Two new studies have found that sperm count in men has declined precipitously over the past 20 years.[1] Sperm count is the number of sperm in each cubic centimeter of semen. The NEW ENGLAND JOURNAL OF MEDICINE reported last month that sperm count has declined 33% during the past 20 years among a study-population of 1351 healthy, fertile men in Paris, France. A briefer report in the BRITISH MEDICAL JOURNAL last summer found that, comparing men of similar ages, sperm count in 3729 Scottish men had declined 41% among those born in 1969 compared to those born in 1941.

In 1992, a historical analysis of 62 separate sperm-count studies, by Elisabeth Carlsen, concluded that sperm count among men throughout the industrialized world has declined by about 50% during the past 50 years.[2] In 1994 this finding was challenged by researchers who said that it might have been caused by Carlsen's erroneous choice of statistical methods, not by an actual decline in sperm count.[3] The two new studies appear to confirm the conclusion than an actual decline in sperm count has occurred and is occurring.

No one knows what is causing the apparent decline in sperm count among men. It is still possible that the decline is not real, that it results from some unknown hidden bias in the 64 studies that have been conducted so far. For example, these 64 studies may have examined men who are not typical of the general population. And various factors that influence sperm count may not have been fully accounted for. On the other hand, it is entirely possible that the decline IS real. As Carlsen and her co-workers said in 1994, defending their 1992 conclusion, "The most cautious conclusion that can be drawn from the existing data is that semen quality has declined significantly between 1940 and 1990." Even if the decline is real, no one knows for sure what might be causing it. Various hypotheses have been suggested.

The hypothesis getting the most attention is this one: something -- perhaps hormone-mimicking chemicals in the mother's blood -- is affecting male children before they are born. This hypothesis suggests that male children are being born with fewer Sertoli cells -- the cells which, after puberty, cause the production of sperm. Reduced numbers of Sertoli cells (and reduced sperm count) have been observed in the male offspring of estrogen-exposed pregnant rats.[5]

New Studies: Paris

The study-group in Paris consisted of 1351 healthy men who had donated sperm to a sperm bank maintained by a hospital, starting in 1973. Each of the men had fathered at least one child. One percent of the men were farmers and 16 percent were manual laborers; 40 percent were classified as "technicians" and 38 percent as "executives." From 1973 to 1992, their average (mean) sperm count declined at the rate of 2.1 percent per year, from 89 million per cubic centimeter (cc) to 60 million per cc. During the same period, the proportion of motile sperm (sperm able to swim) declined at a rate of 0.6 percent per year, and the proportion of "normal" sperm (compared to misshapen sperm) declined at the rate of 0.5 percent per year. In sum, the quantity and quality of sperm declined simultaneously.

This study answers some of the concerns of some of the critics of Carlsen's 1992 study. Those critics charged that abstinence from sex causes an increase in sperm numbers and a decrease in sperm with good motility and Carlsen could not control for that. The Paris study took into account the length of abstinence before samples were taken. It also controlled for age, and for year of birth. The decline in sperm quantity and quality, linked to year of birth, was still observable after controlling for length of abstinence and age.

Among the Paris group, a subgroup of 382 men in a narrow age range (28 to 37 years) was chosen for special analysis; they had all reported a similar period of abstinence (3 to 4 days). Among this group, there was a clear decline in sperm count from 1973 to 1992: from 101 million per cc to 50 million per cc, a reduction by half. The average 30-year-old born in 1945 would have a count of 102 million per cc; the average 30-year-old born in 1962 would have a count of 51 million.

"We conclude that there has been a true decline in the quality of semen during the past 20 years, since the characteristics of semen from a fertile man of a given age in 1992 were significantly poorer than those of a fertile man of the same age in 1973," the French researchers said.

New Studies: Scotland

The researchers in Scotland completed their study in response to criticism of Carlsen's 1992 historical analysis of 62 sperm-count studies, showing a 50% reduction in 50 years. They had records for 3729 semen donors born between 1940 and 1969 and they examined these by statistical techniques chosen to avoid the (controversial) criticisms that had been leveled at Carlsen's work. They found an apparent decline in sperm count from 128 million per cc (in men born in the 1940s) to 75 million in men born in the late 1960s, a 41% loss. "Thus we do not accept that the evidence for a fall in sperm concentrations is unconvincing," they concluded.

Several researchers have noted that the decline in sperm quality (count, motility and normal shape) coincides with an increasing incidence of abnormalities of the male genital tract, including testicular cancer and cryptorchidism (undescended testicles) in various countries.[6] Such abnormalities have doubled in frequency during the past 30 years in many parts of the world.[7] In Scotland, for example, testicular cancer has doubled since 1960 and is striking a younger population (ages 15 to 44) every year. The cause of these increasing abnormalities remains a mystery.

One clue that may tie all the threads of evidence together is the record of what happened to the sons of women who were given a synthetic hormone, diethylstilbestrol (DES), during the 1950s and 1960s. About a million American women were given DES as a "morning after" pill to reduce the likelihood of pregnancy. Their sons have shown an increase in genital tract abnormalities, AND reduced sperm count.

There is confirming data from animal experiments as well. Pregnant female rats given a single, very low, dose of dioxin on the 15th day of gestation, produce male offspring that have genital tract abnormalities (particularly undescended testicles) and that have a low sperm count after they mature.[8] Dioxin does much of its toxic work by acting as an estrogen-like hormone.

Thus, although it remains a hypothesis that estrogen-mimicking chemicals are causing the observed changes in the male reproductive tract, it is a hypothesis that is being taken very seriously by a large number of scientists world-wide; they are working aggressively to confirm its truth or falsehood.

It is, after all, an important matter for the future of the human species. The reported sperm loss appears to be occurring world-wide. The report in February in the NEW ENGLAND JOURNAL OF MEDICINE ends this way: "The significant decline in the concentration of sperm during the past 20 years in the Paris area may be related to an interaction of the age of the [sperm] donors and the chronologic period [in which they are living] that in turn could implicate factors affecting all the inhabitants of an area, such as the water supply or environmental pollution."

--Peter Montague


[4] Richard J. Sherins, "Are Semen Quality and Male Fertility Changing?" NEW ENGLAND JOURNAL OF MEDICINE Vol. 332 No. 5 (Feb. 2, 1995), pg. 327, says that studies conducted so far have not properly controlled for differences in age, abstinence before semen analysis, ejaculatory frequency, and the number of samples analyzed per person, all of which can effect sperm count. Another author who has registered skepticism of the 1992 findings is Stephen Farrow, "Falling sperm quality: fact or fiction?" BRITISH MEDICAL JOURNAL Vol. 309, No. 6946 (July 2, 1994), pgs. 1-2.


Descriptor terms: sperm count; fertility; human health; human reproduction; reproductive system; new england journal of medicine; british medical journal; scotland; france; sperm quality; semen quality; hormones; estrogen;

PUBLIC INTEREST SCIENCE CONFERENCE APRIL 7-9

The 1995 Public Interest Science Conference (PISC) will be held April 7-9, 1995, at the University of Oregon in Eugene. This year the conference will include workshops such as "Scientists Working With Community Members for Environmental Justice" (led by Jerry Poje); "Agricultural Science in the Public Interest: The Politics of Methodology (led by Doreen Stabinsky); "Public Interest Science Campaigns in Communities" (led by Lin Nelson); "Defining the Pro Bono Responsibilities of Scientists and Engineers" (led by Alexandra Allen); "Scientists, Emotion, and the Public Interest" (led by Mary O'Brien); "Certainty in Science and Public Policy" (led by Peter Montague); and "The Ethical Responsibilities of Scientists to Communicate" (led by Joel Pagel).

Registration for the conference costs $50.00 for professionals and $15.00 for students and the general public. No-cost or low-cost housing is available (on a first-come, first-served basis). Contact: PISC c/o Susan Shannon, Biology Department, U. of Oregon, Eugene, OR 97403. Email queries to: pisc@darkwing.uoregon.edu. This promises to be a lively event.