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Probing the conformation of DNA by time-resolved fluorescence¹ ANITA JONES, ROBERT NEELY, ELEANOR BONNIST, DAVID DRYDEN, University of Edinburgh, DALIA DAUJOTYTE, SAULIUS GRAZULIS, SAULIUS KLIMASAUSKAS, Institute of Biotechnology, Vilnius, THOMAS LENZ, EL-MAR WEINHOLD, University of Aachen — The fluorescent adenine analogue, 2aminopurine (AP), is a widely used probe of DNA structure and dynamics. We have investigated the time-resolved fluorescence of AP-labelled duplexes in single crystals, in solution and in frozen matrices, to elucidate the influence of interbase interaction and base dynamics on the photophysics of AP. DNA undergoes conformational change in response to interaction with agents such as enzymes and drugs. Base flipping, induced by DNA methyltransferase enzymes, is a remarkable example of conformational distortion; the target nucleotide is rotated around the phosphate backbone, out of the duplex and into the enzyme active site. We will report the first time-resolved fluorescence measurements of single crystals of AP-labelled DNA duplexes complexed with methyltransferase enzymes (M.HhaI and M.TaqI). Correlation of these results with studies on the analogous solution-phase systems shows that the fluorescence response of AP is a definitive indicator of the base flipping mechanism. Moreover, the AP decay parameters provide detailed information on the nature of the interaction between enzyme and duplex.

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Anita Jones

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