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Advances in prostate pharmacology and toxicology and cutting-edge developments in drug research

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Prostate pharmacology is a specialized area that explores the complex interrelationship between pharmaceuticals and the prostate gland. This discipline includes drug mechanisms, pharmacokinetics, and urofluid dynamics. These components collectively illuminate drug interactions, principles, drug behavior within the body (absorption, distribution, biotransformation, excretion), and how drug effects evolve over time. Furthermore, they encompass processes such as urine flow, urinary flow rate, and bladder pressure.

Conversely, prostate toxicology investigates the effect of external factors, consisting of chemicals, physical elements and biological agents, on the prostate gland. This scientific field examines the severity and frequency of damage, as well as the generation of toxic reactions and the mechanisms that cause toxicity. In addition, it entails both qualitative and quantitative evaluations of the prostate's response to toxic agents.

Testosterone is enzymatically converted into dihydrotestosterone by the action of 5α-reductase. Dihydrotestosterone, exerts a direct stimulatory effect on the proliferation of prostate epithelial cells. This proliferative response results in the enlargement of the prostate gland, which subsequently leads to symptoms such as increased urinary frequency, urgency and retention.

For the first time, our team discovered that an elevated ratio of oestradiol to testosterone facilitates the growth of prostate epithelial cells and the neighboring fibroblasts in a manner that adheres to a binary quadratic equation ($P = -0.1782 + 0.0081E + 0.063T - 0.6 \times 10\text{-}5E2 - 0.28 \times 10\text{-}3T2$). Following the apoptosis and necrosis of these actively dividing epithelial cells, the residual cellular debris accumulates, ultimately forming fibrous, planar, or amorphous connective tissue. Over time, this accumulative process contributes to the progressive enlargement of the prostate gland, culminating in the development of benign prostatic hyperplasia (BPH).

Our 30-years dedication to pharmacotoxicological research on BPH and other prostate diseases has uncovered innovative mechanisms and produced invaluable findings. We have developed novel pharmacotoxicological biological models, thus broadening the knowledge of prostate pharmacology and toxicology.

Figure 1: monographs of Prostate Pharmacology and Prostate Toxicology

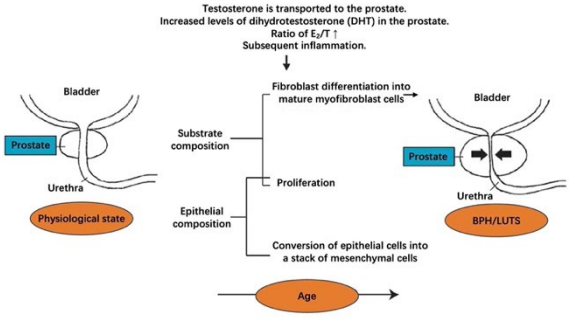

Figure 2: Mechanism of benign prostate hyperplasia: the hypothesis of "accumulation of debris in the prostate epithelial cells".

Biography

Zuyue Sun, MD, PhD, a distinguished research fellow and PhD supervisor at Fudan University, serves as Chief Scientist of the Shanghai Research Institute of Biomedical Technology (SRIBT). He has been awarded the title of a national excellent scientific and technological worker for his remarkable contributions to science, and he also enjoys the privilege of receiving the State Council's Special Allowance. In addition, he serves as the Honorary Chairman of the Reproductive Toxicology Committee within the Chinese Society of Toxicology. He is further acknowledged for his leadership as the Editor-in-Chief of esteemed monographs, Prostate Pharmacology and Prostate Toxicology. His extensive qualifications and influential positions highlight his important contributions to the field of toxicology.

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