

## Prostaglandins and heavy menstrual flow

A type of prostaglandin, one of the group of compounds that have been implicated in menstrual cramps, may also be the cause of heavier than normal menstrual bleeding, according to a report in the March 7 LANCET. This finding suggests that prostaglandin-inhibiting drugs, several of which are currently available by prescription, might prevent excessive menstrual flow just as they do cramps (SN: 11/15/80, p. 312).

Prostaglandins are hormone-like substances that have been found to cause muscle contractions, to control constriction and dilation of blood vessels and to be of particular importance in a variety of reproductive mechanisms. While the regulation of menstrual bleeding is poorly understood, several studies have suggested that prostaglandins might be implicated. In the LANCET study, S. K. Smith and co-workers from the University of Edinburgh, Scotland, note that prostacyclin, a prostaglandin that causes blood vessels to dilate and prevents blood platelets from aggregating, is produced when cells from the mucous lining of the uterus (the endometrium) and from the muscle lining of the

uterus (the myometrium) are combined in a laboratory culture and exposed to the prostaglandin precursor arachidonic acid. Because this suggests that the uterus may have the ability to produce prostacyclin, which may in turn increase menstrual bleeding, the researchers compared the prostacyclin-producing ability of the endometrial cells of women with normal menstrual flows and those of women with heavy flows.

The researchers took endometrium samples from seven women with regular and normal menstrual flows and from six women with regular but heavy flows. These cells were incubated with myometrial cells obtained from a single source and the cultures were exposed to arachidonic acid. Prostacyclin itself was not produced, but the production of an intermediate compound in its synthesis was found to be three times higher in the cell cultures from heavily bleeding women than in those from women with normal flows. The researchers suggest that some abnormality in the endometrium of women who have heavy flows acts on the myometrium, which contains the enzymes necessary to synthesize prostacyclin. The blood vessel dilation and anti-platelet aggregation properties of the prostacyclin in turn "may be responsible for the heavy and prolonged bleeding." □

## Erasing stress signs with a tranquilizer

Minor tranquilizers may do more than simply lower general levels of arousal. Clinical results reported in the April 3 SCIENCE indicate that one such tranquilizer, meprobamate, reduces specific physiological responses to disturbing events. William M. Waid, Emily C. Orne, Mary R. Cook and Martin T. Orne base this conclusion on a study of 44 male college students at the University of Pennsylvania. The students memorized a word list and then took a polygraph, or lie detector, test. Thirty-three of the students were told to lie when asked about the words, and 11 were instructed to tell the truth. The "guilty" men were divided into three groups: One took a 400-milligram dose of meprobamate, another took a placebo and the third received nothing. Men in the first two groups were told they were being given a tranquilizer to help them beat the test. Polygraph examiners were able to pick out 77 percent of the "guilty" subjects from the placebo and no drug groups. But their accuracy plummeted to 27 percent for the tranquilized group. The examiners also had difficulty in judging which subjects had received a tranquilizer. This may have been due to the lack of baseline data on subjects and to the short period of observation — problems polygraph testers in the field encounter often. But some studies suggest that normal doses of tranquilizers cause no obvious impairments in behavior or performance. Despite this un-

certainty, the researchers say that the results were not due to a total lack of responsiveness in the tranquilized men, but to a lack of heightened response while lying. They add that meprobamate may be ineffective in an actual lie-detector laboratory where fear of detection is usually much greater than in an experimental situation. Also, the more intrusive type of questioning practiced by field examiners might aid in seeing through the masking effects of a tranquilizer. But the investigators note that 400-milligram doses of meprobamate are effective in reducing the anxiety of psychiatric patients, and this may generalize to a "normal" population. Substantially higher doses could be used unobtrusively to deceive a field test.

While these findings support doctors' observations that tranquilizers such as meprobamate selectively reduce physiological responses to disturbing events, the validity and reliability of the polygraph test remain the focal points of considerable controversy. Along with reservations about the invasion of privacy, critics question whether the test can uncover habitual liars and assert that it measures several emotions, not just those associated with deception. Polygraph researchers say the test has been shown reliable and accurate. Valid or not, polygraphs are used in most criminal investigations and for pre-employment screening and monitoring of internal theft in many companies. □

## Drug treatment shrinks tumor

Pituitary tumors that produce excess hormone are surprisingly common. Autopsies on persons who have died of other causes indicate that tumors producing the hormone prolactin, for instance, may be present (although not necessarily harmful) in one in ten persons, Michael O. Thorner of the University of Virginia School of Medicine told a seminar in New York sponsored by the Endocrine Society. In some cases these prolactin-producing tumors cause menstrual disorders, inappropriate milk release, infertility, impotence, and eventually vision problems and headaches. Now a drug used clinically to reduce abnormal levels of prolactin in the blood has been found to shrink the tumors. "This is one of the first human tumors that can reliably be treated by a drug not a cytotoxic drug [one that kills cells]," Thorner says.

Pituitary tumors are the most common cause of high levels of prolactin, generally detected in women with menstrual disorders or infertility. Although autopsy data show no difference between men and women in the frequency of pituitary tumors, high levels of prolactin are diagnosed ten times more frequently in women than in men. High prolactin levels impair sexual function in men, but the change is so gradual that men seldom mention it to their physicians. Disturbances of vision and headaches usually cause men with prolactin-producing pituitary tumors to seek medical treatment. Because the pituitary is located just beneath the junction of the optic tracts in the brain, if a tumor grows so large that it expands beyond the pituitary's bone cavity and presses against the brain, it can cause blurred vision, loss of peripheral vision and throbbing headache.

Surgery has been used on patients with pituitary tumors, but only those with small tumors can be cured reliably, Thorner says. Even after surgery, patients with large pituitary tumors have elevated prolactin levels. In contrast, the drug bromocriptine lowers prolactin levels by mimicking dopamine, a natural inhibitor of prolactin release. Bromocriptine is currently prescribed only for short-term treatment of women with abnormal absence of menstruation, inappropriate milk release and no evidence of pituitary tumor. But Thorner says that in addition to lowering prolactin levels, even in patients with tumors, the drug appears to cause a marked reduction in the tumor volume. These results, along with the concomitant restoration of menstruation, fertility and other gonadal functions, only last as long as the drug therapy is continued. High prolactin levels, increased pituitary volume and their symptoms recur when the patient stops taking the medication.

Thorner, however, is not discouraged by the prospect of patients taking bromocriptine or related drugs indefinitely. The drug may mimic a normal prolactin-inhibiting factor that is deficient in the patients, he says. On the other hand, because surgery is more successful on small pituitary tumors than on large ones, he suggests that effective surgical intervention may be

possible after a period of drug therapy. Currently, there is a "very hot" controversy as to whether such tumors should be treated medically or surgically.

If the drug treatment proves successful in treating the pituitary tumors, it could set an important example. "Maybe we can use normal physiological controls to treat other tumors," Thorner says. □

## The thyroid gland and world health

Thyroid gland problems are moving from the scientific to the more political public health arena. Methods for the inexpensive prevention of thyroid-related diseases are well established, and new research increases estimates of the damage done by these diseases, which are based on insufficient amounts of iodine-containing thyroid hormone. Even so, iodine deficiencies are still common in many parts of the world, and newborn screening programs for thyroid function are limited even in the United States.

The impact of thyroid hormone on human health is most obvious in goiter and cretinism. In New York at a seminar of the Endocrine Society Sidney H. Ingbar of Beth Israel Hospital in Boston said that goiter afflicts more than 200 million persons, mostly in underdeveloped areas of the world in which the soil and water have insufficient iodine levels and the diet is not supplemented with iodine. The "grotesque and debilitating" enlargement of the thyroid gland in goiter often allows the gland to provide normal levels of hormone, but it can obstruct breathing, swallowing and blood circulation.

The most dramatic result of iodine deficiency is the mental retardation, neurological defects and dwarfism that may follow deficiency in the few months just before and just after birth. In some areas 4 to 7 percent of the population suffers from this cretinism, which can be prevented by providing iodine to pregnant women, Ingbar says.

Recent work in Zaire demonstrates that a more subtle effect permeates a much larger fraction of the newborns. Children of women injected with a three-year supplement of iodine in oil had higher birthweights, lower infant mortality and enhanced psychomotor development compared with a control group. "This indicates that there is in the population as a whole at least subclinical hypothyroidism in newborns," Ingbar says.

Another area in which social policy has not taken full advantage of scientific development is in detecting congenital thyroid gland deficiencies. If untreated, this condition leads to "sporadic cretinism," characterized by severe retardation of growth, maturation and intellectual development. The disease is difficult to diagnose clinically in a newborn, but can be detected with a biochemical test. So far, screening programs have tested 3.5 mil-



Goiter: Five percent of world population.

lion newborns and found a prevalence of one case of the disease per 4,000 births. This is much higher than physicians expected and, Ingbar points out, higher than that of other disorders for which laws require neonatal screening.

Ingbar urges a national screening program (about 10 states require that test now) because the disease's damage can be prevented if lifelong treatment with thyroid hormone is begun within the first weeks after birth. Ingbar calculates that more than 600 infants are born with thyroid deficiencies each year in the United States, and the cost of institutional care for each over a 50-year life span is \$400,000.

Another aspect of hormone control is the conversion of thyroid hormone to its most active form. This biochemical step, which occurs in such tissues as muscle, heart and liver, removes one iodine atom from the four-iodine form of the hormone. Ingbar reports that when a person is ill the amount of the active form falls, and when the patient recovers the level rises again. A low level of the active form is seen during caloric deprivation, acute and chronic illness, surgical trauma, a variety of drugs, old age and fetal and early neonatal life. "It's what you'd expect in starvation conditions, it cranks down metabolism," Ingbar says. "We don't know if it is adaptive or maladaptive in illness." If maladaptive, it could be countered with thyroid hormone given therapeutically. Ingbar concludes that in any case the phenomenon "is widespread and universal, and it demands immediate attention." □

## Turtle cartography

James Sternberg spent months talking turtle with herpetologists around the world. Now, the Center for Environmental Education has published the fruits of his effort — the most exhaustive mapping of sea turtle nesting beaches ever compiled. (Also see p. 217.)

Sternberg and colleagues of CEE's Sea Turtle Rescue Fund began compiling the maps following a recommendation made in Washington at the 1979 World Conference on Sea Turtles (SN: 12/1/79, p. 372). The finished product was presented in New Delhi, India, at the recent Convention on International Trade in Endangered Species of Wild Fauna and Flora.

The maps — *The Worldwide Distribution of Sea Turtle Nesting Beaches* — indicate major and minor nesting sites of green sea, loggerhead, hawksbill sea, olive ridley sea, leatherback sea, kemp's ridley and flatback sea turtles. All species except the flatback are either threatened (likely to become endangered) or endangered (in danger of extinction) in their various habitats, according to the U.S. Endangered Species Act. Says turtle authority Peter C.H. Pritchard of the Florida Audubon Society in Maitland, "The maps will define the context for the many types of sea turtle conservation programs that must be continued and augmented if these creatures are to survive." □

## Artificial heart delayed

A request by University of Utah School of Medicine researchers to the Food and Drug Administration for permission to implant an artificial heart in a patient (SN: 3/7/81, p. 157) has been turned down until the investigators provide more data. Specifically, they have to give better assurance that the heart will be used only in a subject with irreversible heart damage and that the patient receiving the heart would be made fully aware of the risks involved before signing a consent form. They must also provide more information about how the artificial heart would work in the human body and its impact on other bodily functions. The FDA reached its decision after consulting with scientists both inside and outside the government.

Nonetheless, Utah medical school scientists are optimistic that they can quickly provide the data that the FDA wants. A Utah medical school representative told SCIENCE NEWS it should take the school's scientists four to eight weeks to gather the data together and another month or so for the FDA to examine and respond to them. There should be no more than a three-month delay before the FDA grants the approval the investigators seek.

But even if the FDA does give an okay then, it will take the researchers time to find a suitable heart recipient. □