EDITORIAL

Where have all the sperm gone?

According to a recent paper published on line in *Human Reproduction Update* sperm counts in men in the Western world appear to be on an unrelenting downward spiral.[1] The authors compiled the results of 185 studies between 1973 and 2011 totalling nearly 43,000 men. The meta-analysis revealed there was over a 50% decline in sperm counts in men from Western countries including North America, Europe, Australia and New Zealand. This decline was not apparent in studies reported on men in South America, Africa or Asia. Several health care professionals have expressed the alarming concern that if this trend continues the entire human race might face future extinction.

One of the first studies to suggest a decline in sperm parameters appeared about 25 years ago with sperm counts cut in half between 1940 and 1990. Are there legitimate criticisms of this and other papers that have suggested a progressive decline in sperm quantity that goes back over 70 years? Many recent papers on the topic of semen parameters are on a limited number of men and may be biased towards those who are seeking care due to fertility related issues. Also the specific methodology on how sperm counts were determined has changed over time with perhaps overestimation in the past and more accurate analytic platforms in use today.

This recent analysis noted in addition to a drop in total sperm counts, the average sperm concentration was reduced from 99 million/mL in 1973 and to an average 47 million/mL by 2011. This is in fact a disturbing number given that, according to World Health Organization criteria, men with a sperm concentration of less than 40 million/mL are considered to have an impaired fertility and if a man has a sperm concentration of less than 15 million/mL he is unlikely to be able to father a child. Low sperm counts are also suggested to be associated with increased overall morbidity and early death.

How much solid scientific evidence exists on possible explanations for these significant declines? Almost all are proposed theories and include environmental and lifestyle factors such as pesticides, smoking, obesity, and lack of physical activity. Newer concepts implicate so called endocrine-disrupting chemicals, substances that alter the endocrine system to cause adverse health effects. These chemicals might be present in food and plastic food containers. Also implicated is mothers' smoking, stress or specific hormone altering food intake during critical times of pregnancy. Most of these theories are unproven and often controversial.

Tight fitting underwear, hot tubs and the use of laptop computers also have been speculated to result in increased scrotal temperatures and impaired spermatogenesis. More recent data indicates that scrotal hyperthermia may not have a major impact on sperm production but that stressful life events are an identifiable cause. Maintaining a healthy weight, eating a well-balanced diet, and doing exercise on a regular basis are keys to producing health sperm and achieving pregnancy. While these goals are part of a healthy male lifestyle, getting there may be a challenge in many men today.

Traditionally, urologists have been on the front line of identifying poor semen quality. Urologists with a defined interest in andrology research must take the lead in identifying and sorting out the real issues behind these epidemiologic driven meta-analysis reports of declining sperm quantity. If the trend continues, male factor infertility could become the most common cause of a couple's failure to conceive in the not too distant future.

With all the advances our colleagues are making in the area of reproductive endocrinology we can be hopeful that the human race won't be facing extinction any time soon. All that is needed in the reproductive endocrinologist's lab to work their magic is one good egg and one healthy sperm. However, determining ways to maintain the traditional pathway to conception should be everyone's goal.

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Reference

1. Levine H, Jørgensen N, Martino-Andrade A et al. Temporal trends in sperm count: a systematic review and meta-regression analysis. *Hum Reprod Update* 1-14. Published On Line: 25 July 2017.