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Growth, Genetics, and Hormones*

This excellent international conference on the measurement, physiology, and pathophysiology of growth was arranged by Dr. James Tanner. Its strength and interest evolved from the great diversity of the participants, who included economists, embryologists, statisticians, chemists, pediatricians, pediatric endocrinologists, and educators.

The roles of insulin-like growth factors (IGF) were discussed by Drs. Underwood, Froesch, and Hintz. The gene for IGF-I has five exons that have at least two ways to splice into two prepro hormone variants. The prepro IGF-I (E peptide) is present in large quantities in the plasma of patients with renal failure. In addition to the various prepro IGFs and two separate IGFs, there are several binding proteins that may act as storage receptacles for IGF-I, which itself has a very short half-life when in the unbound state.

Much emphasis is currently placed on investigating the role of IGF-I in various nutritional states. In human beings on restricted diets, IGF-I falls significantly. Restoration to previous levels is dependent on adequate caloric replacement and replacement of protein requirements with essen-

tial amino acids. In contrast, the use of nonessential amino acids limits the increase of IGF-I to pre-diet levels.

IGF-I infusion into growth-retarded diabetic rats leads to near-normalization of growth, as does IGF-I infusion in hypophysectomized rats.

Short-term measurements using knemometry were discussed by several investigators. Dr. Hermanussen (Kiel, West Germany) reported data based on extensive observations of patients and refined statistical methodology to study mini growth spurts. Seventy percent of healthy children were observed to have sharp growth spurts alternating with periods of decreased growth velocity, with a peak-to-peak distance of 30-55 days. He concluded that these mini growth spurts seem to be a major reason why the differences of leg lengths, which are obtained at short intervals, are inadequate for long-term growth prediction. Thus, the investigation of short-term growth, starting from the traditional idea of convertibility of length increment to growth, is complex, and the problem is far from being solved satisfactorily.

Since measurements of the tibia may be of use in studying the physiology of growth patterns in long bones and the spine, Dr Cronk and associates (Philadelphia) designed a knemometer that

is smaller, more portable, and less expensive than the one previously designed by Dr. Valk. We may be hearing more concerning this type of bone study with the new machine if the limitations are understood and the equipment is truly less expensive.

Dr. Mosier (Irvine, California) presented data from studies of growth retardation and catch-up growth in infant rats following cranial irradiation or glucocorticoid administration. Mosier concludes that growth retardation and catch-up growth secondary to irradiation are under control of the central nervous system. The concept of central control requires that there be a mechanism for sensing current body size, a set point for target size (normal body size for age), and a means of stimulating increased growth rate. He believes that the set point is altered by radiation, and this change in set point is independent of nutritional or endocrine dysfunction as they can currently be assessed. The area of the dorsal medial hypothalamic nucleus is thought to be involved in the determination of the set point. However, all scientists interested in these phenomena realize that little is known as yet, and this difficult and important field of investigation needs extensive study.

The Sixth International Auxology Congress will be held in 1991 in Madrid, Spain.