

 FULL TITLE	Biocompatible non-viral polymeric gene delivery systems for the ex vivo treatment of ocular and cardiovascular diseases with high unmet medical need.
ACRONYM	PolExGene
COORDINATOR	Prof. E. Schacht (Ghent University, Belgium)
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KEY WORDS	Biomedical materials; polymer chemistry; medicine; non-viral gene delivery; non toxic, non-immunogenic, ex vivo treatment
SUMMARY	<p>The objective of this proposal is to develop a non-viral ex vivo gene therapy that will be applied for both ocular and cardiovascular diseases with high unmet medical need. The research of the project focuses on improving polymeric DNA-delivery by combining polyplexes with cell penetrating peptides (CPP). To circumvent the toxic and immunogenic problems related to viral vectors, the gene vectors developed in this project will be a non-toxic and non-immunogenic, biodegradable polymeric carrier based on multifunctional poly-alpha-amino acids. The potential of the CPP-containing polyplexes regarding their transfection efficiency and the absence of any toxic or immunogenic side effects will be evaluated using two gene transfer approaches. In a first approach, cells will be transfected with polyplexes (i.e. polymer-DNA complexes) and then seeded on an electrospun polymer membrane prior to implantation. Alternatively, the polymer membrane will be surface coated with polyplexes prior to cell seeding and implantation. In order to enhance the internalisation efficiency, the polyplexes will be functionalised using Penetratin-like CPP. In order to improve the membrane-cell interaction and to enhance the cell proliferation and differentiation, the polymer membrane will be functionalised with cell interacting peptides (CIP).</p> <p>To reach the final project goal, different work packages will be implemented:</p> <ol style="list-style-type: none"> (1) selection of CIP and CPP, (2) development of CPP-containing polymers, (3) development of CIP-containing polymer membranes by electrospinning, (4) preparation of plasmids and CPP-containing polyplexes, (5) characterisation of polyplex-cell and polymer membrane-cell interactions, (6) study on immunological properties of polyplexes and polymer membranes and (7) polymer membrane implantation in test animals. Work package 8 will be devoted to the project management.

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BUDGET	2 135 000 €
PROJECT WEB-SITE	http://www.polexgene.eu/