

# *Administration OF MEDICINE IN paediatric dentistry*

- Dr. Laura Lipták  
(based on Dr. Auth Adrienn's lecture)

- Assistant lecturer

# Anamnesis

- **Present illness**

- tonsillitis, influenza, etc.

- **Drug allergy**

- penicillin, salicylate, Lidocain

- **General diseases**

- haemophylia, leukaemia, leukopaenia, diabetes, epilepsy

- **Latest medication**

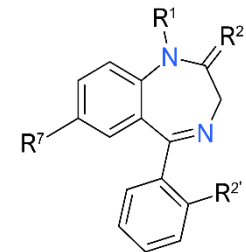
- the time passed since taking the latest medicine and its kind



<http://www.teluguone.com/comedy/content/funny-medical-quotes-34-10296.html>

# Examination and treatment

- **Psychic preparation**
  - At home, in the dental office
- **Premedication- consultation with GP!**
  - Benzodiazepines (anxyolyticum)
  - minor tranquillizers
- **Local anaesthesia**
  - topical, infiltration, block



[https://en.wikipedia.org/wiki/List\\_of\\_benzodiazepines](https://en.wikipedia.org/wiki/List_of_benzodiazepines)

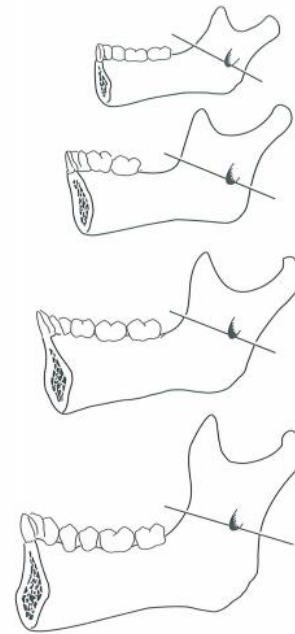


<https://gbdental.hu/hir/jon-szuri>

# Local anaesthesia



topical, infiltration



block



Pain, pain control and sedation in: Göran Koch: Pediatric Dentistry- Clinical Approach

# Local anaesthesia

	Vasoconstrictor	Strength	Toxicity	Longevity (minute)	Max. dose adult	Max. dose child
Lidocaine	Adrenalin 0,001%	2-4	2	100-200	10 ml (2%)	7 mg/kg (with Adr.)
Articaine	Epinephrin or adrenalin	5	1,5	180-240	12,5 ml	7 mg/kg (with Epi.)
Bupivacain	Adrenalin	16	8	3-30 hours!	-	-

Contraindication: unkooperative patient, patient with bleeding diathesis, infection by the injection area, allergy

# Local anaesthesia

## Lidocaine

- First choice in local anaesthesia
- In dentistry, a 1% dilute solution is better
- Allergy is extremely rare, with complaints more often caused by adrenaline

Lidocain gelee (home use) - 0,5% 5mg/ml

Lidocain spray (dental office) 1% (10mg/ml)



## Articain/ Ultracain Forte

- 25-30 kg (age:4-8): 0,25-1 ml
- 30-45 kg (age: 8-12): 0,5-2 ml
- very good diffusion ability
- lower toxicity
- longer faster effect
- more expensive > Lidocaine
- **Not suggested under 4 years of age**



# Medication to complete the local treatment

- Antimicrobial drugs

Antimicrobials are substances that kill or suppress the growth or multiplication of microorganisms, either bacteria, viruses, fungi, or parasites.

- Analgetic drugs



*Antimicrobials in Pediatric Dentistry:* M. W. Roberts, T. H. Belhorn in: Pinkham, Casamassimo, Fields, McTigue, Nowak: **Pediatric Dentistry, Infancy Through Adolescence 4.ed**

# The most important questions

- The type of drug
- Ideal dose to be administered
- How long it should be continued
- Hypersensitivity





# Antimicrobial drugs

- *Indication*
  - profilaxis of infective endocarditis
  - periostitis, increased swelling, cellulitis
  - injury, fever, osteomyelitis, persistent infection
- *Type of drug*
  - to culture the microorganism, antibiogram
  - Hypersensitivity
- *Adequate concentration of the drug to provide the therapeutic level*
  - Body weight kg
  - Solution, pill, capsule
- *Length of medication*

Antimicrobials: Mode of Action
<b>Inhibition of Cell Wall Synthesis</b>
Penicillins
Cephalosporins
Monobactams
Carbapenems
Glycopeptides
Azole antifungals
Echinocandins
<b>Inhibition of Protein Synthesis</b>
<i>Bind 50s ribosome</i>
Macrolides
Chloramphenicol
Lincosamides
Oxazolidinones
Streptogramins
<i>Bind 30s ribosome</i>
Aminoglycosides
Tetracyclines

<b>Antimetabolites</b>
Sulfonamides
<b>Alteration of Cell Membrane Permeability</b>
Polymyxins
Clotrimazole (antifungal)
Polyene antifungals
<b>Inhibition of Nucleic Acid Synthesis</b>
Rifampin
Griseofulvin
Nucleoside antivirals
<b>Topoisomerase Inhibitors</b>
Nalidixic acid
Quinolones
<b>Inhibition of Cytochrome Sterol</b>
Azoles (antifungal)

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# Antimicrobial agents

- Antibiotics
  - B-lactame (penicillin, cefalosporin)
  - Makrolids
  - Lincosamin/Clyndamycin
  - Sulfonamide, trimethoprim derivatives
  - Tetracycline
- Antiviral agents
  - Anti-herpes agents
- Antimicotics

# Penicillin

- penicillins are by far the most widely effective and the most extensively used antibiotics
- penicillins sensitive to beta-laktamase
  - Should be given at other than mealtimes
- broad spectrum penicillins
  - e.g. ampicillin, amoxicillin
- penicillin resistant to beta-laktamase
  - e.g. ampicillin and amoxicillin and others can be protected from destruction by beta-lactamases if they are administered together with lactamase-inhibitors such as clavulanic acid

Dosage: adequate and constant plasma concentration should be maintained to elicit the effect

**CAVE! Parallelallergy with Cephalosporine**



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# Cephalosporin

- chemically related to penicillin
- four "generations,,
- similar to penicillins in activity against gram-positive organisms are resistant to penicillinase
- **the cephalosporins exhibit some cross-sensitivity in patients who are allergic to penicillin → DO NOT USE IN CASE OF PENICILLIN ALLERGY**
- fewer adverse effects than penicillins
- taste less bitter when given orally
- less anaerobic activity than penicillins
- cephalosporins generally offer no advantage over penicillins for most dental infections and are usually more expensive

**Cephalosporins should be reserved for severe infections involving gram negative organisms or mixed infections.**



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# Clyndamycin/Dalacyn C

- dental infections
  - good activity against most gram-positive and anaerobic bacteria associated with oral infections
  - gastrointestinal upset, including diarrhea associated with Clostridium difficile toxin, is occasionally associated with this drug
  - spectrum of activity
  - availability of oral and intravenous formulations
  - not suggested for „the first choice” in dental infections by children → side effect can be:
    - diarrhea
    - pseudomembranous colitis - need for intensive hospitalisation!
- } *a good option for management of oral infections*

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Szántó I: *Gyógyszerek alkalmazása a gyermekfogászati gyakorlatban* in: Fábíán G, Gábris K, Tarján I: **Gyermekfogászat, Fogszabályozás és Állcsont- Ortopédia**

# Macrolides

- **Erythromycin**

- spectrum similar to penicillin's+ penicillinase-producing staphylococci, chlamydiae, Legionella, mycoplasma, and others
- well absorbed orally
- free-base form is unstable at gastric pH, so it is administered with an enteric coating or in a salt form (stearate or estolate)
- gastrointestinal upset in the form of diarrhea is a major disadvantage of erythromycin

- **Azithromycin and clarithromycin**

- structural derivatives of erythromycin that possess a broader spectrum of activity and improved bioavailability
- improved tolerability, specifically with less gastrointestinal upset
- greater use of these two agents

- **Macrolides**

- bacteriostatic rather than bactericidal
- in addition, increasing resistance to macrolides has been a concern and presents another drawback to the routine use of these agents
- atoxic ( can be used in pregnancy)
- indicated in penicillin allergy



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# Tetracyclines

- tetracyclines are bound to the growing bones and teeth
- **tetracyclines are not indicated for pregnant women or for children under 8-12 years of age**
- bacteriostatic, with a broad spectrum of activity
- indication: if other AB can not be used
- chelation formation with metal ions:
- $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Fe}^{2+}$  and  $\text{Al}^{3+}$  from antacids, antianemics, milk and so on. other foods: insoluble complexes (chelates) which reduce absorption,
- binding to the growing bone and teeth as well!!!
- gastrointestinal side effects, sensitivity to light

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# Tetracyclines

## Pregnancy, early u. Newborn:

Effect on the bone substance:

- inhibition of calcification
- delay of bone growth
- reversible

Children under 8-12 years:

*Effect on the tooth hard substance:*

- irreversible
- discoloration: yellow, brown
- enamel hypoplasia



**Cave! As long as tooth germs are present or tooth growth occurs, you should avoid tetracyclines if possible!**



# Metronidazol (KLION)

- Kinetics: Per os well, gets to every tissue fluid
- Mechanism: Anaerobic bact. absorb and transfer to toxic metabolite
- Indication: first choice in anaerobic and mixed infections
- ANUG/ANUP therapy
- Side effect: metallic mouth taste, dark urine, dizziness

- Under 12 years of age 7,5 mg/ttkg
- Over 12 years of age 3x500 mg



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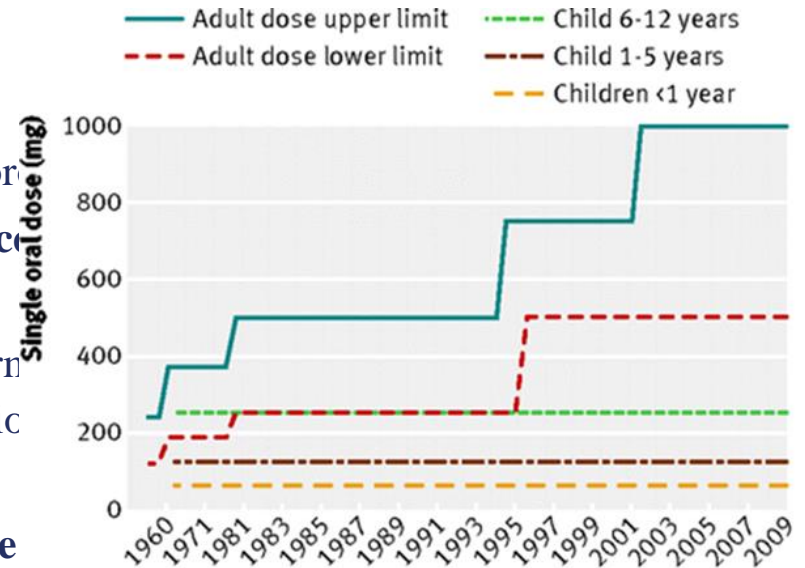
# Indication of AB in pediatric dentistry

- **Periostitis with the combination of:**
  - Extreme swelling
  - High fever, malaise
- **Trauma**
  - Avulsio– replantation ( to the root surface, per os)
  - Infected wound
- **Infective endocarditis prophylaxis**

# Prescribe antibiotics

- Make an accurate diagnosis
- Use appropriate AB and dosing schedules
- Diagnosis and AB selection should be based on thorough history and examination
- **Overprescribing is wasteful and can cause unnecessary side effects**
- Risk of the inappropriate use of antibiotics
  - Gastrointestinal disturbances, AB alter the normal flora
  - Allergic responses: rash → anaphylactic reaction

**Most serious complication of the widespread use of antibiotics is bacterial resistance.**

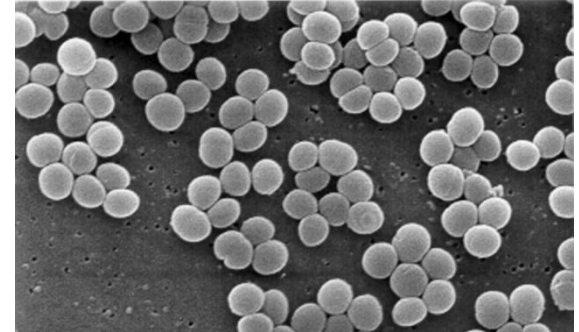


<https://www.bmj.com/content/343/bmj.d7803>

BNF year

# Prescribe antibiotics

- Patient
  - allergy
  - liver or kidney function failure
  - immunosuppressed
  - unable to swallow
  - age
- Degree of infection
- Use appropriate AB



# Prophylaxis of infective endocarditis in the dental practice

- IE in the anamnesis
- Congenital heart disease
  - Cyanotic heart disease without surgical intervention (palliative shunt, residual defects, conduit)
  - Congenital heart disease with surgical intervention, with implants- till 6 months after surgery
  - Restored congenital heart diseases with residual defects
- Abnormal heart valve function, after heart transplantation
- In the case of an artificial valve / valve plastic surgery

Literature: Kivovics P és mtsai: Állásfoglalás az antibiotikumok alkalmazásáról a szájsebészetben

# Prophylaxis of infective endocarditis in the dental practice

- Dental treatment when the prophylaxis is necessary:
  - extraction, sculption, rootcanal treatment, resection, curettage, intraligamental inj., scaling, gingival and parodontal operation, **...any intervention with bleeding**
- Antibiotics for prophylaxis:
  - 1 hour before and 6 hour after intervention:
  - amoxicillin per os
  - in case of penicillin-allergy: Makrolid /Clindamycin antibiotic

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# Prophylaxis of infective endocarditis in the dental practice

Dosage	Antibiotic	Child	Adult
1 hour before treatment , <b>per os</b>	Amoxicilline	50mg/kg	2g
30 min before treatment <b>IV/IM</b>	Ampicilline	50mg/kg	2g
1 hour before treatment in case of: Penicillin allergy, <b>Per os</b>	Clindamycin Cephalexin Azithromycin/Clarithromycin	20mg/kg 50mg/kg 15mg/kg	600mg 2g 500mg
30minutes before treatment: Penicillin allergy, <b>IV, IM</b>	Clindamycin Cefazolin	20mg/kg 25mg/kg	600mg 1g

Literature: Kivovics P és mtsai: Állásfoglalás az antibiotikumok alkalmazásáról a szájszészetben

# Prophylaxis for other high-risk patients

- **Compromised immune system**

- increased risk of developing focal or systemic infection

- following transient bacteremia associated with dental procedures

- AB prophylaxis may be considered

- Bacteremia in children with any form of indwelling hardware:

- including vascular shunt, ventricular shunt, central venous line, various orthopedic devices, and the like, may also provide a source of infection for the hardware

**In addition to consulting current guidelines regarding prophylaxis, consulting with the child's physician is recommended for optimizing patient treatment.**



# Analgetics

## NSAIDs

- Diclofenac (Cataflam, Voltaren)
- Ibuprofen group
- Metamizol (Algopyrin)
- Aminophenazon (Demalgon, Germicid cone)
- Acetilsalicyl acid (Aspirin)

## COX1, COX2 inhibitors

- inflammation reduction
- pain relief
- fever attenuation

## Side effects:

- ulcers
- kidney function disturbance
- allergy
- blood disorders

# Analgetics

	<b>Pain</b>	<b>Inflammation</b>	<b>Fever</b>	<b>Children</b>	<b>Over 12 years</b>	<b>Comment</b>
<b>Diclofenac (Cataflam)</b>	strong	strong	no	Susp.	pill	Slow half-life, bone pain++
<b>Ibuprofen</b>	good	good	good	Susp. (3 months)	pill	Least toxic
<b>Metamizol (Algopyrin)</b>	strong	weak	strong	avoid	pill	agranulocytosis
<b>Aminophenazon (Demalgon)</b>	strong	weak	strong	NO	NO	Stronger side effects Sedative
<b>Acetilsalicylic acid (Aspirin)</b>	medium	weak	medium	Not effective	Not effective	Other more effective analgetics Platelet effects (hinder the thrombocyte-aggregation – produce prolonged bleeding time)

# Analgetics

## Paracetamol

- COX3 inhibitor (?) little COX 1 and 2 effect
- Pain and fever relief (medium)
- Not reduce inflammation
- Liver toxicity
  - Toxic: 6-8g
  - Over 14 years max. 4g
  - Under 14 years max. 2g (50 mg/ttkg)
  - Reduce toxicity: Acetylcysteine

### Forms:

- Syrup: 0,5-2 tsp.(2months-12years)
- Cone: 125 mg (3 months-1 year)
- Pill.: over 12 years of age!!

### Many brand:

- Ben-u-ron
- Béres Febrilin
- Doloramol
- Mexalen
- Miralgin
- Neo-Citran
- Panadol
- Paramax
- Rubophen
- Symptomed
- Talvosilen

**Parent's attention not to take more type of analgetics in the same time!**

# Antifungal agents

- Candida species (esp. *C. albicans*) are in healthy mucous membranes of the body
- multiplication + invasion of the tissues → occur immunity of the host is compromised
- Oral and esophageal candidiasis is usually treated with topical suspensions
- Oral infection is frequent by infants- *soor oris/ mucocutan candidiasis*
- Systemic medication is not suggested
- In case of recurrent, non-persistent infection, further testing is recommended

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# Antifungal agents

## Topical agents:

### **Nystatin**

- most common topical agent
- treatment of oral candidiasis in children
- the drug is available as an oral suspension (100,000 U/ml), tablet (500,000 U), and pastille/ troche (200,000 U)
- a dose of 1 million to 3 million units per day in three to five divided doses for 10 to 14 days is recommended.

### **Corsodyl**

- mild antifungal effect (allergy!)

### **Glycerinum Boraxatum:**

- borax inhibits candida reproduction
- recently not recommended- toxic effects

### **Methylrosalinum**

- fast, effective, mucosa blue discoloration

## Systematic:

**Fluconazole and Other Azoles** → prescription by the general practitioner

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Boric acid- Pubmed

# Antiviral agents

Rare in dental practice

Most frequent: herpes virus group

## Herpes virus:

Herpes labialis

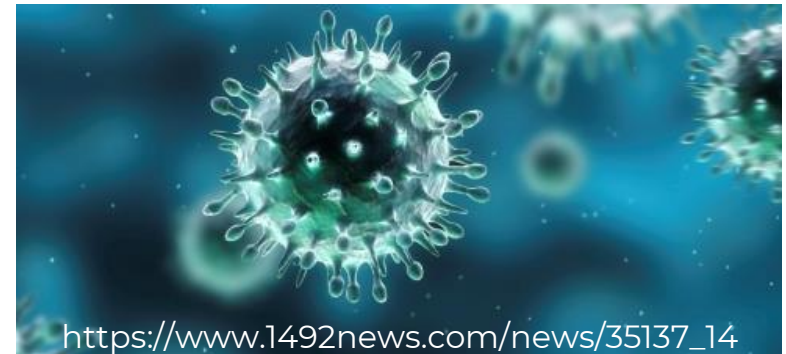
Gingivostomatitis herpetica

Varicella

*Acyclovir (Telviran, Zovirax)*

stop virus DNA synthesis

per os/ IV



# Antiviral agents

## Gingivostomatitis herpetica:

- Acute illness:
  - fever, malaise, irritability, cervical lymphadenopathy
  - oral and perioral ulcerative lesions
- Therapy:
  - resolves spontaneously within 10 to 14 days
  - requires only supportive therapy (Suspensio anaesthetica)
  - immunosuppressed patients primary/
  - reactivation of latent HSV infections } requires more aggressive therapy → paedrist!!
- In case of relapse: *Acyclovir* therapy per os / IV
  - Per os: 5x 200 mg over 2 years old

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# Topical agents

## Solutions for rinsing, pills

- Neomagnol (disinfection)
- Chamomilla floris
- Corsodyl, Chlorhexamed
- Smoke-bush (antiinflammatory, disinfectant)
- Glycosept, Phlogosol (antiinflammatory, disinfectant)
- Strepsils, Neo-Angin (mouth,throat disinfectant sucking tablets)
- Faringosept tabl. (local anaesthesia included: tetracaine!)

## Topical suspension

- Zincum chloratum 10% (wound healing)
- Argentum nitricum 10% (disinfectant)
- Sanilind
- Acriflavin
- Phlogosol, Glycosept
- Vagothyl (aphta suspension)
- Gengigel/Gengigel baby

## Creams

- Azulenol (epithelizing)
- Alsol (antiinflammatory)
- Corsodyl gel
- Virolex, Zovirax (acyclovir)
- Revidur (herpes)
- Hevizos (herpes)



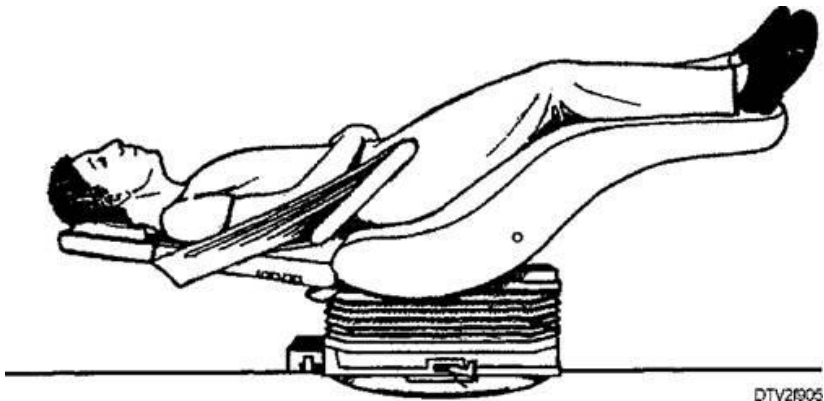
# Vitamins

- Rather in pediatric dentistry and internal medicine
- Tendonitis, ulcers, bone formation disorders
- Multivitamins
- Vitamin C- ascorbic acid: - 500 - 1000 mg / day;
  - fever, infectious diseases
  - recurrent aphthae
  - Gingivostomatitis herpetica
  - in the convalescence stage in larger dose
- Vitamin D+ Calcium



# First aid

- *Trendelenburg position*
- Water with sugar, blood sugar test
- In case of epilepsy: Diazepam
  - *Stesolid (rectalis)*
  - *Seduxen (IV)*



## Quinke-oedema, anaphylactic shock:

- *Depersolon (steroid)*
- *Di-Adreson F Aquosum (steroid)*
- *Calcimusc (calcium)*
- *Tonogen (mainly adrenalin)*
- *Isuprel ( $\beta$ 1-agonist, in bronchospasmus and bradycardia)*

# Anti-allergic agents

## Search for causative factors:

### *Symptoms:*

- rashes on the face and upper body
- lip oedema (Quincke)

### *Local treatment*

### Medicines

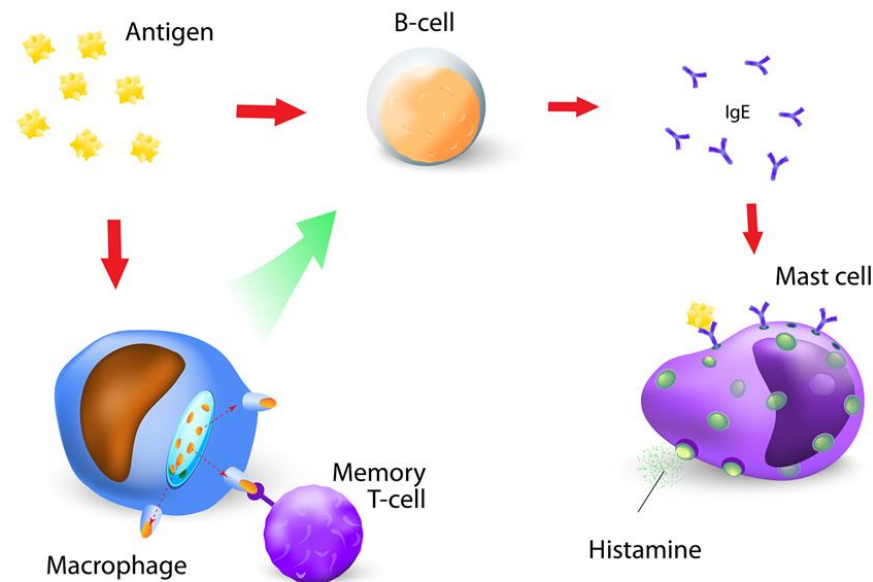
- Antihistamines
- Glukokortikoides

### Side effects:

- drowsiness, fatigue
- dry mouth
- nausea

### *Interaction:*

Sedative component of the analgesics



# Minor tranquillants: Benzodiazepins

## CONSULTATION WITH PEDIATRISTS

### *Indication:*

- Anxiolytic, panic (alprazolam, diazepam)
- Sleeping pills, retrograd amnesia (midazolam)
- Muscle relaxation (diazepam)
- Epilepsy (diazepam, clonazepam)
- **Not analgesics!!**
  - Parental consent statement
  - Release sheet



### **Dosage**

- Diazepam 0.12-0.3 mg / kg body weight
  - muscle relaxant
  - epileptic seizure prevention
- Midazolam 0.2-0.3 mg / kg body weight
  - retrograde amnesia

Thank you for  
your attention!