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Nucleoside-lipids based nanoparticles

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Context and objectives

The use of delivery vehicles to selectively transport anti-cancer agents to tumours is very attractive to address both toxicity and efficacy issues of anti-cancer drugs. In this program we develop a novel approach based on hybrid nucleoside-lipids allowing the efficient encapsulation and delivery of cisplatin.

Results

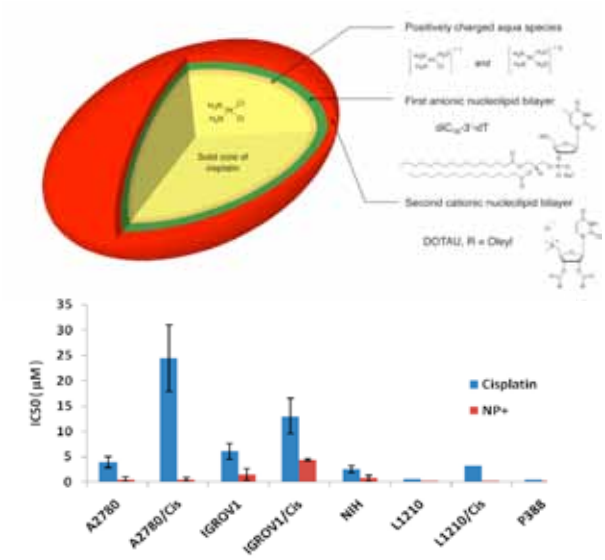

Figure 1. (up) Nanoparticles schematic drawing, chemical structures of anionic and cationic nucleoside-lipids used in this study. (down) Nanoparticles are much more cytotoxic than free conventional cisplatin on all the cell line tested. The IC_{50} ratios are for cell lines from left to right, 14 (A2780), 107 (A2780/cis), 12 (IGROV1), 3 (IGROV-1/cis), 8 (NIH), 3 (L1210), 130 (L1210/cis), 3 (P388), respectively.

Conclusion and perpectives

Our results demonstrate that lipids featuring molecular recognition principles afford an original and powerful approach to address the cisplatin delivery issue. The nucleolipids based nanoparticles can overcome most of the disadvantages or limitation associated with previous traditional encapsulation techniques, including high drug loading and stability. Furthermore, these new NPs appear as ideal candidates for their use as vehicle for cisplatin delivery as witnessed by the increased antitumor activities observed on cisplatin sensitive and resistant cell lines. In the light of these results, nanoparticles supramolecular systems based on biomimetic interactions should contribute to the emergence of major route for the design and development of efficient non toxic drug delivery systems. *In vivo* efficacy and toxicity of these nanoparticles are currently under investigation.

Publications / valorisation

- Barthélémy, P.; Camplo, M.; Campins, N ; Chauffert, B ; Bouyer, F ; dépôt le 30/11/2007 N° INPI 07/08399, extension PCT FR2008/001661.
- Barthélémy, P.; Khiati, S. ; Camplo, M.; dépôt le 29/05/2009 INPI 09/02607
- Oumzil, K., Khiati, S., Grinstaff, M. W., and Barthélémy, P. (2011) « Reduction-triggered delivery using nucleoside-lipid based carriers possessing a cleavable PEG coating. » J. Control. Release, 151, 123–130
- Khiati, S., Luvino, D., Oumzil, K., Chauffert B., Camplo M. and Barthélémy, P. « Nucleoside-lipids based nanoparticles: a new vehicle for cisplatin delivery » submitted.

NANOVA awards
- Lauréat, concours Ministère de la Recherche-OSEO 2011
- Lauréat, concours Tremplin des Entreprises 2011
- Prix du « Futur de l'innovation », Innovaday 2010, Caisse des Dépôts
- Passeport AquitaineValo 2011 et 2008

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