*Courtesy of* [*America Online, Inc.*](http://docs.google.com/www.aol.com)

*At some point in our lives, we are all afraid of death. Aging, or* **senescence***, as it is known among geneticists, only brings those fears to the surface. Many hardships of being elderly, such as Alzheimer's and Parkinson's Disease, are virtually incurable, with families of the victims having to handle an added burden to their daily lives. They must endure months, if not years, of degeneration of the sufferer's mind. It can lead to much pain for both parties involved, arguments ensuing, neglect, and much more.*

*"Aging and cancer research seem, at first glance, to be completely separate fields of scientific study with the only connection being that the incidence of cancer generally increases with age" (Shay, 378). Many companies are researching the complexity of the process as you read these words. They hope that they can find a drug that will slow the aging process and in addition, possibly stop the spread of malignant cancers.*

*"Scientists have cloned an ancient 'immortality gene'...a development that could bring profound advances in the fight against cancer and some of the afflictions of old age," reports the* San Francisco Chronicle*. The* [*Geron Corporation*](http://www.geron.com/) *is currently exploring the possibility that the enzyme* [*telomerase*](http://docs.google.com/TERMS.HTML#telomerase) *is responsible for the extreme rate of division of cancer cells. They have published their findings in the journal* Science (Vol. 279, 16 Jan 1998, p 349-352)*.*

*When a cell goes through cell division* (**mitosis**)*, it expands until the exterior surface area of the cell cannot support the volume growth of the interior. At this point, the cell initiates mitosis, whereby the cell replicates its genetic material and distributes exact copies to "daughter cells". As the cell divides, the* **chromosomes***--the database of all information in any living being--are brought to the new cells. However, when the cell divides, the ends of the chromosomes (which are made up of repeating DNA sequences called* **telomeres***) cleave off and shorten. The sequence that cleaves off (T2AG3) can only be reattached through means of an RNA enzyme designated* [*telomerase*](http://docs.google.com/TERMS.HTML#telomerase)*. This enzyme allows the base pairing on the telomere to recombine with the DNA sequence, and extending the amount of times of divisions the cell can go through.*

*Such a replication process is vital in the survival of a cancerous region of tissue. The top ten cancers* (lung, colorectal, breast, leukemia, prostate, pancreas, urinary, ovary, uterus, and melanoma) *all have* [*telomerase*](http://docs.google.com/TERMS.HTML#telomerase) *active on overdrive, making the cell able to continually divide and remain virtually immortal. In fact, these cells reconnect free telomeres from the environment and extend the lifespan of the cancer. Current therapy includes radiation, which wipes out not only the cancerous cells, but also the vital cells of the body. The patient must go through extensive recovery after the therapy, to assure doctors that the cancer is eliminated. Geron is trying to develop a technique that will limit the activity of* [*telomerase*](http://docs.google.com/TERMS.HTML#telomerase) *in the cancer and allow the cell to divide normally. This will halt the growth and spreading activity of the cancer and allow it to be reincorporated into the body. Such use of a* [*telomerase*](http://docs.google.com/TERMS.HTML#telomerase) *inhibitor is called* **gene therapy***, and it has less of an impact on the physical body than radiation therapy.*

*Aging can be a formidable opponent. It can be a very serious problem for a lot of people. However, the following poem by an anonymous takes aging in stride, trying to relieve the pressures of aging:*

**REFLECTIONS ABOUT GROWING OLD**

|  |  |  |
| --- | --- | --- |
|  | Just a line to say I'm living  That I'm not among the dead;  Though I'm getting more forgetful  And more mixed up in the head.  For sometimes I can't remember  When I stand at foot of stair,  If I must go up for something  Or I've just come down from there.  And before the 'frig so often  My poor mind is filled with doubt,  Have I just put food away, or  Have I come to take some out  And there's time when it is dark out  With my night cap on my head,  I don't know if I'm retiring  Or just getting out of bed,  So if it's my turn to write you  There's no need in getting sore,  I may think that I have written,  and don't want to be a bore.  So remember -- I do love you,  and I wish that you were here!  But now, it's nearly mail time  So I must say, "Good-bye dear."  P.S. There I stood beside the mailbox  with a face so very red  "Instead of mailing you my letter  I opened it instead!" |  |

*The purpose of this experiment is to show the relationship of the strength of telomere repetitions in a chromosome to the relative age of a person.* **(*Note*: The results of this run of the experiment are only to make *predictions* about a person's true biological age. The data does *not* tell how much longer a person has to live or at time the person will live to.)** *It involves a two-step process: a collection of cell samples, and the testing assay. Because of the nature of the assay (it deals with low-level radiation), schools may not have the necessary equipment. Consequently, please contact a research facility that has access to this assay, such as the* [*Geron Corporation*](http://www.geron.com/).

*The animation below was created by* [*ABC News*](http://docs.google.com/www.abc.com)*, broadcasted on* 20/20*, January 16, 1998.*