

Séminaire LIONS



Jeudi 26 mars 2015 à 11h00, bât. 127, salle 26

Nanomedicine and hadrontherapy

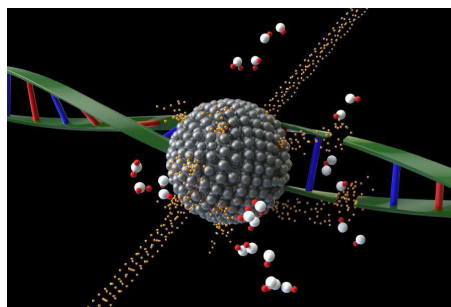
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The main techniques used to treat cancer (surgery, chemotherapy, and radiotherapy) cause severe side effects to the patients due to strong damage in the healthy tissues. The improvement of targeting and efficiency of the treatments is a challenge for future developments.

In this respect, Protontherapy and hadrontherapy, which use fast protons and carbon ions as ionizing particles, have specific advantages. The ballistic effect of the fast ions interacting with biological matter enhances the dose deposition into the tumor. This property specific to ion irradiation improves the preservation of the tissue behind the tumor. However, at the entrance of the track the dose is not negligible.

To improve the performances of proton/hadrontherapy, the group of S. Lacombe is developing a **new strategy where small nanoparticles (< 3nm) are combined with fast ion irradiation** [1]. A multiple-scale approach, from DNA to living cells, is adopted by the group to quantify and to characterize the efficiency of potentially active nanodrugs. The group has shown for the first time that platinum and gadolinium nanoparticles amplify efficiently the radiation effects of fast ions. They have shown that the addition of nanoparticles enhances the induction of **nanometric damages** and cell killing [3].



[1] Porcel, E., et al., *Platinum nanoparticles: a promising material for future cancer therapy?* Nanotechnology, 2010. **21**(8): p. 7.

[2] Porcel, E., et al. *Nano-Sensitization under gamma rays and fast ion radiation* J. Phys.: Conf. Ser. 373, 012006 (2012).

[3] E Porcel O Tillement, F Lux, P Mowat, N Usami, K Kobayashi, Y Furusawa, C Le Sech, S Li, and S Lacombe *Gadolinium based nanoparticles to improve the hadrontherapy performances.* Nanomedicine : Nanotechnology, Biology, and Medicine 2014, vol 10, Issue 8, p 1601-1608