Can we increase our life span? The role of nuclear gerontology

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Abstract

Elderly people, those above 60 or 65 years old differ from younger people in many ways. Nuclear medicine can play a role in the diagnosis of diseases of the elderly and thus help, in social adjustment and in care for the elderly people. The question is why adult stem cells have a certain limit of reproduction, since their DNA in a normal physical environment can theoretically live very much longer. The elderly are prone to suffer more diseases than the young. It is important that the elderly should use water soluble and not lipid soluble drugs. There are many more to write about the elderly. We have tried to be brief in order to show the importance of using nuclear medicine in gerontology. Let us mention here that the word gerontology means in greek "talk about the elderly" (*gerontas* is the old man and *logy* is to talk about). Elderly people are a large part of our society and we do have every reason, every interest and responsibility to keep this part of our society healthy, useful and productive.

Introduction

Elderly people, those above 60 or 65 years old differ from younger people in many ways. They have specific gene changes, some serum hormone levels differ, cellular somatic and functional changes occur and also specific diseases. Elderly people show specific social behavior and are thus in need of greater social support and of specific medical care. Caring, supporting and treating the elderly will increase their life span.

Nuclear medicine can play a role in the diagnosis of diseases of the elderly and thus help, in social adjustment and in care for the elderly people.

Adult stem cells deriving from the embryonic stem cells lay in the basic layer of all our organs and continuously multiply reproducing new tissues. According to the "Hayflick limit" (1965) [1] adult embryonic cells may induce 50-100 cellular reproductions of the tissues. The question is why these adult stem cells have a certain limit of reproduction, since their DNA in a normal physical environment can theoretically live very much longer. One may remember the experiment of the Nobelist Alexis Carrel who preserved the heart of a chicken functioning for 11 years until A. Carrel died. Nuclear medicine could support related research by labeling DNA and also various nutritional factors and thus study the progress to aging

Hormonal changes

In elderly people, there is a slight increase in serum parathormone [2]. On the contrary, serum renin and aldosterone decrease and this decrease of course does not support hypertension. It is important that growth hormone is also decreased in the elderly [2]. Nuclear medicine may examine by RIA and IRMA tests, the levels of these hormones.

There is much doubt and discussion about the sexual life of the elderly and its influence to longevity. It was shown that nymatoid worms, whose chromosomes are alike men's chromosomes, if had a normal sexual life lived by 25%-50% longer than those who had no sexual life [3]. Normal sexual life in the elderly when performed in a reasonable frequency and delayed rhythm with age is rather beneficial for longevity although it is difficult to draw statistically valid results on this subject [4, 5].

Cellular, somatic, functional disturbances and diseases

Cerebral cells are decreased in the elderly by 11%-15% [5, 6]. At the age of 20 years, men after muscular stress can increase their blood volume per minute up to six times while in the elderly this increase is small [7]. Nuclear medicine can measure brain volume, brain function, study the neurodegenerative diseases due to lack of neurotransmitters and also study stroke volume. Of course during nuclear medicine cardiac stress tests in the elderly people, the above should be duly considered.

The elderly are prone to suffer more diseases than the young. Delirium is an important disease of the elderly due to insufficient cerebral circulation and function with partial loss of attention and cognition that may result to depression. The sufferers may have little cooperation with their physicians and the nursing personnel. Delirium may cause 10%-40% the hospitalization of the elderly patients and if appears during hospitalization may lead to death in 25%-35% of the cases [8, 9].

Various drugs like benzodiazepines, simetidine, zanitidine or hypnotics, if taken carelessly, may show more side effects at the age of 70-80 years than at younger ages [10, 11]. Nuclear medicine can study brain function in all cases mentioned above.

It is important that the elderly should use water soluble and not lipid soluble drugs because the latter have a much longer half life in them than in young people. The old moto: "a pill for every ill" stands in the elderly as opposite: "an ill for every pill".

There are many more to write about the elderly [12, 13]. We have tried to be brief in order to show the importance of using nuclear medicine in gerontology. Let us mention here that the word gerontology means in greek "talk about the elderly" (*gerontas* is the old man and *logy* is to talk about). Elderly people are a large part of our society and we do have every reason, every interest and responsibility to keep this part of our society healthy, useful and productive.

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