GROWTH HORMONE IN THE PROCESS OF AGING STUDY OF TWO SECTORS OF EGYPTIAN POPULATION : SEDENTARY AND PEOPLE WITH REGULAR EXERCISE

THESIS

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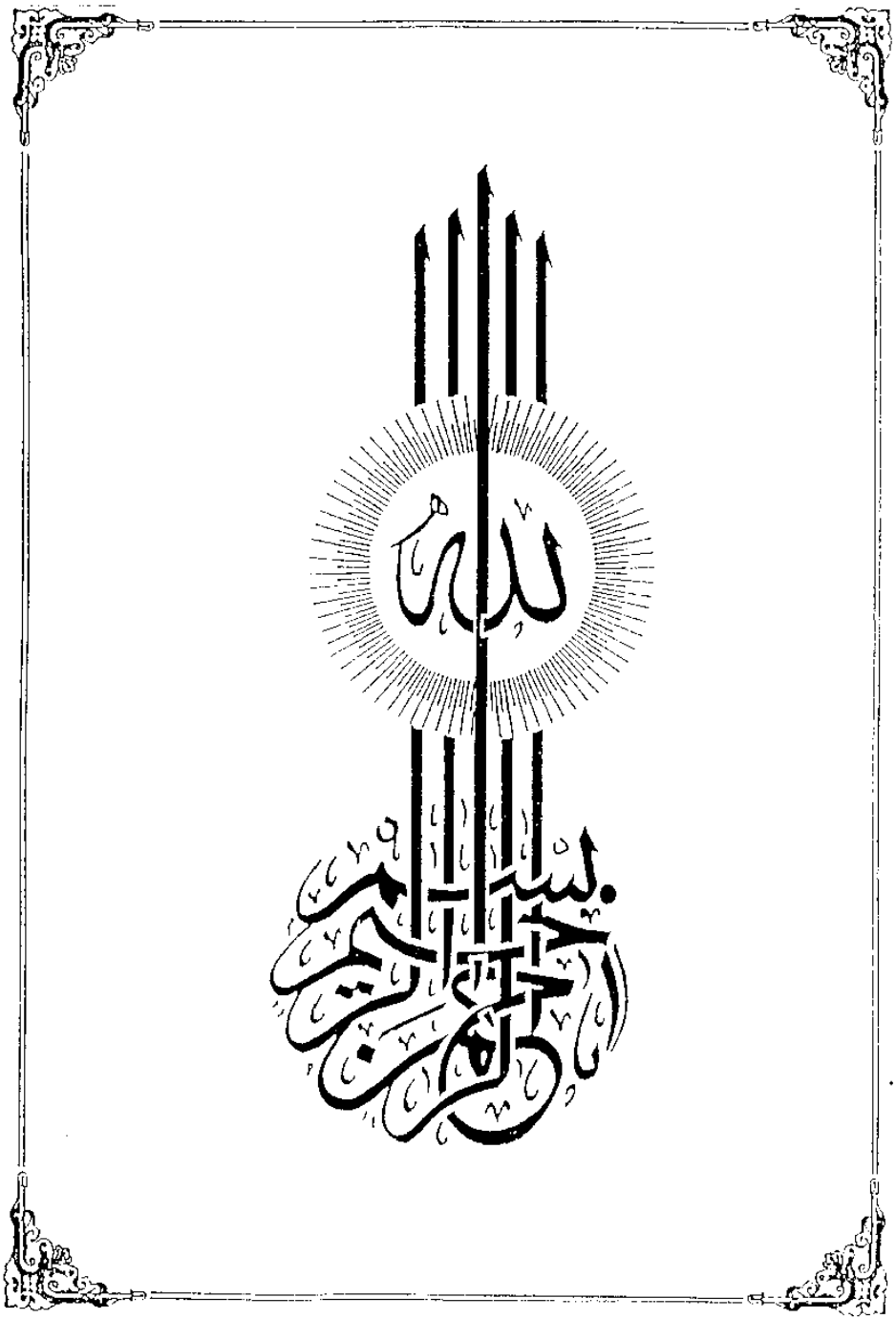

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A B B R E V I A T I O N S

ACTH : Adrenocortictrophic Hormone

ADH : Antidiuretic Hormone

Ca : Calcium

DNA : Deoxyribonucleic Acid

ECG : Electro-cardio-graphy

FFA : Free Fatty Acid

FSH : Follicle-Stimulating Hormone

GH : Growth Hormone

GHRH : Growth Hormone Releasing Hormone

Gn RH : Gonado-trophin Releasing Hormone

HGH : Human Growth Hormane

L-dopa : Levo-dopa

LH : Luteinising Hormone

RIA : Radio-immuno-assay

RNA : Ribonucleic Acid

REM-sleep : Rapid-eye-movement-sleep

T_3 : Tri-iodothyronine

T_4 : Tetraiodothyronine

T-lymphocyte : Thymus-dependent-lymphocyte

TRH : Thyroid releasing Hormone

TSH : Thyroid stimulating Hormone

C O N T E N T S

AIM OF WORK

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It is known that growth-hormone is secreted by the anterior lobe of the human pituitary . Its secretion has a circadian level being maximal at night . In childhood and adolescence , its secretion beside other factors is responsible for human-growth. However , it has not yet been documented whether exercise plays a role in human viability and growth . Racial , dietetic and emotional factors play another role .

The aim of this comunication is to see if exercise-per se plays an important role in growth-hormone secretion.

REVIEW OF LITERATURE

Biology Of Human Aging

Aging is a process that begins at least as early as conception and continues until death (Watkin , 1978). Weg (1978) considered aging to be a reflection of many cellular and systemic processes that occur with time . Along with aging , most organs become smaller and show a decline in function caused by a decline in both number and activity among the cells forming the organ . Some cells are lost because they have completed their inherited predetermined life span and are not replaced e.g. cells of the brain . Others are replaced, when they die, but by cells of inferior vitality e.g. cells of the skin and liver (Sabbour and Farid, 1978) . Everitt and Burgess (1976), who defined aging as a progressive deterioration of the organism after maturity of size, form or function has been reached and which is universal, intrinsic, progressive and deleterious with time , recognized that the involution phase of senescence may be influenced by the rate of development .

Alfin - Slater (1979) stated that aging is a complex biological process associated with a reduced

capacity for self maintenance and a reduced ability to repair body cells . While Makinodan (1977) defined aging as a time-dependent process in which there is loss of physiologic adaptability to environmental stress and change .

Butler (1980) emphasized aging as a complex with numerous antecedent factors leading to specific outcomes at various adaptive levels . Evans (1981) added that the central concept of aging is loss of adaptability of an individual organism with time so that on average, the old are more vulnerable to environmental challenge than the young . Merry and Phillips (1981) regarded that the fundamental aspect of aging is an observed cumulative decreased viability of the organism with time . With advancing chronological age, the probability of death increases , and this increased vulnerability is common to all members of the species . Hammond (1964) presented evidence that physically active people live longer . Johnson et al. (1975) reported regular physical activity can prevent or delay the onset of the degeneration processes typically accompanied with senescence . Retzlaff et al. (1966)

demonstrated obvious and significantly greater longevity among animals that engaged regularly in moderate exercise. Leaf (L973) stated that physical training is one of the most common threads composing the life histories of long-lived people . Montoye et al. (1962) concluded that there is no difference in longevity between athletes and non-athletes .

Petrov (1971) assumed that , on the contrary to un-necessary prolonged rest , physical training counter-acts the age-associated tendency for involution and atrophy of the working tissues , and progressive decrease in the capacity for adaptation . Mateeff (1971) stated that lack of function of the body musculature results in profound processes of involution and atrophy not only in the muscles themselves but also in all vital organs connected with muscular work and metabolism . Although the living organism exhausts itself during work and wears out , but this exhaustion and wearing out that bring into play the processes of recovery and self-repair .

In attempts to explore the nature of aging , human aging is correlated to the interaction between intrinsic and extrinsic factors .

Dynamic Aspects Of Intrinsic Aging .

There is a wide range of theories on the mechanism of intrinsic aging , and briefly these theories have been divided into those which propose programmed aging and those which are based on random error mechanism .

A. Programmed Aging .

I) Genetic Theories :-

The original programmed aging theories envisaged senescence and death as being coded directly in the gene sequence .

Hayflick (1973) described aging as terminal differentiation and it possesses an ordered component which is reminiscent of aging process. Accordingly , specific genetic systems would activate degenerative processes at a programmed point in life cycle with variable life spans in different species .

Smith and walford (1977) have found that , in mice , the main histocompatability complex , the H - 2 system , is one of the gene system involved

with maximum life span . In view of this finding and the known association of the corresponding HL-A system or closely linked genes in man with certain disease states (Bodmer , 1980) , Evans (1981) assumed the possible association of HL-A antigens alleles with longevity .

Moreover , Martin (1978) concluded that many genetic syndromes which produce changes in early life, as progeria or Werner's syndrome ,are apparently similar to those of aging and such conditions identify genetic loci having a role in senescence .

While Comfort (1979) suggested that aging occurs when the cell runs out of programme , so that the orderly sequence of gene action associated with development is succeeded by random repression and derepression of genes . Apart from leading to general impairment of function , this process creates specific correlates of aging such as malignancy , reappearance of fetal antigens and autoimmunity .

Burnet (1982) suggested that aging depends essentially on the accumulation of genetic errors ,in

both the structural and regulatory DNA of somatic cells, regarding that the regulatory DNA differs from structural DNA only in the nature of the information that it carries . At evolutionary level , Burnet also contended that any adaptive change in life span that , involved a slowing down of aging process rather than modification of the timing of the reproductive cycle , can be visualised as dependent on a modification of the timing of the error-proneness of the enzymes that are concerned with the replication and repair of somatic cell DNA . The DNA handling mechanism is set at a very low but measurable level of error-proneness , which is appropiate to produce the errors needed to give rise to the mutants necessary for survival in a variable environment

II) Immune Theories :-

Many programmed aging theories propose the existance of a biological clock in the immune system which paces the changes of senescence (Burch , 1968 ; and Burnet , 1974) .