

# **Pharmacology Review & Update for Dental Hygienists – 2/2014**

**Gum Gardeners Study Group**

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# Learning Objectives

- ▶ Recognize drugs most frequently seen on patient health histories.
- ▶ “What’s New and What’s Not”
- ▶ Discuss side effects of certain drugs.
- ▶ Patient management issues.
- ▶ Off label benefits?

# Drug Categories

- ▶ Cardiovascular Drugs (CV)
- ▶ Respiratory Drugs
- ▶ Gastrointestinal Drugs (GI)
- ▶ Neurological Drugs
- ▶ Endocrine Drugs
- ▶ Drugs for Pain Control
- ▶ Other: Antibiotics; drugs used in Tx of HIV/AIDS & Cancer; Psychiatric Drugs.

# CV Drugs

- ▶ > 25% of the Top Drugs on the market are drugs used in the treatment of heart disease.
- ▶ What's their purpose?



# Categories of CV Drugs

- ▶ Diuretics
- ▶ Beta 1 Blockers
- ▶ Alpha Blockers
- ▶ CCB's
- ▶ Na Channel Blockers
- ▶ ACE Inhibitors
- ▶ ARB's (angiotensin receptor blockers)
- ▶ Nitrates
- ▶ Cardiac Glycosides
- ▶ Anti-Arrhythmics
- ▶ Anti-Hyperlipidemics
- ▶ Anticoagulants

# “Old StandBy’s”

- ▶ Hydrochlorothiazide (HCTZ) – diuretic
- ▶ Furosemide (Laxis) – diuretic
- ▶ Prazosin (Minipress) – Alpha 1 Blocker
- ▶ Propranolol HCl (Inderal) – Beta 1 Blocker
- ▶ Nifedipine (Procardia; Adalat) – CCB
- ▶ Lisinopril (Prinivil – ACE Inhibitor
- ▶ Losartan (Cozar) – ARB
- ▶ Digoxin (Lanoxin) – cardiac glycoside
- ▶ Warfarin NA (Coumadin) – anticoagulant
- ▶ Clopidogrel (Plavix) – anticoagulant
- ▶ Aspirin, 81 mg

# More “OSB’s”

- ▶ Nitroglycerin (NTG) – vasodilator
- ▶ Atorvastatin (Lipitor); Simvastatin (Zocor); Ezetimibe (Zetia) – antihyperlipidemics
- ▶ Quinidine – Na Channel Blocker; amiodarone (Cordarone) – K Channel Blocker: anti-arrhythmic drugs.



# What's New in CV Drugs?

- ▶ **Platelet Aggregation Inhibitor:** Prasugrel (Effient); 2009; fewer drug interactions.
- ▶ **Anti-Coagulants / Thrombi Inhibitors:** Dabigatren etexilate (Pradaxa); Rivaroxaban (Xarelto); Ticagrelor (Brilinta); 2009–2010; Apixaban (Eliquis), 2012.
- ▶ **Anti-hyperlipidemic:** Pitavastatin (Livalo), 2009.
- ▶ **Many prospective new CV drugs being developed & tested.**



# Possible Oral Side Effects/Concerns



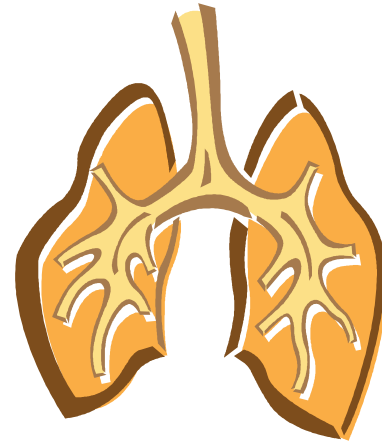
- ▶ Xerostomia
- ▶ Increased bleeding
- ▶ Gingival hyperplasia
- ▶ Good OHI.
- ▶ Cardiac dose epin –  
.04mg;  
levonordefrin??
- ▶ N2O OK as stress  
reducer.

# “Off Label” Benefits

- ▶ *Statins* used to lower cholesterol: “More successful cancer treatment” (AARP Magazine, July 2013) – 15% lower risk of death.
- ▶ *Beta Blockers* used to lower blood pressure: research indicates these drugs may reduce the risk for dementia.

# Respiratory Drugs

- ▶ Used in treatment of:
  1. Asthma (23 million Americans)
  2. COPD
  3. Common cold



# Categories of Respiratory Drugs

- ▶ Inhaled corticosteroids (ICS)
- ▶ Long acting beta 2 agonist (LABA's)
- ▶ Short acting beta 2 agonist (“Quick Relief”; “rescue medications”)
- ▶ Leukotriene Modifiers (Leukotriene Blockers)
- ▶ Anticholinergic drugs
- ▶ Topical corticosteroids
- ▶ Alpha adrenergic (agonist) drugs
- ▶ Antihistamines
- ▶ Expectorants

# Long Term Medications for Treatment of Asthma

- **Beclomethasone (Vanceril); Triamcinalone (Azmacort); Fluticasone (Flovent, Advir):** Corticosteroids administered w/MDI.
- **Salmeterol (Serevent); Formoterol (Foradil):** Long acting Beta 2 agonist administered w/an inhaler.
- **Montelukast (Singulair):** Leukotriene Modifier/Blocker taken orally. OK for children.
- **Tiotropium (Spiriva):** anti-cholinergic; prevents bronchospasms.
- **Omalizumab (Xolair):** tx of persistent, poorly controlled asthma; prev's release of histamines.

# “Rescue Med’s”; “Quick Relief” for Treatment of Asthma

- **Albuterol (Proventil); Metaproterenol (Alupent):** Beta 2 agonists administered w/inhaler.
- **Ipratropium (Atrovent):** anticholinergic drug; inhaler; drug of choice for long term tx for COPD.
- **Epinephrine:** used in emergencies!!
- ▶ **Med’s for the “pesky cold!” & Seasonal Allergies:**
  - **Afrin; Neo-Synephrine:** alpha agonists
  - **Benadryl; Tavist; Allegra; Clariton; Zyrtec:** anti-histamines.
  - **Flonase; Nasonex:** topical corticosteroids; intra-nasal.

# Expectorants

- **Guaifenesin (Mucinex)**
- **Robitussin w/ guaifenesin**
- **Acetylcysteine (Mucomyst) – tx for cystic fibrosis.**



# What's New in Respiratory Drugs

- ▶ **Dulera** (combo corticosteroid, mometasone furate & long-act B2 Agonist, formoterol fumarate dihydrate.); controls & prevents asthma symptoms; 2010.
- ▶ **Asthmanefrin**: replacement for Primatine Mist (off market 12/2011); recalled 5/2013 due to faulty atomizer.
- ▶ **Dupilumab**: not FDA approved yet; trials continue; blocks proteins associated w/ inflammation.



# Possible Side Effects/Concerns

- ▶ Xerostomia
- ▶ Dental caries
- ▶ Candidiasis
- ▶ GI upsets/nausea
- ▶ Tachycardia
- ▶ Headaches
- ▶ Altered taste
- ▶ Know pt's "triggers"
- ▶ Stress reduction



# GI Drugs

- ▶ Used in the treatment of:
  - GERD
  - Peptic Ulcer Disease (PUD)
  - Irritable Bowel Syndrome (IBS)
  - Chronic Inflammatory Bowel Disease
  - Other



# “Old Standby’s”

- ▶ **Antacids:** TUMS; Pepto Bismol – neutralize HCl acid in the stomach.
- ▶ **H2 Receptor Antagonist drugs:** Cimetidine (Tagamet); Ranitidine HCl (Zantac); Famotidine (Pepcid) – block amt of gastric acid stimulated by release of histamines.
- ▶ **Proton Pump Inhibitors:** Omeprazole (Prilosec); Lansoprazole (Prevacid); Esomeprazole (Nexium) – inhibit the production of gastric acid.

# More OSB's

- ▶ **GI Stimulant Drugs:** Metoclopramide HCl (Reglan; Metozolv) – accelerates the emptying of the stomach/gastric acid.
- ▶ **Anti-inflammatory Drugs:** Mesalamine (Apriso, etc.) – salicylic acid derivative. Treatment of Inflammatory Bowel Disease.
- ▶ **Antibiotic:** Metronidazole (Flagyl) – used in treatment of PUD.

# What's New in GI Drugs

- ▶ Rifaximin (Xifaxan): oral AB to treat “traveler’s diarrhea”.
- ▶ Golimumab (Simponi): treatment for ulcerative colitis.
- ▶ Linaclotide (Linzess): treatment for IBS.
- ▶ Imatinib (Gleevec): treatment for cancer of the stomach.

# Concerns with the GI Pt & their Drugs

- ▶ Pt positioning in the dental chair.
- ▶ Appointing post-meal.
- ▶ Dry mouth; hard tissue erosion.
- ▶ Why? Frequency? How long?
- ▶ Cariogenic concerns.
- ▶ Absorption of other drugs may be altered by antacids (iron, digitalis, t'cycline)

# Neurologic Drugs

▶ Used in the tx of:

- Seizures
- Parkinson's Disease
- Alzheimer's Disease



# Drugs Commonly Used in Treatment of Seizures

- ▶ **Na Channel Blockers** phenytoin (Dilantin); carbamazepine (Tegretol); oxcarbazepine (Trileptal); gabapentine (Neurontin).
- ▶ **Possible oral side effects & other concerns:**
  - Xerostomia
  - Gingival enlargement
  - Stomatitis; glossitis
  - Last episode? Trigger?

Good home care imperative!



# Drugs Used in Treatment of Parkinson's Disease

- ▶ **Dopaminergic drug** levodopa (Dopar; Larodopa) – increases levels of the NT dopamine; “gold standard”.
- ▶ **Dopamine agonist drugs** ropinirole (Requip) & pramipexole (Mirapex) – act directly on the dopamine receptor.
- ▶ **Concerns:**
  - Orthostatic hypotension
  - Short appointments; frequent rests.
  - GI upsets possible w/these drugs.

# Drugs Used in treatment of Alzheimer's Disease

- ▶ Drugs that enhance function of NT ACH – donepezil (Aricept); rivastigmine (Exelon).
- ▶ Drug that delays the breakdown of ACH –
  - Tacrine (Cognex).



# Alzheimer Drugs (Cont.'d)

- ▶ Memantine HCl (Narmenda): antagonist of the NT, glutamate. Decrease the activity of the NT at the nerve synapse.
- ▶ Concerns w/Alzheimer drugs: ortho hypotension; dizziness; dry mouth; NSAID's MLT GI upsets.
- ▶ Good OHI; good communication w/ primary care giver; short appt.'s.

# What's New in Neurologic Drugs?

- ▶ **Anticonvulsants:** levetiracetam (Keppra) – mechanism unknown/binds to plasma membrane in the brain. Ezogabine (Potiga) – neuronal potassium channel blocker (2011).
  - **Concerns:** dizziness; fatigue; suicidal thoughts.
- ▶ **Anti-Parkinson's:** apomorphine (Apokyn), – dopamine agonists. Others are in various stages of development & testing... trans-dermal; orally inhaled.

# “New” Cont’d.

## ▶ Anti Alzheimer’s:



- Galantamine (Razadyne) – delays breakdown of the NT, ACH; used in E.Europe & Russia for many yrs; relatively new in U.S
- **Side Effects:** headaches, nausea, vomiting, etc.

# Endocrine Drugs

- ▶ Used to treat:
  - Diabetes, I & II
  - Hyperthyroidism
  - Hypothyroidism
  - Osteoporosis



# Treatment of Diabetes I

## ▶ **Rapid Acting Insulins**

Insulin lispro  
(Humalog)

Insulin aspart (NovoLog)

## ▶ **Intermediate Acting Insulins –**

NPH Insulin (Human  
insulin)

## ▶ **Long Acting Insulins**

Insulin detemir  
(Levemir)

## ▶ **Delivery Systems:**

- Prefilled pen device
- Vials w/syringe
- Insulin pump –  
abdomen; “continuous  
subcutaneous insulin  
infusion therapy”.
- Inhaled powder (nasal  
spray) (Type I & Type II)

# Drug Therapy for the Treatment of Type II Diabetes

## Oral Anti-Diabetic Drugs

- ▶ **Glipizide (Glucotrol); Repaglinide (Prandin):** these drugs stimulate the pancreas to release insulin.
- ▶ **Metformin (Glucophage):** increase glucose uptake into cells (tissue).
- ▶ **Rosiglitazone (Avandia):** improves cell sensitivity to any circulating insulin. **FDA restricts** access to this drug; cardiac & osteoporosis concerns.



# One More Oral Diabetic Agent



- ▶ Pioglitazone (Oseni): improves target-cell response to insulin; decreases hepatic glucose output.

# Concerns w/ Anti-Diabetic Drugs

- ▶ Epinephrine: use with caution; may decrease amount of insulin released/available.
- ▶ Aspirin & other salicylates: may increase effects of the oral anti-diabetic agents.
- ▶ Dry mouth
- ▶ Increased risk of caries and periodontal disease.
- ▶ Hypoglycemia is the most common emergency with the diabetic patient.
- ▶ Morning dental appointments. Took med's?

# *Potential Perk with Metformin*

(AARP Magazine, July 2013):

“A 2012 review of seven studies published in the journal *Breast Cancer Research & Treatment* showed that metformin is also linked with a 17% lower risk of breast cancer. Women taking metformin for at least 3 years had a 25% lower risk....”

# Treatment of Hyper- & Hypo- Thyroidism

## Hyperthyroidism

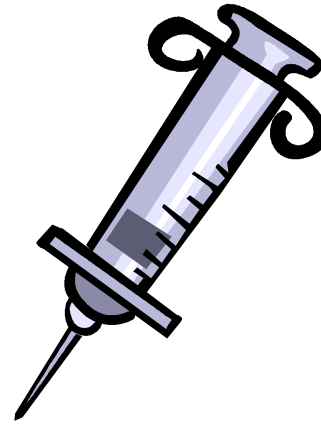
- ▶ Methimazole (Tapazole) & propylthiouracil (PTU): these agents are thyroid hormone antagonists.

## Hypothyroidism

- ▶ Levothyroxine (Levothroid; Synthroid): hormone T4 replacement therapy.

# Dental Concerns

- ▶ Limit use of local anesthesia with epin w/patients taking thyroid hormone antagonist.  
Possible cardiac concerns/reaction.



# Drug Therapy for Osteoporosis

## ▶ Bisphosphonates:

- Alendronate (Fosamax) – 1<sup>st</sup>; 1996.
- Ibandronat Na (Boniva) – 1x month tablet
- Risedronate (Actonel)

## Dental Concerns:

1. Osteonecrosis of the jaw (ONJ) – primarily affects pts on high doses of IV bisphosphonates.
2. Nausea; vomiting

# ONJ – (FYI)

“For patients requiring dental procedures, there are no data available to suggest whether discontinuation of bisphosphonate treatment, prior to the procedure, reduces the risk of osteonecrosis of the jaw. Clinical judgment should guide the management plan of each patient, based on individual benefit/risk assessment.”

(From the Actonel PI, as stated in *Access*, March 2008.)

# Osteoporosis Drug Therapy (Cont'd.)

## ▶ Estrogen receptor modulator:

- Raloxifine HCl (Evista) – regulates / adjusts estrogen levels.
- Leg cramps
- Pt. may need frequent breaks.

## ▶ Ca regulator:

- Calcitonin (Calcimax) helps increase absorption of Ca
- Dry mouth
- Caries
- Potential for perio disease.



# Drugs Used in the Treatment of Pain – *Analgesic & Anti-inflammatory*

- ▶ **Non-narcotic drugs:** treatment of mild-moderate pain; inflammation; OTC & Rx.
- ▶ **Narcotic drugs:** treatment of moderate-severe pain; Rx.



# Non-Narcotic Analgesics

- ▶ **Aspirin: “4-A’s”;** OTC
- ▶ **Ibuprofen (Advil, Motrin):** OTC; NSAID
- ▶ **Naproxen (Aleve, Anaprox, Naprosyn):** OTC; NSAID
- ▶ **Acetaminophen (Tylenol):** OTC; not an NSAID.
- ▶ **Diflunisal (Dolobid):** Rx; derivative of salicylic acid; potent NSAID.
- ▶ **Diclofenac (Voltaren; Cataflam):** Rx; NSAID.
- ▶ **Celecoxib (Celebrex):** Rx; Cox-2 Inhibitor; NSAID.

# Treatment of Inflammation/Pain w/ Corticosteroids

## Medications

- ▶ Prednisone  
(Deltasone); Rx
- ▶ Prednisolone  
(Hydeltrasol); Rx

## ▶ Possible Side Effects

- ▶ Weight gain
- ▶ GI upsets
- ▶ Headaches
- ▶ Mood swings

# Narcotic Analgesics – Controlled Substances/ Scheduled Drugs

- ▶ High potential for abuse & addiction.
- ▶ CNS suppressants.
- ▶ Cause insensibility & stupor; “impaired consciousness”.



# Narcotic Analgesics (Cont'd.)

- ▶ **Morphine:** narcotic prototype; II
- ▶ **Meperidine (Demerol):** II
- ▶ **Oxycodone (OxyContin):** semisynthetic; II
- ▶ **Hydrocodone:** used in combo's w/ OTC analgesics; III (II Oct 2013?)
- ▶ **Fentanyl (Duragesic; Sublimaze):** II; semisyn.
- ▶ **Codeine:** II, III; used in combo w/OTC med's; great anti-tussive.

# Narcotic Combo's

- ▶ Percodan: *oxycodone + aspirin*
- ▶ Percocet: *oxycodone + acetaminophen*
- ▶ Emperin #3: *codeine + aspirin*
- ▶ Tylenol #3: *codeine + acetaminophen*
- ▶ Vicodin: *hydrocodone + acetaminophen*
- ▶ Vicocet: *hydrocodone + aspirin*
- ▶ Vicoprofen: *hydrocodone + ibuprofen*

# Contraindications & Concerns

1. Other CNS depressants (no N2O)
2. Alcoholic or addict
3. Chronic pain
4. Head injury
5. Respiratory disease
6. Pregnancy & nursing
7. Nausea
8. Constipation: these drugs are great anti-diarrheals!
9. May not be treating this pt.!

# Drugs used in the Treatment of Headaches

- ▶ OTC analgesics
- ▶ Narcotics analgesics/ narcotic combo's
- ▶ Almotriptan (Axert): vasoconstrictor (cranial)
- ▶ Valproic acid (Valproate): Na Channel Blocker
- ▶ Many more! Too numerous to list!



# Drug Therapy for Osteoarthritis & Rheumatoid Arthritis:



- ▶ **OTC's:** Aleve, etc.
- ▶ **Diflunisal (Dolobid):** Rx NSAID; dry mouth; caries/periodontitis.
- ▶ **Diclofenac (Voltaren; Cataflam):** Rx NSAID; dry mouth; caries.
- ▶ **Celecoxib (Celebrex):** Rx; Cox-2 Inhibitor; dry mouth; risk for candidiasis.
- ▶ **Methotrexate (Mexate):** 1<sup>st</sup> choice tx for RA
- ▶ **Tofacitinib (Xeljanz):** 2012 anti-inflammatory; RA tx.

# Other Drugs our Patients May be Taking & Why.

- ▶ **Antibiotics:** bacterial infections; AB prophylaxis prior to dental treatment.
- ▶ **Antiretroviral drugs** used in treatment of HIV/AIDS.
- ▶ **Psychiatric Drugs:** depression; anxiety; ADHD.
- ▶ **Antineoplastic Drugs:** treatment for cancer.

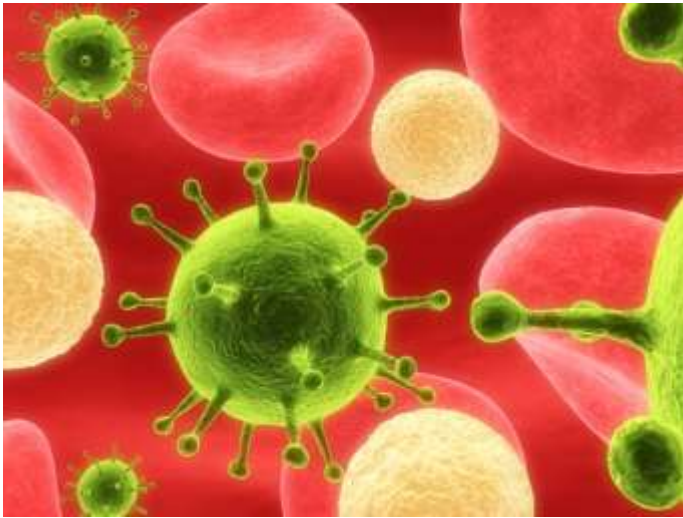


# Antibiotics

- ▶ **Penicillins:** amoxicillin; ampicillin
- ▶ **Cephalosporins:** cephalexin (Keflex); cefadroxil (Duricef)
- ▶ **Quinolones:** ciprofloxacin (Cipro); levofloxacin (Levaquin)
- ▶ **Macrolides:** azithromycin (Zithromax); clarithromycin (Biaxin)
- ▶ **Lincomycins:** clindamycin (Cleocin)
- ▶ **Tetracycline**
  - semi-syn analogues: doxy & mino-cycline

# Miscellaneous Antibiotics

- ▶ **Vancomycin:** tx of methicillin resistant staphylococcus aureus (MRSA)
- ▶ **Streptomycin:** secondary treatment for TB.



# Conversations we need to have with our patients re: AB's

- ▶ Take them until they are gone!
- ▶ Don't share them! Don't save them!
- ▶ Antibiotics will not cure a viral infection!
- ▶ AB + OC = BABY!
- ▶ Tetracycline + pregnancy = stained teeth for child.
- ▶ Tetracycline + sunlight (real or artificial) = skin photosensitivity.
- ▶ Possible GI upsets; superinfections; allergies.

# Antibiotic Prophylaxis

## AHA Recommendations – Pt.s with:

- ▶ Prosthetic cardiac valves
- ▶ Previous bacterial endocarditis
- ▶ History of congenital heart disease
- ▶ Surgically constructed systemic pulmonary shunts or conduits.
- ▶ Hypertrophic cardiomyopathy
- ▶ Mitral valve prolapse with valvar regurgitation.

# Guidelines of the American Academy of Orthopedic Surgeons

- ▶ Total joint replacement <2 yrs (2009, “for life”)
- ▶ Multiple joints replaced
- ▶ History of IE
- ▶ Diabetes, lupus, HIV, hemophilia.
- ▶ Consult with the surgeon!



# What's New in the World of AB's?

- ▶ The main emphasis continues to be the concern with bacteria becoming resistant to current AB's.... "multi-resistant bacteria"... & the need to develop AB's to address this problem.
- ▶ Developing & testing of new AB's/anti-infectives continues, however...
- ▶ Small % of pharmaceutical research is devoted to the development of new AB's. (\$ in cancer, CV disease, HIV/AIDS, & diabetes research.)



# Antiretroviral Therapy for the Treatment of HIV/AIDS

**HAART** (*highly active antiretroviral therapy*): current treatment guidelines involving a 2 or 3 drug “combo” / “cocktail”...varies with the individual patient.

“Approximately 78% of HIV/AIDS patients are becoming resistant to at least one HIV drug”. (“Oral Pharmacology of the Dental Hygienist”, Weinberg, Theile, Fine; 2013.)

**Research** continues for an AIDS vaccination.

# Specific Antiretroviral Drugs

- ▶ **Zidovudine (Retrovir): 1<sup>st</sup>**  
ARV drug; prophylaxis  
for exposed new borns.
- ▶ **Didansoine (Videx)**
- ▶ **Indinavir (Crixivan)**
- ▶ **Enfuvirtide (Fuzeon)**

## Concerns:

1. U–Precautions
2. Appoint early in  
day.
3. LA OK
4. Headaches
5. GI upsets; nausea;  
vomiting.
6. Dry mouth; 0  
mouthrinse w/  
alcohol.

# “So your patient is anxious?”

- ▶ Alprazolam (Xanax)
- ▶ Diazepam (Valium)
- ▶ Lorazepam (Ativan)
- ▶ Fluoxetine (Prozac)
- ▶ Sertraline (Zoloft)
- ▶ Chloral hydrate (Noctec) – pedo pre-op
- ▶ **Concerns:** use LA w/ epin w/caution; stress reduction; N2O.



## *“Are They Dealing with Depression?”*

- ▶ **Anti-depressants** are the largest group of anti-psychotic drugs.
  - **Amitriptyline (Elavil); protriptyline (Vivactil):** 1957; have been used the longest; TCA.
  - **Fluoxetine (Prozac); sertraline (Zoloft); paroxetine (Paxil):** SSRI; 1980's.
  - **Escitalopram (Lexapro):** SSRI; 2002.
  - **Citalopram (Celexa):** SSRI; 1998.

**Concerns:** dry mouth; GI upsets; cardiac dose of epinephrine; bruxism; glossitis; stress reduction.

# Schizophrenia???



▶ Drugs of choice:

1. Risperidone  
(Risperdal)
2. Olanzapine  
(Zyprexa)

Concerns: dry  
mouth; use LA  
with caution;  
current w/med's?

# *Anything New?*



- ▶ **Desvenlafaxine (Pristiq):** atypical anti-depressant. 2008.
- ▶ **Vortioxetine (Brintellix):** SSRI; 2013.

# Attention Deficit/Hyperactivity Disorder (ADHD)

“The goal of treatment is to improve behavior & academic performance.” (“Oral Pharmacology for the Dental Hygienist”; Weinberg, et al)

- ▶ **Adderall XR**, an amphetamine; CNS stimulant
- ▶ **Methylphenidate (Concerta; Ritalin)**: related to amphetamine; CNS stimulant.
- ▶ **Concerns**: epin should be kept to minimum; patient management; good HC.; appt early in the day.

# Antineoplastic (Cancer) Drugs

## There are Many!!!

- ▶ Tamoxifen (Novadex)
- ▶ Methotrexate (Mexate; Abitrexate; Folex)
- ▶ Anastrozole (Arimidex): these 3 drugs tx of breast cancer.
- ▶ Clodronate (Bonafos): tx myeloma & metastatic carcinoma. ONJ a concern.
- ▶ Sipuleucel (Provenge): tx of advanced prostate cancer; a “vaccine”.
- ▶ Bevacizumab (Avastin): tx of colon, lung & kidney cancers.



# Concerns



- ▶ 40 per cent of cancer pts experience complications in their mouth due to cancer drugs they're taking.
- ▶ **TLC!!!**

# Summary

- ▶ Be specific when talking to your patients about their drug history!
- ▶ Have an updated, thorough drug reference handy!
- ▶ The science of pharmacology cont's to evolve!

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*The End*