

# DNA Repair and Mutagenesis

## I. Chemicals react with DNA like every other molecule

Evidence for repair  
Survival Assays

## II. Repair of Specific Common Forms of DNA Damage

### Deamination

Hypoxanthine, Xanthine, Uracil

Base Excision Repair

DNA Glycosylases, AP Endonucleases, Polymerase I, Ligase

Very Short Patch

Dcm, Vsr

### Oxidation

8-oxoG (more than 30 other common forms as well)

MutM, MutY, MutT

### Alkylation

N<sup>7</sup>-methylguanine, N<sup>3</sup>-methyladenine, O<sup>6</sup>-methylguanine, O<sup>4</sup>-methylthymine

Base Excision Repair

Direct Reversal- Ogt, Ada: Suicide Proteins

Adaptive Response

### Photoproducts

Pyrimidine dimer, 6-4 photoproduct

Direct Reversal- Photolyase

Base Excision Repair (in some organisms)

### Interstrand Crosslinks

Repaired by?

## III. General Repair Pathways

### Methyl Directed Mismatch Repair

Dam, MutS, MutL, MutH, exonucleases, MutU(UvrD), Polymerase III

### Nucleotide Excision Repair

UvrA, UvrB, UvrC UvrD, Pol I Ligase

transcription-coupled repair, Mfd

## IV. When Replication is Blocked

Special Damage Recognizing Polymerases

UmuCD, DinB, PolB others

Recombination Proteins At Replication Forks, Replication coupled repair?

SOS Response- Inducible repair

RecA, LexA

Weigle Mutagenesis

## V. Isolation of Repair Mutants, Mutagenesis Proteins