

Against cancer, retardation

Until about 10 years ago, vitamin B-6 (pyridoxine) was all but unknown. Now researchers realize that though it is needed only in tiny amounts—as few as 2 milligrams a day—it is as essential to health as its cousins, riboflavin and thiamine, which are routinely added, by Federal law, to foods such as bread and cereals.

Convulsions, mental retardation, anemia, bladder cancer and toxemia of pregnancy have all been linked to deficiency of B-6. This little-publicized member of the vitamin B family is not among those added to vitamin-fortified foods—but, research suggests, it should be.

Though it is naturally present in vegetables and meat, investigators believe that a high percentage of persons in the United States do not get enough B-6 in their diets. Those who consume large quantities of protein-rich foods are particularly lacking.

The vitamin, they reported as the New York Academy of Sciences convened a symposium on the subject this month, plays a key role in the metabolism of amino acids, the building blocks of all proteins. In the absence of B-6 the body cannot use proteins or fats properly, it cannot manufacture red blood cells and the nervous system cannot function normally.

Studies of both animals and children, says Dr. David B. Coursin of St. Joseph's Hospital in Lancaster, Pa., show that B-6 deficiency during the first weeks of life affects brain development, with symptoms including excessive irritability, defective behavior and convulsive seizures. Brain-wave patterns are abnormal and biochemical tests reveal excessive excretion of amino acid products.

But the cure among treated children is dramatic. In many cases, Dr. Coursin reports, "administration of 100 milligrams of vitamin B-6 corrects the biochemical, electrophysical and clinical signs within minutes."

Other studies relate vitamin B-6 deficiency to pregnancy. Dr. Jack A. Klieger and co-workers at St. Joseph's Hospital, Milwaukee, suggest that toxemia of pregnancy, a metabolic disturbance that kills some 30,000 infants and hundreds of mothers every year, is associated with either deficiency of B-6 or failure to metabolize it normally.

The vitamin, Dr. Klieger observes, plays an important role in the biochemical reactions of proteins believed to be vital to the placenta and the fetus.

The female hormone estrogen, according to Dr. Raymond R. Brown and

colleagues at the University of Wisconsin at Madison, is another factor influencing B-6 metabolism in pregnant women. When a woman is pregnant, or when she takes hormone-rich birth control pills, the amount of estrogen in her body rises. Dr. Brown's tests of women in both categories showed them to be vitamin B-6 deficient. They excreted unusually high levels of amino acid products until B-6 doses restored metabolism to normal.

"It probably would be sensible for pregnant women to take B-6, though we're not in a position to say a deficiency is a real hazard. The implications of our findings are unclear," Dr.

Brown comments, adding that there is still dispute over the connection between B-6 deficiency and toxemia.

Dr. Brown suggests that the real value of his experiments lies in the proved relationship between B-6 and the hormones. "We can use it as a tool for studying hormones to see how they create metabolic changes in the body."

The relationship between B-6 deficiency and bladder cancer is clearer, he says. In the absence of B-6, increased levels of products of the amino acid tryptophan are constantly passing through the bladder. These products, or metabolites, structurally resemble chemicals known to induce cancer.

ACCELERATORS

More curve for the bubbles

Bubble chambers, a favored instrument for tracking subatomic particles, can be improved in two basic ways. One is making them bigger so that they accommodate longer tracks and can show more of what happens. The other is to increase the magnetic field in them so that they distinguish better among particles with similar properties.

The second method has been chosen by physicists of Great Britain's Rutherford Laboratory. They have designed a chamber whose size is modest but whose 70 kilogauss magnetic field will separate particle tracks with extra sharp precision.

Now they are looking for money to build it. But budgets in Britain, as everywhere, are tight.

Charged particles passing through the liquid hydrogen in bubble chambers leave tracks of ionized particles that show where they have gone. A magnetic field in the chamber, generated by electromagnets surrounding it, will cause the tracks to curve. From the curvature, the sign of the charge and the velocity and mass of the particle can be calculated.

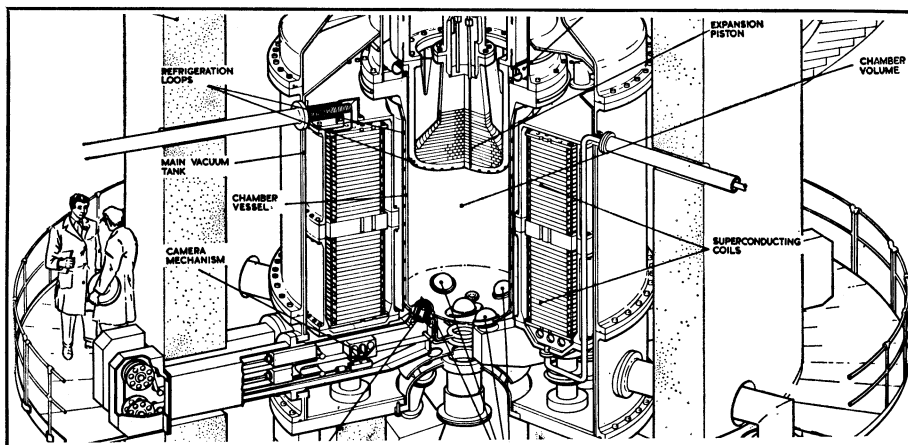
The point of the British plan is the extra strong magnetic field. This will cause the paths to curve more sharply than in weaker field chambers. Thus it will be easier to discriminate between particles with nearly the same speed and mass, and the points where paths meet—that is, where some collision or radioactive decay has taken place—will be determined more precisely.

The size of the British chamber, 1.5 meters in diameter, will not be large compared to other bubble chambers now being built or planned. Argonne National Laboratory is building one with a diameter of slightly more than three meters, while Europe's CERN is building a 3.7-meter one.

But the British plan calls for a measurement error of 0.5 percent at a particle energy of 7 billion electron volts, compared with present values of about three percent.

The British chamber is being designed for use with the Rutherford Laboratory's 7-GeV accelerator Nimrod, but it will be movable.

The chamber could be built in about four years, if the money can be found.



Rutherford High Energy Lab

Sectional plan of the proposed British high-magnetic-field bubble chamber.