

Therapeutic targeting of α - and β -adrenergic signaling for urologic diseases

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Video Byte

Keywords: adrenoceptors, α - and β -adrenergic blockade, urologic tumors, urologic disease, cell polarity, phenotypic landscape, fibrosis, kidney disease, urology, uropathology, urinary tract, benign, malignant, genitourinary, urogenital, autonomic nervous system, adrenergic receptor, epithelial–mesenchymal transition, EMT, Cell Communication and Signaling

Posted Date: October 13th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-966260/v1>

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Abstract

Autonomic nervous system dysfunction contributes to both benign and malignant urinary tract diseases. Thus, autonomic nervous system components that are expressed in genitourinary organs, such as α - and β -adrenoceptors, can be targeted to treat urologic disease. α -Adrenoceptors typically mediate blood vessel constriction and smooth muscle contraction, and blocking α_1 -adrenoceptors with antagonists relaxes the prostate and urinary tract, improving urine flow in individuals with prostate enlargement, stones, and lower urinary tract symptoms. In contrast to α -adrenoceptors, β -adrenoceptors mediate vasodilation and relaxation. Thus, β -adrenoceptor stimulants are used to treat conditions such as overactive bladder. Notably, α - and β -adrenoceptors can also be targeted to protect against acute and chronic kidney disease, and existing α - and β -adrenoceptor antagonists can be repurposed to treat genitourinary cancers. In cancer, these drugs affect multiple intracellular pathways to remodel the tumor microenvironment, ultimately decreasing cancer cell survival and proliferation, inducing apoptosis, and preventing invasion by regulating epithelial-mesenchymal transition (EMT). Although the side effects must be considered given the complex roles of α - and β -adrenoceptors in multiple body systems, α - and β -adrenoceptor manipulation is a very promising strategy for the treatment of genitourinary conditions with diverse pathological mechanisms.