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Expert Column

Short Notes on Exercise and Aging

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Aging is the accumulation of physical changes over time. People said that if a person spends much of the time napping then in the address book will the majority of names that start with Dr, then there is likely that this individual might in the aging period. As of the beginning of 2020, the percentage of the Malaysian population aged 65 years and above has increased from 6.7% in 2019 to 7.0%. Director of the National Institute on Aging (NIA), Dr. Richard J. Hodes said that "People are living longer, but that does not necessarily mean that they are living healthier". Aging is not a disease, but it occurs at different rates do not generally cause symptoms but the cellular and physiologic will deteriorate over time which increased mortality with age following maturation, increased vulnerability to disease, and decreased ability to adapt to stress. Aging is affected by both intrinsic and extrinsic influences. Intrinsic aging is the natural aging process. As we age, the development of collagen decreases and cell turnover slows down. External aging is caused by sunlight and stress that speed up the entire aging process.

Why Does Aging Happen?

Theories on aging have been around for more than two thousand years. Ancient medical scientist, Galen believed that aging is caused by the accumulation of waste matter in the body from the beginning of life. These changes caused a slow increase in dryness and coldness of the body. Meanwhile, Roger Bacon suggests a "wear and tear" theory that aging is the result of abuses and insults to the body system. He suggests that good hygiene might slow the aging process. In addition, Charles Darwin attributed aging to the loss of irritability in the nervous and muscular tissue. One of the popular aging theories is the Programmed senescence theory that a process by which organisms through proceed physical deterioration of the body. This theory proposed a degenerative process by which a cell loses its ability to divide, grow and function which ultimately ends in death.

Age-related Physiological Changes

As we age, our sweat glands have reduced production and heart rate, and skin blood flow will decrease as well. The changes in the skin such as loss of subcutaneous fat that increase vulnerability to pressure sores, less insulation of body to cold, and thickened fingernails and toenails with some remaining pigment cells enlarge know as "age spots" will be obvious. There will also change in the musculoskeletal system where the muscle mass will be decreased, deterioration in joint cartilage, and a decrease in bone density. All these changes, however, can be preventable or reversible with regular physical activity.

Exercise and aging

A person living a sedentary lifestyle is often has a high risk for vascular aging due to reduction in vasodilation, cardiac and arterial compliance, as well as endothelial dysfunction. However, if a person living an active life, it will reduce the risk for vascular aging due to less arterial stiffening and endothelial dysfunction. Many studies show that a small change in physical activity or fitness in individuals who are physically unfit or inactive can lead to a significant improvement in health status, including a reduction in the risk of chronic disease and premature mortality.

Exercise prevents cardiovascular disease and death from the disease. The maximal oxygen consumption (VO2max) declines with aging and is increased by regular exercise. VO2max is higher in trained elderly persons and declines with age in both a trained and untrained elderly person to become almost equal. Exercising at 45–50% of VO2max able to facilitate fat loss and then start to metabolize carbohydrates that may decrease the risk of diabetes. 12 weeks of high intensity and resistance training in younger and older adults have shown that the oxidation capacity increased as well as increased in muscle mass and strength.

Regular exercise helps to increase or maintain control age or-related decreases in muscle mitochondrial mass and antioxidant defenses. Exercise training can also result in 100% increments in mitochondrial mass, oxidative (respiratory enzymes), and related enzymes for defense against oxygen-free radicals. Studies have shown that gene expression of Nrf2; a basic leucine zipper (bZIP) protein that may regulate the expression of antioxidant proteins that protect against oxidative damage triggered by injury and inflammation, and other antioxidant defense genes were significantly increased in skeletal muscle of fit males when partaking in exercise lasting more than 90 minutes. However, in participants who had never exercised continuously, there

were no effects on the gene expression of Nrf2. The more we exercise, the greater this response comes, and like everything, the body adapts to higher levels of stimulation to produce antioxidants, so naturally, our body produces more even when at rest.

Sedentary people lose large amounts of muscle mass (20-40%) and 6% per decade loss of Lean Body Mass (LBM). The aerobic activity not sufficient to stop this loss. Only resistance training can overcome this loss of mass and strength. Balance and flexibility training contributes to exercise capacity. Aging appears neither to impair the ability to improve muscle strength nor to prevent muscle hypertrophy. When older men (60 to 70 years old) did strength training for 12 weeks at 80% of their onerepetition maximum for extension and flexion of both knees, their extension strength is increased by 107% whilst flexion strength increased by 227%.

What is the type of exercise that will slow aging?

In the study "Resistance Exercise Reverses Aging in Human Skeletal Muscle', it was proven that six months of progressive resistance training made the gene expression pattern of aging mitochondria become significantly younger. Scientists measured telomeres in twins to gauge the effect of exercise on aging, a study that proved the research participants who spent more than 3 hours each week lifting weights had longer telomeres than subjects 10 years younger, suggesting that individuals who eschew placing a vigorous load on their body may wind up biologically older by 10 years. Beyond the age of 30, we lose approximately six pounds of muscle mass per decade and these findings indicate that intervention designed to increase skeletal muscle mass (such as weight training) are critical weapons in the fight against obesity and obesity-related ailments, including diabetes, heart disease, stroke, hypertension, and cancer. Meanwhile, another study found that younger people participating in HIIT showed a 49-per-cent increase in mitochondrial capacity and the older group saw 69-per-cent. Mitochondria are the cells' powerhouses, responsible for producing the molecule that transports chemical energy within cells.

Any kind of exercise is better than none. Choose the one that you comfortable with. You know what is best for you. Healthy life, long life!

The infographics simplified the exercise and aging as shown below.





SARCOPENIA: Loss of muscle mass & function during normal aging.



SARCOPENIA



For more information: https://www.healthline.com/nutrition/sarcopenia







Prevention & Management





Reduce risk of diseases

Especially cardiovasular and respiratory dieseases by keeping heart and lungs active







Psychological benefits

Keeping the mind active, Improve sleep, Enhance mood and overall emotional well being.

Consequences of sedentary lifestlye



E levated Blood Preasure D epression risk E levated glucose levels N erve damage T riglyceride levels increased A dipose tissue deposition R isk of cardiovascular diseases

Yeast infection

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Dreaming of healthy aging? Improve your older days **START PHYSICAL ACTIVITY NOW!**

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Move differently = age differently

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CARDIORESPIRATORY FITNESS

- Regular moderate to vigorous activity lowers the risk of cardiovascular disease is lowered by 3 times (Swain & Franklin, 2006)
- Lower levels of fitness are associated with an increased risk of both morbidity and mortality

2 **NEUROMUSCULAR FUNCTION**

- Exercise results in better cognitive function (Lautenschlager et al. 2008) and motor control (Power et. al., 2012). People who walk 5–7 days per week have 50–80 % lower risk of mobility
- impairments (Roh & Park , 2013) Strength training (60-80% of maximum strength) improves muscle size
- and strength, reducing mobility impairments associated with age-related loss of muscle mass and strength (Maden-Wilkinson et. al., 2013)



RISK OF NON-COMMUNICABLE DISEASE 3

• Active lifestyle and physiological fitness contributes to better health in older age (Hamer et. al, 2014), thus lowers the mortality risk (Feldman et al. 2015).

People who exercise have increased longevity and disability free life expectancy by approximately 4 years and 2 years approximately
Even a short, 10 minutes exercise break from sitting or lying is also beneficial for sedentary people (Powell et. al., 2011)

4 **MENTAL HEALTH & PSYCHOSOCIAL** WELLBEING

- Physical activity improves mood and reduces signs of depression Improved oxygenation resulting from exercise acts as a protection to
- the brain from cognitive and psychological decline in later age
- Vigorous activity more than 3 times a week is beneficial in preventing Alzheimer's Disease
 - (Lautenschlager, et. eal., 2004)



- Leg muscle strength and balance decline over time (Mc Phee, et.al.,
- 2016). · Regular exercise improves balance and coordination, reducing risk of falls (Franco et al. 2014).
- · Active people have stronger bones with higher bone mineral density (Ireland et al. 2014), thus less likely to suffer from fracture.

Moderate activity >150 mins weekly RECOMMEND Mc Phee et. al., (2016)



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