BIOMEDICINE

The pill and smoking—heart attack risk

Ever since oral contraceptives became available in the early 1960s, an increasing number of negative side effects have been linked to them, notably heightened risk of stroke and high blood pressure. And now it appears that cigarette smoking combined with use of oral contraceptives can increase the chance of having a fatal heart attack, according to a report in the March 29 STUDIES IN FAMILY PLANNING.

The report, prepared by Anrudh K. Jain, a research analyst at the Population Council in New York City, shows that the annual death rate for American and British women age 40 through 44 who neither smoke nor use oral contraceptives is only 7.4 per 100,000. In contrast, for women who use the pill but do not smoke, the death rate is 10.7 per 100,000. For women who smoke but who do not use the pill, it is 15.9. And if women both smoke and use oral contraceptives, the death rate is 62 per 100,000—almost a ninefold increase over that for women who neither smoke nor use the pill.

Even for women in their 30s, Jain reports, there is an increased heart attack fatality risk from smoking and taking the pill. For women ages 35 through 39, the death rate is 23 per 100,000 and for women age 30 through 34, 16 per 100,000.

Triggers behind a maternal pheromone

Lactating female rats emit a chemical in their feces that attracts rat pups. Under certain conditions nonlactating female rats and even male rats also try to nurse rat pups. Howard Moltz and Lois C. Leidahl of the University of Chicago attempted to see whether these rats also secrete the maternal pheromone. They found that the females do, but the males do not. So what enables the female rats to make the chemical?

First they thought it might be the female nursing hormone prolactin. When they injected this hormone into males, however, they did not make the pheromone. So obviously prolactin alone is not the trigger. They then hypothesized that since the pheromone is known to be synthesized in the large intestine, the pheromone might be released because of an interaction between prolactin and the liver. To test this hypothesis, they first took bile (fluid from the liver) from lactating females and injected it into the intestines of males. Sure enough, the injections made the males release the maternal pheromone. They then injected bile drawn from females in which prolactin had been inhibited. This time the males did not make the pheromone.

"These data," they conclude in the April 1 SCIENCE, "suggest a sex difference in the way prolactin alters the composition of bile so that the female can emit the maternal pheromone while the male normally cannot."

Protein primer for RNA synthesis

The virus that causes polio has an RNA molecule as its genetic core. A protein has now been found on the five prime (left) end of the molecule by James B. Flanegan and his colleagues at the Massachusetts Institute of Technology.

As the MIT researchers report in the March PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, the protein probably acts as a primer for initiating synthesis of poliovirus RNA molecules. They believe that this is the case since they have also found the protein on a replicative intermediate of poliovirus RNA and since a poliovirus enzyme was recently isolated that will make more copies of poliovirus RNA only if provided with a preformed primer. They also believe that a protein primer may be required to initiate the synthesis of some other viral RNAs and perhaps even of some cellular RNAs. The protein primer does not appear to initiate poliovirus infection, their experiments reveal.

LIFE SCIENCES

Drugs and resistance: Same source?

In the war against bacterial diseases, scientists now suspect that single agents may be both providing us with the weapons and providing the bacteria with the defenses. As physicians administer antibiotics, resistant bacteria appear carrying extra genes that produce an enzyme that changes the antibiotic into an ineffective form.

Researchers have suggested that the genes for drug resistance actually come from the original antibiotic-producing organisms. Many antibiotic-producing bacteria contain antibiotic-modifying enzymes. These enzymes may be involved in biosynthesis or may protect the bacteria against its own enzyme, explains Julian Davies, a University of Wisconsin biochemist.

Davies, Patrice Courvalin and Bernard Weisblum have constructed an antibiotic-resistant *Escherichia coli* bacteria in the laboratory, they report in the March PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES. They took genes from the bacteria *Bacillus circulans*, which makes the antibiotic butirosin, attached them to a plasmid, and transplanted them into *E. coli*. Those *E. coli* receiving the gene for the enzyme that modifies butirosin became resistant to that antibiotic. Furthermore, Davies explains, those *E. coli* expressed resistance in the same way as resistant bacteria in a hospital. The enzyme didn't inactivate all the drug; instead some inactivated antibiotic prevented further antibiotics from entering the cell.

This result has implications beyond antibiotic resistance, the researchers explain. It suggests that genes may move relatively freely between bacterial species in nature.

Roots of bee social behavior

The remarkable social behavior of bees arose, not once, but twice, during evolution, according to new evidence of entomologists Mark L. Winston and Charles D. Michener. They propose that the complex behavior developed independently in stingless bees and honey bees, the two highly social groups. The new theory restructures the family tree of the higher bees, moving the honeybee closer to bumblebees and orchid bees, and putting stingless bees on a branch by themselves.

The University of Kansas researchers base this arrangement on physical differences between bee groups and on differences in simple and social behavior. "The social behaviors of stingless bees and honeybees, while more or less equally elaborate, are so different as to support their independent origins," Winston and Michener write in the March PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES. The groups diverge in swarming behavior, communication about food, mechanism of queen production, feeding of larvae and nest design. Winston and Michener speculate that the common ancestor was a primitive bee with some potential for social behavior.

Chemical components up in smoke

Cigarette smoke has been under analysis for over twenty-five years, but new components are still being discovered. In fact, a paper in the March JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY announces the detection of 387 more smoke constituents, bringing the total count to over 2,000.

Most analyses have concentrated on components soluble in nonaqueous solvents. Researchers at the R. J. Reynolds Tobacco Co. used chromatographic techniques to isolate 479 compounds soluble in water. The chemicals could have come from the tobacco, the paper casing or additives.

Joseph N. Schumacher, Charles R. Green, Freddie W. Best and Marjorie P. Newell found evidence for the first time of chemicals in smoke that are classified as imides and imidazoles.