

## THE PHARMA INNOVATION - JOURNAL

# Sperm Motility Affected By Advanced Technologies (Mobiles-Laptops) Leading Lifestyle and Environmental Causes of Low Sperm Count

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The use of laptop computers wirelessly connected to local area networks (Wi-Fi) has increased dramatically in recent years. People using Wi-Fi may be exposed to radio signals. The use of portable computers (connected via Wi-Fi) on the lap exposes the genital area to radio frequency electromagnetic waves (RF-EMW) and high temperatures. It has been postulated that declines seen in male fertility over recent years may be related to various environmental factors, including RF-EMW. The effects of extremely low frequency magnetic fields may be associated with oxidative damage of cellular structures and molecules. Oxidative damage to spermatozoa could affect motility or damage DNA. Spermatozoa in warm-blooded animals, including humans, spend their entire life span inside the male and female genital tract-an environment that consistently remains at body temperature (37°C). Human sperm that is ejaculated into the female genital tract retains its fertilizing capacity for up to 85 hours. Progressive sperm motility is important in evaluating the fertility potential of spermatozoa, and a prerequisite for fertilization in humans. Sperm motility depends on a number of factors, including the temperature.

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*Keyword:* Laptop Computer; Wi-Fi; Sperm Quality; Fertility; Sperm DNA fragmentation

### 1. Introduction<sup>[1,2]</sup>

The use of laptop computers wirelessly connected to local area networks (Wi-Fi) has increased dramatically in recent years. Wi-Fi stands for "wireless fidelity". The term refers to a group of technical standards which enable the transmission of data over wireless networks. Put simply: Wi-Fi means wireless internet connection. People using Wi-Fi may be exposed to radio signals. The use of portable computers (connected via Wi-Fi) on the lap exposes the genital area to radio frequency electromagnetic waves (RF-EMW) and high temperatures. It has been postulated that declines seen in male fertility over recent years may be related to various environmental factors, including RF-EMW. The effects of extremely

low frequency magnetic fields may be associated with oxidative damage of cellular structures and molecules. Oxidative damage to spermatozoa could affect motility or damage DNA.



## 2. Getting Into The Topic:

### 2.1 Wi-Fi Laptops Harm Sperm Motility and Increase Sperm DNA Fragmentation: <sup>[3, 4, 5]</sup>

Males who place a laptop on their laps with the WI-FI on might have a greater risk of reduced sperm motility and more sperm DNA fragmentation, which could, in theory, undermine their chances of becoming fathers, Sperm motility refers to the percentage of sperm in a semen sample that are moving - normally, a high percentage of all sperm should be moving (thrashing their tails and swimming).

The double-whammy of the Wi-Fi signal and laptop temperature can cause:

- A decrease in human sperm motility
- Sperm DNA fragmentation-irreversible changes in the genetic code

### 2.2 Electromagnetic Radiation: <sup>[6, 7]</sup>

EM Radiation or EMR is "The energy that radiates from all things in nature and from man-made electronic systems. It includes cosmic rays, gamma rays, x-rays, ultraviolet light, visible light, infrared light, radar, microwaves, TV, radio, cell phones and all electronic transmission systems. Electromagnetic radiation is made up of electric and magnetic fields that move at right angles to each other at the speed of light.". Ex vivo exposure of human spermatozoa to a wireless internet-connected laptop decreased motility and induced DNA fragmentation by a non-thermal effect.

### 2.3 Reproductive Health Will Be At Risk:

"Keeping a laptop connected wirelessly to the internet on the lap near the testes may result in decreased male fertility."

"Use of cell phones decreases the semen quality in men by decreasing the sperm count, motility, viability and normal morphology. The decrease in sperm parameters was dependent on the duration of daily exposure to cell phones, and independent of the initial semen quality."



### 2.4 It may be Better to use a Battery-Powered Laptop: <sup>[8, 9, 10]</sup>

Laptop computers are a high-energy source of both electric- and magnetic fields, so, as mentioned, avoid putting a laptop directly on your lap. You can block the thermal effects by using a lap pad if you also avoid sitting with your legs held closely together, and you can shield against the electric field by adding a reflective material or metal to it, but you cannot block the magnetic field component, so ideally you'll only want to use a laptop when it's running on battery not when it's plugged into an outlet and charging. The same goes for iPods, Kindle's and even cell phones. Pregnant women should be especially careful using these types of technologies while plugged in. The current Archives of Environmental and Occupational Health study also suggested that the power supply from a laptop induces strong electric current densities in the fetus when the laptop is used at close contact with a woman's womb, so taken together the research suggests that both men and women should use due care when considering whether or not to use a laptop, especially in close proximity to their bodies. I would strongly encourage you to only use your notebook computer with an external keyboard.

### 2.5 Even Typing on A Laptop May Expose You to Unsafe Levels of EMFs

If you use your laptop on a desk, as opposed to your lap, does this mean you're safe? If you want to be sure your health is not at risk, not only

should your laptop not be put on your lap, but you should not type on it either. As I explain below, I have used a gauss meter on many notebook computers, and found EMF levels higher than 100 milli gauss on most of them; safe ranges are less than 0.3.

## 2.6 Other Factors: <sup>[11,12, 13]</sup>

**2.6.1 Stress:** adrenal hormones can interfere with the production of our major sex hormones. Chronic stress leads to other health ailments which can eventually interfere with the reproductive system.

**2.7 Nutritional Deficiencies and Poor Eating Habits:** lack of fresh organic fruit and vegetables. Eating too many processed products, refined foods, sugars, and fats.

- **Pesticides:** Present on conventional fruit and vegetables. Responsible for numerous health issues.
- **Growth Hormones:** found in conventional animal products. Associated with estrogen dominance related conditions.
- **Too much alcohol consumption** – depletes vitamins and minerals from the body. An overworked liver can cause a rise in estrogen.
- **Excessive caffeine consumption** – linked to several sperm problems. Mostly found in coffee, tea, chocolate, cola, energy drinks, and some medications. There are other types of caffeine based stimulants people use to help keep awake (e.g. in tablet form).
- **Overheating of the scrotum** – one of the common causes of low sperm count. Hot baths, saunas, and electric blankets can overheat sperm producing cells in the testicles. Exposure to heat in the work environment. Using a laptop on your knees (heat produced by battery) has been proved to increase scrotal temperature. Long hours driving or sitting. Tight underwear or trousers, or constantly keeping legs crossed/pressed together can trap heat.
- **Sleep deprivation** – an array of health complaints and illnesses including fertility problems.

- **Lack of exercise** – too little physical activity can lead to sluggish circulation and poor health, which can become causes of low sperm count.
- **Overexertion** - some men go to the extreme and overexert themselves, which risks sperm supply by overheating. Prevalent in endurance athletes.
- **Regular bike riding** - poses a risk because of pressure and friction against the seat restricting blood flow to the testicles.
- **Obesity** – fat cells secrete estrogen. The consequence is a diminished testosterone level (hormone needed for sperm production). Skin folds covering the genital may also be a problem for obese men, as the testicles can overheat effecting sperm count.
- **Underweight** - hormonal imbalance is a possibility. Lack of essential nutrients required for sperm production.
- **Smoking cigarettes** – major cause of poor sperm quality. Known to cause agglutination (sperm cells clumping together). Can damage genetic material within the sperm cells.
- **Abuse of anabolic steroids** - suppresses the testes ability to produce testosterone.
- **Marijuana use** – includes sperm motility problems which make it harder to reach the female egg.
- **Other recreational drugs, substance abuse** – can cause DNA damage, therefore putting future offspring at risk.
- **EMF exposure (electromagnetic field)** – cell phones in pockets near the crotch, laptops placed on knees, and electric blankets.
- **X-rays** – any rapidly dividing cells are affected, including sperm cells. The genital area should have a protective shield whenever possible. Higher doses of x-ray radiation have more severe effects on sperm production.
- **Hidden environmental toxins and hormone disruptors (xenoestrogens)** – one of the not so obvious causes of low sperm count! Found all around us in a variety of unsuspecting places, such as cleaning products in the home, plastic food packaging, and the personal care products that we use on a daily basis.

- **Hazards in the workplace** many men work with and around toxic substances, chemicals, and heavy metals, which can be damaging to sperm cells. Precautionary measures should always be enforced and practiced.
- **Frequent ejaculation** can lower sperm count.
- **Lubricants** There's specifically designed lube for couples trying to conceive. Only use sperm friendly lubricants as other brands are inhospitable to sperm cells and can damage or kill them.

### 2.8 Precautions: [14, 15]

- Use a headset or speakerphone mode. That moves the phone (and its antenna) away from your head.
- Consider reserving the use of mobile phones for shorter conversations or when a conventional phone is not available.
- The effects of cellular damage are greatest on growing, developing organisms (i.e., the young), and so limit children's use of cell phones!
- In a car, use an external antenna mounted outside the vehicle to move the source of the radiation farther from you!
- Limit use to essential calls and keep calls short.
- Children should be allowed to use the cell phones in case of emergency only.
- Use air-tube head set not an ordinary one.
- If using the phone without headset, wait for the call to connect before placing it near the ear.
- Don't make calls when signal is just single point or less.

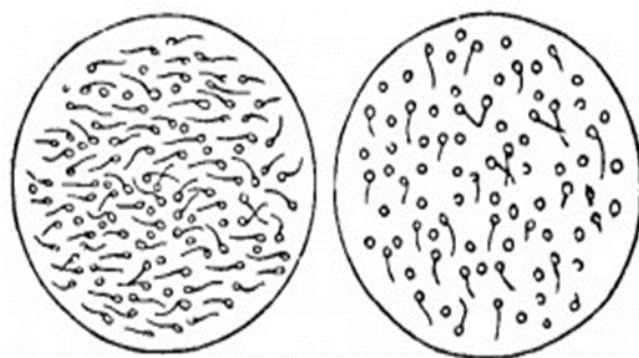
### 2.9 Experiment Done In Our College Lab:

Some of the samples were placed under a laptop with Wi-Fi, while others were held at the same temperature away from the computer. In the Wi-Fi sample, 25% had stopped swimming compared to less than 1/6 in the samples not directly exposed to the wireless signal.

According to scientists, wireless Internet devices like laptops, iPads, and cell phones generate electromagnetic radiation or EMF. It can also be generated by cell phone towers, microwaves,

radio waves and even the wiring in homes. EMF is said to interfere with the molecules in living things and has been tied to a mixed bag of health issues such as DNA and brain cell damage, certain kinds of cancers even, suicide, miscarriage and asthma.

Collectively, the research indicates that exposure to cell phone radiation may lead to decreases in sperm count, sperm motility and vitality, as well as increases in indicators of sperm damage, DNA damage and changes in sperm morphology.



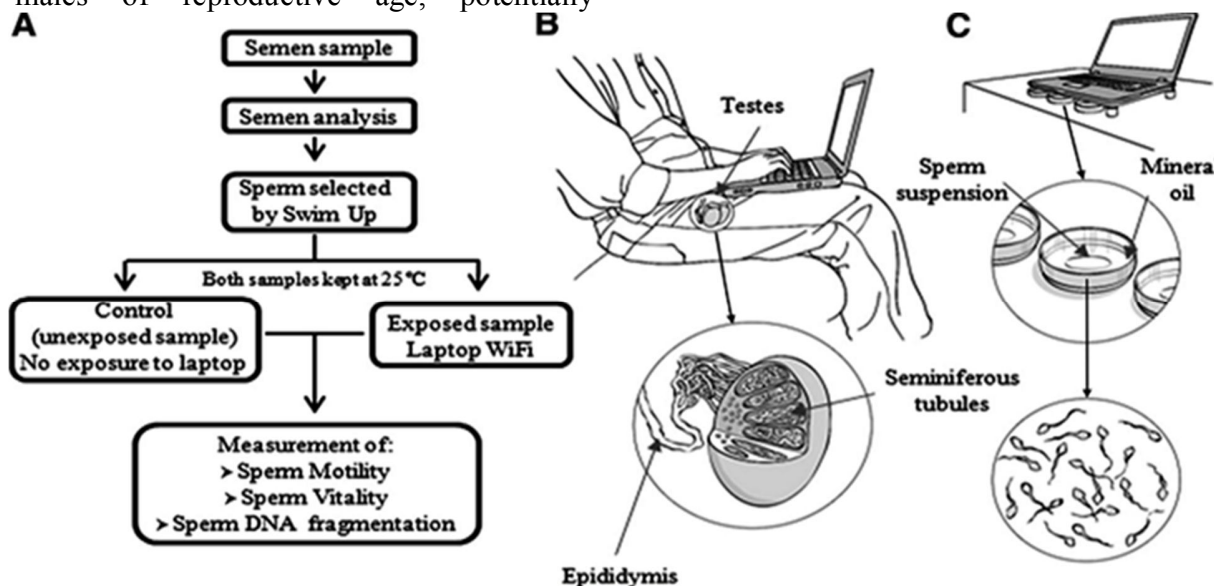
### 2.10 Among the findings:

- Men who carried a phone in a hip pocket or on the belt had 11 percent fewer mobile sperm than men who kept a phone elsewhere on the body.
- Men who carried a cell phone on the belt and used it intensively during a five-day test period had a 19 percent drop in highly motile sperm from their previous levels.
- Men who talked on the phone for more than an hour a day had 17 percent fewer highly motile sperm than men who talked less than 15 minutes a day.
- Laboratory studies on the effects of cell phone radiation on rats, rabbits and other animals have found similar effects on reproductive health.
- “Keeping the cell phone in a trouser pocket in talk mode may negatively affect spermatozoa and impair male fertility”
- “Use of cell phones decreases the semen quality in men by decreasing the sperm count, motility, viability and normal morphology. The decrease in sperm parameters was

dependent on the duration of daily exposure to cell phones and independent of the initial semen quality”<sup>[16]</sup>.

- “These findings have clear implications for the safety of extensive mobile phone use by males of reproductive age, potentially

affecting both their fertility and the health and wellbeing of their offspring”



### 3. Results:

“The results show that human spermatozoa exposed to RF-EMR have decreased motility, morphometric abnormalities and increased oxidative stress, whereas men using mobile phones have decreased sperm concentration, motility..., normal morphology, and viability. These abnormalities seem to be directly related with the length of mobile phone use” <sup>[17]</sup>

CAUTION: <sup>[18]</sup>

“Cell phone use negatively affects sperm quality in men... Men with poor sperm quality planning for pregnancy should be advised not to use cell phones extensively”

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### 5. Conclusion:

Cell phone damage to male sperm and male infertility, men who are trying to conceive might want to pay attention and perhaps limit their cell phone use during while they are trying to get pregnant. Alternatively, keeping cell phones away from the waist and pant pocket areas, and avoiding clipping them to their belts may decrease EMW exposure and provide some measure of protection. We speculate that keeping a laptop connected wirelessly to the internet on the lap near the testes may result in decreased male fertility. The data suggest that the use of a laptop computer connected wirelessly to the internet and positioned near the testes may decrease sperm quality. <sup>[19,20]</sup>

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