RNA Therapeutics Delivery and Biomaterials for Tissue Repair

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Duff Medical Building, 3775 University St.

We have developed nanovectors that are electrostatic complexes of the cationic polymer chitosan and its derivatives with nucleic acids (siRNA, miRNA, miRNA, pDNA). These polyelectrolyte complexes achieve high levels of gene expression and specific gene silencing in many cell types. A specific intravascular targeting of current systems to proximal tubules in the kidney in mice was found, leading to applications in renal disease. Chemically modified systems are being investigated for cancer applications. The same family of polymers is also used to stabilize platelet rich plasma (PRP) as injectable implants for tissue repair. Specific compositions in a lyophilized form were resuspended in PRP and injected into meniscus tears and rotator cuff tears to biologically stimulate repair at these sites in animal models. The latter technology is now being transferred to a GMP manufacturer and is entering clinical phase testing.

Michael Buschmann received a B. Engineering Physics from the University of Saskatchewan in 1984, and a Ph.D. in Medical Engineering and Medical Physics from MIT and Harvard University in 1992. Since 1994, Dr. Buschmann is Professor of Biomedical Engineering and Chemical Engineering at Polytechnique de Montréal. His current research program focuses on the use of biomaterials to repair joint tissues and to effectively deliver nucleic acids. He has helped found two previous start-ups and invented 3 technologies that have been commercialized, including a mechanical tester benchtop instrument, a clinical arthroscopic cartilage evaluation device and a therapeutic biomaterial that is approved in 18 countries to repair cartilage. He recently co-founded two additional start-ups based on current research, one in orthopaedic tissue repair and another in RNA therapeutics. He has received the Partnership and Innovator Prize from the Quebec Association for Industrial Research (ADRIQ) and several teaching awards.

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