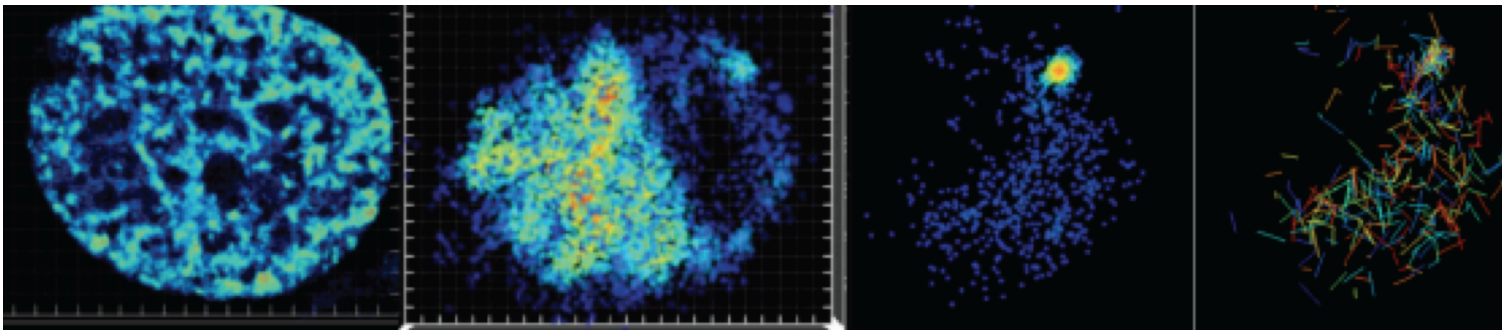

POST-DOCTORAL POSITION

IMAGING DNA REPAIR

AT SUPER RESOLUTION

Curie Institute, Paris

Laboratory: Nuclear dynamics, UMR 3664
Angela Taddei Team: Compartmentalization and dynamics of nuclear functions.
Starting date: As soon as possible.

SUMMARY OF LAB'S INTERESTS:

The eukaryotic genome is packaged into large-scale chromatin structures that occupy distinct domains in the nucleus. This DNA organization is a key contributor to genome functions. Our aim is to understand what determines the spatial and temporal behavior of chromatin and how this affects two essential functions of the genome: gene expression and the maintenance of genome integrity. To understand these fundamental processes, we combine genetics, molecular biology and advanced live cells imaging.

PROJECT:

In this project, we propose to investigate the molecular mechanisms of repair proteins inside cells using super-resolution microscopy (photo-activable localization microscopy PALM and single particle tracking) in *Saccharomyces cerevisiae* yeast. In response to double strand break (DSB), repair proteins such as Mre11, Rad52 and Rad51, colocalize from a diffuse distribution to a repair focus located at the damaged DNA site. An enduring question in the DNA damage field is how do repair proteins find the correct target and how these membrane-less compartments are maintained and dissolved.

To answer these questions, we use PALM/STORM and single particle tracking approaches to elucidate the internal structure of repair foci and the dynamics of individual repair proteins. More specifically, the internal structure gives access to the shape, size and stoichiometry of repair foci; the dynamics of single repair proteins gives access to diffusion coefficients, kon/koff, residence time inside a focus, exchange rates between proteins inside the focus and the rest of the nucleus… The precise nature of repair foci will be studied for

different types of DNA damages (endonuclease, chemical damaging agents, ionizing-irradiations).

We have already started to investigate the mobility of Rad52 proteins, an essential protein of homologous recombination in *Saccharomyces cerevisiae* yeast. To better understand the molecular mechanisms of DNA repair, we will study the nature of repair foci in mutant Rad52 defective in their interactions with its partners, before and after induction of different types of DNA damage(s).

We offer a 12-months founded post-doc contract and will support the candidate for post-doc grants applications (EMBO, Marie Curie, HFSP, FRM, La Ligue …).

Key publications:

Multi-scale tracking reveals scale-dependent chromatin dynamics after DNA damage. Miné-Hattab *et al.,* Mol Biol Cell. 2017.

Recombination at subtelomeres is regulated by physical distance, double strand break resection and chromatin status. Batté *et al.,* EMBO 2017.

Increased chromosome mobility facilitates homology search during recombination. Miné-Hattab *et al.,* Nat Cell Biol. 2012.

DNA in motion during double-strand break repair. Miné-Hattab *et al.,* Trends Cell Biol. 2013.

ENVIRONMENT:

The Taddei team provides all equipment's necessary for yeast cells cultures. A super resolution microscope is available in the unit (3D multi colors PALM/STORM/MFM and single particle tracking routinely used, and possibilities to install a SIM). Many yeast strains have been already developed for PALM/STORM and single particle experiments. The UMR 3664 of the Curie Institute is a very stimulating environment to work in the epigenetics and DNA repair field. The project in carried out in collaboration with Maxime Dahan's team (Physico-Chimie Curie, UMR168).

PROFILE AND EXPERTISE:

We invite applications from highly motivated and dynamics individuals holding, or shortly expecting to be awarded, a PhD degree in **Biophysics or Biology.** Proven research skills (publication track), good communication skills (in English) and **interdisciplinarity** are essential.

Expertise:

- Microscopy, image analysis (ImageJ, Matlab)
- Strong interest in cell biology
- Organization, responsibility and autonomy are required
- Knowledge in DNA repair mechanisms is appreciated
- An experience in budding yeast and cell culture is appreciated

To apply, please send a letter, your CV including publication record and contact details for 2 referees at:

Angela.taddei@curie.fr, Judith.mine@curie.fr