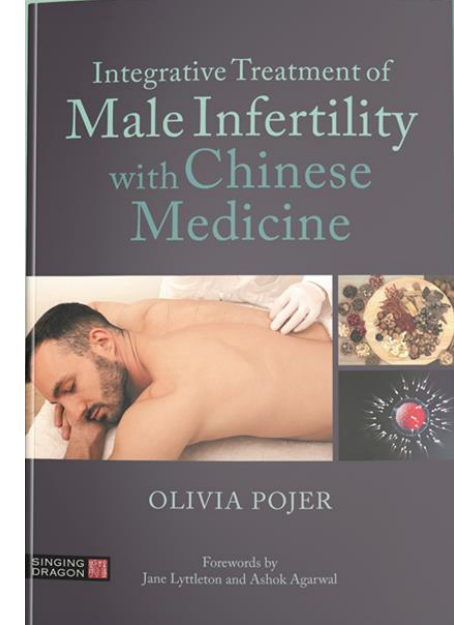
Book about TCM treatment of male infertility

International speaker

President of the OGKA (Austrian acupuncture society)

Academic at the Medical University of Graz

Currently in Master program „clinical embryology“
at the University of GRaz





Volume 29, Issue 2
March-April 2023

[Article Contents](#)

JOURNAL ARTICLE

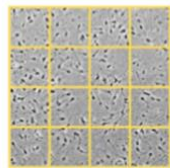
Temporal trends in sperm count: a systematic review and meta-regression analysis of samples collected globally in the 20th and 21st centuries ^{FREE}

Hagai Levine ✉, Niels Jørgensen, Anderson Martino-Andrade, Jaime Mendiola, Dan Weksler-Derri, Maya Jolles, Rachel Pinotti, Shanna H Swan

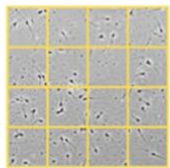
Human Reproduction Update, Volume 29, Issue 2, March-April 2023, Pages 157–176,
<https://doi.org/10.1093/humupd/dmac035>

Published: 15 November 2022 [Article history](#) ▼

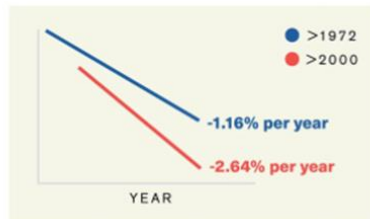
Sperm count is declining at an accelerated pace globally



101 mill/ml
(1973)

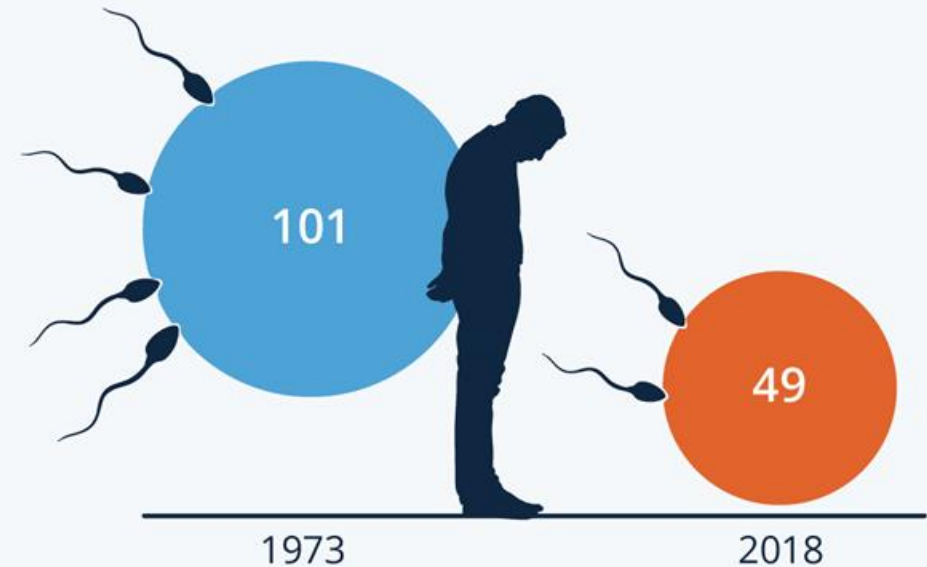


49 mill/ml
(2018)



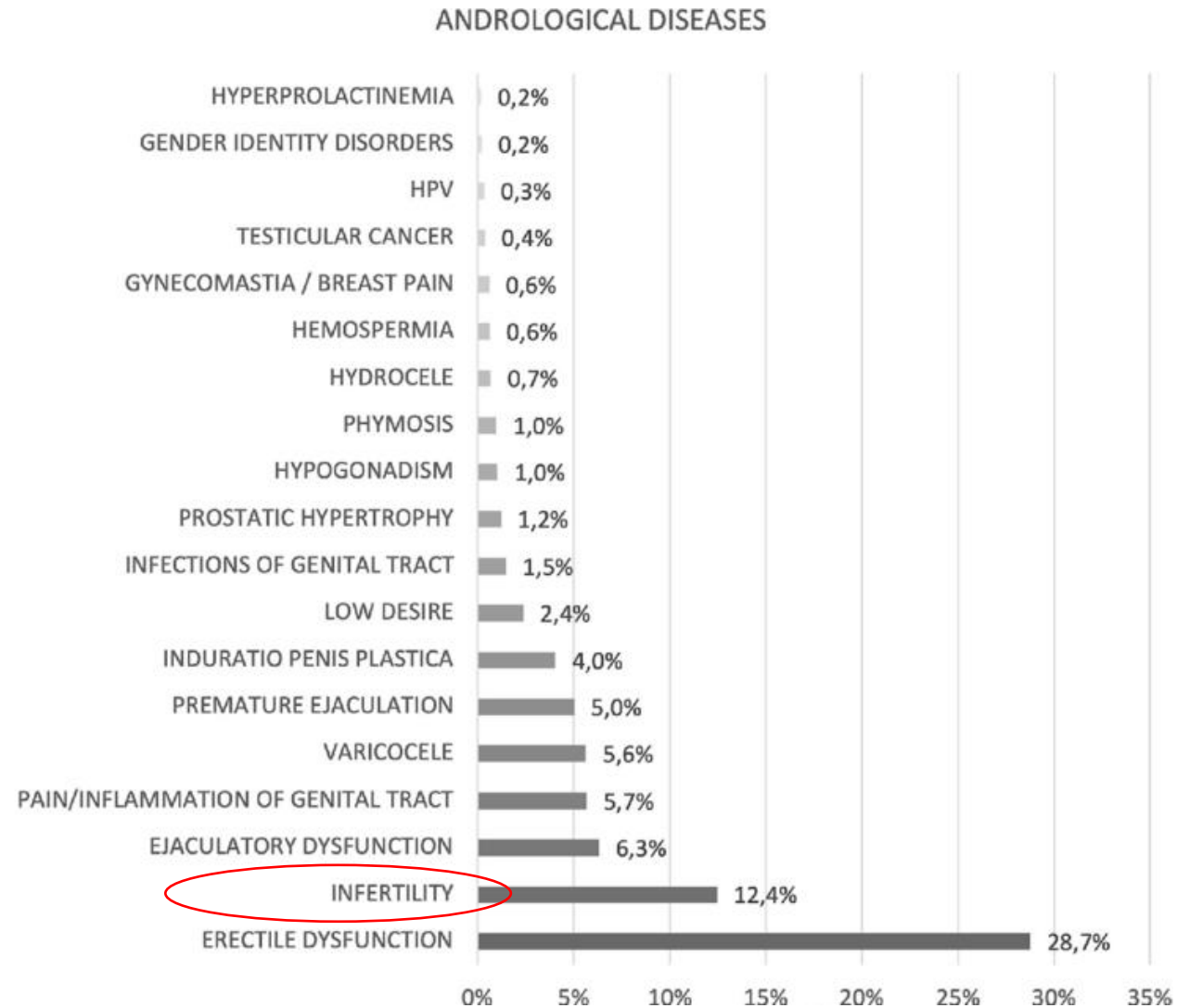
Fragile Fertility

Average sperm count of men worldwide in 1973 and 2018
(million sperm per milliliter of semen)



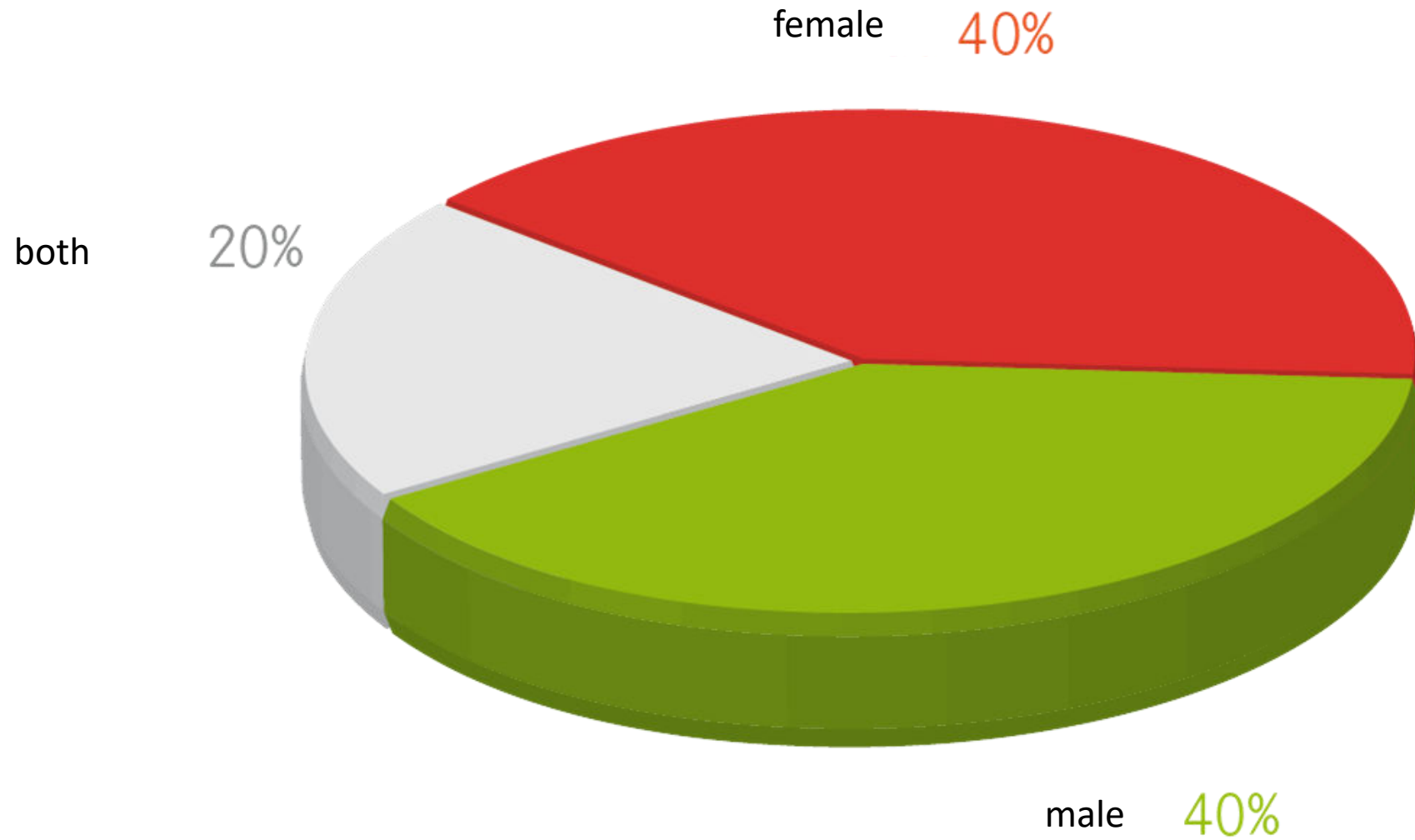
Source: Levine et al. Temporal trends in sperm count: a systematic review and meta-regression analysis. *Human Reproduction Update* (2022)

Prevalence of the main andrological diseases

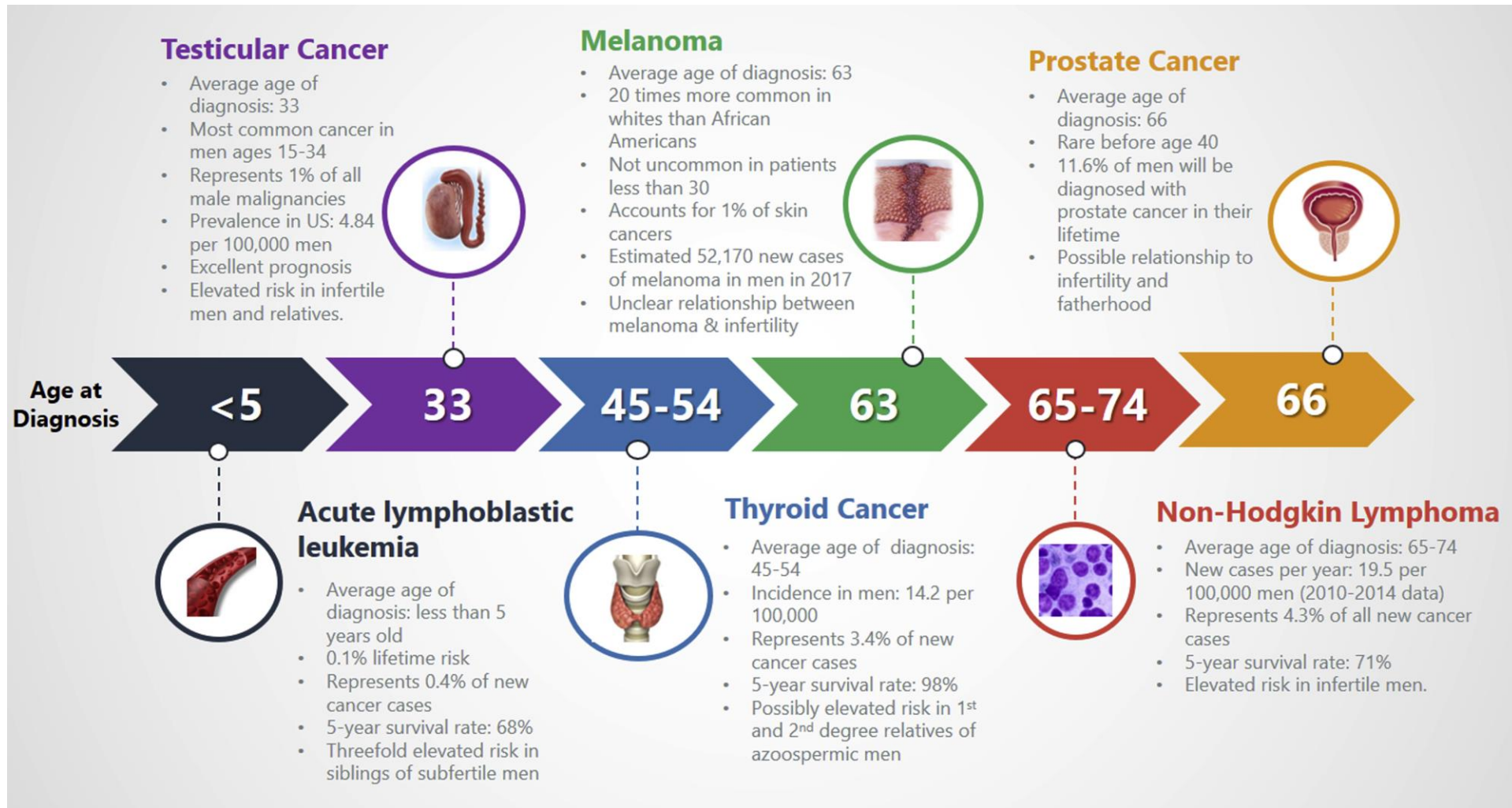


Mazzilli, Rossella & Zamponi, Virginia & Mangini, F. & Olana, S. & Defeudis, Giuseppe & Faggiano, Antongiulio & Gianfrilli, D.. (2023). The effects of non-andrological medications on erectile dysfunction: a large single-center retrospective study. *Journal of Endocrinological Investigation*. 46. 10.1007/s40618-023-02011-9.

Causes of Infertility



Specific malignancies associated with infertile men and their family members by average age at diagnosis



Brent M. Hanson, Michael L. Eisenberg, James M. Hotaling,
Male infertility: a biomarker of individual and familial cancer risk,
Fertility and Sterility, Volume 109, Issue 1, 2018

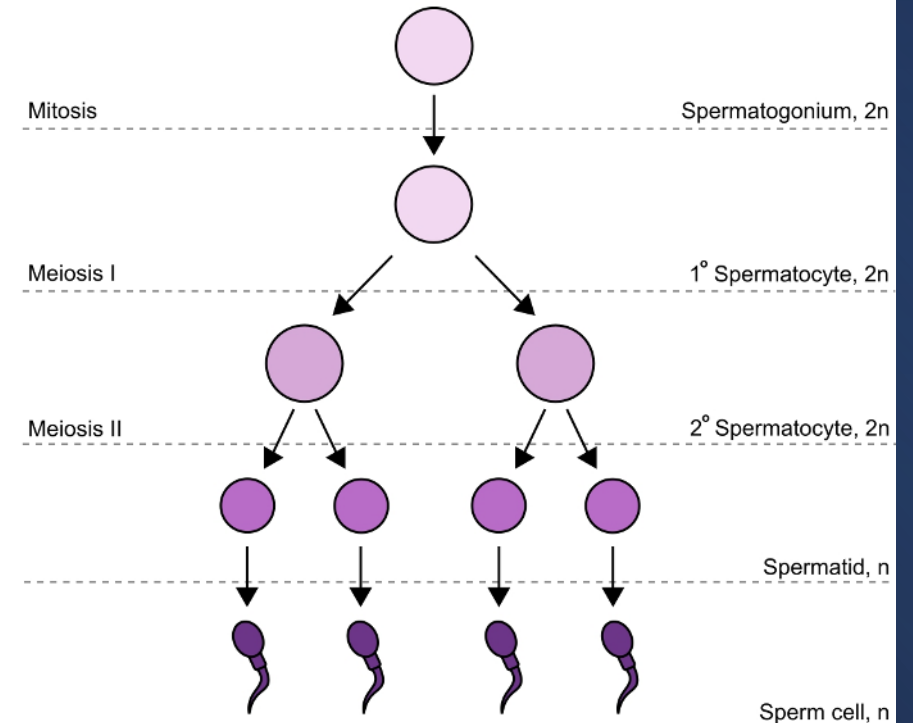
Spermatogenesis

The development from a spermatogonia to a spermatid takes about **64 days**.
Within this time, the various differentiation forms of sperm can be found

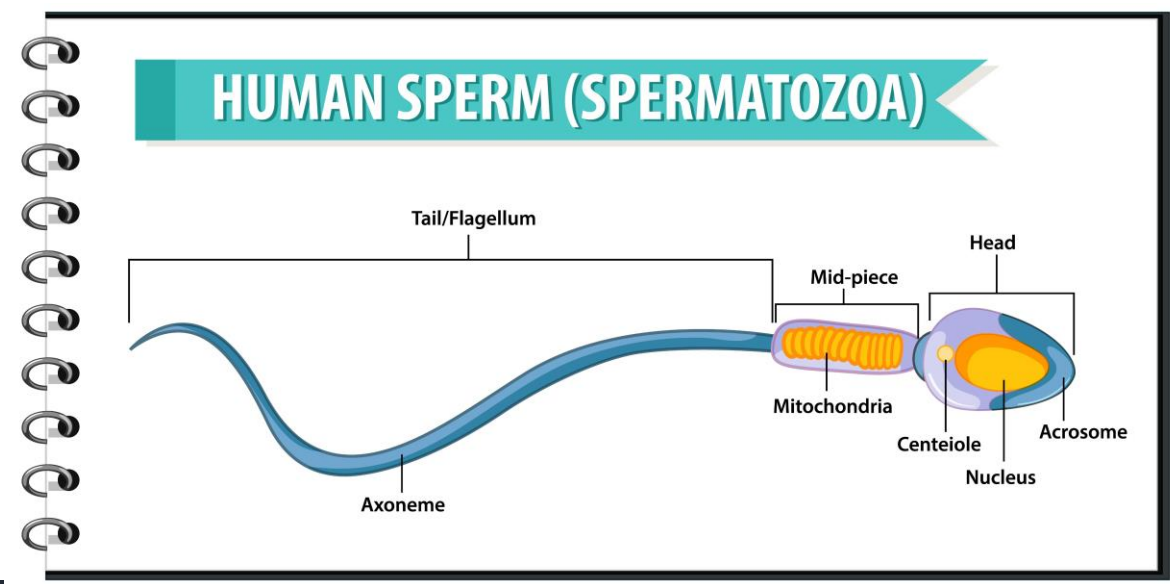
After 64 days of production in the **testes**, the sperm cells are transported to the **epididymis** to achieve their functional maturation and their fine-tuning

producing spermatozoa
(**1500 per second or 200 million per day**)

Spermatogenesis

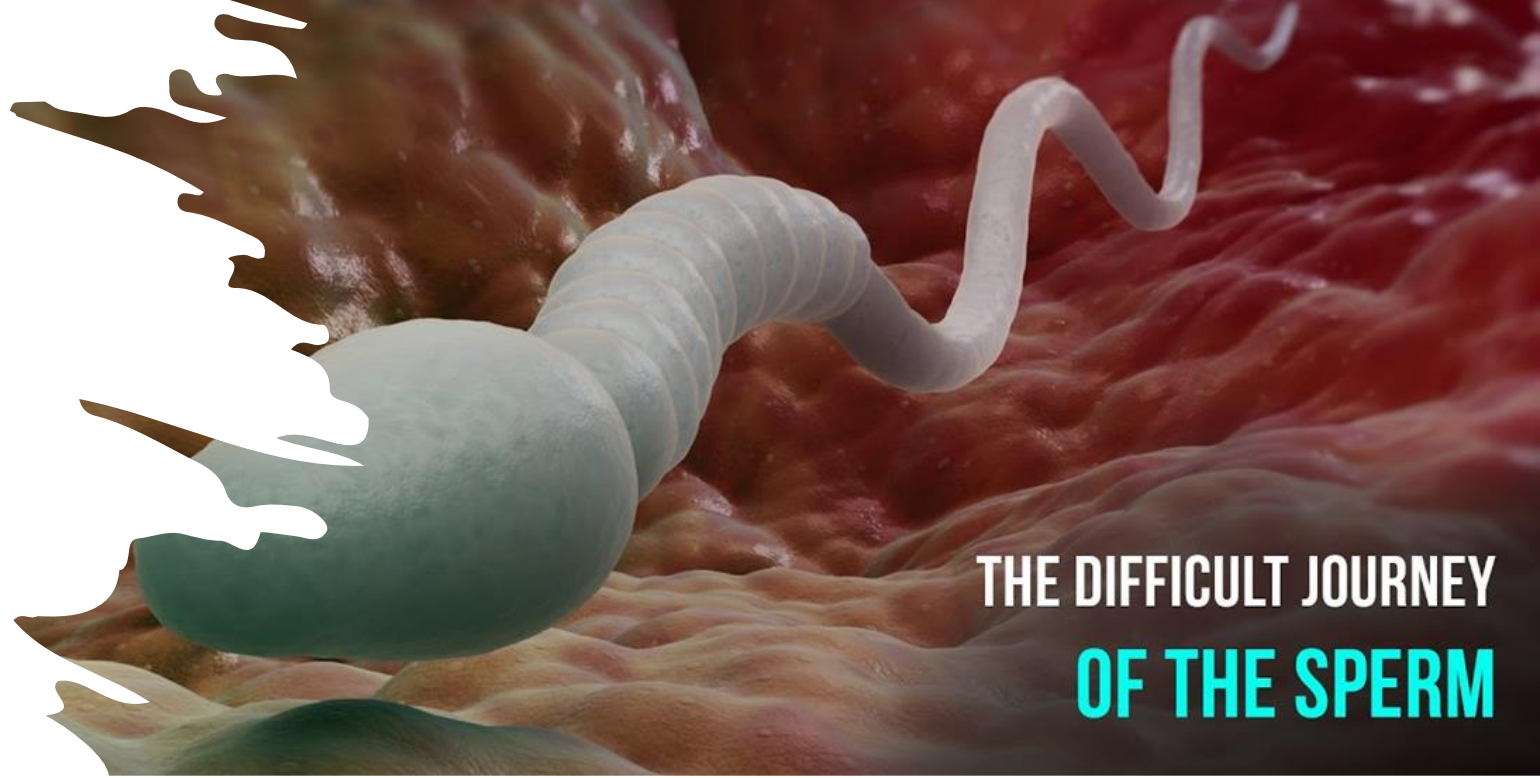


Spermatozoa



- **Head:** oval in shape, 4.3–5.2 μm in length. consists of a compact nucleus with chromatic substance. The nucleus contains the paternal genetic material, the DNA, stored in 23 chromosomes (a haploid set of chromosomes)
- **Middle piece:** is the powerhouse of the sperm cell as it consists of tightly packed mitochondria supplying energy in the form of adenosine triphosphate (ATP) for the tail movement in the presence of magnesium.
- **Tail:** longest part (ten times longer than the sperm head). It flagellates, which propels the sperm cell (at about 1–3 mm per minute in humans) by whipping in an elliptical cone.

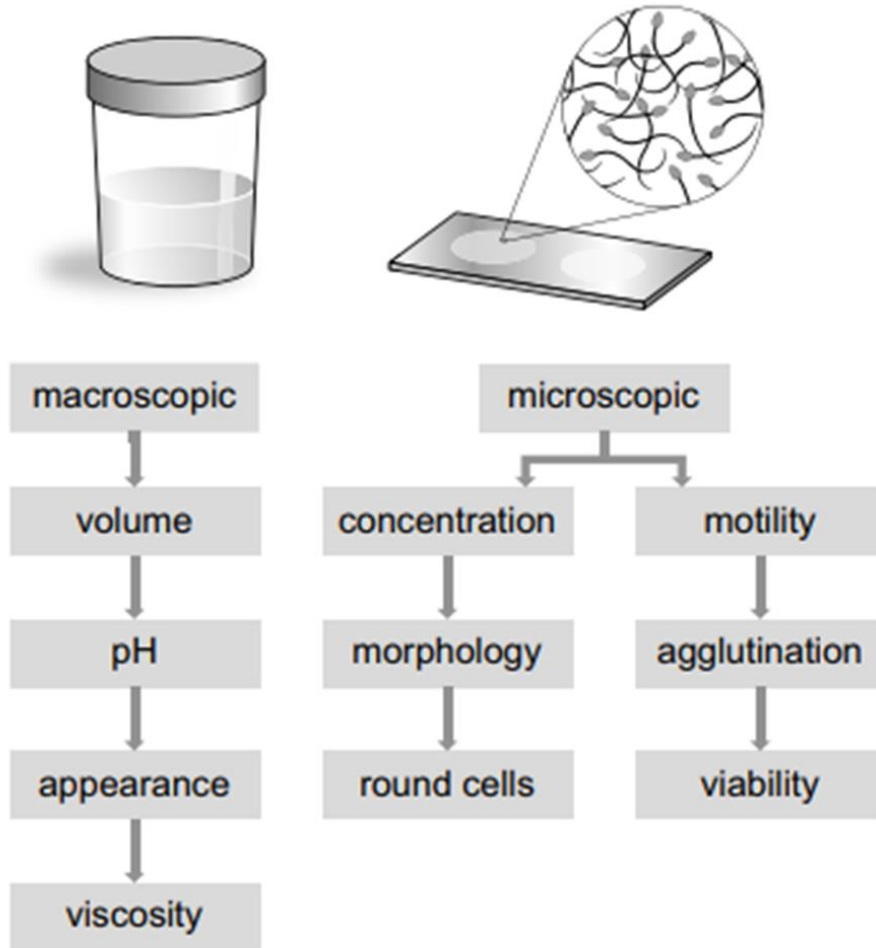
- Approximately **300 million sperm** cells enter the female vagina during intercourse.
- Only a small percentage gets to the fallopian tube and reaches the egg there
- A higher percentage never get to the fallopian tube; they have other jobs to do in addition to fertilizing the egg.
- On their way to the egg that 'waits' in the fallopian tube, the spermatozoa are directed by **chemotaxis** (fragrances, attractants from progesterone and other substances) as well as the **pH value and difference in temperature**.
- Due to the many obstacles on their way, only **300 sperm cells reach the egg** and only one fertilizes the egg.



THE DIFFICULT JOURNEY OF THE SPERM



Semen analysis



Cut-off reference values for semen characteristics as published in consecutive WHO manuals

Semen characteristics	WHO 1980	WHO 1987	WHO 1992	WHO 1999	WHO 2010	WHO 2021
Volume (mL)	ND	≥ 2	≥ 2	≥ 2	≥ 1.5	1,4 (1,3-1,5)
Sperm count (10^6 /mL)	20-200	≥ 20	≥ 20	≥ 20	≥ 15	
Total sperm count (10^6)	ND	≥ 40	≥ 40	≥ 40	≥ 39	39 (35-40)
Total motility (%)	≥ 60	≥ 50	≥ 50	≥ 50	≥ 40	42 (40-43)
Progressive motility	≥ 2	$\geq 25\%$	$\geq 25\%$ (a)	$\geq 25\%$ (a)	$\geq 32\%$ (a+b)	30 (29-31)
Vitality (%)	ND	≥ 50	≥ 75	≥ 75	≥ 58	54 (50-56)
Morphology (%)	80.5	≥ 50	≥ 30	(14)*	$\geq 4^*$	4 (3,9-4)
Leukocyte count (10^6 /mL)	< 4.7	< 1.0	< 1.0	< 1.0	< 1.0	< 1

Liquefaction

Semen is a thick gel at the time of ejaculation and normally becomes liquid within 20-**30** minutes after ejaculation

Liquefaction time is a measure of the time it takes for the semen to liquefy



-
- The prevalence of **semen hyperviscosity (SHV)** is estimated to be between 12-29% and can lead to male factor infertility
 - **Hypofunction of the prostate or seminal vesicles** causes abnormal viscosity of seminal fluid
 - **Infection** and high levels of seminal leukocytes may also result in the development of SHV
 - **Oxidative stress** and biochemical and genetic factors can furthermore contribute to this condition.

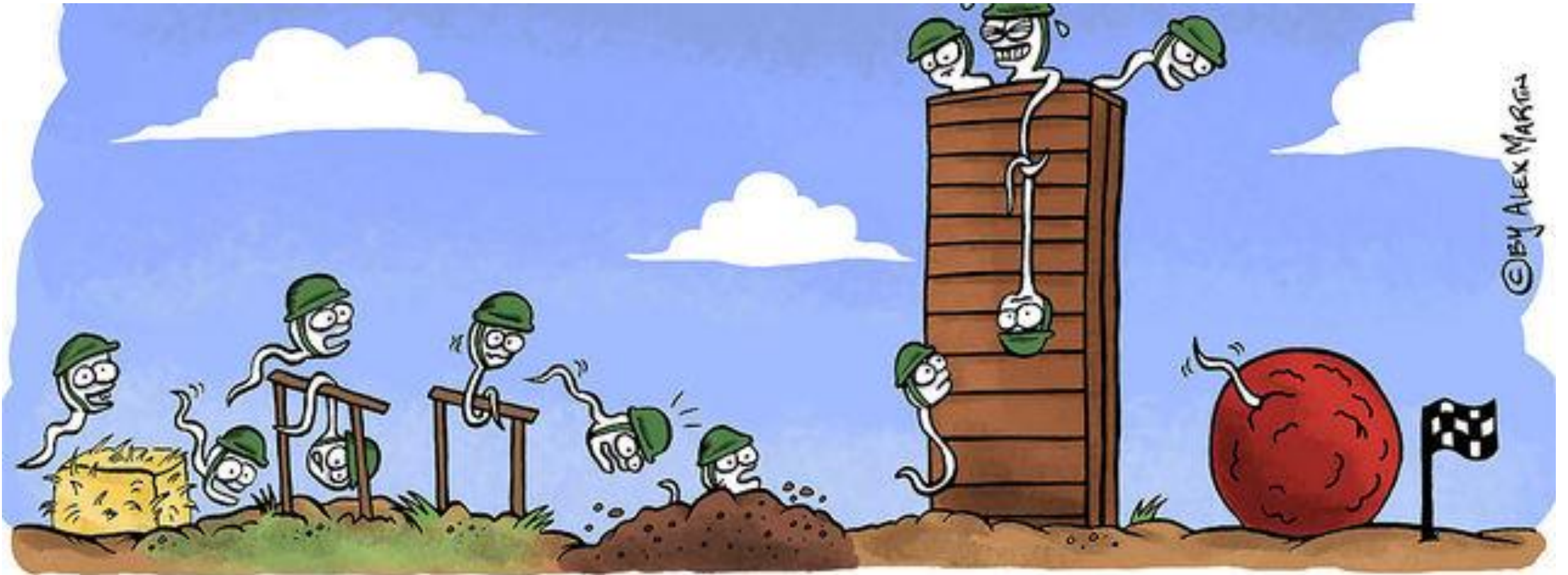
Hyperviscosity can impair normal sperm movement in the female reproductive tract, and can lead to decreased sperm count.

Bromelain

- Bromelain: is the name of two enzymes from the family of cysteine proteases. The crude extract from the plant is often also referred to as bromelain. It contains several sulfhydryl-containing, proteolytic enzymes, a peroxidase enzyme, an acidic phosphatase enzyme, several protease inhibitors, as well as calcium.



Motility



Speed: 3 mm/min

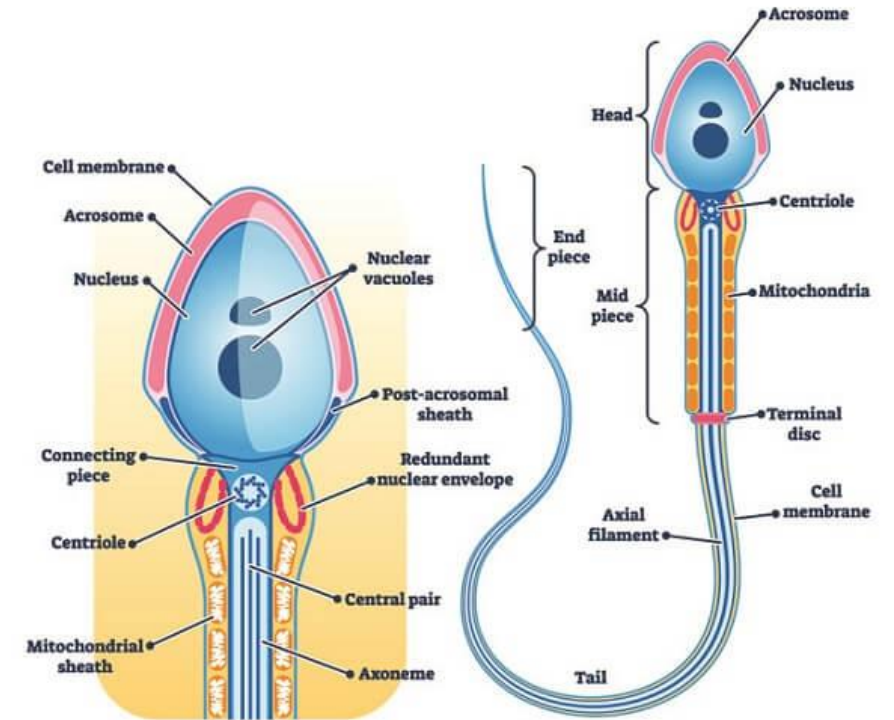
On average takes 15 -40 Minuten to reach the fallopian tube

But due to a crowded starter-field of 50-500 mio sperm that hinder each other it actually takes 1-1.5 hours

> J Physiol Pharmacol. 2018 Jun;69(3). doi: 10.26402/jpp.2018.3.05. Epub 2018 Aug 22.

Sperm mitochondrial dysfunction and oxidative stress as possible reasons for isolated asthenozoospermia

K Nowicka-Bauer¹, A Lepczynski², M Ozgo², M Kamieniczna¹, M Fraczek¹, L Stanski²,
M Olszewska¹, A Malcher¹, W Skrzypczak², M K Kurpisz³



Review > Evid Based Complement Alternat Med. 2014;2014:856273. doi: 10.1155/2014/856273.

Epub 2014 Dec 29.

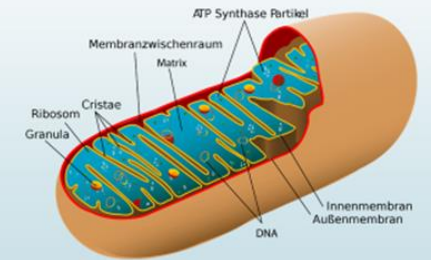
New insights into the chemical and biochemical basis of the "yang-invigorating" action of chinese yang-tonic herbs

Jihang Chen¹, Hoi Shan Wong¹, Pou Kuan Leong¹, Hoi Yan Leung¹, Wing Man Chan¹,
Kam Ming Ko¹

Laseracupuncture!!

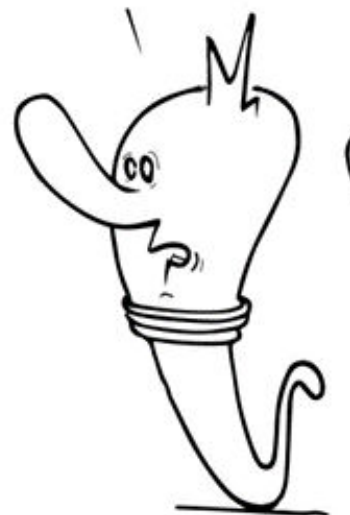
Kräuter die die ATP Produktion (im Labor an Mäusen) verbessern

- **Suo Yang**= Feuerspornkraut
- **Tu Si Zi**= Chinesischer Teufelszwirnsamen
- **Rou Cong Rong (Artenschutz)**= Wüstencistanchenkraut
- **Bu Gu Zhi**= Asphaltklee
- **Du Zhong**= Chinesische Gutapercharinde
- **Gu Sui Bu**= Drynaria-Wurzelstock
- **Xian Mao**= Rüssellilienwurzelstock
- **Ba Ji Tian**= Morindawurzel
- **Yin yang Huo**= Bischofsmütze
- **Xu Duan**= Chinesische Kardenwurzel





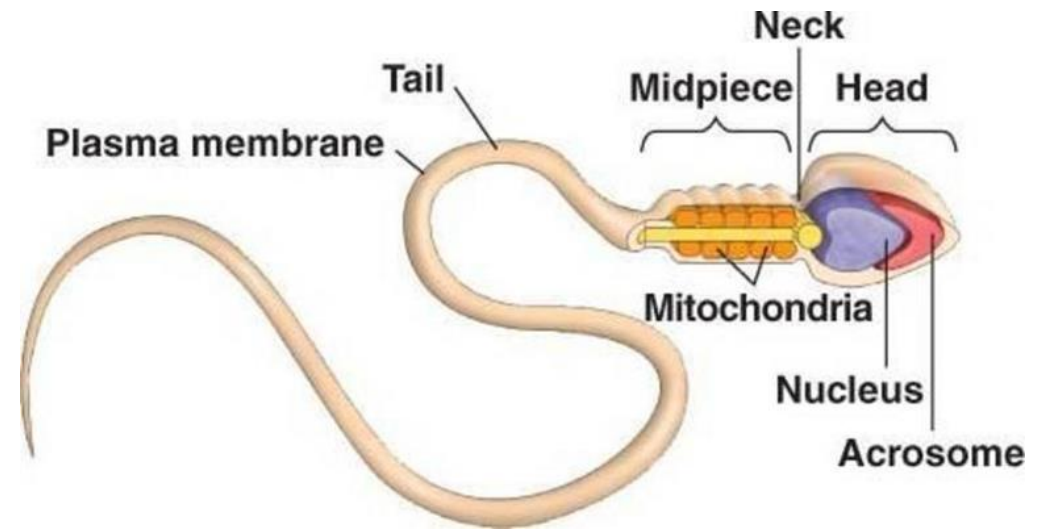
What happened to
Paul ?



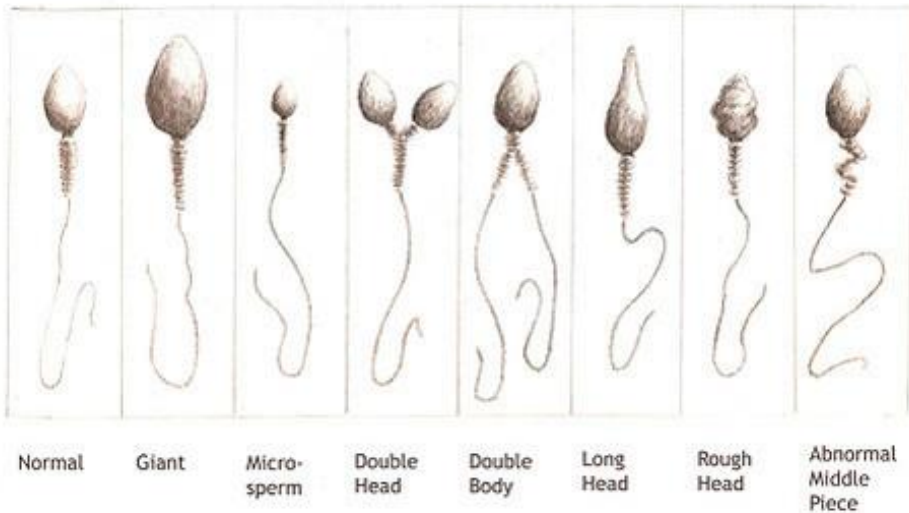
I've heard he's hooked
on TCM now !



Morphology



Sperm Morphology

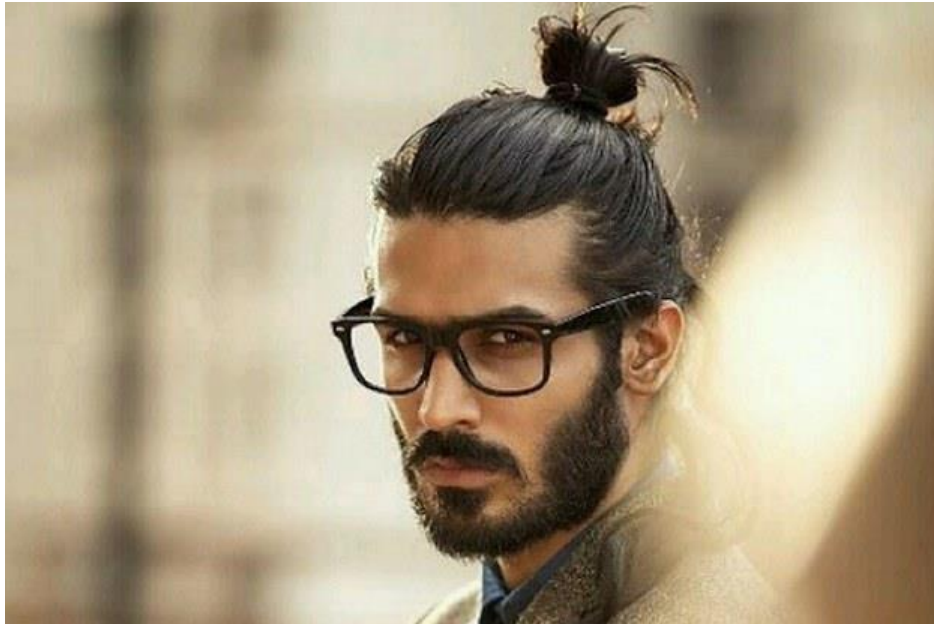


Sperm morphology

4% 

The minimum number of normally shaped **sperm** your sample needs to be considered normal.

All good if semen analysis is good?



DNA fragmentation

Sometimes a normal semen analysis is not enough to judge the quality of the sperm as it doesn't tell us something about the sperm's genetic material-the DNA



Not only that the DNA damage influences the male fertility negatively and decreases the chance of a pregnancy-
New research shows that there is a connection between DNA fragmentation and the rate of early abortions and recurrent miscarriage.

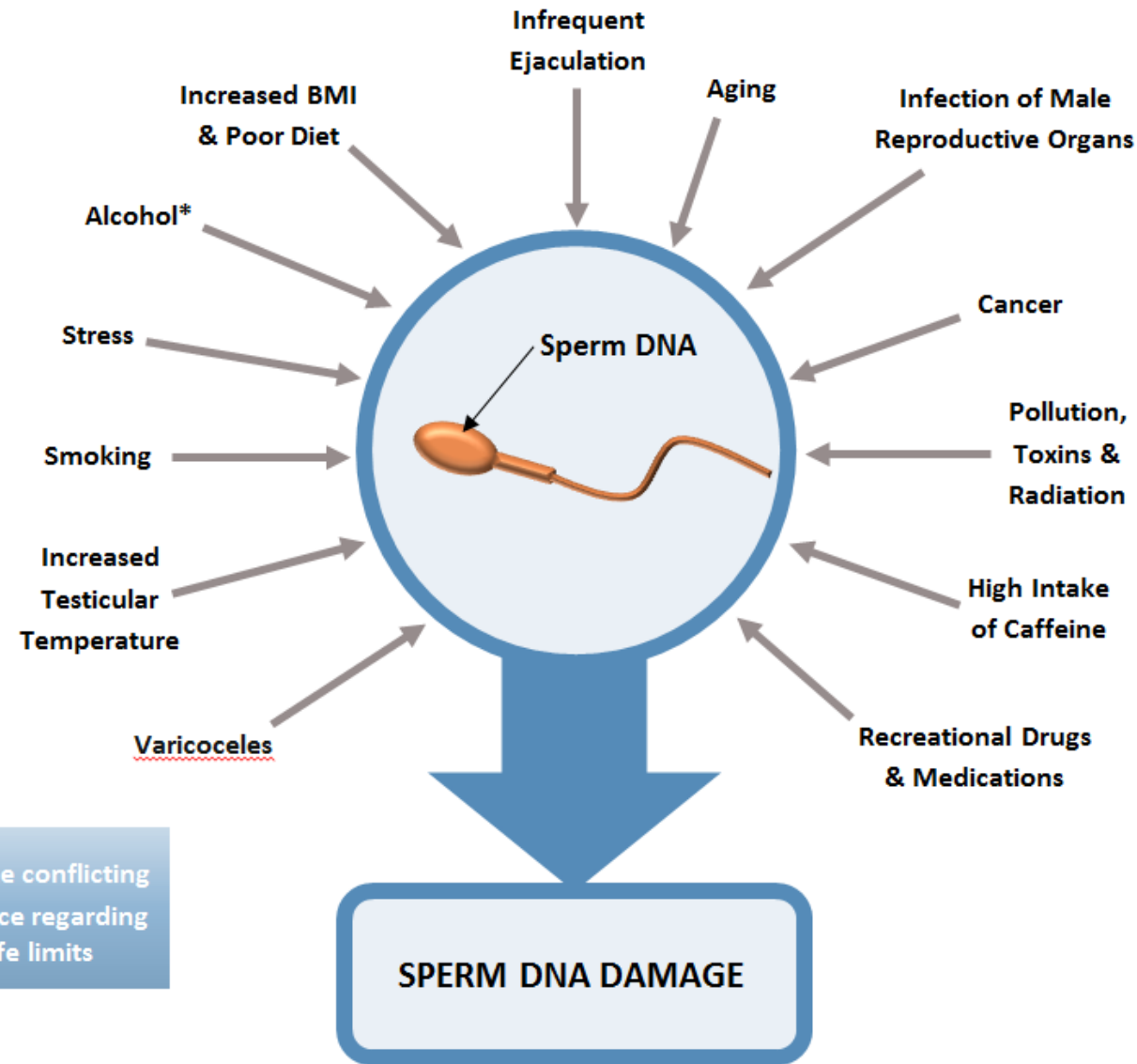


Sperm DNA anomalies impact on every fertility check point

- Poor embryo development
- Failure of fertilization in IVF
- Failure to implant in ICSI
- Post-implantation loss and malformations
- Increased miscarriage rate
- Poorer childhood health

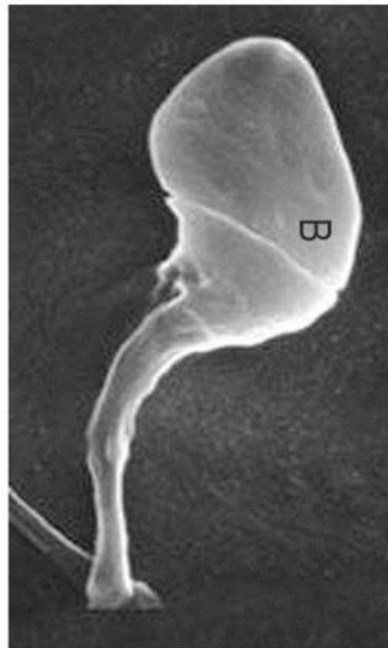
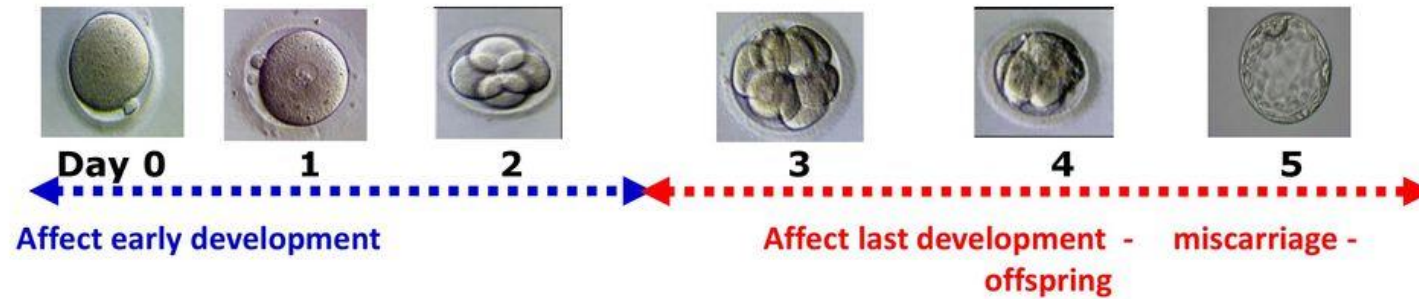


Sperm quality as well as quantity is essential for ART success



* Some conflicting evidence regarding safe limits

Impact of sperm defect affecting embryo development



- Important correlation between *sperm morphology* and *ICSI results*

➤ Abnormal sperm shape and genetic status

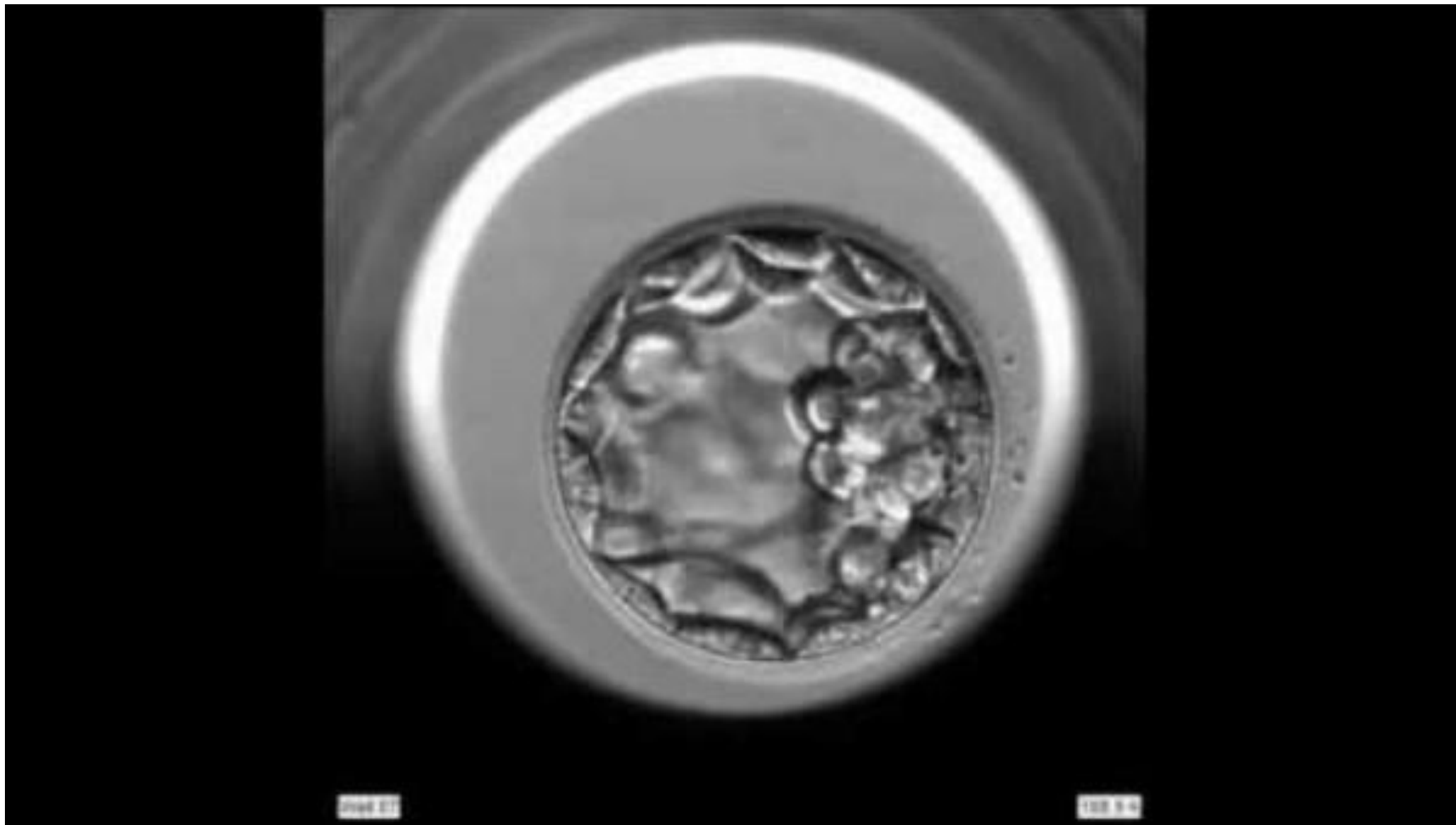
increased risk of aneuploidy and diploidy

(Lee 1996, Bernardini 1998, Colombero 1999, Kabraman 1999, Calogero 2001, Rubio 2001, Yakin 2001, Templado 2002)

➤ Abnormal sperm shape and pregnancy

Reduction in ongoing pregnancy rates: 20,2%
versus 36,7%

Reduction in implantation rates: 9,6%
versus 18,7% DeVos (2004)

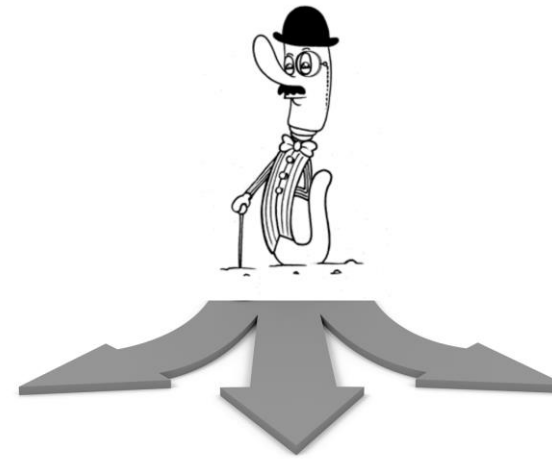


How sperm is made

- The **Kidneys** produce the Tian Gui which is the direct origin of sperm
- The Post-Natal Qi and blood of the **Spleen and Stomach** indirectly supplement the Tian Gui (*by being post-natal Jing as possible add-on to the pre-natal Jing producing Tian Gui*)
- The **Liver** stores the Blood contributing to the production of Tian Gui
- **Heart**-Yang descends to meet Kidney-Yin to produce Tian Gui, also the physiological Fire of the Heart warms the sperm.



possible patterns for male infertility



Deficiency	Repletion	Mixed
Kidney-Yin	Qi-Stagnation	Spleen deficiency with
Kidney-Yang	Cold-Stagnation	Damp-Heat pouring downwards
Kidney-Jing	Blood stasis	Damp-Phlegm blocking
Spleen Deficiency (Qi&Blood)		

Kidney- Yin Vacuity

Sketch: This is often the overworked, restless, businessman who always on the run and thus 'overheating his engine'.

He may complain of back or knee pain, tinnitus, poor memory, poor sleep, feeling hot at night and there is typically a red tongue (if there is vacuity heat) and a rapid pulse.

Vacuity heat tends to lead to an increased libido but with an insufficient erection and/or premature ejaculation



Main points

To tonify Kidney yin: Taixi KID-3, Zhaohai KID-6, Guanyuan REN-4

To tonify Kidney qi: Henggu KID-11, Dahe KID-12, Zhongji REN-3, Qihai REN-6, Shenshu BL-23, Zhishi BL-52

To clear empty heat: Rangu KID-2

To support fluids: Zusanli ST-36

To increase blood flow in the testicles: Guilai ST-29, Sanyinjiao SP-6 (with electro-stimulation at 2 hertz joining same side points for 5 to 20 minutes)

Local points to move qi and blood in the testes and improve sperm quality BL 31, BL 32

Kidney yang vacuity

Sketch: This is the tired, puffy-looking 'couch potato', who typically presents with fatigue, cold and/or painful back or knees, frequent urination at night

a pale, coated tongue, and a slow, soft pulse

Sexually, he tends to present with weak orgasm and ejaculation, low libido, erectile dysfunction, premature ejaculation and watery semen.



Main points

To warm and tonify Kidney yang: Shenshu BL-23, Zhishi BL-52, Mingmen DU-4 (use moxa)

To warm the lower burner, promote Kidney yang: Guilai ST-29, Shenque REN-8, Bl32, Qichong ST-30, Guanyuan REN-4 (use moxa)

Raise yang qi: Baihui DU-20

To increase blood flow in the testicles: Guilai ST-29, Sanyinjiao SP-6 (with electro-stimulation at 2 hertz joining same side points for 5 to 20 minutes)

Qi-and Blood stasis

Sketch: This patient may have a strong body, but presents with a dark complexion, purple lips, purple tongue, spider veins on the skin and

may report sensations of distension, heaviness and pain in the scrotal/perineal area, burning inguinal pain during ejaculation, erectile dysfunction, and pain in the testicles

They may have been diagnosed with varicocele (traditionally described as a scrotum that feels like a 'bag of worms').



Main points

Move Qi and blood in the genitals and lower burner:
Dadun LIV-1, Taichong LIV-3, Ligou LIV-5, Zhongdu LIV-6,
Sanyinjiao SP-6, Dijie SP-8

Local points to invigorate qi and blood in the genital region
and ease pain: Ciliao BL-32, Guilai ST-29, Qichong ST-30,
Zhongji REN-3, Dazhu KID-11

Invigorate blood: Geshu BL-17, Xuehai SP-10

To increase blood flow in the testicles: Guilai ST-29,
Sanyinjiao SP-6 (with electro-stimulation at 2 hertz joining
same side points for 5 to 20 minutes)

Damp-heat in the Lower Burner:

Sketch: This is the heavy drinking, cigar-smoking, curry-loving 'gourmand'.

He may complain of delayed ejaculation, priapism or an inability to ejaculate at all, distension and pain in the genital region after sexual activity, swollen genitals, genital itching, red, overly warm and moist malodorous genitals, genital eczema, and may present with prostatitis or cystitis.

The tongue is red with yellow slimy fur, and the pulse is slippery and stringlike.



Main points

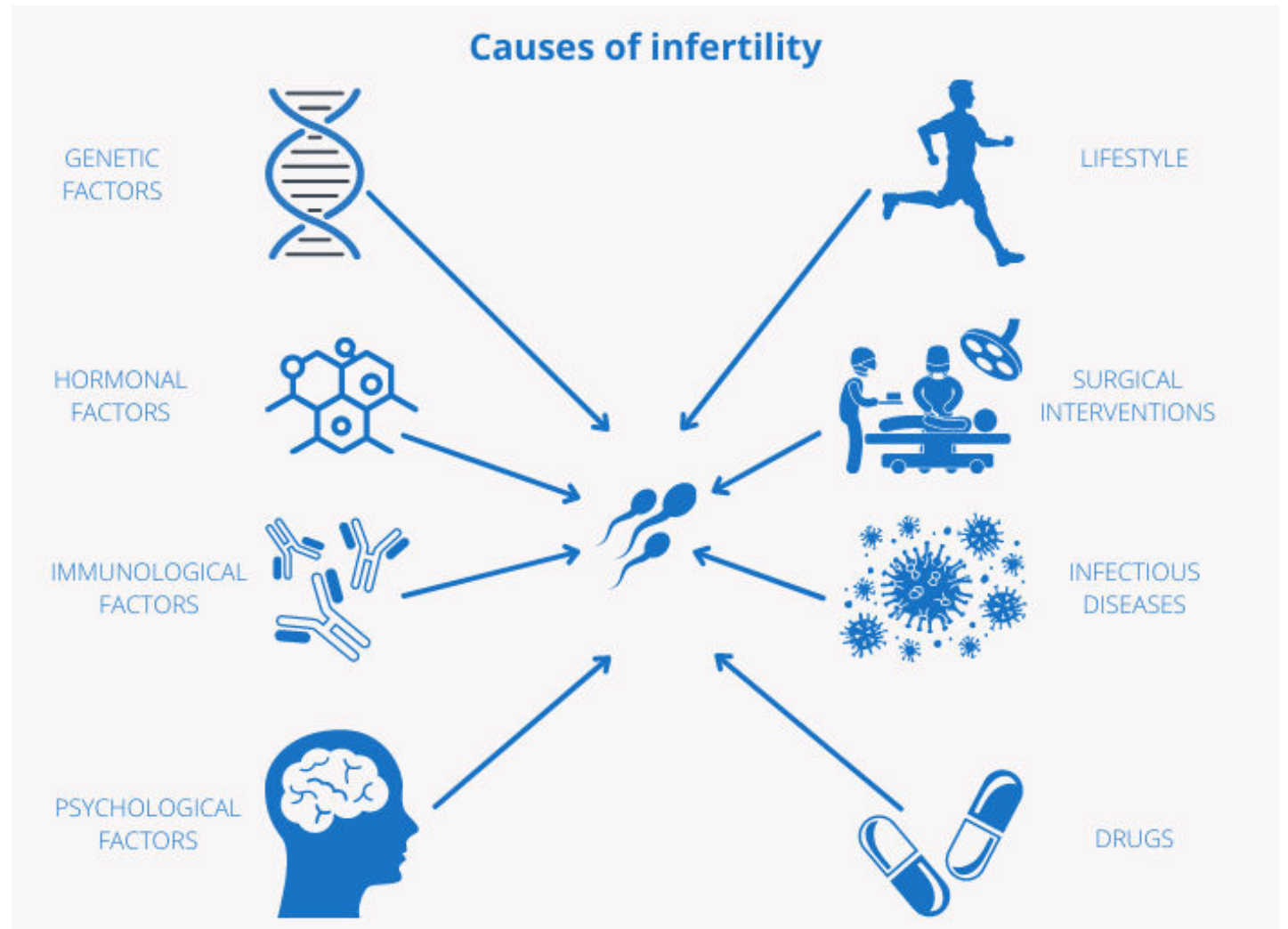
Eliminate damp-heat and lower burner:

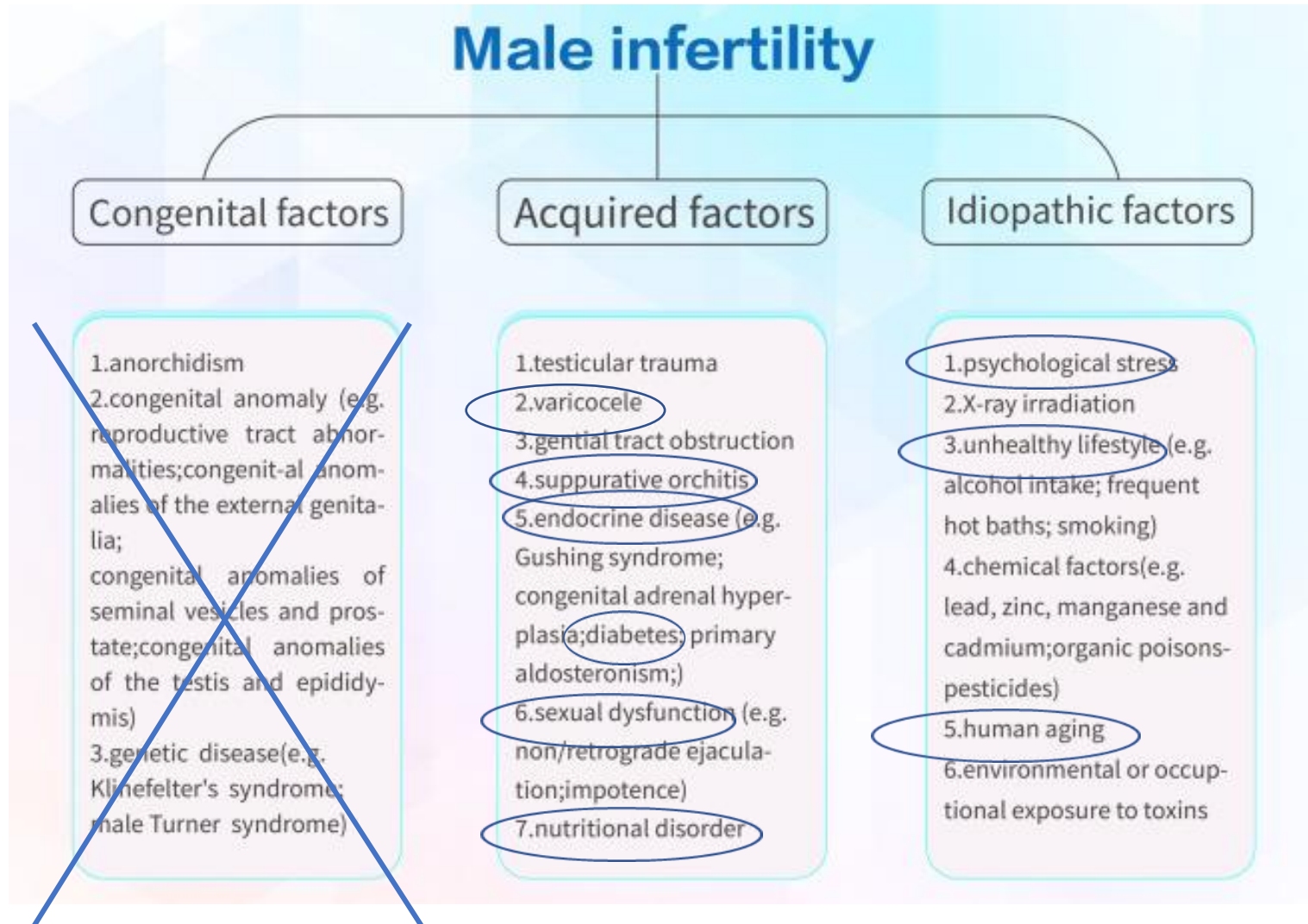
Dadun LIV-1, Xingjian LIV-2, Taichong LIV-3, Ligou LIV-5, Ququan LIV-8, Rangu KID-2, Jaoxin KID-8, Yinggu KID-10, Sanyinjiao SP-6, Yinlingquang SP-9, LI-11 Quchi

Local points to remove damp-heat from the genitals:

St 28, St 30, Bl 28, Ren 3, Bl 35 and Ren 1, Bl 27, Bl 28

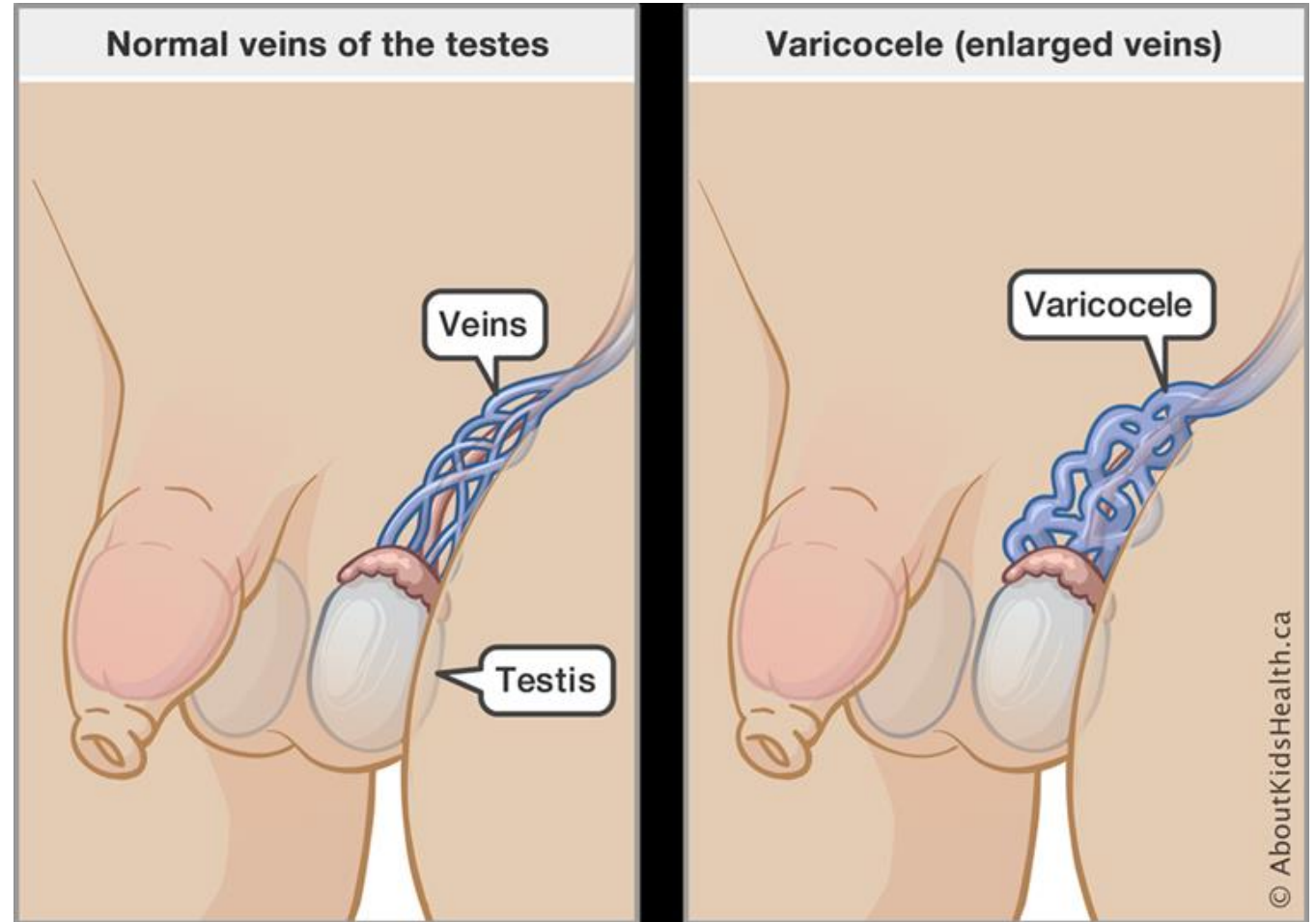
Causes of male infertility





Varicocele

- Varicocele-a kind of vascular disease-is manifested by abnormal dilatation and tortuosity of the pampiniform plexus veins
- can be observed in **35%–44% among men with primary infertility** and **45%–81% with secondary infertility!**



[Front Endocrinol \(Lausanne\)](#). 2022; 13: 1009537.

PMCID: PMC9624472

Published online 2022 Oct 18. doi: [10.3389/fendo.2022.1009537](https://doi.org/10.3389/fendo.2022.1009537)

PMID: [36329891](https://pubmed.ncbi.nlm.nih.gov/36329891/)

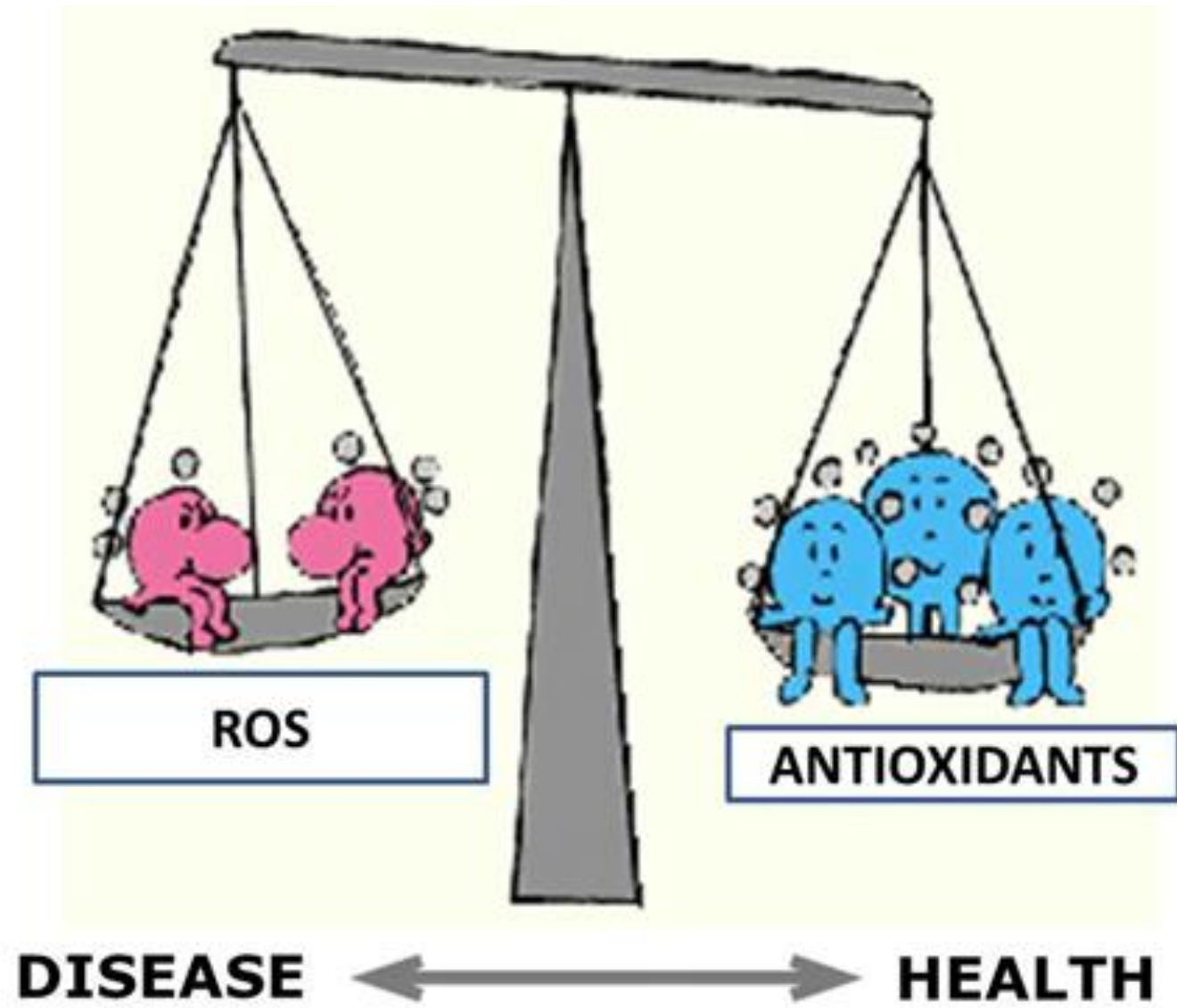
The efficacy and mechanism of acupuncture in the treatment of male infertility: A literature review

[Jiaying Feng](#), ¹ · [†] [Hui He](#), ¹ · [†] [Yu Wang](#), ² · [†] [Xu Zhang](#), ¹ [Xiuying Zhang](#), ¹ [Tiantian Zhang](#), ¹ [Mengyi Zhu](#), ¹ [Xiaoke Wu](#), ² · ³ · ^{*} and [Yuehui Zhang](#) ² · ^{*}

Repairing a varicocele reduces the amount of oxidative stress in the ejaculate, thus preventing further oxidative damage

This not only improves various sperm parameters but also increases pregnancy rates

This can be demonstrated by measuring antioxidants as well as inflammatory and oxidative stress markers such as malondialdehyde (MDA), hydrogen peroxide (H₂O₂), and nitric oxide (NO) before and after the repair



Comparison acupuncture vs varicocele surgery in infertile couples

January 2008- May 2010

30 men with **primary infertility and a varicocele** with **normal hormonal levels** in the blood test but **abnormal semen analysis** were randomized in 2 groups

- group 1 : subinguinal microscopic varicocelectomy
- group 2 : acupuncture 2x/week for 2 months

The pre-treatment sperm concentration, motility and morphological characteristics were similar in both groups. After 6 months a semen analysis was performed in both groups

result:

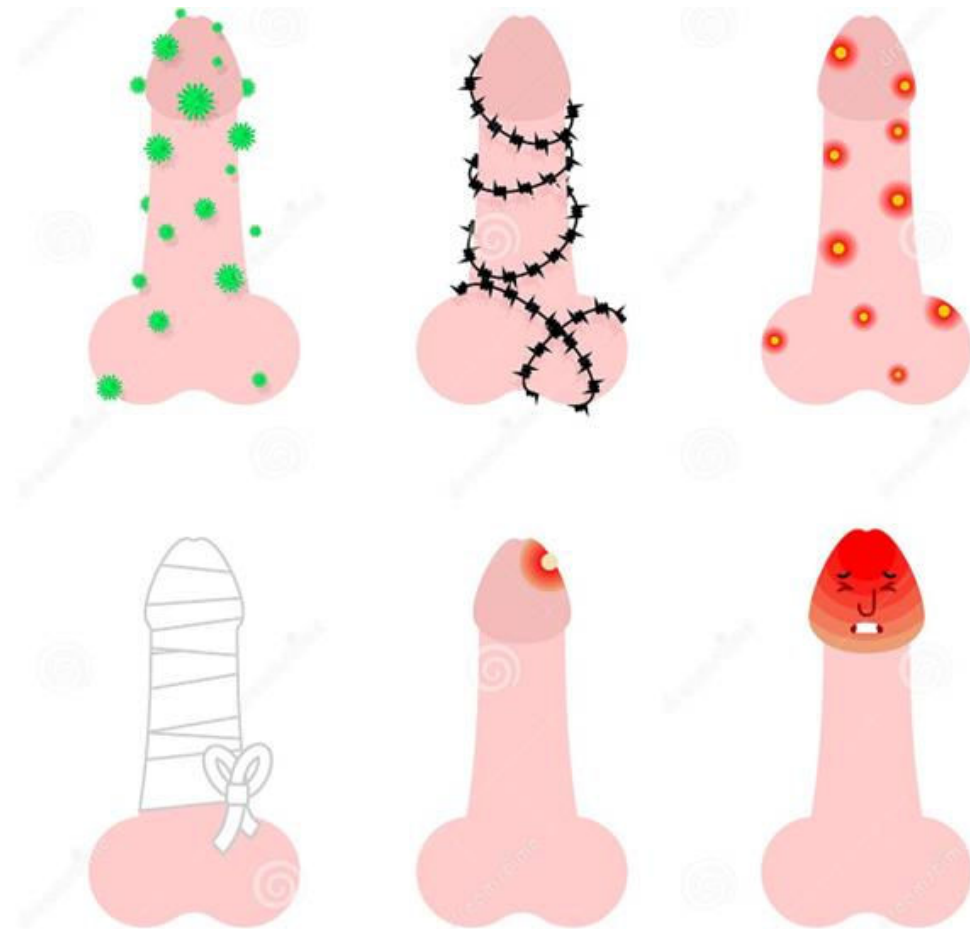
Sperm concentration and motility improved significantly in both groups after the treatment.

Increase in sperm concentration was higher in the acupuncture group compared to the varicocelectomy group (P = 0.039).

The average follow-up was 42 months, and **pregnancy rates were emphasised 33% in both groups.**

• **Kucuk EV, Bindayi A, Boylu U: Randomised clinical trial of comparing effects of acupuncture and varicocelectomy on sperm parameters in infertile varicocele patients, Andrologia. 2016ec;48(10):1080-1085.*

Genital tract infections



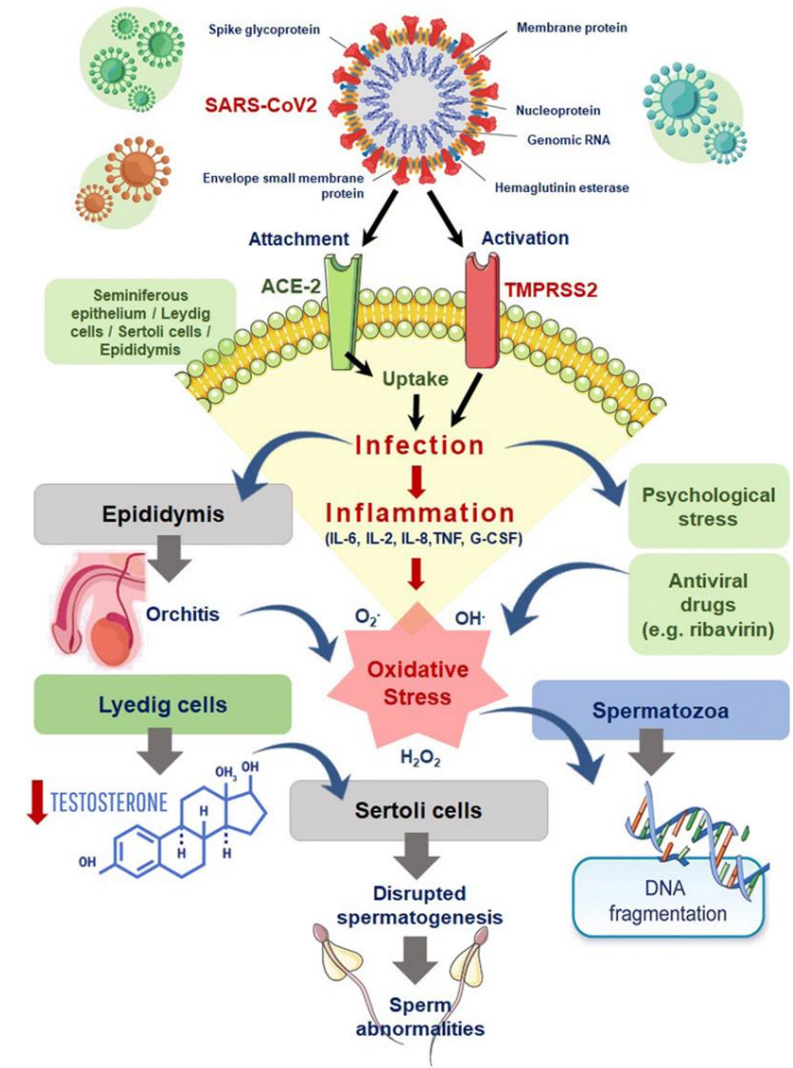
- they account highly to the causes of male infertility
- Globally, the presence of genital tract infection-related infertility varies between 10 and 20% in non-selected cases and up to 35% in a large study compromising more than 4000 patients consulting for infertility

Covid

The four main testicular cell types showing expression of ACE2 receptors are the **seminiferous duct cells, spermatogonia, Leydig cells, and Sertoli cells**

cells with higher ACE2 expression are more susceptible to SAR-CoV2 infection

Having considered these reports, it is a breakthrough revelation in male fertility research that **testes show almost the highest ACE2 mRNA and protein expressions** among the various body tissues



Nature Public Health Emergency Collection

Public Health Emergency COVID-19 Initiative

J Endocrinol Invest. 2022 May 9 : 1–13.

doi: [10.1007/s40618-022-01801-x](https://doi.org/10.1007/s40618-022-01801-x) [Epub ahead of print]

Andrological effects of SARS-Cov-2 infection: a systematic review

G. Corona,¹ W. Vena,² A. Pizzocaro,² F. Pallotti,³ D. Paoli,³ G. Rastrelli,⁴ E. Baldi,⁴ N. Cilloni,⁴ A. Salonia,^{7,8} S. Minhas,⁹ R. Pivonello,^{10,11} A. Sforza,¹ L. Vignozzi,⁴ A. M. Isidori,³ A. Lenzi,³ F. Lombardo³

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Original Article

Male reproductive health and infertility

pISSN: 2287-4208 / eISSN: 2287-4690
World J Mens Health Published online Oct 4, 2022
<https://doi.org/10.5534/wjmh.220091>

Association between COVID-19 and Male Fertility: Systematic Review and Meta-Analysis of Observational Studies

Shangren Wang^{1,*}, Aiqiao Zhang^{2,3,*}, Yang Pan¹, Li Liu¹, Shuai Niu¹, Fujun Zhang^{2,3}, Xiaoqiang Liu¹

¹Department of Urology, Tianjin Medical University General Hospital, ²Department of Neonatology, First Teaching Hospital of Tianjin University of Traditional Chinese Medicine, ³Department of Neonatology, National Clinical Research Center for Chinese Medicine Acupuncture and Moxibustion, Tianjin, China

TAU TRANSLATIONAL ANDROLOGY AND UROLOGY

Transl Androl Urol. 2022 Feb; 11(2): 159–167.

doi: [10.21037/tau-21-922](https://doi.org/10.21037/tau-21-922)

Evaluation of mid- and long-term impact of COVID-19 on male fertility through evaluating semen parameters

Bintao Hu,^{#1,2} Kang Liu,^{#1,2} Yajun Ruan,^{1,2} Xian Wei,^{1,2} Yue Wu,^{1,2} Huan Feng,^{1,2} Zhiyao Deng,^{1,2} Jihong Liu,^{1,2} and Tao Wang^{#1,2}

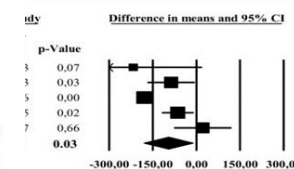
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Abstract

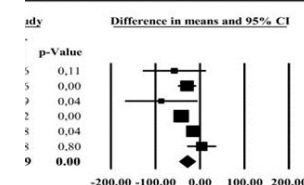
PMCID: PMC8899150

PMID: [35280660](https://pubmed.ncbi.nlm.nih.gov/35280660/)

COVID-19 vs. controls



COVID-19 vs. controls



C Sperm total motility (%) COVID-19 vs controls

Study name Statistics for each study Difference in means and 95% CI

Med Sci Monit. 2022; 28: e935879-1–e935879-7.

PMCID: PMC8951594

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PMID: [35313326](https://pubmed.ncbi.nlm.nih.gov/35313326/)

A Review of Recent Studies on the Effects of SARS-CoV-2 Infection and SARS-CoV-2 Vaccines on Male Reproductive Health

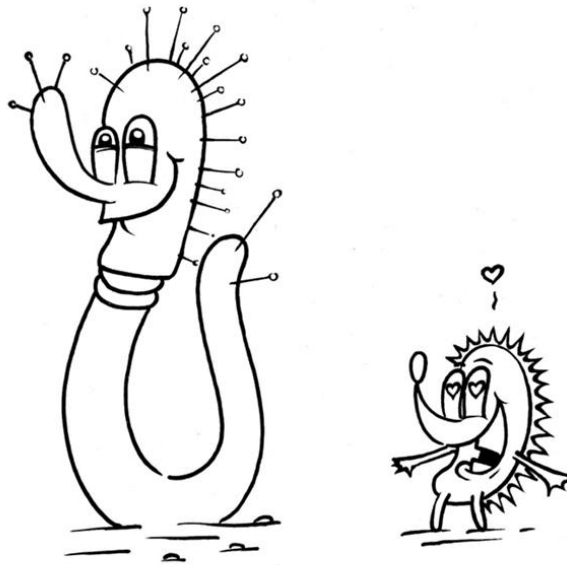
Leila Adamyan,^{1,A,D,G} Vladimir Elagin,^{1,2,B} Valeriy Vechorko,^{2,B,D} Assia Stepanian,^{3,D} Anton Dashko,^{2,B} Dmitriy Doroshenko,^{2,B} Yana Aznaurova,^{#1,E,F} Maxim Sorokin,^{4,5,6,C,E,F} Andrew Garazha,^{5,D,E} and Anton Buzdin^{4,5,6,A,C,E}

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A covid infection might impair the semen quality for the next 120-180 days!!!



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- Research on acupuncture for male fertility problems



Efficacy and safety of nonpharmacological strategies for the treatment of oligoasthenospermia: a systematic review and Bayesian network meta-analysis

Zhen Wang¹, Ziyang Zhou¹, Lijuan Zhang¹, Xujie Li¹, Miaoxiu Li¹, Yankun Pan¹, Ti Yong Jiao¹, Xiaoyun Shi¹, Qing Liu¹, Congan Wang^{# 2}, Yongquan Wang^{# 3}

Affiliations + expand

PMID: 36600309 PMCID: PMC9811722 DOI: 10.1186/s40001-022-00968-6

Results: A total of 4629 publications were initially retrieved; ultimately, 38 RCTs were analysed, including 8 nonpharmacological therapies and 3080 patients. Each intervention outperformed the sham intervention and no treatment approaches in terms of improved efficacy.

In terms of improved total effective rate and sperm concentration, **warming acupuncture** may be the most effective treatment (SUCRA = 80.1% and 93.4%, respectively).

Electroacupuncture perhaps resulted in the best improvement in sperm motility a% and a + b% (SUCRA = 96.6% and 82.0%, respectively)...

In terms of improving the reproductive hormones FSH, LH, and T, the best interventions perhaps were hyperbaric oxygen, **2 Hz TEAS**, and **electroacupuncture** (SUCRA = 85.1%, 96.8% and 99.4%, respectively).

