31. DNA repair
1 unit, Xiaolan Zhao, October 14, 2025

DNA lesions, DNA repair, and their impact on human health

1) **Types and sources of DNA damage**

- Base Damage (hydrolysis, oxidation, methylation, bulky adducts, UV damage, etc)
- Strand Damage (strand crosslinking, ssDNA break, dsDNA break)
- Mismatches (replication errors, single base changes, small insertion and deletions)

2) **Overview of three DNA repair pathways and their relevance in diseases**

- Base excision repair (BER)
- Nucleotide excision repair (NER)
- Mismatch repair (MMR)

Note: other DNA repair pathways, such as homologous recombination and end joining will be discussed in other lectures.

3) **Challenging questions & examples of recently discovered DNA repair processes**

Discussion Paper:
Stingele J, Schwarz MS, Bloemeke N, Wolf PG, Jentsch S. A DNA-dependent protease involved in DNA-protein crosslink repair. *Cell*. 2014;158(2):327-338.

Related Papers:
Relevant chapters in "DNA repair and mutagenesis" (2nd edition)
Stingele J, Bellelli R, Alte F, et al. Mechanism and Regulation of DNA-Protein Crosslink Repair by the DNA-Dependent Metalloprotease SPRTN. *Mol Cell*. 2016;64(4):688-703.