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Towards a better understanding of DNA repair in Deinococcus radiodurans Joanna Timmins[a], Ingar Leiros,[b] Elspeth Gordon[a], Gordon Leonard[a] and Sean McSweeney[a] [a]*ESRFs, Grenoble, France.* [b]*NorStruct, University of Tromsø, Norway.* E-mail: timmins@esrf.fr

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Our team is interested in the structural biology of *Deinococcus radiodurans*, a Gram-positive eubacterium that displays an extraordinary resistance to a wide-range of DNA-damaging agents, such as ionising radiation and desiccation. Ionising radiation induces the most lethal form of DNA damage, namely DNA double-strand breaks (DSBs). Whilst in most species only a few DSBs can be tolerated and repaired, *D. radiodurans* can withstand and repair over 100 DSBs in its genomic DNA. Initial investigations support the view that the extreme radiation resistance of *D. radiodurans* is complex and is most likely determined by a combination of factors such as efficient DNA repair machinery, genome packing and cell structure. To improve our understanding of this unusual phenotype, we are studying the proteins involved in the three major DNA repair pathways. Two of these, the nucleotide-excision and recombinational repair pathways, have been the focus of our recent work. We have determined the three-dimensional structures of RecO alone and in complex with its cellular partner RecR, both of which are involved in recombinational repair. More recently, we obtained the structure of a key protein involved in nucleotide-excision repair. These three novel structures together with extensive biochemical studies have largely contributed to our improved understanding of the molecular mechanisms underlying DNA repair