Correlations Between Chronological & Biological Age Levels of Blood Lipids

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Abstract

Chronological age is a crude index of the probable length of life a person has remaining. Biological age can be regarded as a more accurate estimation of one's position in time relative to one's potential life span. Biological age can be conceptualized as theoretical index based on the physiological functioning of major organ systems. Development of biological age markers has been explored by Hochschild. His studies suggest that many risk factors predict that rates of common biological functioning decline with age. These findings were based on self-report health survey data when compared with computerized age scan performances of subjects. No blood tests were run to elaborate further on those suspected areas of cause. One significant predictor of biological age was the number and quantity of high fat foods consumed. In our study, when blood lipids levels were compared with biological and chronological age of 36 non-supplementers versus 78 supplementers, non-supplementers showed significant correlation between LDL and cholesterol while supplementers showed significant correlation with VLDL and triglycerides. Non-supplementers showed a more positive correlation between chronological age, biological age, VLDL and triglycerides, possibly indicating the dietary intake of this group was inadequate.

Although aging is a normal developmental process, all too often it is addressed as a pathological phenomenon. Prevalent in our society is the attitude that being old means being sick. While epidemiological reports show a relationship between chronological age and illness, it is vitally important to recognize that the two are not synonymous. While functional decline is measurable in a number of physiological processes among aging persons, it is a cumulative process. What is significant is not that these gradual diminutions occur, but that older persons can modify them in a positive way.

Complex functions of the body, such as sensory perception, movement, lung function and lung capacity, and communication are dependent upon the organized efforts of individual cells or group of cells. The coordinators of these high-level functions, such as hormones or nerve impulses, are themselves of cellular origin or manufacture. The conclusion is inescapable that the function and well-being of the human body are intimately dependent upon cellular activities.[1]

Table 1

Correlations Between Chronological Age, Biological Ages[1] and Blood Levels of Low Density Lipoproteins (LDL) and Cholesterol

		Non-Supplementers (n=36)			
Estimated biological age scales	**HDL**	**LDL**	**VLDL**	**Cholesterol**	**Triglyceride**
Audio reaction time, sec.	NS	NS	NS	NS	NS
Highest audible pitch, KHZ	NS	.494**	NS	.518***	NS
Touch sensitivity	NS	.448**	NS	.491**	NS
Lung: vital capacity, ML	NS	.451**	NS	.463**	NS
Lung: FEV-1, ML	NS	NS	NS	.361*	NS
Visual reaction time, sec.	NS	.412**	NS	NS	NS
Movement time, sec.	NS	NS	NS	.376*	NS
Memory, longest chain	NS	.366**	NS	NS	NS
Button tapping times, sec.	NS	NS	NS	.439**	NS
Decision reaction time, sec.	NS	NS	NS	NS	NS
Movement time with decision, sec.	NS	NS	NS	NS	NS
Estimated biological age (calculated from the scales above)	NS	.501**	NS	.514***	NS
Chronological age	NS	.497**	NS	.478**	NS

Notes:

"Ages shown in the table above are computed from equations of average scores at each age obtained by persons of your sex, and in the case of lung scores, height." Taken from H-Scan standard test output report form.

Statistical significance is indicated above as follows:
* p<.05
** p<.01
*** p<.001
NS = not statistically significant

Adulthood is a continually changing process; it is at no time static.[2] Throughout the human life span, people are subjected to a complex series of influences (internal as well as external) that become the process known as aging. While chronological age is a crude index of the probable length of life a person has remaining, it is not an absolute indicator of biological age. Biological age can be regarded as a more accurate estimation of one's position in time relative to one's potential life span. Biological age can be conceptualized as a theoretical index based on the physiological functioning of such major organ systems as the cardiovascular, respiratory, nervous, digestive and immunological systems.

Development of biomarkers of aging has been explored by Hochschild as a tool to be used to evaluate proposed treatment to retard aging rates.[3] The biological age scan standardized scores used in his computerized testing system were based on the performance of 2,462 office workers who were tested on twelve possible physiological tests that might be used as biomarkers of aging. This study suggested that many risk factors which predict rates of common function declines with age. Among these risk factors are dietary factors, exercise habits, lifestyle and other geographical factors.

In the study by Hochschild, self-health survey data were compared with the computerized age scan performances on subjects. No biochemical tests were performed to elaborate further on those suspected areas of cause. Since the dietary number and quantity of high-fat food was found to be a significant predictor of biological age, researchers at The Bio-Communications Research Institute at the Center for the Improvement of Human Functioning International (CIHFI) in Wichita, Kansas, postulated that a review of blood lipid profiles might add additional information to this problem. The question raised was whether there was a correlation between chronological age, the overall biological age scales, and blood lipid levels (HDL, LDL, VLDL, cholesterol, triglycerides).

Since patients' data reviewed reflected chronic illnesses of various durations and severities, it was postulated that selected biochemical tests might correlate with chronological age, biological age and various physiological functions of the body as measured by the H-Scan of Hochschild. A detailed description of the physiological functions of the body measured in the H-Scan test can be found in an article by Hochschild.[4]

Methods

At the CIHFI, the ABNA (Achievable Benefits Not Achieved) Research Program was initiated to assist patients with chronic illnesses who had been treated by at least three other physicians or a major medical institution without success. By introducing them to the various tests that would determine the health risk factors involved, each patient was given a biological age determination which could then be compared to their chronological age. The use of biological age determination, it was hoped, would help patients to understand those factors which affected their health status. Data from the charts of 114 patients were statistically analyzed using SYSTAT, Version 4.1. Of this number 78 were supplementing with vitamins and minerals other than that obtained from their diet, and 36 were non-supplementers. Non-supplementers are those individuals who do not supplement with vitamins, minerals, essential amino-

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Table 2

Correlations Between Chronological Age, Biological Ages[1] and Blood Levels of Low Density Lipoproteins (LDL) and Cholesterol

	Supplementers (n=78)				
Estimated biological age scales	**HDL**	**LDL**	**VLDL**	**Cholesterol**	**Triglyceride**
Audio reaction time, sec.	NS	NS	NS	NS	NS
Highest audible pitch, KHZ	.273*	NS	.232*	NS	NS
Touch sensitivity	NS	NS	NS	NS	NS
Lung: vital capacity, ML	NS	NS	.279*	NS	.380***
Lung: FEV-1, ML	NS	NS	NS	NS	.308**
Visual reaction time, sec.	NS	NS	NS	NS	.299**
Movement time, sec.	NS	NS	NS	NS	NS
Memory, longest chain	NS	NS	NS	NS	NS
Button tapping times, sec.	NS	NS	.258*	NS	.340**
Decision reaction time, sec.	NS	NS	NS	NS	NS
Movement time with decision, sec.	NS	NS	.233*	NS	.351**
Estimated biological age (calculated from the scales above)	NS	NS	.293**	.246*	.390***
Chronological age	NS	NS	.322**	.240*	.346**

Notes:

"Ages shown in the table above are computed from equations of average scores at each age obtained by persons of your sex, and in the case of lung scores, height." Taken from H-Scan standard test output report form.

Statistical significance is indicated above as follows:

* $p<.05$

** $p<.01$

*** $p<.001$

NS = not statistically significant

acids, fatty acids, etc. in addition to their normal intake of food. Supplementers are those individuals who supplement their normal daily intake of food with these substances. Correlation between chronological and biological age, and serum lipids were examined for both male and female patients.

Results

An overview of Tables 1 and 2 suggests that the patterns of correlation are quite different between non-supplementers and supplementers. Among non-supplementers (n=36), all of the significant correlations between biological age scores and lipids are with LDL and cholesterol. On the other hand, the significant correlations among the supplementers (78) are virtually all with VLDL and triglycerides.

Discussion

There is a generally acknowledged gradual age decline in the functional and reserve capacities of individuals. The rate of the decline differs, however, from one organ to another and from one person to another. These declines in physiological function were once thought by many to be an inexorable part of the aging process. We now suspect there is some manipulable variability in rates of age related decline in functional performance.

Hochschild's data suggested that the average number of servings of high-fat food consumed per day was a significant predictor of biological age in men but not in women.[5] In our study, correlating blood lipid levels with biological age data, males did not demonstrate statistically significant correlation while females did. Independent data (unpublished) suggest there are quite significant systematic errors in the way different subgroups of people complete nutrient questionnaires, which may, to some extent , explain differences between Hochschild's data and that reported here.

The data reported cannot absolutely demonstrate whether correlation between chronological and biological age scales with blood lipids can be accepted as a criterion for predicting rates of functional decline with aging. Risk factors, such as dietary consumption of high fatty foods, amounts of red meat ingested, vitamin/mineral supplementation were not ascertained to determine whether or not these had an effect on the results obtained. These relationships and others like them should be considered causative factors. Since non-supplementers showed a more positive correlation between chronological and biological age, and blood lipids, it can be assumed that the dietary intake of most of the non-supplementing patients was inadequate or lacking in nutritional value. While this does not indicate that this can predict any increase in life expectancy, it does suggest that correction of inadequate diet may lead to increased life expectancy in healthy persons.

A proper attitude towards aging may be not to look forward to decrements and infirmity, but rather to continue to use and nourish all remaining capacities to the fullest.[6] An inadequate understanding of this relationship between age standardized measures of physiological functioning and appropriate balanced nutrient levels clearly awaits further study.

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Students Offered Surgical Implants to Avoid Pregnancies

Time

With one of the highest teenage pregnancy rates in the nation, Baltimore already provides birth control pills and condoms to its public school students. But health officials have decided that extra measures are needed. Starting in January, school clinics will begin offering Norplant, a surgically implanted contraceptive that lasts for five years.

About 500,000 women nationwide use the device, which consists of six capsules inserted under the skin on a woman's upper arm. Inserting the capsules is a simple medical procedure, and they can later be removed to restore fertility. Despite the new option, however, officials say they will continue to recommend abstinence as the best way to avoid pregnancy, and even students who receive the contraceptives will be urged to use condoms to avoid AIDS and other sexually transmitted diseases.

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