Present in nearly all living organisms, DNA is the natural carrier of hereditary information. Despite being tightly associated around histone proteins within eukaryotic cells and packed as chromatin for the vast majority of the cell cycle, DNA is constantly subject to both endo- and exogenous sources of damage, leading to chemical modifications such as alkylation, cross-linking and depurination. This latter event leads to the formation of an abasic site. With an estimated 10,000 such sites formed per cell, per day\(^1\), abasic sites are considered one of the most abundant forms of DNA damage.

In the ring open form, abasic sites contain a highly reactive aldehyde group which can be labelled, for example, with a nucleophilic probe conjugated to a fluorophore\(^2\). The aim of this project is to synthesize a fluorescent probe which can selectively react with abasic sites in living cells, enabling live cell imaging of these DNA lesions. Single molecule resolution microscopy will be used to generate a cellular 3D map of abasic sites.

You should apply for this project if you have an interest in or would like to learn more about:

- Organic synthesis
- Chemical biology
- Microscopy
- Nucleic acids

References