

# NOBEL PRIZE IN CHEMISTRY 2015

The Nobel Prize in Chemistry 2015 was awarded to **Tomas Lindahl**, **Paul Modrich**, and **Aziz Sancar** for having mapped how cells repair damaged DNA.

## DNA DAMAGE



BASES: **A** PAIRS WITH **T** **C** PAIRS WITH **G**

DNA damage occurs regularly, due to UV radiation, carcinogenic substances, & copying errors. The prize is for the discovery of the mechanisms that repair this damage.

## BASE EXCISION REPAIR



1  
C loses amino group to form U. U can't pair with G.

2  
Enzymes remove U and its section of the DNA strand.

3  
The correct base is inserted and the strand is sealed.

DNA is an unstable molecule. Lindahl showed that base excision repair prevents its decay. Without this mechanism, development of life would have been impossible.

## NUCLEOTIDE EXCISION REPAIR



1  
UV radiation can cause two Ts to bind to each other.

2  
Enzyme cuts a 12 nucleotide strand, removing damage.

3  
The resulting gap in the DNA is filled and then sealed.

Sancar explained how DNA is repaired after damage from UV and mutagenic substances. People with defects in this repair system are at higher risk of developing cancer.

## MISMATCH REPAIR



1  
Sometimes the nucleotides in copied DNA don't match.

2  
Enzymes remove a section containing the faulty nucleotide.

3  
The resulting gap in the DNA is filled and then sealed.

Modrich showed how errors produced when cells divide and DNA is replicated are repaired. This reduces the error rate of DNA replication by a factor of 1000.

