MEDICINE

Laying down the fat

There is ample evidence that persons who have too many fat cells have been overweight since their first year of life. This suggests that there are critical periods for fat deposition, and that overeating or undereating can disrupt these natural cycles. S.A. Dugdale of the University of Queensland in Australia confirms this hypothesis in the Aug. 28 NATURE.

Dugdale examined published data on growth and body composition of normal children to see whether there are critical fat deposition periods. He found that there are—right before a person is born, during the first year of life, between 6 to 10 years and at 17 years.

Dugdale then developed a computer model to simulate changes in energy balance and body composition during growth. He used the model to study the effect of departures from the recommended energy intake. He found, for example, that overfeeding or underfeeding by 20 percent during the first year of life resulted in a deviation from the expected weight and fat content, and that these deviations persisted throughout the following nine years of normal feeding even though total body weight rapidly returned to near expected values.

The lesson: Don't overfeed children during their critical fat deposition periods. They may have the results for life.

Prostaglandins and the pituitary

Prostaglandins are local hormone-like compounds that do many different and often opposing things in the body. While hundreds of researchers throughout the world are looking into prostaglandins' drug potential (see p. 188), hundreds more are attempting to better understand prostaglandins' natural actions.

Now two Worcester Foundation scientists have found that prostaglandins may be intimately involved in the release of hormones from the pituitary gland, the master hormone gland in the brain.

John A. McCracken and John S. Roberts developed a technique for monitoring the production of prostaglandins by the brain. Using this technique, they noted that the brain produces prostaglandins in a series of pulses with remarkable regularity (every 70 minutes). They also noted that these pulses coincided with the release of at least one pituitary gland hormone, luteinizing hormone, suggesting that the prostaglandins may be intimately involved in the release of other pituitary hormones.

Their work will be published in SCIENCE.

Stomach gas: A deceptive problem

Those people who go through life feeling like balloons may be in for a surprise, according to a report in the Sept. 11 NEW ENGLAND JOURNAL OF MEDICINE. Their problem is *not* excess stomach gas.

Robert B. Lasser and his colleagues at the Minnesota Veterans Administration Hospital used an intestinal-gas-washout technique followed by intestinal infusion of gas to see what really happens in the nether region of people who complain of excess gas, bloating and flatulence. Within 15 to 20 minutes of the start of gas infusion, control subjects passed gas at a rate close to the infusion rate, whereas persons who complained of excess gas experienced severe discomfort during the infusion. In fact, pain was so intense for some of these persons that the infusion had to be stopped.

The intense pain response, Lasser and his team concluded, "was associated with abnormalities in the transport of gas through the gut, with a tendency to pass gas less rapidly per rectum and for increased quantities of the gas to reflux from the intestine back into the stomach."

PHYSICAL SCIENCES

Highest direct frequency measurement

The continuing program of directly measuring infrared frequencies at the National Bureau of Standards' Boulder, Colo., laboratories reports a new high. It is a near infrared frequency of 147.915850 terahertz (or more than 147 trillion cycles per second) measured to a probable error of one part in 10 million. This is only a factor of three below the red end of the visible spectrum, the next goal of the physicists doing the work, Don Jennings, Russel Petersen and Ken Evenson.

Frequencies of light beams can, of course, be determined by measuring wavelength and dividing that into the speed of light. But direct measurement is much more accurate and therefore desirable in a number of applications. The technique is to combine the unknown frequency with a known frequency near to it made with precisely known laser beams. Combining the known and the unknown produces a difference or beat frequency that is low enough to be sensed by direct frequency-measuring devices. One then determines the unknown frequency by adding the measured difference frequency to the known laser frequency.

More support for Einstein

The theories of general relativity that attempt to rival Einstein's have been taking something of a beating lately in the search for observational support. The latest piece of evidence in Einstein's favor comes from the National Radio Astronomy Observatory in Green Bank, W. Va., and is presented in the ASTROPHYSICAL JOURNAL (199:749) by E.B. Fomalont and R.A. Sramek.

The effect to be measured was the bending of radio waves as they passed through a strong gravitational field. The field was the sun's; the radio waves came from the celestial sources 0116+08, 0119+11 and 0111+02. The bending of the rays causes an apparent change in the positions of the sources as the sun passes in front of them. The measured bending is 1.775+0.019 seconds of arc or 1.015 times the Einstein prediction, a very good agreement.

Mathematically, Einstein's theory differs from its main rivals in how it represents the gravitational field. Einstein uses mathematical entities called tensors, while the rivals employ a mixture of tensors and scalars. In the scalar-tensor theories the coupling constant of the scalar part, the measure of the strength with which it grasps bodies, is usually a free parameter, not specified in theory but left for experiential determination. Fomalont and Sramek say their finding is not consistent with a scalar-tensor theory if the scalar coupling constant is less than 23, and when the coupling constant gets that high, they assert, there is not much practical difference between the Einstein and the rival theories even in the early moments of the universe.

Nucleon structure: Something simple?

For once, the result of a particle-physics experiment came out simple. It was an experiment to study the production of pairs of hadrons when protons struck beryllium nuclei done by 14 scientists from Massachusetts Institute of Technology and Brookhaven National Laboratory (J.J. Aubert et al., in the Sept. 8 PHYSICAL REVIEW LETTERS).

Various paired combinations of protons, antiprotons, pi mesons and K mesons were studied. The production cross sections all show a very simple dependence on the mass of the produced pair, "surprisingly simple" in the words of the experimenters. They suggest this indicates that simple structures may exist inside nucleons and become apparent at very small distances.