

life sciences

Gathered at the Atlantic City meeting of the Federation of American Societies for Experimental Biology

VITAMIN D

The last frontier

Biochemists at the University of Wisconsin announced results that should revolutionize treatment of incurable vitamin D deficiency disease.

Prof. Hector DeLuca directed the team in a broad-range research effort concerned with the chemical synthesis of an active form of the vitamin and its physiological role in calcium metabolism. This is the last great uncharted area in vitamin D research. The actual mechanism of the vitamin in its action on calcium utilization in the body is now described as taking place in the cell nucleus, the site where genetic information is stored.

The type of vitamin D ordinarily taken into the body does not participate directly in calcium assimilation, but first must be converted to an active form by the liver. The active form, designated as 25-hydroxycholecalciferol or 25-HCC, is then carried through the circulation to bone marrow and intestinal cells where it performs its work assisting bone formation by causing the release of specific genetic information. This genetic blueprint directs the synthesis of a specific enzyme which removes calcium from the blood and transports it to the locations where calcium is utilized.

COMPARATIVE PSYCHOLOGY

Whirling mouse models psychosis

A possible animal model for the study of psychosis has been described in studies with a mutant strain of mouse. In contrast with its genetically normal relative, the strain of whirling mutants exhibits behavioral, metabolic and endocrinologic characteristics which resemble the description of human psychosis.

Working in the Laboratories for Therapeutic Research in the Research Institute of the Brooklyn College of Pharmacy, Dr. A. Stanley Weltman and colleagues report that the "whirlers represent one of a group of waltzing mice mutations displaying syndromes of rapid circling locomotor activity, head shaking and deafness," which the scientists found suggestive of the spinning behavior of childhood schizophrenics.

The experimental results show an abnormal adrenal cortical activity which is akin to psychotic reactions of humans to excess cortisone. Another finding which has its parallel in human psychotics is an underfunctioning of gonads.

BRAIN CHEMISTRY

GEF and reproduction

An extract of the cerebral cortex has been found to contain substances which profoundly affect the response of animals to ovulation-inducing hormones. Called gonadotrophin-enhancing factor (GEF), the extract has particular interest because of its location in the areas of higher brain processes, suggesting a possible pathway through which emotion affects reproductive functioning.

A common experience of women, for example, is often that, following an unusual amount of emotional disturbance or mood-affecting drugs such as tranquilizers, the menstrual cycle becomes irregular.

How GEF produces its inhibiting or promoting effects on the gonads is not understood, nor is it known even what the substance is chemically. The action of gonadotrophic hormones in promoting maturation of the female organs of reproduction, including egg development and release, is greatly enhanced by administering crude homogenates or partially purified extracts of cerebral tissue.

Experiments also show similar effects in the male animal, and in animals other than the species from which the extract came. If GEF proves to participate in normal reproductive functioning, it may offer new approaches to regulating reproductive processes.

NEUROPHYSIOLOGY

Brain affected by environment

That the brain is materially affected by experiences engaged with the environment and by the general amount of brain activity has been clearly demonstrated at the University of California in Berkeley. Drs. Edward L. Bennett and Mark Rosenzweig have been subjecting animals to different environments designed to require varying degrees of activity from the animals.

There were basically two experimental groups of animals: Gerbils lived either in isolation (the impoverished condition) or in groups of 12 in a large cage provided with numerous objects to offer varied stimulation (the enriched condition). Following suitable periods of exposure to their environment, the animals were killed and their brains subjected to quantitative measurements and chemical analysis.

Gerbils from the enriched condition exceeded those from the impoverished condition in weight of cerebral cortexes. Chemical analysis showed the animals of the enriched condition with a greater amount of enzyme related to synaptic functioning, a good indication of higher rate of brain activity.

GENETICS

Large RNA for X-ray study

University of Wisconsin scientists reported they have discovered a large RNA crystal which will lead to further understanding of the mechanisms of protein synthesis in the living cell. A breed of transfer-RNA, the crystal of the nucleic acid is large enough to be studied by X-ray diffraction.

Knowing the diffraction pattern of the molecule will facilitate understanding of how the transfer action works in picking up amino acids and aligning them for protein synthesis, says Dr. Robert M. Bock, director of the research team of molecular biologists at the Sloan-Kettering Institute for Cancer Research in N.Y. The crystal is present in the serum of pigs.