

**Master 2 internship project  
Year 2026-2027**

**Laboratory/Institute:** IBS  
**Team:** GenOM

**Director:** Winfried WEISSENHORN  
**Head of the team:** Joanna TIMMINS

**Name and status of the scientist in charge of the project:**  
Pierre VAUCLARE. CRCN CNRS

**HDR:** yes ☐ no ☒

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**Program of the Master's degree in Biology:**

X Microbiology, Infectious Diseases and Immunology X Biochemistry & Structure  
X Physiology, Epigenetics, Differentiation, Cancer ☐ Neurosciences and Neurobiology

**Title of the project:** Recruitment and mobility of DNA repair proteins UvsE and UvrA in the radioresistant bacterium *Deinococcus radiodurans* following UV exposure.

**Objectives (up to 3 lines):** This M2 project aims to investigate the recruitment, distribution, and mobility of DNA repair proteins, notably UvsE and UvrA, following high-dose UV exposure, in order to shed light on the remarkable DNA repair capacity of the radioresistant bacterium *D. radiodurans*.

**Abstract (up to 10 lines):** *Deinococcus radiodurans* (*Drad*) survives extreme radiation due to its outstanding DNA repair capacity. This exceptional resilience relies on universal DNA repair pathways, including the base excision repair (BER) and nucleotide excision repair (NER) pathways, that together eliminate nucleobase lesions. In *Drad*, these repair systems are further complemented by the UvsE endonuclease and a non-canonical UvrA2 variant; together, all these proteins act synergistically to eliminate UV- and ionizing radiation-induced lesions. Preliminary results further suggest that this process is modulated by nucleoid organization, as UV-induced nucleoid-associated proteins (e.g., DdrC) appear to act synergistically with UvrA from the NER pathway during the early sensing steps. The objective is to characterize the distribution and recruitment of DNA repair factors at sites of UV-induced damage *in vivo* using advanced fluorescence imaging techniques, and, where feasible, study their interactions using complementary biochemical approaches.

**Methods (up to 3 lines):**

*Drad* strains expressing fluorescently-tagged (or V5) repair proteins will be used. Spinning disk confocal microscopy and Western blotting will assess protein localization and expression, while single-molecule localization microscopy (sptPALM) will be used to track protein dynamics.

**Up to 3 relevant publications of the team:**

1. Banneville AS., et al. (2022). *Nucleic Acids Research*. 50(13): 7680-7696.

<https://doi.org/10.1093/nar/gkac563>.

2. Vauclare P., et al. (2024). *Nucleic Acids Research*. 2024;52(11). 6406-6423.

<https://doi.org/10.1093/nar/gkae379>.

3. Seck A, et al. (2023). *Nucleic Acids Research*. 51(6): 2931-2949.

<https://doi.org/10.1093/nar/gkad108>.

**Requested domains of expertise (up to 5 keywords):**

DNA repair, DNA damage, radio-resistance, nucleoid, *Deinococcus radiodurans*