

## Current Theories about Aging

Taylor and Johnson (2008) present a perceptive overview of the current theories about how people age. These theories are divided into six broad categories:

**Wear-and-Tear Theories.** The wear-and-tear theories suggest that all cells, tissues, organs and systems of the body wear out as a result of continual use throughout life. The theory also states that internal bodily damage may hasten the aging process from sites within the body. For instance, free radicals (scavenger molecules seeking electrons from other molecules) and cell disease are internal mechanisms that may promote cell aging and death. Environmental agents—such as carcinogens, pollutants, viruses and environmental radiation—are external factors that may advance cellular demise.

**Genetic Theories.** The genetic theories propose that all genes in the human body are age-coded from birth to death. This supports the concept that the life of cells has a biological clock. Supporters of this concept suggest that chronological changes (e.g., puberty and menopause) bolster this theory; however, cellular errors or mutations are examples of complications that may alter the biological clock of a cell, organ or body system.

**General Imbalance Theories.** The general imbalance theories suggest that the brain, endocrine glands and/or immune system (or any combination of these) gradually start to dysfunction, leading to the aging process. The failure of an organ or body system will vary throughout the body and may be upsurged (strongly and abruptly increased) by infection and disease.

**Accumulation Theories.** The accumulation theories propose that the functional decline correlated to aging is the result of an accumulation of certain chemicals that result in cells' dysfunction, damage and death. For instance, with this theory it is felt that free radicals may continually accumulate and hasten the death of certain cells and tissues.

**Dysdifferentiative Hypothesis of Aging and Cancer.** Differentiation describes the process by which all cells in the human body are very specialized in their function and structure. The dysdifferentiative hypothesis proposes that cells gradually (with aging) lose their highly specific mechanisms, leading to a cascade of age-related changes in the body organ.

**Caloric Restriction Hypothesis.** Quite a few scientists are presently doing investigations to understand the cellular and molecular basis for why calorie restriction retards aging in selected animals. Research has demonstrated that some animals (e.g., rats) can consume 30%–50% fewer calories (while getting the satisfactory amounts of protein, fat, vitamins and minerals) and increase their life span. In fact, with rodents, low-calorie diets can actually postpone some of the major diseases observed in late life. No controlled, data-based, long-term study has yet to be completed with healthy adults. The underlying mechanism of this theory is that calorie

restriction limits injury to the cells' mitochondria (ATP power plant of the cell) from highly reactive free radicals (Weindruch 2006).

## Highlights of ACSM Exercise and Physical Activity Guidelines for Older Adults

Following are the current health, frequency, intensity and duration guidelines for older adults from the American College of Sports Medicine (ACSM). For those unable to meet these guidelines, ACSM recommends performing physical activity that can be safely endured.

### **Exercise for Health**

- Do a minimum of 150 minutes of physical activity per week.
- For greater health benefits, increase the duration, frequency and intensity of exercise.

### **Endurance Exercise**

**Frequency and Duration.** With moderate-intensity activities, accumulate a total of 150–300 minutes a week in bouts of 10 minutes or more (up to 60 for greater benefits) per day. With vigorous-intensity activities, complete a total of 75–150 minutes per week in 20- to 30-minute work bouts.

**Intensity.** Using a subjective assessment range of 0–10, let 5–6 represent moderate-intensity exertion and 7–8 signify vigorous-intensity effort.

**Type.** Use any exercise mode that does not trigger orthopedic stress to the body. For clients with lower-extremity limitations, water exercise, walking, elliptical training and stationary cycling may be more advantageous, owing to their minimal-impact stresses.

### **Resistance Training**

**Frequency and Intensity.** Complete resistance training at least twice per week at a moderate (5–6 intensity on a 10-point scale) or vigorous (7–8) intensity.

**Type.** Do 8–10 progressive weight training exercises involving the major muscles of the body. Weight-bearing calisthenics and stair climbing are also beneficial.

### **Flexibility Exercise**

**Frequency and Intensity.** Do stretching exercises at least 2 days per week at a moderate (5–6) intensity on the 0–10 scale.

**Type.** Perform static stretches that maintain and/or increase the desired range of motion for the selected joint or group of joints.

### **Balance Exercise for Frequent Fallers and Older Adults With Mobility Problems**

At this time, the research does not specify an optimal dose (frequency, intensity, time, duration) for balance exercises. That said, the ACSM guidelines for balance include gradually more challenging exercises that reduce the base of balance support (e.g., two-legged stationary stand with legs different widths apart, weight shifting from one leg to the other, one-legged stand); dynamic movements that challenge the center of gravity (e.g., walking in a circle or figure eight and changing direction and speed); exercises that challenge the posture muscles (e.g., heel stands and toe stands); and movements that challenge sensory input (e.g., standing movements with eyes closed).

Source: Chodzko-Zajko, et al. 2009.

### **Additional References**

Centers for Disease Control and Prevention (CDC). 2009. [www.cdc.gov/aging](http://www.cdc.gov/aging); retrieved Nov. 11, 2009.

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Elmadfa, I., & Meyer, A.L. 2008. Body composition, changing physiological functions and nutrient requirements of the elderly. *Annals of Nutrition & Metabolism*, 52 (Suppl. 1), 2–5.

Taylor, A.W., & Johnson, M.J. 2008. *Physiology of Exercise and Healthy Aging*. Champaign, IL: Human Kinetics.

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### **Sandy Stoub's Review on Current Theories on Aging**

The many current theories related to aging are addressed in this article. All of which have been recognized as possible contributors to the aging process.

Everyone ages in a distinct and personal way, often influenced by decisions made throughout the course of their lifetime, manifesting in later years in positive, or negative ways.

To me what is most important to consider is not why someone is aging, but how to assist someone to maintain functionality and independence. In other words, to die young at an old age

The American College of Sports Medicine guidelines outlined in this article are an adequate springboard for program planning.

Starting with basic and general recommendations, these guidelines offer a template for program planning.

This article offers a reliable breakdown of the key aspects of training that should be considered for older adults.

Each aspect, from cardiovascular to strength and flexibility should be incorporated into a well-rounded program for older adults, regardless of age, and frailty.

The most important element discussed here is the area of balance and mobility. The statistics related to morbidity as the result of the consequences of a fall are frightening, as a fall often has a fatal outcome, and at very least can significantly impact quality of life and continued function and independence.

What I found particularly beneficial in this article was the practical application that was given to assist a practitioner in putting together a solid, and customized plan for each participant which acknowledges their limitations, but also has a focus on their potential

Symbria's SeniorFIT program, which serves over 100 senior living venues nationwide, uses a functional training approach using similar guidelines. Participant's range in age from 65-105 and each receives a personalized program that accommodates any chronic conditions, or aging limitations, and focuses on real life functional goals with a solid plan of progression to move them along. This program has been proven to reduce fall risk by an average of 40% across all levels of living, from independent to long term care. Exercise is the magic bullet for the fountain of youth.

### **Current Theories Related to Aging – Mary Wykle, PhD, Review**

Taylor and Johnson (2008) address the current theories related to aging in this article – Wear & Tear, Genetic, General Imbalance, Accumulation, Dysdifferentiative Hypothesis, and Caloric Restriction. Although they have been recognized as possible contributors to the aging process, there are 4 primary areas that are used to categorize age – Chronological, Biological, Psychological, and Functional and most people identify with two of these categories. It is important to understand these categories and the impact on the way that people age.

Taylor and Johnson identify the Dysdifferentiative Hypothesis to propose that with aging, cells gradually lose their highly specific mechanisms leading to a cascade of age-related changes in the body organ. It is understood that Sarcopenia and Dynapenia gradually occurs beginning between age 30 and 40 but can be slowed with proper physical activity and nutrition. Slowing this process is important for Quality of Life and performing the Activities of Daily Living to live independently. The functional category of aging is the ability to meet demands of our daily living (ADLS) and the most critical measure in slowing the Dysdifferentiative Hypothesis.

Referencing the American College of Sports Medicine guidelines provides an outline for program planning for seniors as they age. Important considerations include the individual's current health, frequency, and duration for each older adult. Components should include cardiorespiratory/cardiovascular, muscular strength, endurance, balance, agility and flexibility. Program development cannot be a one-plan fits all but tailored to every individual.

Following the ACSM Physical Activity Guidelines for Older Adults discussed in this paper provides a guide to develop a thorough program to assist seniors in living an independent life and optimum health.