Like stress, aging gets richly deserved bad press. Mother Nature forces us into a game where she makes up the rules as we progress toward various reversals of mental and physical fortune, and then, occasionally even before our “best-by” date, we reach our expiration. Indeed, growing old is not for sissies. Younger readers will please note that because some age-related mental slowing begins shortly after the brain’s prefrontal lobes become fully developed, smugness about brain aging is not appropriate for those approaching (or passing) 40.

Why aging? Why death?

There are various theories about why we age and expire. Irrespective of the insights they provide, none evokes great mirth. Each one mentioned here seems reasonable and probably contributes to our ultimate exit. In no particular order, they are:

1. **Telomeres.** The caps on the ends of each of our chromosomes are surely implicated. Those complexes of protein and DNA are called by the friendly name **telomeres.** By capping the ends of the chromosomes, the telomeres protect the chromosomes from picking up stray and unhelpful bits of DNA, and from acquiring the errors that would result. The telomeres also allow the chromosomes to replicate themselves completely, as they must when cells divide. Apparently without telomere caps on DNA, the parts of the DNA closest to the chromosome ends would not replicate.

   Although telomeres are quite long at birth, they get shorter as we age. In part that happens because each time our chromosomes get frisky and reproduce, bits of the telomeres are lost, so that as we age...
the chromosomes are less well protected until so little of the telomeres remains that our cells cannot divide. It takes no imagination to see the implications of curtailed cell division for a continued healthy life, particularly if the nonreplicating cells are components of the immune system. In fact shorter telomere length in our immune system leukocytes (white blood cells) corresponds with cardiovascular-related diseases and with earlier mortality.

Research shows that accelerated telomere shortening results from psychological and physical stressors that we may experience from our beginnings in fetal life to old age. For example, telomere shortening results from depression, from the stress of caring for a chronically sick child, and from caring for an adult with dementia. Factors that predispose us to be less tolerant of stressors are also implicated in shorter telomeres. Thus, the telomeres in leukocytes are shorter in preschool-aged children who had lower birth weight, suggesting that their immune systems will age more rapidly than they should. Other factors that shorten telomeres are smoking, obesity, and having a sedentary life style (see Shalev et al., 2013a, for a review of factors that affect telomeres.)

Chronically elevated stress hormones apparently participate in shortening telomeres. How those hormones shorten telomere length is still under study, but cortisol has been shown in laboratory studies to inhibit the enzyme telomerase, and telomerase restores telomere length. If there is a mechanism for lengthening the telomeres, and if short ones portend an early death, then perhaps we can find a way to keep our telomeres long and content, and then we might live forever. Happily, some recent research shows lengthening of telomeres in some mice who were lucky enough to land in the low-stress-control group in a stress study. However, more relevantly for us humans, lengthening also occurred in a subgroup of older adult people who were experiencing a period of decreasing life stressors, and in a subgroup of men in a prostate cancer study—men who indicated lessening distress and fewer negative and intrusive thoughts about cancer. Those studies suggest that after the accelerated telomere shortening that results from chronic stress, relief from stress reverses those processes, at least temporarily (much of the foregoing on telomeres is from Epel, 2009, and see Verhoeven et al., 2013, for specifics on telomere shortening with depression).

Even better, Jacobs et al. (2010) found substantial positive impacts on telomerase activity following training in meditation. Apparently we can be proactive in stretching our telomeres. Perhaps there is a grain of reality in those ubiquitous cartoon images of long-bearded gurus meditating on their mountaintops, occasionally revealing the secret of life... Or perhaps