

Physiological Changes in Old Age

Rachel Zachar, MS, Lisa Lashley, PsyD, Charles J. Golden, Ph.D.

Nova Southeastern University

Beginning in the third and fourth decades of life, subtle physiological changes start to occur with progressive decline as age increases. Some changes are visible such as wrinkling of the skin or whitening of hair, but the majority of physiological changes due to aging are internal. Many changes occur within the cardiovascular system. Boss and Seegmiller (1981) explain that with aging, cardiac output decreases as diastolic and systolic myocardial stiffness increases. These changes have been associated with increased blood pressure in older adults, leading to hypertension. This age-related change can be safely managed by antihypertensive therapy that is monitored regularly. In addition to these changes, lipid content of vessels increases, usually from increased cholesterol. While other factors play a part in myocardial infarctions, this change may increase the likelihood of myocardial infarctions in older adults.

Changes in the lungs are also observed as adults continue to age. Decreases in oxygen pressure, carbon monoxide diffusing capacity, and voluntary ventilation occur within the lungs. Moreover, bacterial and viral pneumonia are more prominent in older adults. Although this medical condition occurs within the lungs, it usually occurs due to suppressed immune systems or poor oral hygiene. Kidneys in older adults decrease in volume, weight, and number of glomeruli, clusters of capillaries which aid in filtration of waste from the blood. These changes make it more difficult for adults to quickly filter certain medications such as penicillin and digoxin.

Another common ailment in older adults is urinary and bowel incontinence. As adults age, the capacity of the bladder decreases. Paired with central nervous system dysfunction, older

adults may have a decreased sensation of voiding the bladder, leading to overfilling and ultimately incontinence. With age, older adults may also lose control of internal and external anal sphincters, leading to bowel incontinence. Older adults also have a decrease in intestinal motility, leading to increased storage of waste and longer transit of fecal matter. These changes lead to chronic constipation which is usually treated with a high-fiber diet.

Changes also occur separately in men and women. As they age, men experience an enlargement of the prostate, leading to the retention of urine and inability to void their bladders. On some occasions, prostate surgery may be implicated to correct urinary retention due to prostate enlargement. Women will experience menopause signifying the cessation of their menstrual cycle. More often, hot flashes will be a commonly experienced symptoms of menopause, leading to changes in skin and core temperature, and pulse rate during each hot flash. These may also disrupt sleep patterns if hot flashes are occurring during the night.

As adults age, they will experience delayed transit of food or decrease relaxation for swallowing, making it more difficult to eat. Moreover, older adults will have a higher incidence of gastritis within their stomachs. Aging will also lead to a decrease in liver weight. While liver functioning shows insignificant changes due to aging, certain medications will be metabolized more slowly in older adults which may be attributed to the smaller size of the liver.

Bone mass will decrease with aging, leading to a higher likelihood of osteoporosis. Older adults with this condition will have a higher risk of broken bones and need to monitor activities accordingly. Covering the bones, atrophy and thinning of the epidermis occurs with aging and is most severe in the face, upper chest, neck, and hands. Additionally, dermal collagen also stiffens with age, leading to looser skin and the development and appearance of wrinkling and sagging. Aging also leads to a decrease in muscle mass, leading to atrophy of peripheral muscles.

Older adults will experience reduced pupil size, leading to less responsiveness to lighting changes. Resultantly, older adults will have a higher need for ambient lighting to read and may have difficulty adjusting to brighter lights or headlights when driving. Dry eyes and loss of peripheral vision are also common physiological changes seen in aging. The latter change may also lead to a difficulty in seeing cars out of blind spots, increasing automobile accident risks. Cognitive changes also occur as a result of aging. Auditory changes can lead to impairment in hearing and the ability to separate foreground and background sounds. Taste will become less able to separate or even recognize some tastes, with similar changes happening to the sense of smell. Tactile, kinesthetic and proprioceptive feedback becomes less accurate, and motor neurons, joints, and muscles show deterioration.

Older adults will exhibit a decrease in gray matter brain mass as they age and reduced ability to produce core neurotransmitters. These lead to secondary impairment in mood regulation, memory, motor functioning, and other important higher order cognitive functions. These age-related physiological changes are important to note as they may also lead to secondary effects in functionality, independence, self-image, and motivation.

Further Readings

Boss, G. R., & Seegmiller, E. (1981) Age-related physiological changes and their clinical

significance. *Western Journal of Medicine*, 135(6), 434-440.

Navaratnarajah, A., & Jackson, S. (2013). The physiology of aging. *Medicine in Older Adults*,

41(1), 5-8. doi: 10.1016/j.mpmed.2012.10.009