

Nanoparticles: exquisite tools to improve radiation based therapies

Erika PORCEL

Institut des Sciences Moléculaires d'Orsay

ISMO, University Paris Saclay / CNRS

91405, Orsay cedex, France.

Radiotherapy, one of the main treatments in cancer, can be improved by the use of heavy atoms, as radiation enhancers. Many investigations are conducted in this area. The challenge is to increase the radiation damage on tumor whilst preserving healthy tissue by improving targeting. Recent developments in nanotechnology brought new perspectives by using nanoparticles, which can be specifically functionalized. We have shown that metal based nanoparticles strongly enhance complex molecular damage induced as well by carbon ions, as by protons or gamma rays. This effect is not due to the nature of the incoming radiation but explained by the auto-amplification of electron cascades into the nanoparticles. This work aims at evaluating the efficiency of the NPs, understanding the biological mechanisms underlying these effects and findings the action sites. These results allow us to measure how the use of heavy nanoparticles could improve treatments by enhancing efficiency into the tumor.

Erika Porcel is an Associate Professor at Institute of Molecular Sciences, at University Paris Saclay, France. She received her Ph.D in Sciences in 2011 and obtained the certification to be a medical physicist in 2013. She is an expert in the study of the combination of nanoparticles with radiation therapies. She recently patented platinum nanoparticles for this purpose. She is strongly involved in medical physics education at bachelor and master level as a teacher and as a coordinator of the master.