

# MEDICINAL PLANTS & RENAL-URINARY SYSTEM



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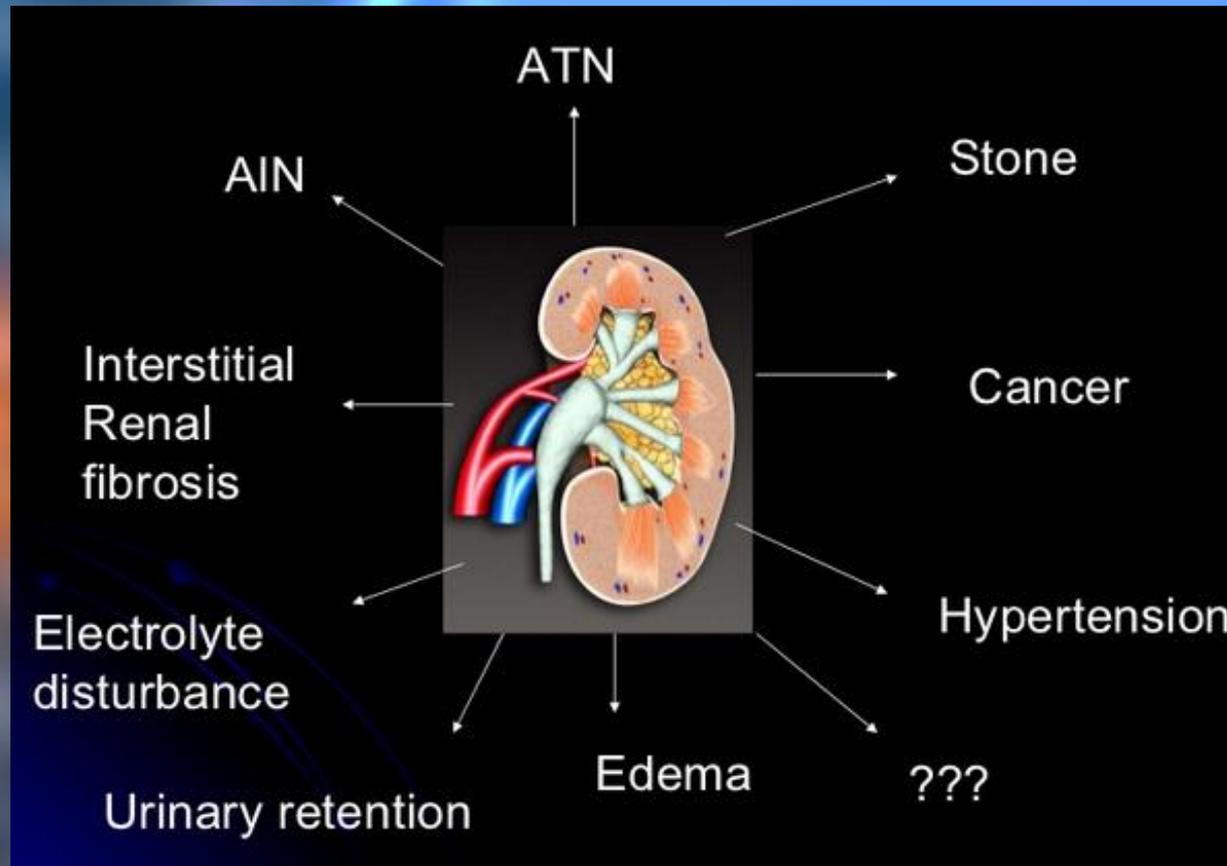
Tehran University of Medical Sciences

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وَالَّذِينَ وَالزَّيْتُونَ ① وَمَلُورِ سِينِينَ ② وَهَذَا الْبَلَدِ الْأَمِينِ ③  
لَقَدْ خَلَقْنَا الْإِنْسَانَ فِي أَحْسَنِ تَقْوِيمٍ ④ ثُمَّ رَدَدْنَاهُ  
أَسْفَلَ سَافِلِينَ ⑤ إِلَّا الَّذِينَ ءَامَنُوا وَعَمِلُوا الصَّالِحَاتِ  
فَلَهُمْ أَجْرٌ غَيْرُ مَمْنُونٍ ⑥ فَمَا يُكَذِّبُكَ بَعْدُ بِالذِّينِ ⑦  
أَلَيْسَ اللَّهُ بِأَحْكَمَ الْحَاكِمِينَ ⑧

# Definition of Herbal Medicine

Herbal medicines are crude drugs of vegetable or plant origin, utilized for the treatment of disease states, often of chronic nature, or to attain or maintain a condition of improved health



Botanical diuretics are discussed with a focus on

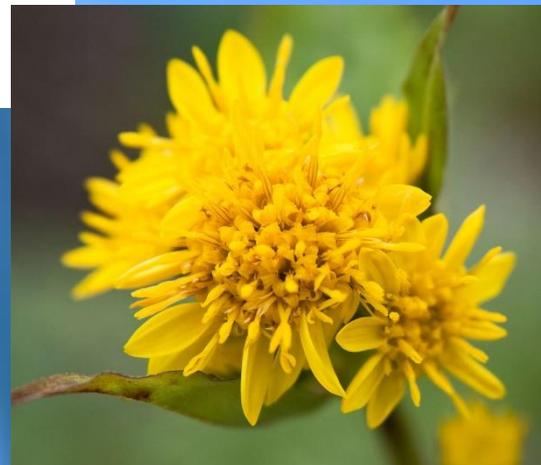
***Solidago spp*** (Goldenrod)

***Levisticum officinale*** (Lovage)      ***Petroselinum***

***crispus*** (Parsley)

***Urtica dioica*** (Stinging nettle) .

***Equisetum arvense*** (Horsetail)



# Diuretics

# Urinary Antiseptics

***Arctostaphylos uva-ursi*** (Bearberry)

***Juniperus* spp** (Juniper)

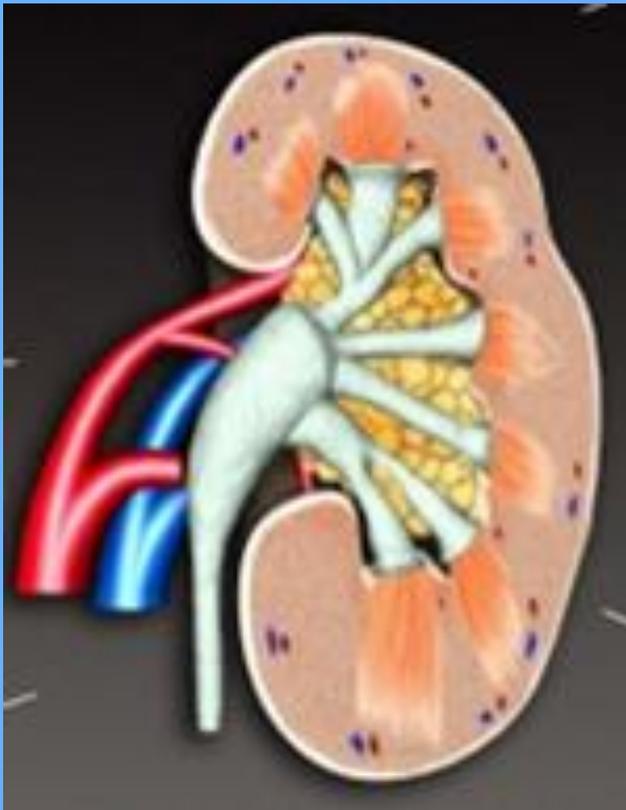
***Vaccinium macrocarpon*** (Cranberry)



# Antinephrotoxic

***Rheum palmatum*** (Chinese Rhubarb)

***Lespedeza capitata*** (Round-head Lespedeza)



*Saw Palmetto*



*Rye Grass*

*Pumpkin Seed*



*Heather*

©the herbal resource

## Benign Prostatic Hyperplasia

*Serenoa repens* (Saw Palmetto)

*Urtica dioica* (Nettle)

*Prunus africana* (Pygeum)

*Cucurbita pepo* (pumpkin)

*Pygeum*



*Stinging Nettle*

# Diuretics

Clinical trials have shown that various herbs increase urinary output both in healthy people and people with urologic disease, and they continue to be widely prescribed in the World

Potency	Latin name (common name)	Part used	Family	Miscellaneous notes	Commission E approved for diuresis
Strong	<i>Solidago spp</i> (goldenrod)	Herba	Asteraceae	Anti-inflammatory	Yes
	<i>Levisticum officinale</i> W Koch (lovage)	Radix	Apiaceae	Mild risk of photosensitivity	Yes
	<i>Betula spp</i> (birch)	Folium	Betulaceae	Antimicrobial, anti-inflammatory	Yes
	<i>Petroselinum crispum</i> (Mill) Nyman ex AW Hill (parsley)	Radix, fructus	Apiaceae	Antispasmodic, anti-inflammatory	Yes (root only)
	<i>Apium graveolens</i> L (celery)	Fructus	Apiaceae	Antispasmodic	No
Medium	<i>Taraxacum officinale</i> Weber ex FH Wigg (dandelion)	Folium	Asteraceae	Bitter digestive tonic	No
	<i>Ononis campestris</i> Koch & Ziz (restharrow)	Radix	Fabaceae	Aqueous extracts only	Yes
	<i>Urtica dioica</i> L (stinging nettle)	Folium	Urticaceae	Anti-inflammatory, radix for bph	Yes
Mild	<i>Parietaria judaica</i> L (pellitory-of- the-wall)	Herba	Urticaceae		No
	<i>Galium aparine</i> L (cleavers)	Herba	Rubiaceae		No
	<i>Equisetum arvense</i> L (horsetail)	Herba	Equisetaceae	Commission E also approves topical use for wounds & internal use for post- traumatic edema	Yes
	<i>Chimaphila umbellata</i> (L) WPC Barton (pipsissewa)	Herba	Ericaceae	Demulcent, mild antimicrobial	No

# *Solidago* spp (Goldenrod)

The leaf and flower of

*Solidago virgaurea* L (European goldenrod)

*S. canadensis* varieties (Canadian goldenrod)

*S. gigantea* Aiton (Early goldenrod)

and

related species exert fairly consistent diuretic effects clinically

***Levisticum officinale***  
(Lovage)





***Levisticum officinale***  
(Lovage)

*Levisticum officinale* (Lovage)





# *Petroselinum crispus* (Parsley)

The parts used are either the root or the fruit,  
**Ancient Diuretic**





*Petroselinum crispum*

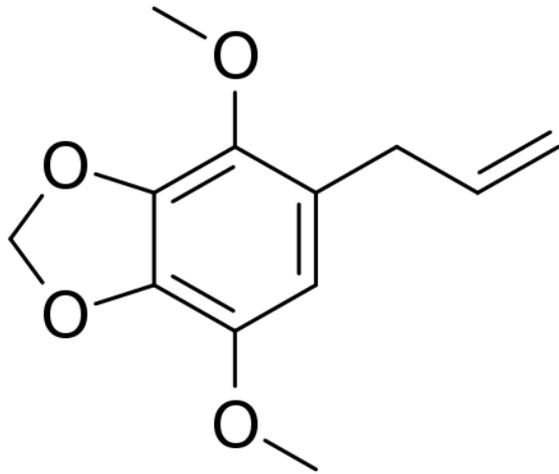
# *Petroselinum crispum* (Parsley)

Mechanistic investigations suggested parsley was inhibiting  $\text{Na}^+/\text{K}^+$  ATPase, primarily in the renal cortex, and thus interfering primarily with potassium secretion.

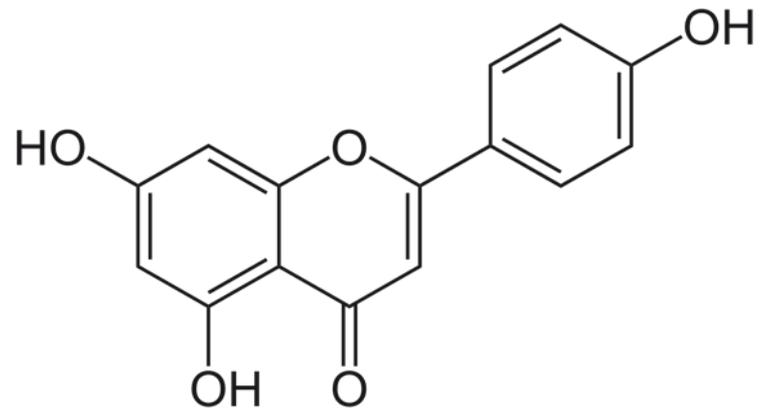
This appeared to cause the increased urine output

# *Petroselinum crispus* (Parsley)

Terpenoids, **Apiol**,



Flavonoids, **Apigenin**



**Parsley** contains **Furanocoumarins**

that may cause photosensitivity though the quantities are so low the chance of an actual problem from internal use of medicinal doses is slight





Magic Garden  
Seeds

# *Urtica dioica*

(Stinging Nettle)



# *Urtica dioica* (Stinging Nettle)



## The Leaves and Seeds,

Mild diuretics, for nonspecific support of the urinary tract, and as topical and internal anti-inflammatories

## The Roots

Has been used as a treatment for symptoms of benign prostatic hyperplasia



# *Urtica dioica* (Stinging Nettle)



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# *Equisetum arvense* (Horsetail)



## Other categories of botanical diuretics:

1. Plants containing cardiac glycosides,
2. Plants with angiotensin-converting enzyme (ACE) inhibiting properties,
3. Plants containing methylxanthines

Mechanism	Examples	Notes
Cardiac glycosides	<i>Digitalis purpurea</i> L (digitalis) folium <i>Nerium oleander</i> L (oleander) folium <i>Apocynum cannabinum</i> L (Indian hemp) folium <i>Adonis vernalis</i> L (spring adonis) flos <sup>a</sup> <i>Urginea maritima</i> (L) Baker (red squill) bulbus <i>Convallaria majalis</i> L (lily-of-the-valley) herba	Used for CHF patients exclusively, and largely superseded by synthetic drugs.
ACE inhibitors	<i>Allium sativum</i> L (garlic) bulbus <i>Camellia sinensis</i> L (tea) folium <i>Crataegus laevigata</i> (Poir) DC (hawthorn) fructus, flos, & folium <i>Ganoderma lucium</i> (Curtis Fr) P Karst (reishi) fruiting body <i>Olea europaea</i> L (olive) folium	Have only been proven to act in this way in vitro at present.
Methylxanthines	<i>Camellia sinensis</i> <i>Coffea arabica</i> L (coffee) semen <i>Paullinia cupana</i> Kunth (guaraná) folium <i>Cola nitida</i> (Vent) A Chev (cola) semen	Rarely used in this way due to adverse effects (anxiety, insomnia, cystic breasts, etc.).

# Urinary Antimicrobial & Antiadhesion Herbs

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Urinary Antimicrobial  
&  
Antiadhesion Herbs

***Major Mechanisms***

1. Directly kill microbes
2. Interfere with their adhesion to epithelial cells.

# *Arctostaphylos uva-ursi*

(Bearberry)

Ericaceae

Leaves

Arbutin



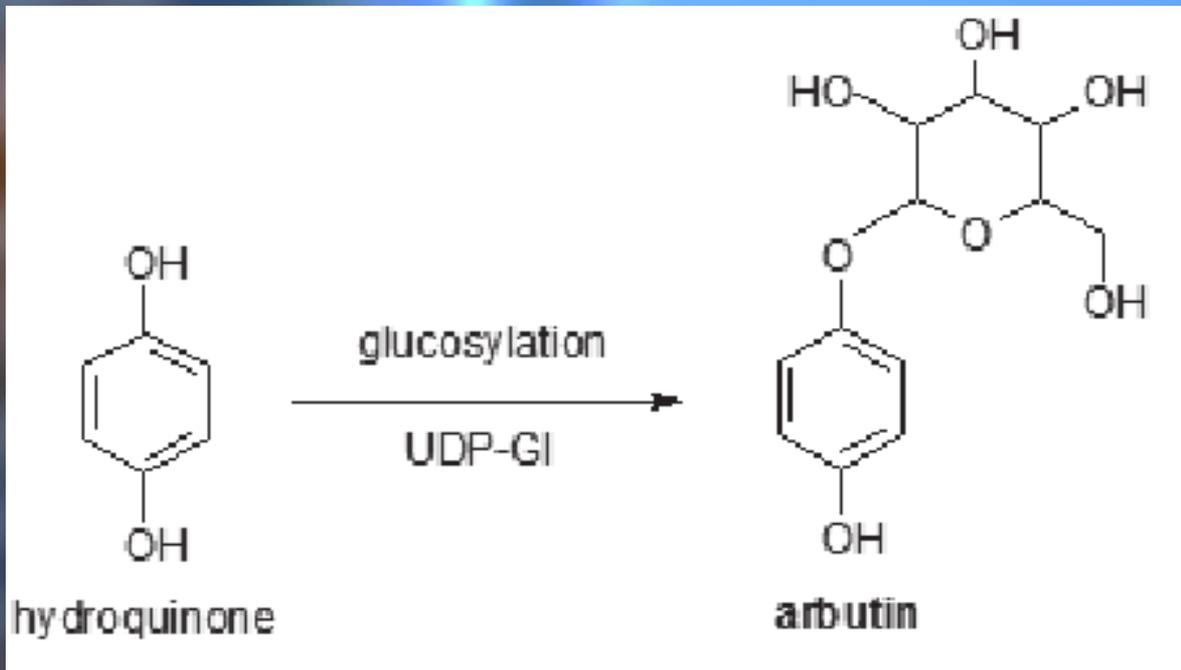
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# *Arctostaphylos uva-ursi*

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Ericaceae

Leaves

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## Hydroquinone

Absorbed and then glucuronidated in the liver.

Hydroquinone glucuronide is then carried to the kidneys where it is excreted in the urine. If the pH of the urine is sufficiently alkaline ( $>7$ ), then the hydroquinone glucuronide will decompose spontaneously, releasing the hydroquinone to act as a direct antimicrobial agent

# *Arctostaphylos uva-ursi*

(Bearberry)

Ericaceae

Leaves

Arbutin

If uva-ursi does not seem to be working, there is a possibility that the patient's urine is excessive acidic and interfering with decomposition of the hydroquinone glucuronide complex.

Animal product ingestion should be decreased in the diet or 1 tablespoon sodium or potassium bicarbonate taken once or twice a day to alkalinize the urine in such situations before making a final determination about efficacy

# *Arctostaphylos uva-ursi* (Bearberry)

Recently, a tannin from uva-ursi dubbed corilagin has been shown to potentiate the activity of beta-lactam antibiotics against methicillinresistant *Staphylococcus aureus* in vitro



# *Arctostaphylos uva-ursi* (Bearberry)

Uva-ursi should be avoided during pregnancy and lactation, renal failure, and dyspepsia (tannin-containing extracts only) and may not be appropriate for children



*Arctostaphylos uva-ursi*



# *Juniperus communis* (Juniper)

## Juniper leaves

Contain antimicrobial terpenoids (Cedrenes Type) that may also have diuretic activity. Terpenoid-free hexane extracts from various parts of a number of juniper species showed fairly limited antibacterial activity in vitro

Juniper berry is approved for treatment of dyspepsia by the German Commission E but only indirect mention is made of its use in treating UTI

# *Juniperus communis* (Juniper)

## Juniper leaves

There is a long-held belief in botanical medicine circles that juniper volatile oil contains nephrotoxic compounds, particularly hydrocarbon terpenoids such as pinenes. However, animal studies clearly show this is only true at extraordinarily high doses, far beyond the typical therapeutic realm

Should be used with caution in acute pyelonephritis and probably avoided in pregnancy until more information becomes available showing it definitely safe.

# *Vaccinium macrocarpon* (Cranberry)



Proanthocyanidins that inhibit binding of *E. coli* and other microbes to the bladder epithelium

It also inhibits binding of *E. coli* to intestinal mucosa and *Helicobacter pylori* to gastric mucosa

Cranberry was previously believed to work through acidification of the urine, but it only causes temporary if any pH changes lasting 10–15 min in most people

Cranberry is nontoxic and safe in pregnancy in lactation, given that it is routinely consumed as food in such situations without ill effects.

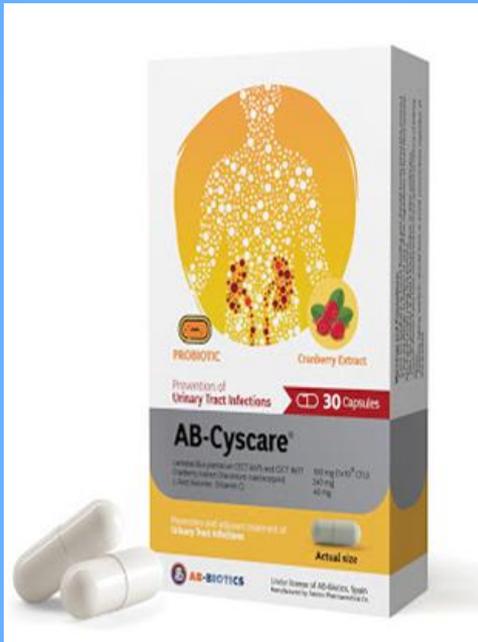
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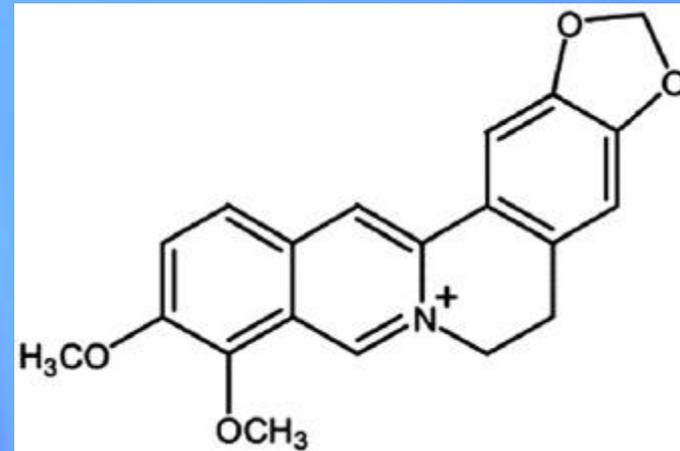
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# Berberine

Berberine is an alkaloid found in plants such as :

*Mahonia aquifolium* (Oregon Grape) radix,  
*Hydrastis canadensis* (goldenseal) radix,  
*Coptis chinensis* (goldthread) radix



**Antinephrotoxic**



# *Rheum palmatum*

(Chinese Rhubarb)

Radix

Though many *Rheum* species are utilized in medicine, *R. palmatum* consistently contains higher levels of tannins and thus is considered to be of superior quality

# *Rheum palmatum*

(Chinese Rhubarb)

Radix



# **Prostatic**

## **Botanicals**

# *Serenoa repens*

(Saw Palmetto)

Ripe Fruits

Saw palmetto extracts have much broader actions than just inhibition of 5AR.

Extract partially antagonize testosterone receptors and interfere with estrogen receptors in prostate cells, to relax prostatic smooth muscle, and to interfere with prolactin

# *Urtica dioica* (Stinging Nettle)

## The Roots

Has been used as a treatment for symptoms of benign prostatic hyperplasia

Stinging nettle root contains lignans that directly or indirectly (through metabolites produced primarily by the gut flora)

Prevent

testosterone binding to sex hormone-binding globulin (SHBG)

Other constituents

may contribute to the ability of root extracts to weakly inhibit 5AR and more strongly inhibit aromatase



# *Urtica dioica* (Stinging Nettle)

In double-blind clinical trials generally less extensive and rigorous than those conducted with saw palmetto, stinging nettle root extracts have shown to significantly lower SHBG levels and improve uroflow measures in men with BPH compared to placebo



# *Prunus Africana* (Pygeum)

## Stem Bark

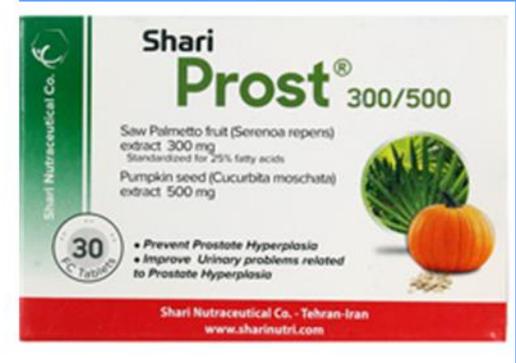


Beside hyperplasias, *Prunus africana* has been used for generations in African traditional medicine to treat prostate cancer.

*Prunus Africana* Cortex consists of the dried bark of *Prunus africana* (Hook. f.) Kalkm. (Rosaceae).

# *Prunus Africana* (Pygeum)

## Stem Bark



# *Prunus Africana* (Pygeum)

## Constituents

1. Phytosterols (e.g.  $\beta$ -sitosterol 15-18%, and its 3-O-glycoside,  $\beta$ -sitostenone, campesterol, daucosterol)
2. Pentacyclic triterpenoids (mainly of the Oleanolic and Ursolic acid type)
3. Long chain aliphatic alcohols (e.g. n-docosanol; n-tetracosanol)
4. Long chain (C12-C22) fatty acids (e.g. Palmitic acid)
5. Trans-ferulic acid esters of 2, 3 and 4.
6. Cyanogenic glycoside amygdalin

# *Prunus Africana* (Pygeum)

## Mechanisms of Action

1. 5 $\alpha$ -reductase inhibition, preventing conversion of testosterone to dihydrotestosterone (DHT)
2. Aromatase inhibition, preventing conversion of DHT to androstandiol and hence blocking the synthesis of oestrogen /oestradiol
3. Blocking of leukotriene synthesis by inhibition of 5-lipoxygenase
4. Reduction in oedema by inhibition of glucosyl transferase and  $\beta$ -glucuronidase

# *Prunus Africana* (Pygeum)



A few cases of minor and transient GI side effects : Diarrhoea, Nausea and Gastric pain have been reported and single cases of constipation, dizziness and visual disturbance.



# Cucurbita pepo

## Pumpkin





*Tribulus terrestris* L.

# *Tribulusterrestris*

Bindii



# Products containing several plants

- *Urtica dioica*, *Cucurbita pepo*, *Matricaria recutita*, *Tribulus terrestris*, *Pimpinella anisum*



- *Serenoa repens*, *Urtica dioica*, *Camellia sinensis*, *Zingiber officinale*, *Cucurbita pepo*, *Rosmarinus officinalis*



# Products containing several plants

- *Serenoa repens, Trifolium pratense, Cucurbita pepo, Urtica dioica, Arctostaphylos uva-ursi*



- *Sereona repens, Panax ginseng, Allium sativum, Zinc*



# Products containing several plants

- *Serenoa repens, Utrica dioica*



# Products containing several plants

- *Foeniculum vulgare*, *Cuminum cyminum*, *Laurus nobilis*, *Cerasus avium*, *Zea mays*, *Tribulus terrestris*, *Cucumis melo*



*Cucurbita pepo*, *Populus nigra*, *Solidago canadensis*

\*



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*Cucurbita pepo*, *Populus nigra*, *Solidago canadensis*

\*



# Products containing several plants

- *Alpha pinene, beta pinene, Camphene, Fenchone, Borneol, Anethol*



- *Zingiber officinale, Didymocarpus pedicellata, Saxifraga ligulata, Rubia cordifolia, Cyperus scariosus, Achyranthes aspera, Onosma bracteatum, Vernonia cinerea*



**MEDICINAL PLANTS  
&  
RENAL-URINARY SYSTEM**

**THANKS**

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