

Wear and Tear Theory of Aging

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The wear and tear theory of aging is an idea proposed by German biologist, Dr. August Wiesmann, in 1882. The theory suggests that aging results from a gradual deterioration of the cells and tissues of the body via wear and tear, oxidative stress, exposure to radiation, toxins, or other deteriorative processes. It suggests that living organisms “wear out” over time with repeated use and increased stress on the body. This concept is similar to the idea that objects such as automobiles deteriorate or wear out as they are used repeatedly over time. Because people observe the wear and tear on these objects, this theory fits in with their perception of how humans age as well. Therefore, the concept is very popular and has been accepted by many.

The wear and tear theory can also be described as the fundamental limitations theory or the simple deterioration theory. This is based on the idea that aging results from fundamental limitations, including the laws of physics and chemistry. For instance, the second law of thermodynamics is the idea of entropy which suggests that the universe moves toward death and disorder. Another argument in support of the theory is based on the physical observation that the internal and external organs of the body such as skin and bones noticeably deteriorate over time, even when one has a healthy lifestyle. Another example of a system in the human body that shows gradual deterioration is our nerve cells. These cells are not replaced; therefore, gradual loss of these cells leads to eventual decrease in function. Based on the examples provided, it is important to note that proponents of the wear and tear theory believe that reversing this deterioration on the body is impossible despite one’s lifestyle. This claim, along with other

arguments, have led to controversy surrounding the legitimacy of the wear and tear theory as more recent data may suggest otherwise.

Researchers in more recent years have argued that this theory is long outdated and that there is no direct data to support the claims made by the wear and tear theory. Several arguments have been made as to why the theory does not necessarily explain the aging process. Perhaps one main argument against this theory is proven by the ability of a mammal to repair itself via repair mechanisms throughout the different systems of the body. A simple example is the ability of a broken bone to heal in as little as a few weeks. Another key argument is the fact that living organisms become stronger while they are developing, rather than starting out at their strongest and best performance. In fact, in infancy, an organism is quite weak, and strength along with other vital physical and cognitive features progress throughout development before peaking. Thus, aging is essentially nonexistent during these growth stages because of the progression that occurs during this development as opposed to decline. This is the major difference between living species and inanimate objects as material items are considered to be at their peak performance when they are brand new and degrade with each use.

Another argument made against the theory is the idea that there are large differences in the lifespans of similar species. This would go against what the theory proposes because it fails to provide an explanation for these differences in organisms that are biologically similar. Several research studies have been conducted to test the wear and tear theory. For example, some studies have found that an increase in stress or illness lowers the life expectancy of organisms, therefore concluding that aging is accelerated with this increased stress. However, this research defined aging in terms of the age associated with death. The problem this introduces is whether or not stress speeds up the rate of aging or if a population has a decreased life span because the rate of

stress or disease that causes death, is increased. On the other hand, some research has suggested that mammals are equipped to handle stressful situations without a significant effect on the body. This would therefore discredit the claim that increased exposure to stress leads to gradual wear out. Overall, while there are convincing data in favor of and against the wear and tear theory of aging, it seems as though other factors should be taken into account, as there are many individualized differences even within a single species. It may be that wear and tear occurs, but its rate and extent may be modified by life style, genetic makeup, environmental stress, psychological stress, injury and disease.

Further Reading

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Goldsmith, T. (2011). *An introduction to biological aging theory*. Azinet.

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Mitteldorf, J. (2010). Aging is not a process of wear and tear. *Rejuvenation research*, *13*(2-3), 322-326.