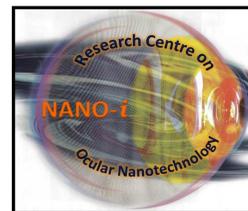


Ocular Drug Delivery Systems for drug and gene targeting



Research Centre on Ocular Nanotechnology



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INTRODUCTION

The eye is an organ protected by anatomical, biochemical and functional barriers against the entry of exogenous substances, including the majority of drugs. Furthermore, the very limited time of contact of a formulation with the corneal surface, after topical application, results in an insufficient bioavailability at the level of target sites, with the need for repeated instillations and low patient compliance.

New therapeutic strategies for pathological situations contemplate the use of Ocular Drug Delivery Systems (ODDS), that can provide various advantages compared to conventional forms. The research team at Nano-i (Research Centre on Ocular Nanotechnology) has extensive experience in the production of therapeutic ODDS.

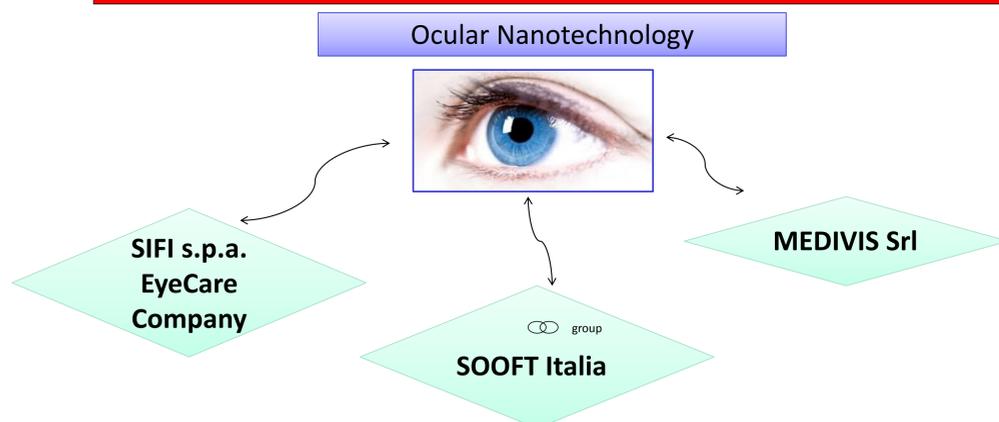
The last frontier is represented by nanocarriers for gene delivery, that currently appear to be of considerable value for the treatment of many eye diseases, such as diabetic retinopathy. ODDS can in fact carry and deliver specific siRNA (short interfering RNA) capable of inhibiting the expression of single genes responsible for the production of mediators or molecules involved in pathological processes. Currently, the team of Nano-i is involved in the production of drug-carrier systems within three PON projects, in collaboration with national companies working in the ophthalmology area.

OBJECTIVES

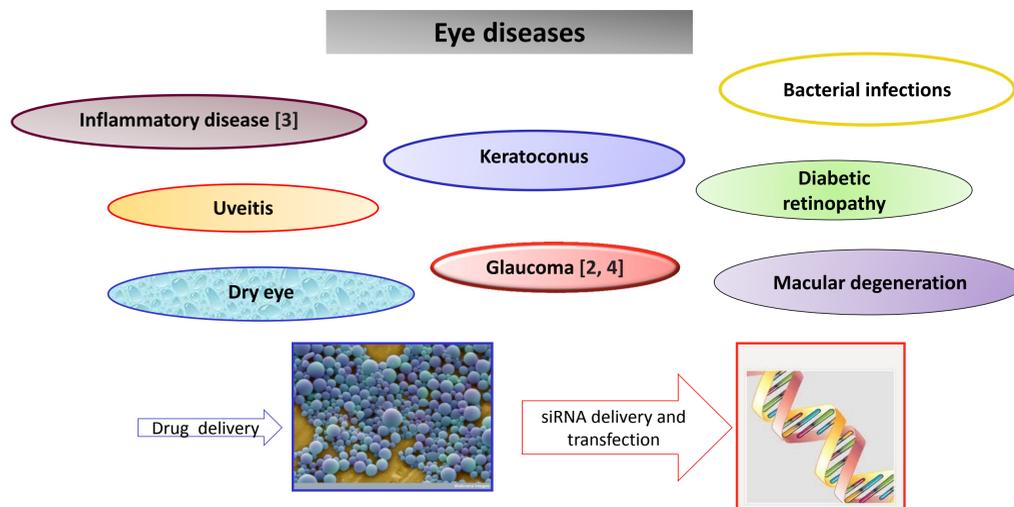
Realization of ocular drug and gene delivery systems using safe and biodegradable (GRAS) materials. Validation of production methods susceptible of industrial scale-up. Designing ODDS that are able to meet the requirements of ocular formulations to efficiently target the anterior or posterior segments of the eye.

In some cases, designing mucoadhesive ODDS can increase the residence time on the ocular surface, with a consequent prolonged drug release and avoid repeated administrations.

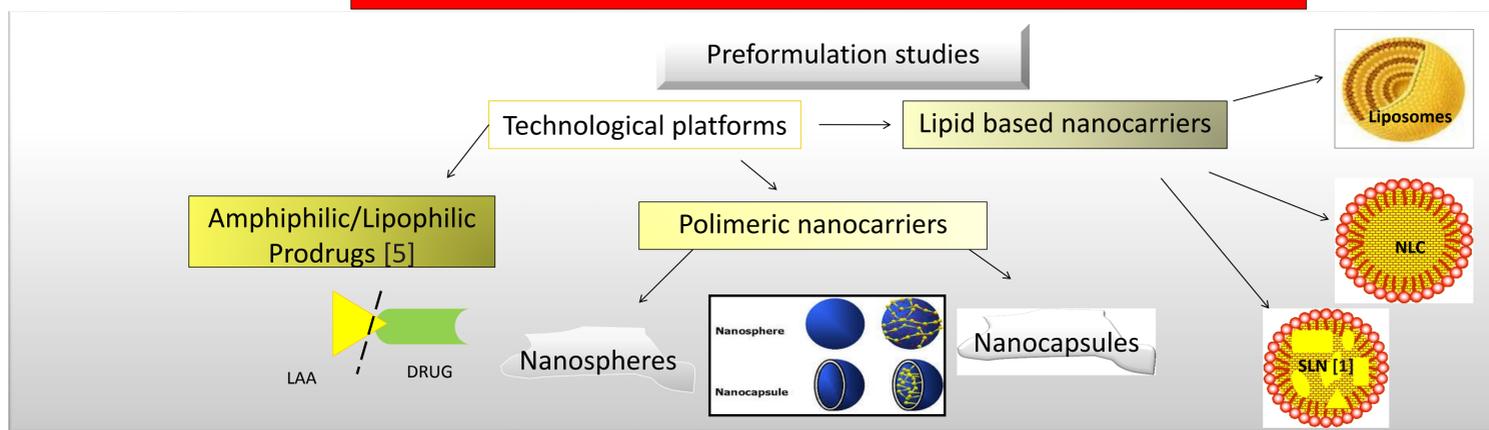
PARTNERSHIPS



THERAPEUTIC AREAS



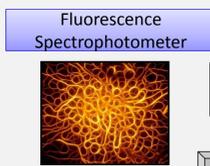
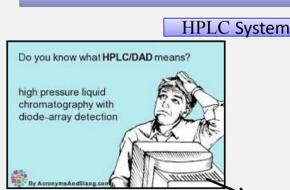
EXPERTISES AND INSTRUMENTS



Analytical platforms

The team has a large set of instruments for chemical, physical and technological characterization.

Quantitation Analysis



Particle size

Zeta potential

Flash Chromatography System



Accelerated Stability studies

Turbiscan AGEING STATION



Differential Scanning Calorimetry



FT-IR Spectroscopy



Gonotec Osmomat 030



REFERENCES

- [1] Pignatello R., Leonardi A. et al. *Int J Med Nano Res* 2014, 1:1
- [2] Musumeci T., Bucolo C. et al., *Int. J. Pharm.* 440, 135-140 (2013)
- [3] Pignatello R., Bucolo C. et al., *Biomaterials*, 23, 3247-3255 (2002)
- [4] Leonardi A., Bucolo C. et al., *Int. J. Pharm.*, 478 (1) 180-186 (2015)
- [5] Pignatello R., Mangiafico A. et al., *Eur. J. Med. Chem.* 46(5), 1665-1671 (2011)