The merits of bypass surgery

Although intestinal bypass surgery is a popular form of treatment for extreme obesity, its superiority to medications has never been documented with a scientific trial. A team of Danish physicians decided to undertake such a study, and as they report in the Dec. 15 LANCET, intestinal bypass does appear to offer excessively obese patients greater weight loss and greater improvement in the quality of life than do drugs. Complications of the operation, however, are common and occasionally severe.

Specifically, 130 grossly obese patients were given intestinal bypass surgery for the condition between 1973 and 1976. Sixty-six grossly obese patients similar in age, sex, height and weight were instead given various forms of medications during the same time period. Follow up of all of the patients continued for three years to see how they responded physically and psychologically to their treatments.

By July 1979, the closing date of assessment, none of the bypass patients had died, whereas two drug treatment patients had. However, eight of the surgery patients suffered wound infections, four experienced lung complications and two had severe liver dysfunction. They were also more likely to encounter abdominal pains, foul-smelling flatus or anal complaints than were the drug patients.

Nonetheless, bypass subjects enjoyed a median weight loss of 42.9 kg (30 to 50 percent of initial body weight), whereas medication patients lost a median of only 5.9 kg — a highly significant difference in favor of the operation. What's more, the bypass patients reported more psychosocial improvements than did the drug patients, noticeably less fatigue, depression and irritability; greater security and self-liking; and fewer feelings of isolation, loneliness and exposure to contempt. The bypass patients also tended to exercise more, wear ready-made clothes more and feel socially and sexually satisfied more than did the drug patients.

Thus, intestinal bypass surgery does indeed appear to be superior to drugs as a treatment for excessive obesity. The researchers caution, however, that only a longer follow up of their patients will really document whether this is the case. Evidence of later weight gain and liver damage, for instance, might force them to revise their conclusions. □

A charmed life for baryons

From the point of view of the group-theoretic theories of modern physics and of the quarks that are the most famous artifact of those theories, the known subatomic particles can be divided into two classes: hadrons, which can be regarded as composed of quarks, and leptons, which cannot. The hadrons are subdivided into baryons, each of which consists of three quarks, and mesons, each of which combines a quark and an antiquark.

The theories now propose that there are at least six varieties of "flavors" of quark. Therefore no single meson or baryon can contain all the flavors, but it is reasonable to suppose that each flavor is represented one or more times in both kinds of structures. In a paper published in the Jan. 7 PHYSICAL REVIEW LETTERS the group of physicists working with the Mark II detector at the SPEAR colliding beam facility of the Stanford Linear Accelerator Center (G. S. Abrams and 53 others from SLAC and the Lawrence Berkeley Laboaratory) report detection of a baryon that contains the flavor called charm.

When the theories that revolve around quarks first began, they predicted only three flavors, known as up, down and strange. These could account for the properties of the particles then known. Among those there are mesons and baryons that contain only up and down quarks as well as those that contain strange quarks. As physicists worked with the theory, they found that it could not account for certain behavior of the strange particles. To explain that a fourth quark flavor had to be added, called charm. If charm particles existed (as yet undetected) and affected the known strange particles, the anomalous behavior was no longer inexplicable.

For mathematical as well as physical reasons going to four flavors necessitated a jump to a minimum of six. The fifth and sixth flavors were named bottom and top. Searches for explicit examples of the three new flavors were instituted, and in 1974 charm was found in the form of the psi particles or charmonium, a structure containing a charm quark and a charm antiquark. About two years ago, the upsilon particles were discovered. These are generally held to be bottomonium (bottom-antibottom combinations), evidence for the existence of the bottom quark. So far the corresponding toponium has not appeared. The next question is whether these "new" quarks have families of particles analogous to those associated with the up, down, and strange.

Immediately physicists began to look for charm mesons and baryons. (Charmonium is a mesonic structure, but there is also the possibility of mesons containing charm and another flavor.) A number of charm mesons have been found, but the expected baryons proved elusive. There has been evidence here and there. Last summer the possibility that the so-called F particles, one class of charm baryons, had been found was raised, but not very conclusively. Some people were beginning to question the nonappearance of the charm baryons. Why were they so hard to find? As the present paper states, "Our present understanding of the charmonium states and of charmed mesons leads us to expect the existence of weakly decaying charmed baryons."

Having started with that sentence, the Mark II paper goes on to say, "... we observe the [proton, K-minus, pi-plus] and [antiproton, K-plus, pi-minus] decay modes of what appears to be the lowest-lying charmed baryon [lambda-c]." This lambda-c, with a rest mass of 2.285 billion electron-volts, is the least massive charm baryon that theory envisions. It is the lowest level in a whole family or hierarchy of such structures, and for people who like to study the spectroscopy pinning down the lowest level will be particularly important. In general, if charm has one baryon, it should have more, and if charm has baryons, that increases the odds that top and bottom will.

The lambda-c appears to be made as electrons and positrons collide and annihilate each other. The main evidence that it is formed out of such annihilations is the appearance of its expected decay products in a pattern that for momentum, energy, geometry and physical characteristics (quantum numbers) matches the model calculated from physical theory and probability theory. "In conclusion," these 54 physicists write, "our observation ... argues for the interpretation of this state as the charmed baryon [lambda-c]." Flatter than that, in the traditional language of this sort of presentation, you hardly ever get. □

Soviet grain for gasohol

A measure invoked by President Carter to punish the Soviet Union for its invasion of Afghanistan could ultimately prove a powerful—albeit expensive—boost to the United States' gasohol program. Only two days after Carter announced a halt in shipments of U.S. grain to the Soviets, Deputy Secretary of State Warren M. Christopher described the bare bones of a plan by the administration to divert five million tons of the embargoed corn for gasohol production. Gasohol is a mix of nine parts gasoline with one part octane-boosting alcohol, an additive that could help stretch petroleum-based fuels.

While awaiting details of the new program, critics worry about where the federal government expects to find the distilling capacity to handle the five million tons of corn Christopher mentioned in his January 6 announcement. One Energy Department official says the corn figure appears to be a factor of 10 higher than the capacity available. Another said it's rumored the corn will be stockpiled for distilling over the next several years. □