WRN Gene

Subjects: Genetics & Heredity
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Werner syndrome RecQ like helicase: the WRN gene provides instructions for producing the Werner protein, which plays a critical role in repairing damaged DNA. The Werner protein functions as a type of enzyme called a helicase.

Keywords: genes

1. Normal Function

Helicase enzymes generally unwind and separate double-stranded DNA. The Werner protein also functions as an enzyme called an exonuclease. Exonucleases trim the broken ends of damaged DNA by removing DNA building blocks (nucleotides). Research suggests that the Werner protein first unwinds the DNA and then removes abnormal DNA structures that have been accidentally generated.

Overall, the Werner protein helps maintain the structure and integrity of a person's DNA. This protein plays an important role in copying (replicating) DNA before cell division and transferring the information in genes to the cell machinery that makes proteins (transcription). Additionally, recent studies suggest that the Werner protein may be particularly important for maintaining DNA at the ends of chromosomes (telomeres).

2. Health Conditions Related to Genetic Changes

2.1. Werner syndrome

More than 60 mutations in the *WRN* gene are known to cause Werner syndrome. Most of these mutations result in an abnormally short, nonfunctional Werner protein. Research suggests that this shortened protein is not transported into the cell's nucleus, where it normally interacts with DNA. Furthermore, the shortened protein is broken down more quickly than the normal Werner protein, reducing the amount of this protein in the cell. Without normal Werner protein in the nucleus, DNA replication, repair, and transcription are disrupted. Researchers are still determining how mutations in the *WRN* gene lead to the signs and symptoms of Werner syndrome.

2.2. Prostate cancer

2.3. Cancers

Some changes to a person's genes are acquired during that person's lifetime and are present only in certain cells. These differences, called somatic changes, are not inherited. Somatic changes in the *WRN* gene are found in nonhereditary tumors and involve a process called methylation. Methylation is a chemical modification that attaches small molecules called methyl groups to certain segments of DNA. When too many methyl groups are attached to the *WRN* gene (hypermethylation), the gene is turned off and the Werner protein is not produced. Without this protein, cells do not respond normally to DNA damage. The lack of Werner protein allows mutations to accumulate in other genes, which may cause cells to grow and divide in an uncontrolled way. This kind of unregulated cell growth can lead to the formation of cancerous tumors. Hypermethylation of the *WRN* gene has been found in many different types of tumors, including colon, rectal, lung, stomach, prostate, breast, and thyroid tumors.

3. Other Names for This Gene

- RECQ3
- RECQL2
- RECQL3

- Werner syndrome
- Werner Syndrome helicase
- Werner syndrome protein
- Werner syndrome, RecQ helicase-like
- WRN_HUMAN

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