Introduction
Benign prostatic hyperplasia (BPH), the predominant neoplastic disease of men, is associated with lower urinary tract symptoms (LUTS). These symptoms are due to two fundamental elements of the disease: an increase in the proliferation of the stromal, glandular and epithelial tissue (static component), and an increase in the smooth muscle tone of the prostate (dynamic component). As symptoms are often related to prostate size, the increase in contractility of the prostate appears to be more important in the aetiology of the disease. Sympathetic and parasympathetic nerves innervate the prostate gland and modulate smooth muscle tone. Although the sympathetic co-transmitters noradrenaline and adenosine 5'-triphosphate (ATP) are responsible for the contraction of the smooth muscle, acetylcholine is also believed to play a role. Although α-adrenoceptor antagonists are often used to treat BPH, increasing sufferers are opting for phytotherapy.

Urtica dioica, commonly known as stinging nettle, has been used in traditional medicine by different cultures around the world for the treatment of symptoms associated with BPH. The root extract is thought to decrease the size of the prostate gland, while the leaf extract has been used in traditional medicine for the relief of LUTS, as well as for hypertension. The constituents of the leaf extract have been shown to have vasorelaxant properties, which may infer a similar effect in the prostatic smooth muscle.

Methods
Isolated Organ Bath Studies
Electrical field stimulation parameters: 0.5 ms pulse duration, 60V, 10 pulses at 0.1 – 0.5 Hz, 10 seconds at 1.0 – 20.0 Hz. Exogenous agonists: noradrenaline, acetylcholine, ATP and 6-methylene ATP. Rat prostates were incubated with MediHerb® stinging nettle leaf or root extract (500 mg/ml in 25% ethanol) or the test fraction for 30 minutes prior to testing.

Liquid-liquid Partitioning
Using a separating funnel, ethyl acetate was used to partition the stinging nettle leaf extract into its respective organic and aqueous phases. Each extract was tested in isolated organ bath studies.

Reversed-phase Column Flash Chromatography
Fractions of the aqueous extract were isolated using reversed-phase column flash chromatography. Each fraction was tested in isolated organ bath studies.

High-Performance Liquid Chromatography
The active fraction was further separated and analysed using high-performance liquid chromatography. Each of the resultant fractions were tested for activity.

Aims
This study aims to investigate the acute effect of stinging nettle root and leaf extracts on smooth muscle contractility of the isolated rat prostate gland, and to determine the bioactive and the mechanism of action.

Results

Stinging Nettle Extract
Effect on Electrical Field Stimulation (Nerve Stimulated) Induced Contraction of the Rat Prostate

Effect on Noradrenaline and Acetylcholine Induced Contraction of the Rat Prostate

Effect on ATP and 6-methylene ATP Induced Contraction of the Rat Prostate

Extracted Organic Phase
The organic phase of the leaf extract had no effect on electrical field stimulation induced contraction

Reversed-Phase Column Chromatography
Fraction 1 demonstrated activity against electrical field stimulation induced contraction

High-Performance Liquid Chromatography
chromatogram of Fraction 1

High-Performance Liquid Chromatography
Fraction E demonstrated activity against 6-methylene ATP induced contraction

Conclusions
- Stinging nettle root extract did not have an effect on electrical field stimulation induced contraction of the rat prostate.
- Leaf extract attenuated electrical field stimulated induced contraction of the rat prostate.
- It appears to act as an antagonist at the P2X1-purinoceptor, with no effect against noradrenaline or acetylcholine induced contraction.
- The bioactive is in the aqueous phase of the extract.

References:

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