



INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

PHYTOPHARMACEUTICALS

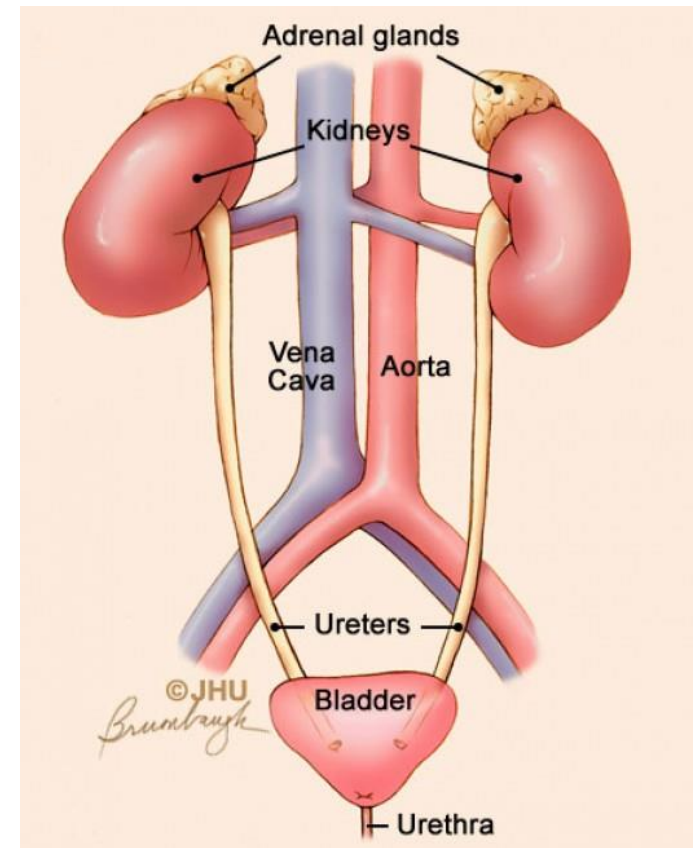
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LECTURE 10 – Preparations used to treat some disorders of urinary system

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URINARY SYSTEM

- ▶ also known as the **renal system**
 - is the body's drainage system for removing urine, which is composed of wastes and extra fluid excreted by the kidneys = it produces, stores and eliminates urine
- ▶ Besides filtering and eliminating wastes from the body, the urinary system also maintains the homeostasis of water, ions, pH, blood pressure, calcium and red blood cells.



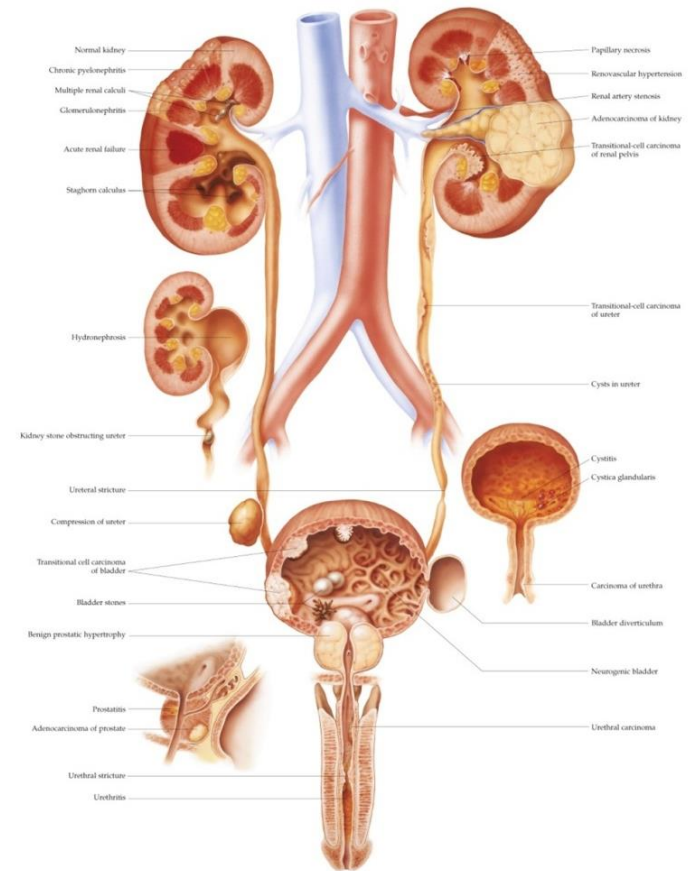
URINARY SYSTEM

Major disorders of urinary system:

- ▶ **infectious and inflammatory diseases** (e.g. glomerulonephritis, urethritis, cystitis, prostatitis,...)
- ▶ acute renal failure
- ▶ renovascular hypertension
- ▶ renal artery stenosis
- ▶ kidney and bladder stones
- ▶ obstructive disorders
- ▶ neurogenic bladder
- ▶ **benign prostatic hyperplasia**
- ▶ carcinomas
- ▶ etc.

Phytopharmaceuticals are suitable as a **supplementary** and **supporting therapy**

DISEASES OF THE URINARY TRACT



DIURETICS

- ▶ **Diuretic** is any substance that promote production of urine by the kidneys. **Diuresis** = increased excretion of urine.
- ▶ In the strict sense, the term is applied to drugs with a direct renal action. The predominant mode of actions are:
 - ▶ inhibiting the reabsorption of NaCl and water in the nephrons
 - ▶ changes in the osmotic balance
- ▶ The most important **indications** for the use of diuretics are:
 - ▶ diseases of urinary tract – infections, inflammation; kidney stones, etc.
 - ▶ elimination of toxic agents
 - ▶ prophylaxis of renal failure – in case of circulatory failure (shock)
 - ▶ fluid retention – oedemas, swellings
 - ▶ hypertension, congestive heart failure
 - ▶ obesity, rheumatism, gout (= high level of uric acid),...

DIURETICS

- ▶ active constituents of plant drugs with possible diuretic effect:
 - ▶ **FLAVONOIDS**
 - ▶ **SAPONINS**
 - ▶ **ESSENTIAL OILS**
- ▶ **theophylline**
- ▶ **polyols = sugar alcohols** – e.g. D-mannitol
 - ▶ osmotic diuretic agent – these agents bind water osmotically and retain it in the tubular lumen, consequently there is a reduction of sodium reabsorption → a larger volume of dilute urine

DIURETIC HERBS

Plant drugs containing mostly **flavonoids**, e.g.:

- ▶ *Betulae folium* – *Betula pendula*, Betulaceae, birch
- ▶ *Ononidis radix* – *Ononis spinosa*, Fabaceae, spiny rest-harrow
- ▶ *Equiseti herba* – *Equisetum arvense*, Equisetaceae, horsetail
- ▶ *Polygoni avicularis herba* – *Polygonum aviculare*, Polygonaceae, knotweed

- ▶ *Sambuci nigrae flos* – *Sambucus nigra*, Adoxaceae, black elder
- ▶ *Tiliae flos* – *Tilia cordata*, *T. platyphyllos*, Malvaceae, lime tree
 - ▶ both plant drugs contain flavonoids as main active principles
→ they have diuretic and diaphoretic effects

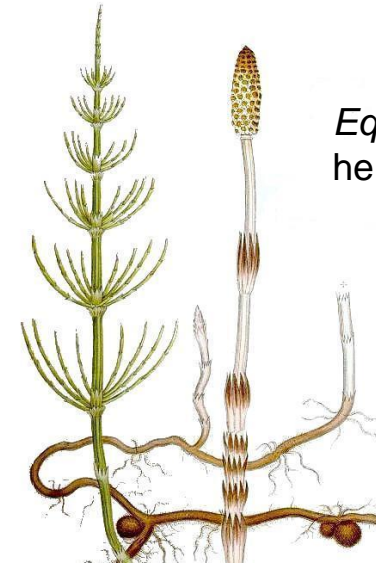
DIURETIC HERBS – flavonoids/saponins



Betula pendula
leaf



Ononis spinosa
root



Equisetum arvense
herb



Polygonum aviculare
herb



Sambucus nigra
flower



Tilia cordata
flower

DIURETIC HERBS

Plant drugs containing mostly **flavonoids**, or **saponins**, or both, e.g.:

- ▶ Virgaureae herba – *Solidago virgaurea*, Asteraceae, golden rod
- ▶ Herniariae herba – *Herniaria glabra*, *H. hirsuta*, Caryophyllaceae, rupturewort
- ▶ Orthosiphonis herba – *Orthosiphon stamineus*, Lamiaceae, cat's whiskers
- ▶ Violaе herba cum flore – *Viola tricolor*, Violaceae, wild pansy
- ▶ Urticae herba/folium – *Urtica dioica*, Urticaceae
common nettle
 - ▶ flavonoids, chlorophyll, carotenoids, triterpenes, sterols, minerals, vitamins (B group, C, K₁),...

DIURETIC HERBS – flavonoids/saponins



Solidago virgaurea
herb



Viola tricolor
herb (with flower)



Urtica dioica
herb/foolium



Orthosiphonis stamineus
herb



Herniaria glabra
herb

DIURETIC HERBS

Plant drugs containing mostly **essential oils**, e.g.:

- ▶ Petroselinii radix – *Petroselinum crispum*, Apiaceae, garden parsley root
- ▶ Levistici radix – *Levisticum officinale*, Apiaceae, lovage
- ▶ Juniperi lignum/fructus – *Juniperus communis*, Cupressaceae, common juniper
- ▶ Bucco folium (Barosmae folium) – *Barosma (Agathosma) betulina*, Rutaceae, buchu
 - ▶ the drug contains essential oils with disinfectant effect and flavonoids with diuretic effect

DIURETIC HERBS – essential oils, etc.



Petroselinum crispum
root



Levisticum officinale
root



Juniperus communis
wood / (pseudo)fruit



Barosma betulina
leaf

DIURETIC HERBS

▶ Other plant drugs

▶ **Theae folium**

Thea (Camellia) sinensis,
Theaceae

- ▶ contains **theophylline**
(methylxanthine derivative)
with diuretic effect



▶ **Manna**

Fraxinus ornus, Oleaceae

- ▶ a sweetish exudate is obtained
from the stems of manna ash
by incision
- ▶ source of **D-mannitol**

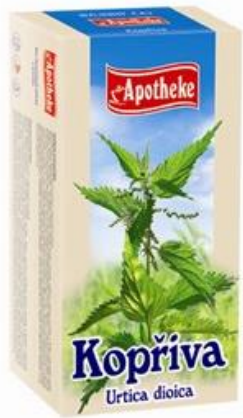


Fraxinus ornus
„manna“



DIURETIC PREPARATIONS

Herbal teas – monocomponent/polycomponent



Urticae folium/herba



Solidaginis herba



Equiseti herba



Betulae folium

▶ URINARY TRACT Herbal tea (Megafyt Pharma)

- ▶ loose tea 75 g
- ▶ Betulae folium (30 %)
- ▶ Urticae herba (30 %)
- ▶ Menthae pip. herba
- ▶ Petroselini radix (10 %)
- ▶ Herniariae herba
- ▶ Ononidis radix (5 %)



URODISINFECTANT HERBS

Plant drugs containing **phenolic glycosides** (arbutin derivatives):

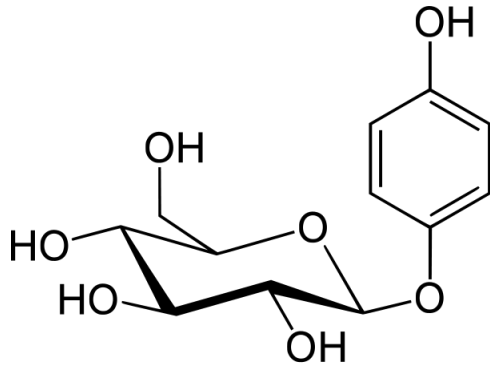
- ▶ *Uvae ursi folium* – *Arctostaphylos uva-ursi*, Ericaceae, bearberry leaf
- ▶ *Vitis idaeae folium* – *Vaccinium vitis-idaea*, Ericaceae, cowberry or lingonberry leaf
- ▶ *Myrtilli folium* – *Vaccinium myrtillus*, Ericaceae, bilberry (blueberry) leaf

x

- ▶ *Vaccinium macrocarpon* fruits
 - ▶ „big fruit“ cranberries, American cranberries
 - ▶ contains proanthocyanidins, flavonoids and other phenolic compounds



URODISINFECTANT HERBS



ARBUTIN → **HYDROQUINONE** = active principle



Arctostaphylos uva-ursi
leaf



Vaccinium vitis-idaea
leaf



Vaccinium myrtillus
leaf

URODISINFECTANT HERBS

- ▶ *Vaccinium macrocarpon fructus*
 - ▶ „big fruit“ cranberries, American or Canadian cranberries
 - ▶ it contains proanthocyanidines, flavonoids and other polyphenolic compounds (but not arbutin!)
 - ▶ the effect is bound to **proanthocyanidins (PACs)** that are easily absorbed into the blood after ingestion, then blood is filtered through the kidneys into the urine where they prevent bacteria (predominantly *Escherichia coli*) from attaching to the surface of the urinary tract wall (*E. coli* is one of the main agents of urological inflammation!)
 - ▶ some studies completely deny the cranberries efficiency (??)



URINARY SYSTEM DISORDERS

Herbal teas

- ▶ **URCYSTON** (Leros)
- ▶ POR SPC 20X1.5GM
- ▶ composition, in 100 g:

Uvae ursi folium	25 g
Equiseti herba	20 g
Myrtilli herba	15 g
Matricariae flos	10 g
Sambuci nigrae flos	10 g
Solidaginis herba	10 g
Thymi herba	10 g
- ▶ SUKL code: 0093469
- ▶ Selected medicinal products
- ▶ ATC: V11



- ▶ The main medicinal component are bearberry leaves. The antibacterial effects of bearberry are suitably supplemented by other medicinal plants that increase and supplement its medicinal effects.
- ▶ Drink warm, 3-5x a day, always prepare fresh, immediately prior to use. Not suitable for long term application. Do not use for more than 2 weeks. The treatment can be repeated a maximum of 5 times a year.
- ▶ **Do not take with acidic food or acid reacting medication.**

URINARY SYSTEM DISORDERS

Herbal teas

▶ SPECIES UROLOGICAE (Leros)

▶ POR SPC 20X1.5GM, 1X100GM

▶ composition, in 100 g:

Betulae folium 27.5 g

Uvae ursi folium 22.5 g

Polygoni avic. herba 10 g

Ononidis radix 10 g

Petroselini radix 11 g

Urticae herba 10 g

Millefolii herba 7 g

Sambuci nigrae flos 2 g

▶ SUKL code: 0056350
0000966

Selected medicinal products

▶ ATC: V11

- ▶ A supplementary remedy for inflammatory diseases of the urinary tract (acute and infectious urological diseases, acute and chronic inflammation of the urinary tract and the bladder). The infusion is diuretic, has antiseptic (antibacterial) effects, relaxes smooth muscle spasms.
- ▶ Do not use for more than two weeks except on medical advice. Treatment may only be repeated up to 5 times a year. If the symptoms persist, seek medical advice.



URINARY SYSTEM DISORDERS

Herbal teas

- ▶ **UROLOGICAL Herbal Tea** (Megafyt Pharma)
 - ▶ 20 x 1.5 g
 - ▶ Betulae folium 450 mg
 - ▶ Uvae ursi folium 450 mg
 - ▶ Menthae pip. herba 225 mg
 - ▶ Ononidis radix 150 mg
 - ▶ Petroselini radix 150 mg
 - ▶ Herniariae herba 75 mg
 - ▶ SUKL code: 0076432
 - ▶ Selected medicinal products
 - ▶ ATC: V11
- ▶ A supplementary remedy for acute infectious diseases of the urinary tract. The infusion has diuretic, antiseptic (antibacterial) effects, relaxes smooth muscle spasms.
- ▶ CI: swellings caused with heart and kidney insufficiency, pregnancy, lactating, children up to 12 years.
- ▶ Do not use more than 1 week. Treatment may only be repeated up to 5 times a year.



URINARY SYSTEM DISORDERS

Herbal teas

Other plant drugs used as a component of urologic herbal teas:

- ▶ Callunae herba – *Calluna vulgaris*, Ericaceae, common heather
 - ▶ contains proanthocyanidins, flavonoids, a small amount of arbutin
 - ▶ it has anti-inflammatory properties, especially with respect to the urinary system
- ▶ Cynosbati fructus sine semine (Cynosbati pericarpium) – *Rosa canina*, Rosaceae, dog rose
 - ▶ contains carbohydrates (saccharides), pectin, sorbitol, vitamin C, organic acids, tannins
- ▶ Filipendulae herba – *Filipendula ulmaria*, Rosaceae
 - ▶ contains flavonoids and other phenolic compounds
- ▶ Hibisci flos – *Hibiscus sabdariffa*, Malvaceae
 - ▶ contains proanthocyanidins, polysaccharides, phenolics, organic acids

URINARY SYSTEM DISORDERS

Herbal teas

▶ KIDNEYS, URINARY TRACT Herbal Tea (Leros)

- ▶ 20 x 1.5 g
- ▶ Betulae folium (30%)
Solidaginis herba (15 %)
Callunae herba (15 %)
Equiseti herba (15 %)
Polygoni avic. herba (10 %)
Menthae pip. herba (10 %)
Ononidis radix (5 %)



▶ UROLOGICAL Herbal Tea (Teekanne)

- ▶ 10 x 2.0 g
- ▶ Solidaginis herba (25 %)
Betulae folium
Equiseti herba
Ononidis radix
Menthae piperitae herba (5 %)
Liquiritiae radix (5 %)



URINARY SYSTEM DISORDERS

Herbal teas

▶ URINARY TRACT

Herbal Tea with cranberry (Megafyt Pharma)

- ▶ 20 x 1.5 g
- ▶ Hibisci flos
Cynosbati fructus sine semine
Callunae flos (13 %)
Solidaginis herba (6 %)
cranberry juice granular (5 %)
Cymbopogonis herba
Liquiritiae radix
Anisi fructus



▶ URINARY TRACT

Herbal Tea (Leros)

- ▶ 20 x 1.5 g
- ▶ Callunae herba (25 %)
Hibisci flos (25 %)
Solidaginis herba (20 %)
Anisi fructus (15 %)
Cynosbati fructus sine semine (10 %)
cranberry (5 %)



URINARY SYSTEM DISORDERS

Other preparations



▶ URINAL[®] cps. (Walmart/Idelyn)

- ▶ contains *Vaccinium macrocarpon* fruit extracts:

NutriCran[®] = concentrated extract of **cranberry juice** – 200 mg

CystiCran[®] = highly concentrated extract of **whole fruits** – 3 mg
(this extract contains minimally 40 % of PACs)

+ extract of *Solidaginis herba* 20 mg

+ vitamin D 1.7 µg

- ▶ daily dose (= 3 capsules) replies to the content minimally **57,3 g** of fresh cranberries
- ▶ suitable as a supplementary preparation with antibiotic therapy (in some studies it was more effective than trimethoprim!)
- ▶ chronic usage: 1 capsule a day



URINARY SYSTEM DISORDERS

Other preparations

- ▶ **URINAL Akut[®] tbl. 10** (Walmart/Idelyn)
 - ▶ suitable for treatment of acute disorders, effective from the first day of usage
 - ▶ content in 1 tbl.:
 - ▶ 90 mg **CystiCran[®]** highly concentrated extract of whole fruits (min. 40 % of proanthocyanidines, PACs = 36 mg) – equivalent to 423 g of cranberry fruits
 - ▶ 20 mg extract of *Solidaginis herba*
 - ▶ 5 µg vitamin D
 - ▶ dosage: 1 tablet per day
- ▶ **URINAL[®] sirup** (Walmart/Idelyn)
 - ▶ contains NutriCran[®] 500 mg in 5 mL (equivalent to 12,5 g of fruits)
 - ▶ suitable for children over 1 year (5 mL)



URINARY SYSTEM DISORDERS

Other preparations

▶ UROVAL® gtt. (Valosun)

- ▶ contains herbal extracts of:
 - Arctostaphylos uva-ursi* leaf
 - Calendula officinalis* flos
 - Calluna vulgaris* herb
 - Galium odoratum* herb
- ▶ support remedy for better function of urinary system – diuretic, antibacterial, anti-inflammatory effects



▶ UROVAL® Manosa tbl. (Valosun)

- ▶ *Vaccinium macrocarpon* fruit extract
 - contains PACs (36 mg in daily dose = 5 tablets)
 - + D-mannose
 - + enzymes – trypsin, bromelain – supportive effect
- ▶ 1-2 tablets, 2-3 times a day

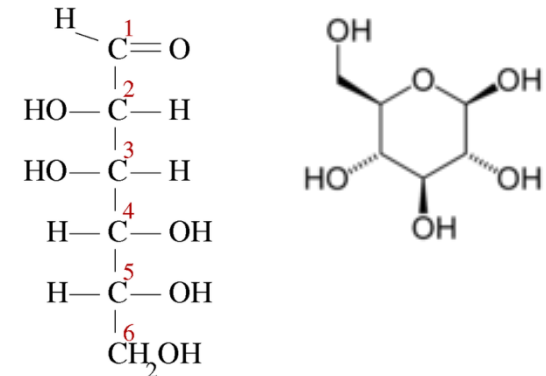


URINARY SYSTEM DISORDERS

Other preparations

▶ D-MANNOSE

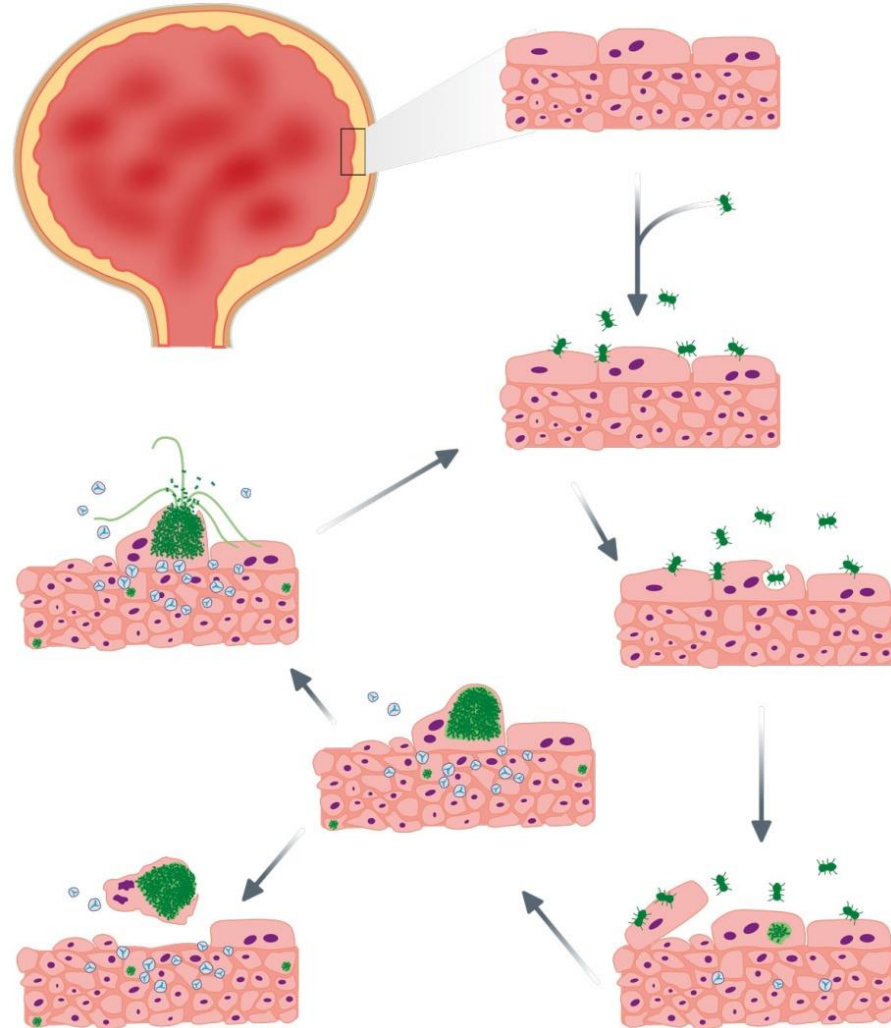
- ▶ = monosaccharide, naturally occurring in some fruits (pears, apples), produced during the fermentation
- ▶ is practically not metabolized, is largely secreted by the urine. In the urinary tract, it binds to the surface of uropathogenic bacteria *E. coli* (= UPEC), which then lose the ability to attach to the bladder mucosa and are subsequently flushed with urine stream
- ▶ a natural alternative to antibiotics, it works quickly and efficiently
- ▶ products, e.g.: **BLOKURIMA, URO-MANOSA, Uroval D-MANOSA, PM D-MANOSA...**



URINARY SYSTEM DISORDERS

Other preparations

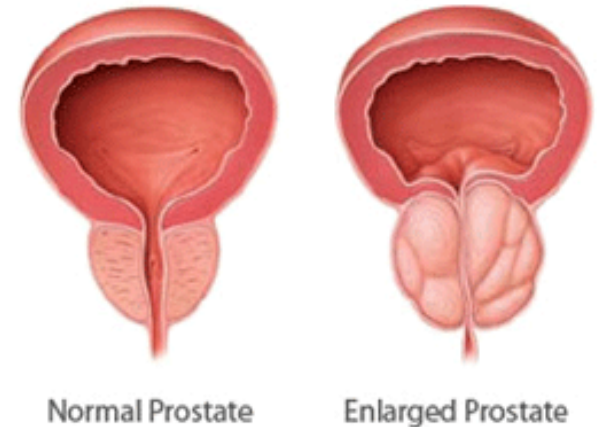
UPEC INVASIVE CYCLE



URINARY SYSTEM DISORDERS

Benign prostatic hyperplasia (BPH):

- ▶ is common urological condition caused by the non-cancerous hypertrophy (enlargement) of the prostate gland as men get older
- ▶ as the prostate enlarges, it can squeeze down on the urethra – this can cause trouble urinating
- ▶ the symptoms associated with BPH are known as lower urinary tract symptoms (LUTS)
 - ▶ frequent urination, urinary urgency, the need to frequently empty the bladder, especially at night (nocturia)
 - ▶ urinary retention
 - ▶ formation of bladder stones (due to crystallization of salts)
 - ▶ increased risk of urinary tract infections and inflammation



URINARY SYSTEM DISORDERS

- ▶ in the pathogenesis of BHP, a major role is played by increased production of androgenic hormone DHT (dihydrotestosterone) which is formed from testosterone produced by the 5- α -reductase enzyme
- ▶ DHT induces growth of prostate tissue through binding to androgen receptors in the cytosol

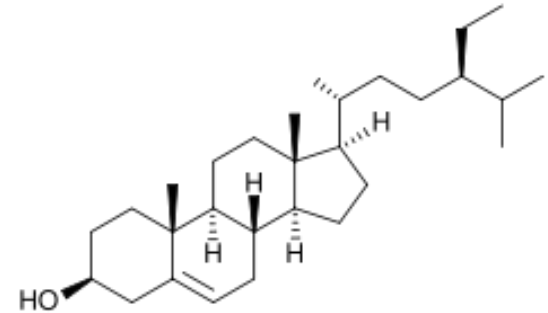
Pharmacological treatment – influencing of plasma androgen concentration or competition on androgen receptors

- ▶ **5- α -reductase inhibitors**
- ▶ **blockers of α 1-adrenergic receptors**
- ▶ **5-phosphodiesterase inhibitors**
- ▶ irreversible binding of steroid hormones (testosterone)
- ▶ (estrogens, progestins due to inhibition of LH-RH secretion - are not used in therapy for a number of side effects)

URINARY SYSTEM DISORDERS

Phytotherapy:

- ▶ plant drugs with high PHYTOSTEROL content (especially **beta-sitosterol**)
 - ▶ the mechanism of action is not fully elucidated, it could be due to:
inhibition of 5- α -reductase, competitive testosterone binding to adrenergic receptors, aromatase inhibition, attenuation of prostate cell metabolism and fibroblast proliferation, inhibition of prostaglandin and leukotriene synthesis,...
 - ▶ other effects: inhibition of prolactin binding to receptors, anti-inflammatory action (inhibition of 5-lipoxygenase), anti-edematous effect
- ▶ in combined preparations also contain:
 - ▶ plant drugs with a diuretic, urodisinfectant, anti-inflammatory effect
 - ▶ vitamin E, zinc...



URINARY SYSTEM DISORDERS

Preparations for care of prostate

Plant drugs used to treat and prevent prostate disorders:

▶ **Saw palmetto** – *Serenoa repens*, Arecaceae

- ▶ **fruits** are rich in phytosterols and fatty acids
- ▶ contributes to maintain normal urinary function and right urinary flow, support reproductive function



▶ *Pygeum africanum* (*Prunus africana*), Rosaceae, the African cherry tree

- ▶ **bark** contains phytosterols

▶ *Cucurbita pepo*, Cucurbitaceae

- ▶ seeds
(seed oil/lipophilic extract from the seeds)



URINARY SYSTEM DISORDERS

Preparations for care of prostate

Plant drugs used to treat and prevent prostate disorders:

▶ **Epilobii herba**

Epilobium sp., Onagraceae, willow-herb

- ▶ contains flavonoids, phytosterols, gallic acid derivatives
- ▶ cyclic dimeric ellagitannins – **oenothein A, B**



▶ **Urticae radix**

Urtica dioica, Urticaceae

- ▶ lipophilic extract of the root contains phytosterols (beta-sitosterol and its derivatives)
 - ▶ other compounds: polyphenolic structures (tannins, phenylpropanoids), coumarines
- ▶ other plant drugs with diuretic and urodisinfectant properties

URINARY SYSTEM DISORDERS

Preparations for care of prostate

▶ WILLOW-HERB

(Megafyt Pharma, Leros)

- ▶ Epilobii herba
- ▶ loose tea



▶ EPILOBIN Planta (Leros)

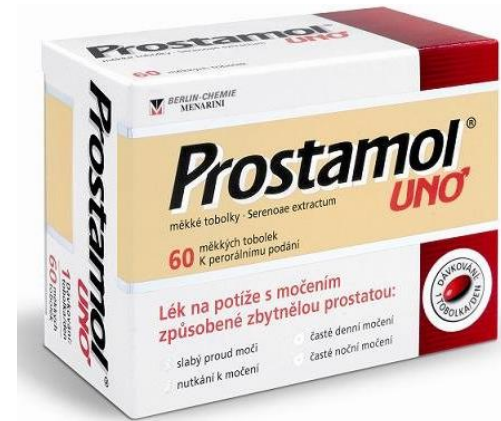
- ▶ 20 x 1.5 g
- ▶ composition in 100 g:
 - Epilobii herba 50 g
 - Bucco folium 25 g
 - Solidaginis herba 15 g
 - Calendulae flos cum calyce 10 g
- ▶ SUKL code: 0057688
- ▶ Selected medicinal products
- ▶ ATC: V11



URINARY SYSTEM DISORDERS

Preparations for care of prostate

- ▶ **PROSTAMOL UNO**
POR CPS MOL 30X320MG
(Berlin-Chemie AG – Menarini Group)
 - ▶ content in 1 cps:
320 mg of Serenoae extract (9-11:1),
extracted with ethanol 96%
 - ▶ SUKL code: 0059710
OTC medicinal products
 - ▶ ATC: G04CX02
 - ▶ treatment of BPH: 1 capsule a day (effect after 4-6 weeks)
 - ▶ CI: in case of known hypersensitivity to any component of product
- ▶ other products: PROSTAKAN MONO, PROSTA-URGENIN,
CAPISTAN, NO-PROSTAL



URINARY SYSTEM DISORDERS

Preparations for care of prostate

- ▶ **PROSTAKAN Forte POR CPS MOL 60**
(Dr. Willmar Schwabe GmbH & Co., Germany)
 - ▶ content in 1 capsule:
 - 160 mg **Serenoae** extractum (10-14,3:1)
 - 120 mg **Urticae radicis** extractum siccum (7,6-12,5:1)
 - ▶ SUKL code: 0007430
OTC
 - ▶ ATC: G04CX02
 - ▶ dosage: 1 capsule 2 times a day



URINARY SYSTEM DISORDERS

Preparations for care of prostate

- ▶ **PROSTENAL[®] cps.** (Walmart)
 - ▶ a combination of herbal extracts that helps to maintain healthy prostate - maintenance of normal urinary function and right urinary flow
 - ▶ content in 1 cps (soft-gel):
 - Saw palmetto extract – 300 mg
 - Urtica dioica* extract – 250 mg
 - Lycopene (obtained from tomatoes) – 0.5 mg
 - Pumpkin oil (*Cucurbita pepo* seed oil) – 300 mg
 - Bearberry extract (*Uvae ursi folium*) – 50 mg
 - ▶ 1-2 capsules daily 2 times a day,
 - ▶ It is recommended to use it for long time. The positive effects can be seen after 3-6 weeks.



URINARY SYSTEM DISORDERS

Preparations for care of prostate

- ▶ **PROSTENAL[®] Perfect complex cps.** (Walmart)
 - ▶ content in 1 cps:
 - 160 mg of Saw palmetto extract (10:1)
 - fatty acids 85-95 %, sterols 0.2-0.4 %
 - 120 mg of *Urtica dioica* root extract (10:1)
 - Lycopene 3 mg
 - ▶ daily dose: 1-2 capsules
 - ▶ positive effect usually after 3-6 weeks
- ▶ **PROSTENAL[®] Forte cps.** (Walmart)
 - ▶ 320 mg of Saw palmetto extract
 - 240 mg of *Urtica dioica* root extract
 - 10 mg of Zinc

