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Bladder tissue permeability and intravesical drug delivery

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The treatment of bladder pathologies (e.g., tumours, cancers, infections, interstitial cystitis, neurogenic bladder) involves either oral or intravesical drug delivery. The intravesical delivery has the advantage (i) to reduce systemic side effects, (ii) to improve bioavailability of macromolecules or drugs with poor solubility and weak permeability, (iii) to directly target the drug towards the urothelial layers with potential sustained local therapeutic effects. Although intravesical treatments are widely used in bladder pathologies, the importance of bladder biopharmaceutics is often neglected.

The aims of this study were to assess the tissue permeability of the bladder and to characterize the transport of four drugs displaying different physico-chemical properties and commonly used in intravesical delivery, through porcine bladder. The transport of aluminium through porcine bladder was assessed by using a vertical static diffusion cell. Lidocaine hydrochloride, methylprednisolone hemisuccinate and mitomycin C were tested by using three different experimental setups, including vertical static diffusion cell, microdialyseur and lab-patented device. Penetration results on different experimental setups were homogenous suggesting dependency on physico-chemical characteristics of drug and subsequent interaction with bladder wall structure. Oppositely, permeation varied consistently with experimental setup characteristics (i.e., permeation surface, receptor fluid volume and hydrodynamic). Mathematical modeling of drug transport through bladder wall is proposed considering scarce literature on this route of administration. Practical outcome of this study could drive compounding optimization towards improvement of safety and efficacy in patient undergoing intravesical administration.

Biography

Fabrice Pirot has completed his PhD at the age of 29 years from University of California San Francisco and University of Franche-Comté (France). He is hospital pharmacist, associated professor and director of a research team focusing on drug transport and biopharmaceutics at Hospices Civils de Lyon and University of Lyon. He has published more than 50 papers in reputed journals and serving as an editorial board member of repute.

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