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 Assignment

Discuss the role of telomeres and telomerase in the replication of linear DNA

The ends of the **linear** chromosomes are known as **telomere** repetitive sequences that code for no particular gene.

The role of the These telomeres are to protect the important genes from being deleted as cells divide and as DNA strands shorten during replication.In humans, a six base pair sequence, TTAGGG, is repeated 100 to 1000 times. After each round of DNA replication, some telomeric sequences are lost at the 5′ end of the newly synthesized strand on each daughter DNA, but because these are noncoding sequences, their loss does not adversely affect the cell. However, even these sequences are not unlimited. After sufficient rounds of replication, all the telomeric repeats are lost, and the DNA risks losing coding sequences with subsequent rounds.

The also function to protect the ends of chromosomes. They prevent one chromosome from binding to another (DNA is sticky). They also don't have any genetic information. This comes in handy during DNA replication because we lose a bit of DNA with each round of cell division, so the telomeres protect the chromosomes so they are not lost.

Telomerase is the enzyme responsible for maintenance of the length of telomeres by addition of guanine-rich repetitive sequences. Telomerase activity is exhibited in gametes and stem and tumor cells. In human somatic cells proliferation potential is strictly limited and senescence follows approximately 50-70 cell divisions. In most tumor cells, on the contrary, replication potential is unlimited. The key role in this process of the system of the telomere length maintenance with involvement of telomerase is still poorly studied. No doubt, DNA polymerase is not capable to completely copy DNA at the very ends of chromosomes; therefore, approximately 50 nucleotides are lost during each cell cycle, which results in gradual telomere length shortening. Critically short telomeres cause senescence, following crisis, and cell death

Telomeres protect the end of the chromosome from [DNA damage](https://en.m.wikipedia.org/wiki/DNA_damage_%28naturally_occurring%29) or from fusion with neighboring chromosomes. The fruit fly [*Drosophila melanogaster*](https://en.m.wikipedia.org/wiki/Drosophila_melanogaster) lacks telomerase, but instead uses [retrotransposons](https://en.m.wikipedia.org/wiki/Retrotransposon) to maintain telomeres