"DNA Endgame: Using frog egg extracts to unravel how copying of the DNA blueprint is terminated"

DNA inside a human cell is faithfully replicated with an error rate of ~1 in a billion. The fidelity of this process is critical to prevent a diverse set of diseases, from cancer, to dwarfism and neurodegeneration. DNA replication in humans involves loading and activation of ~60,000 DNA replication machines which copy the DNA.

Completion of DNA replication is called termination and occurs when pairs of copy machines meet head-on upon the same stretch of DNA. Termination is highly perilous in bacteria and viruses and was assumed to be equally-problematic in humans. This assumption persisted for decades, because technical limitations prevented termination from being studied in cells. However, using a ‘cell in a tube’ approach derived from frog egg extracts, Dr. Dewar showed that termination in humans is rapid, suggesting humans possess specific proteins to promote termination.

The Dewar lab is working to identify proteins that promote rapid termination. It is particularly important to study termination because this process is targeted during chemotherapy. The Dewar lab is also working to understand a specialized form of termination that occurs at telomeres, which cap chromosome ends and impair cellular aging.