

P073 Replication and repair crosstalk induced by targeted DNA damage

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Many of the key proteins involved in DNA replication are also involved in DNA repair.

Though DNA replication and repair both involve DNA synthesis, the replication proteins have been observed to behave distinctly during these two processes (Essers et al, 2006).

Discrete cell signalling pathways are thought to control the protein kinetics in the replication and repair processes (Solomon et al, 2004).

Currently, quantitative live cell imaging combined with techniques to induce localised damage in a small region of the cell nucleus is making substantial contributions to unravelling the behaviour of proteins involved in DNA repair. One of the most precise methods of inducing localised DNA damage comes from exploiting the powerful multiphoton principle. Ultraviolet DNA damage can be induced by 3-photon absorption from a focused near infra-red laser beam. The region of UV damage is confined to a femtolitre volume in the focal plane that conforms to the multiphoton absorption volume (Meldrum et al 2003). The targeting of these spots of damage can also be very precise.

This technique enables detailed study of the spatiotemporal interaction between DNA replication and repair and measurement of the distinct kinetics of proteins that are simultaneously involved in both functions. Using this technique and cells that contain GFP tagged PCNA we examined the proteins behaviour in replication centres close to or distant from the damage spot.