

## **Barriers and challenges to nanomedicine developments**

Workshop de l'EMJMD NANOMED

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Nanotechnology has made important contributions to oncology over the past decades.

Although encapsulating drugs in liposomes has been broadly shown to improve PK and biodistribution, as yet no marketed liposomal therapeutic agents have exhibited an overall survival benefit when directly compared with the conventional parent drug.

The lack of or limited gain in overall survival challenges the field to improve patient survival further with more effective nanomedicine-based therapies.

Up to now, nanomedicine research projects have been structured to adapt the physico-chemical parameters of a delivery system – loading, chemistry, size, charge, surface modification – to control its *in vivo* behaviour. Many experimental scientists, pharmacologists and nanotechnology engineers have held to the premise that solid tumors consist of uniform tissues.

In fact, human tumors are highly diverse and heterogeneous; they vary in pathological characteristics, size less than 1 mm to above 10 cm, metastatic or primary tumor...

Even experimental rodent tumors and implanted tumors, or those of orthotopic or autochthonous origin, exhibit these different characteristics.

The complex physiological and pathophysiological interactions between NPs and biological systems, which are unique to individual patients, have hampered the clinical translation of cancer nanomedicine

Therefore, the effects of heterogeneity of human tumors should be better understood. This conference will discuss some of these complexities to understand and consider for effective nanomedicine development.