

NUMERICS PACE Grant

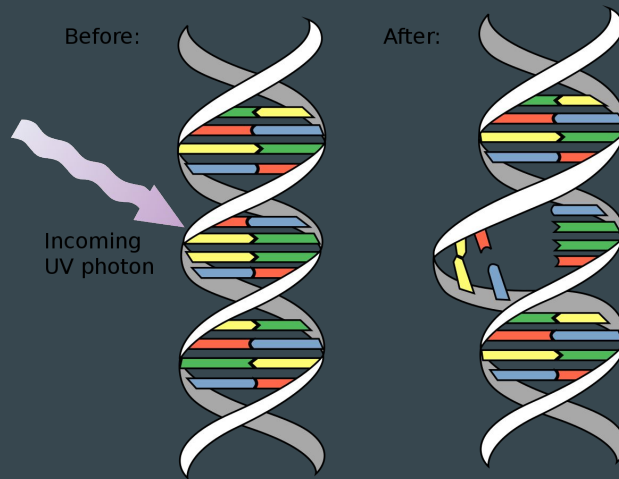


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PhD Project: Modelling DNA Repair in Living Cells

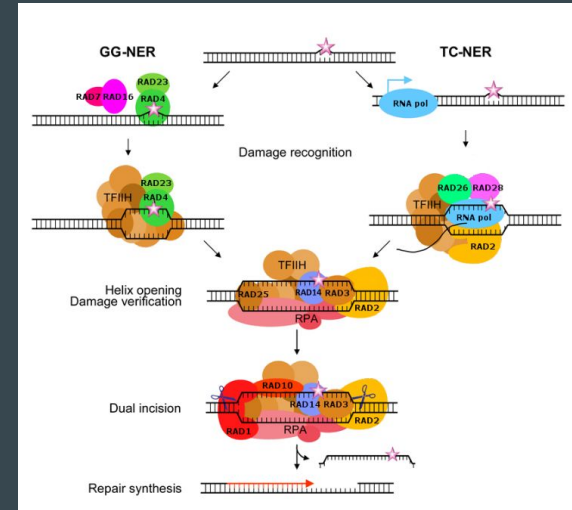
DNA is constantly targeted and damaged by environmental factors.

Damage



By NASA/David Herring

Repair



Modified from Schärer Adv Exp Med Biol. 2008 for yeast proteins

In vivo dynamics for DNA repair are complex.

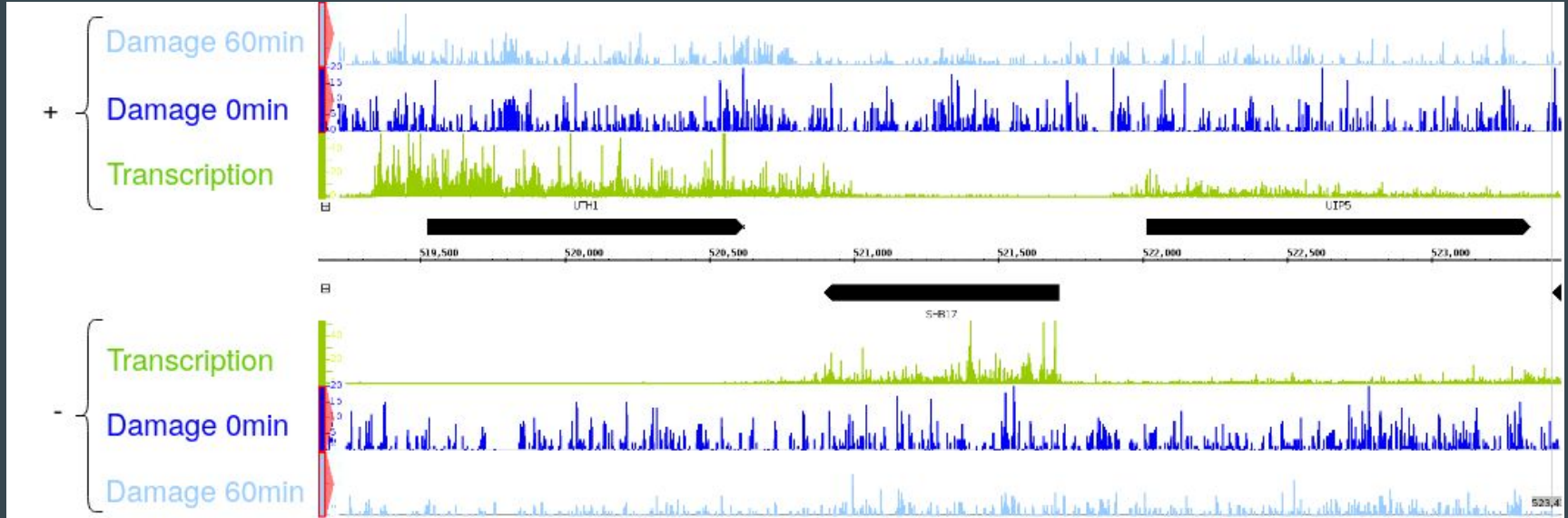
Need computer models!

Next Generation Sequencing Data

CPD damage data from: Mao, Peng, et al. "Chromosomal landscape of UV damage formation and repair at single-nucleotide resolution." *Proceedings of the National Academy of Sciences* 113.32 (2016): 9057-9062.

Pol 2 data for transcription from: Georges, Adrien, et al. "Functional interplay between Mediator and RNA polymerase II in Rad2/XPG loading to the chromatin." *Nucleic acids research* 47.17 (2019): 8988-9004.

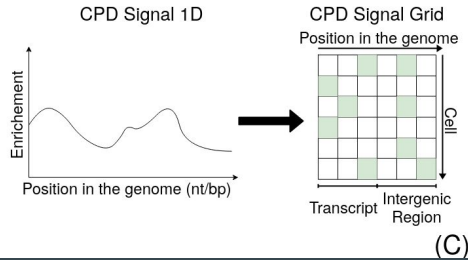
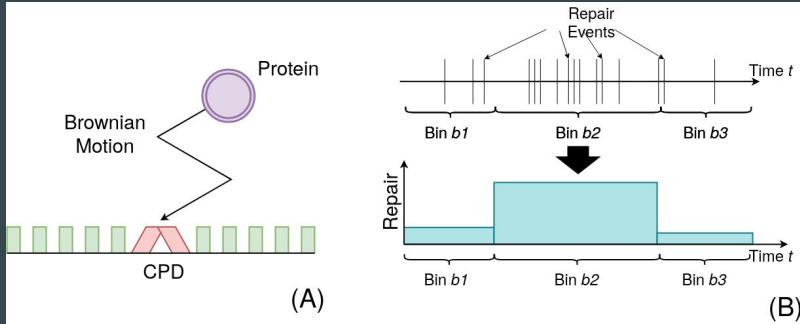
Next Generation Sequencing (NGS) data measures a property (e.g. protein association or presence of damage) along the genome for an entire cell culture.



The complex data signal is difficult to describe.

Only few time points per NGS data set.

Describing Repair by Understanding the Data



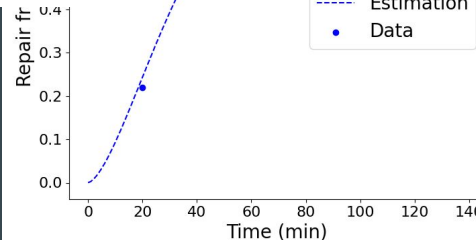
Cells are independent of each other.

Explain the repair time through diffusion of proteins and accessibility to the lesion.

Understand the NGS signal as the product of independent cells.

From: Zeitler, Leo, et al. "A quantitative modelling approach for DNA repair on a population scale." *PLoS computational biology* 18.9 (2022): e1010488.

air evolution: chrVIII YHL025W



Postdoctoral Project: Model Cellular Communication during Blood Vessel Formation (Angiogenesis).



Study the effect of cellular connections for the temporal process of angiogenesis at **Francis Crick Institute in London**.

Laboratory: **Cellular Adaptive Behaviour**
Laboratory - Katie Bentley