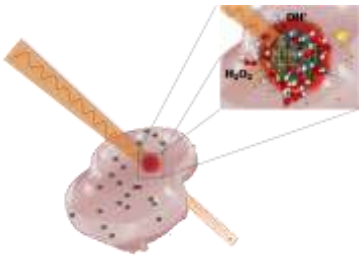
Soutenance de thèse

Sha LI

Institut des Sciences Moléculaires d'Orsay (ISMO), Orsay

"Potency of nanoparticles to amplify radiation effects revealed in radioresistant bacteria"

The addition of nanoparticles (NPs) is proposed as a novel strategy to amplify the radiations effects in the tumors (radiosensitization). It was found that radiosensitizers such as platinum, gold and gadolinium nanoparticles enhance the lethal effect of ionizing radiations (fast ions and gamma rays) in mammalian cells. This is attributed to a multiscale cascade of events, which includes the NPs activation and relaxation, the production of water radicals up that induce the biological damage and cell killing.



It is not clear yet what from the early stage processes or from the (eukaryotic) cell response is the key stage of the radiosensitization. Hence**, the challenge of this work was to probe the radiosensitizing effects of gold, platinum and gadolinium based nanoparticles on cells other than eukaryotic cells.** For the first time, their effect was tested **on the most radioresistant bacterium ever reported** *Deinoccocus radiodurans* (*D. radiodurans*). For comparison, the nanoparticles were tested on the radiosensitive bacterium *E.coli*. Studies performed at molecular scale were used to understand the elementary mechanisms.

In summary, throughout this study, a set of standard methods was established to evaluate the cellular uptake and the toxicity of the potential nanodrugs. This work demonstrated that the radiosensitizing nanoparticles amplify the effects of gamma rays in radiosensitive but also in radioresistant bacteria. This is attributed to the production of radical clusters and to the induction of nano-size biodamages in DNA but also in repair proteins. Finally, this work proves that the radiosensitization is a "universal" phenomenon that can take place in all living organisms.

Vendredi 4 avril 2014 à 14h

Bât 351 – 2ème étage (Bibliothèque)

Université Paris-Sud, 91405 Orsay Cedex

La soutenance sera suivie d'un pot auquel vous êtes chaleureusement conviés.