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Insight in a Hormone

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FPEWP USRUF ANLMU
RWUSU GUWST UGPVG
FLHRU HQULF AEOGG
FGGLO WPIGQ IOSFU
QAPGE SUCFS SWGSA
PPERG GEQIS AUGUU
RSVFL NSUVO YLSNS
AVOAU UIAUG GYWGE
UMYRU GAPSY REYQW
FIGEO SIFAE NSHNA
ALUUI AOYUU OCFRI
AMAIV GEFUR

Locked within this code-paragraph is an important, if dimly perceived, insight into human nature. This is the formula for somatotropin, the human pituitary growth hormone, reported in the Journal of the American Chemical Society by Dr. C. H. Li and his colleagues at the University of California Medical School.

Science and Man

Each letter, painstakingly worked out one by one, stands for one of the 20 amino acids: A for alanine, C for cysteine, etc. The somatotropin molecule is a protein made from the 188 amino acid units strung together as spelled out above. Each and every human has a gene corresponding to the somatotropin message in one of his 23 pairs of chromosomes. In a DNA code 564 units long, this gene is the blueprint from which a special sequence is fabricated in the cells of his pituitary gland.

This is the frontier: we have to discover which of the chromosomes bears the gene and why only the pituitary cell is made to read it out, even though the same blueprint is carried by cells throughout the body. This is the secret of embryonic development and holds the answer to how the specialized functions that make up a man are sorted throughout his anatomy.

Somatotropin is one of the most complex and most precious proteins to be analyzed so far. Its only source is the human pituitary, the "master gland" of the hormones located at the base of the brain.

Somatotropin is remarkably distinctive to man. It is unlike most other hormones, say of the adrenals, thyroid, sex glands, or insulin, which, isolated from domestic animals, will work in man. Somatotropin will not. In this respect, somatotropin differs sharply even from other protein hormones of the pituitary gland itself.

THAT A GENERALIZED growth hormone should be so closely associated with the brain is also puzzling. The other pituitary hormones are controlled by messages from the overlying hypothalamus, a region of the brain richly endowed with its own chemical sensors and with trunk-line communications to the rest of the brain. Almost nothing is known of these control loops for somatotropin.

At present, the only medical use of somatotropin is in the treatment of pituitary dwarfism, a rare hereditary disease evidently associated with impairment in the normal synthesis of the hormone. Excess hormone production, usually from a pituitary tumor, can give the opposite result, a form of distorted growth and giantism called acromegaly.

However, it is probably misleading to think of somatotropin as merely a growth hormone when the growth itself depends on far reaching effects on tissue functions throughout the body.

With the exact knowledge of somatotropin structure, the door is now open to its synthesis in the laboratory, though a molecule of this complexity poses formidable obstacles. We can also foresee a rational search for derivatives and fragments that would be easier to prepare and that should still retain significant biological potency.

The comparative study of detailed structure of hormones from different species gives some of the most cogent insights into evolution, and thus into man's special nature. Even without complete synthesis, knowledge of structure opens the possibility that some animal hormone might be experimentally modified to work better in man. And some derivatives may be found that have more specialized effects than somatotropin.

The use of a hormone for developmental modification is plainly in the province of medicine when it remedies a blatant abnormality like dwarfism or acromegaly. But there may be an even wider impetus, if less intense, to use such agents for modifications within the so-called normal range of human character.