

A chemical cause of stationary sperm

The first known biochemical cause of male infertility has been discovered. Richard J. Sherins of the National Institute of Child Health and Human Development in Bethesda, Md., and colleagues have identified an enzyme deficiency in patients with nonmotile sperm.

Reduced or absent sperm mobility "has assumed increasing importance" in the study of male infertility, Sherins and colleagues report in the April 8 *NEW ENGLAND JOURNAL OF MEDICINE*. (Another important factor in determining the fertility potential is sperm count.) In some patients with nonmotile sperm, specific morphologic defects, such as structural flaws in the sperm tail, are to blame. "However, in the majority of infertile men with reduced or absent sperm motility, morphologic alterations are not present," Sherins says, so scientists must search for a molecular basis of the defect.

In the study by Sherins and colleagues, that molecular basis turned out to be a deficiency in an enzyme called "protein-carboxyl methylase (PCM)." The researchers found that PCM activity in the semen of nine infertile patients with nonmotile sperm was only one-fourth that of 22 fertile controls. Moreover, they discovered, the PCM activity of the infertile group was similar to the PCM activity in the (no sperm-containing) semen of 10 vasectomized patients. The cause of the PCM deficiency in the infertile patients is not yet known.

While PCM is found in various places throughout the body, the sperm-producing organ, the testis, normally has one of the highest tissue concentrations of it. Within the testis, most of the enzyme is localized in spermatids, the immediate precursors of spermatozoa. Sherins and colleagues had decided to look at the PCM levels in infertile patients with nonmotile sperm, because previous studies had shown that enzyme to be involved in controlling the movement of bacteria and certain white blood cells. Specifically, the enzyme is part of a cellular motility system that involves methylating (adding CH₃ to) and demethylating protein. Presumably, Sherins notes, an entire series of reactions controls cellular motility, "... and it is conceivable that the elimination of any one of the components will disrupt the entire process."

A more thorough understanding of the entire sperm motility process at the molecular level eventually could lead to treatments for certain cases of male infertility. Moreover, says Sherins, such research also has long-range implications for male contraception. "We're very excited about our observation," he says; "we think it will make people in this field pay more attention to the biochemistry of sperm function."

Chemistry capsules

- The Soviet government recently granted chemist Tatyana Lozansky permission to join her husband Edward, who teaches at American and George Mason universities in the Washington, D.C., area. The decision came on day 32 of a hunger strike that Mrs. Lozansky vowed to continue until she and her daughter were told they could leave the Soviet Union (SN: 5/15/82, p. 325).
- The Food and Drug Administration recently asked manufacturers and distributors of a nonprescription diet aid called "starch blockers" to discontinue marketing the product until tests confirm its safety and efficacy. Starch blockers — which contain an extract of kidney (or other) beans and several filler ingredients — are sold nationwide with claims that they block the activity of alpha amylase, an enzyme needed to digest starch. (Inhibition of amylase, according to the claims, means no digestion of most starch, which in turn means no absorption of that starch, or no calorie intake.) Users of the product, the FDA says, have complained of severe constipation (leading to diverticulitis), nausea and vomiting.

Up on the rooftops

Sir Percival Pott's identification in 1775 of scrotal cancer as an occupational hazard among chimney sweeps helped initiate the science of cancer epidemiology. Since then, epidemiologists have all but ignored the sooty profession — except in Sweden. There, chimney sweeps recently became the focus of the nation's largest epidemiological study in occupational medicine. And results of that study, reported in *WORK ENVIRONMENT* 1982 (published by the Swedish Work Environment Association in Stockholm) indicate the occupation is still far from benign.

The study, headed by Christer Hogstedt of Sweden's National Board of Occupational Safety and Health, tracked down records for 2,495 chimney sweeps via union registries. Those chosen for study worked between 1951 and 1979 and were actively employed in the profession for at least 10 years.

After controlling for age and sex, the study found that among sweeps both esophageal and liver cancer occurred at five times the expected rate. Lung cancer incidence was three times that in the Swedish population. Statistics indicate that for the age distribution of those who died there was an "excess mortality" — also known as early mortality — of at least 24 percent. And the number of deaths due to cardiovascular disease was roughly 20 percent higher than expected in the general population.

Says Hogstedt, "chimney sweeps, as a gainfully employed group, ought to be healthier than the population at large. But this is not at all the case." In fact, he says, "I haven't run across any occupational category with such a high excess mortality rate."

The project has yet to analyze questionnaires completed by 500 of the participants — half of whom are still working as sweeps. Besides answering questions on possibly confounding variables, such as smoking habits, it will look at why so many leave their profession. "Furthermore," Hogstedt offers, "we'll be examining the Swedish national cancer registry, where we can find cancers that haven't resulted in death, e.g. skin cancer."

Benefits of the Clean Air Act

For most of the past year, Congress has been working on reauthorization — and the possible modification — of 1977 amendments to the Clean Air Act. Hoping to sway the outcome, manufacturing and processing industries have been campaigning to change or eliminate strictures they view as needlessly costly and proscriptive. Now environmental groups are countering with a campaign based on data of their own that they say indicate that benefits of clean air are indeed worth its costs.

A study issued last month by the National Audubon Society, for example, challenged the oft-touted claim that elimination of the amendments would not affect health. Looking only at projected impacts for residents in western states, authors Jan Beyea and G. Steve Jordan estimated that elimination of the amendments could induce several thousand premature deaths annually from increased pollution, especially sulfur dioxide. (They considered 2,200 premature deaths per year likely, but said 16,000 annually was possible; it all depends on future economic-growth and fuel-use patterns.) Their report, *Implications for Mortality of Weakening the Clean Air Act*, anticipated most premature deaths would occur "as an indirect result of air-pollution-induced exacerbation of existing diseases."

Economic Effects of the Clean Air Act, a report prepared in March by Robert Wolcott and Adam Rose of the Public Interest Economics Foundation, challenges another major industry assertion — that costs of the act outweigh its benefits. Among their findings, the pair report that "the most comprehensive survey to date estimates benefits of \$21.4 billion and costs of \$17 billion." There is also evidence, they say, suggesting that the Clean Air Act has increased labor productivity.