

Common Over-the-Counter and Alternative Medications

Uche Mordi

Doctor of Pharmacy Candidate, 2019

University of California, San Francisco

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Adapted from slides by Brandon Conley

University of California
San Francisco

- **What we will discuss:**
 - Common OTC Medications used for pain, cold/sinus/allergy, and sleep
 - Alternative medications and dietary supplements
- **What you (should) already know:**
 - Principles of trauma treatment (PRICE)
 - Causes and basic pathophysiology of pain, allergic rhinitis, viral vs. bacterial infections, and sleep disorders
 - When to refer a patient to a physician
- **What you should be able to do:**
 - Match brand and generic names of common OTC medications
 - Compare and contrast NSAIDs and APAP
 - Distinguish between 1st and 2nd generation antihistamines
 - Identify the indications for, and side effects of, common OTC medications
 - Identify patients exceeding maximal daily doses
 - Identify resources for accessing reliable information on alternative medications and dietary supplements

OTC Treatments for Pain

Oral

- Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)
 - Ibuprofen (Advil, Motrin)
 - Naproxen (Aleve)
 - Aspirin
- Acetaminophen (APAP)
 - Acetaminophen (Tylenol)

Topical

- Salicylates
- Camphor, Menthol
- Capsaicin

NSAIDS:

Ibuprofen, Naproxen, Aspirin

- **Functions:**

- Analgesic
- Antipyretic
- Anti-inflammatory
- (Anti-platelet)

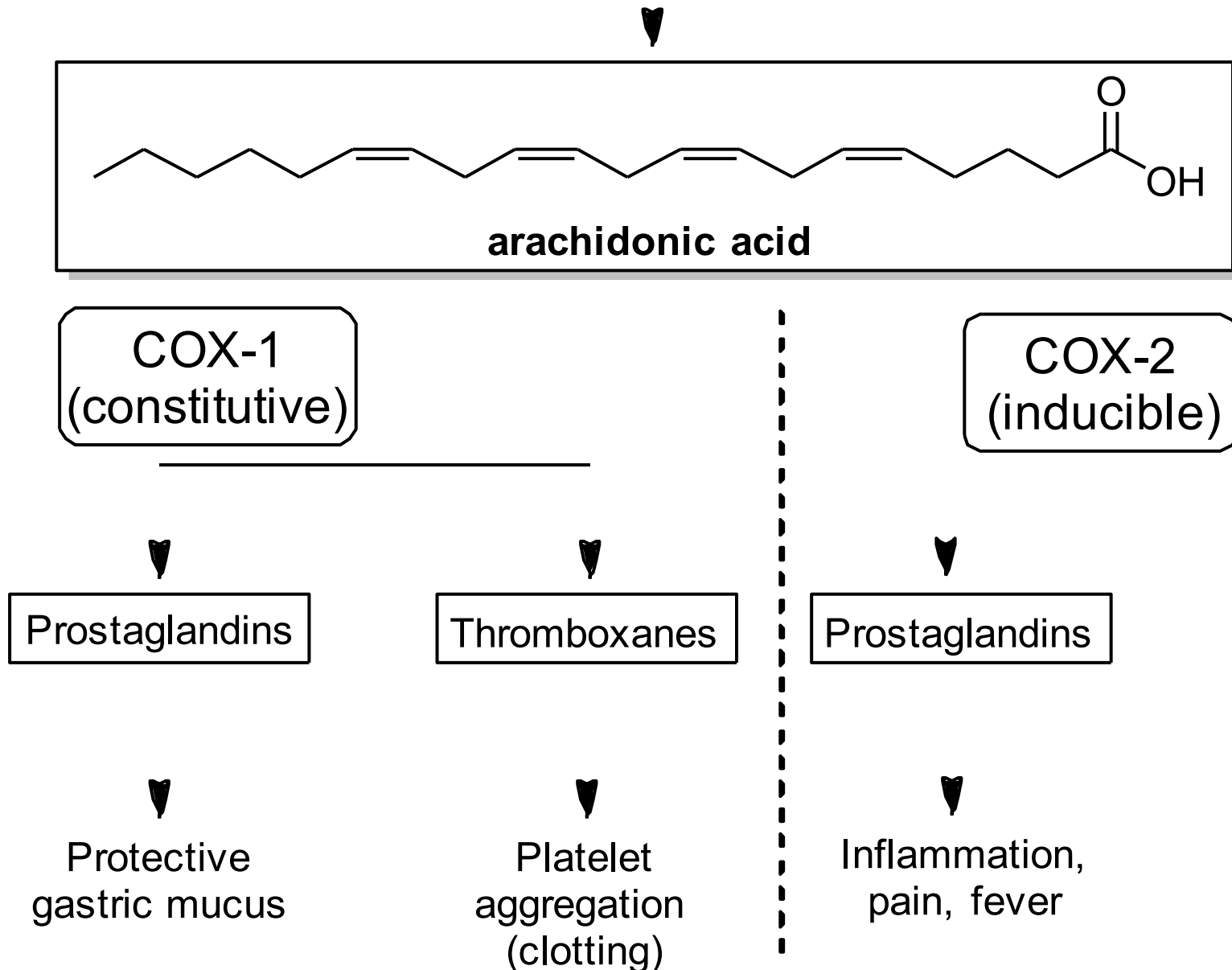


- **Mechanism of Action:**

- Central and peripheral cyclooxygenase (COX) enzyme inhibition

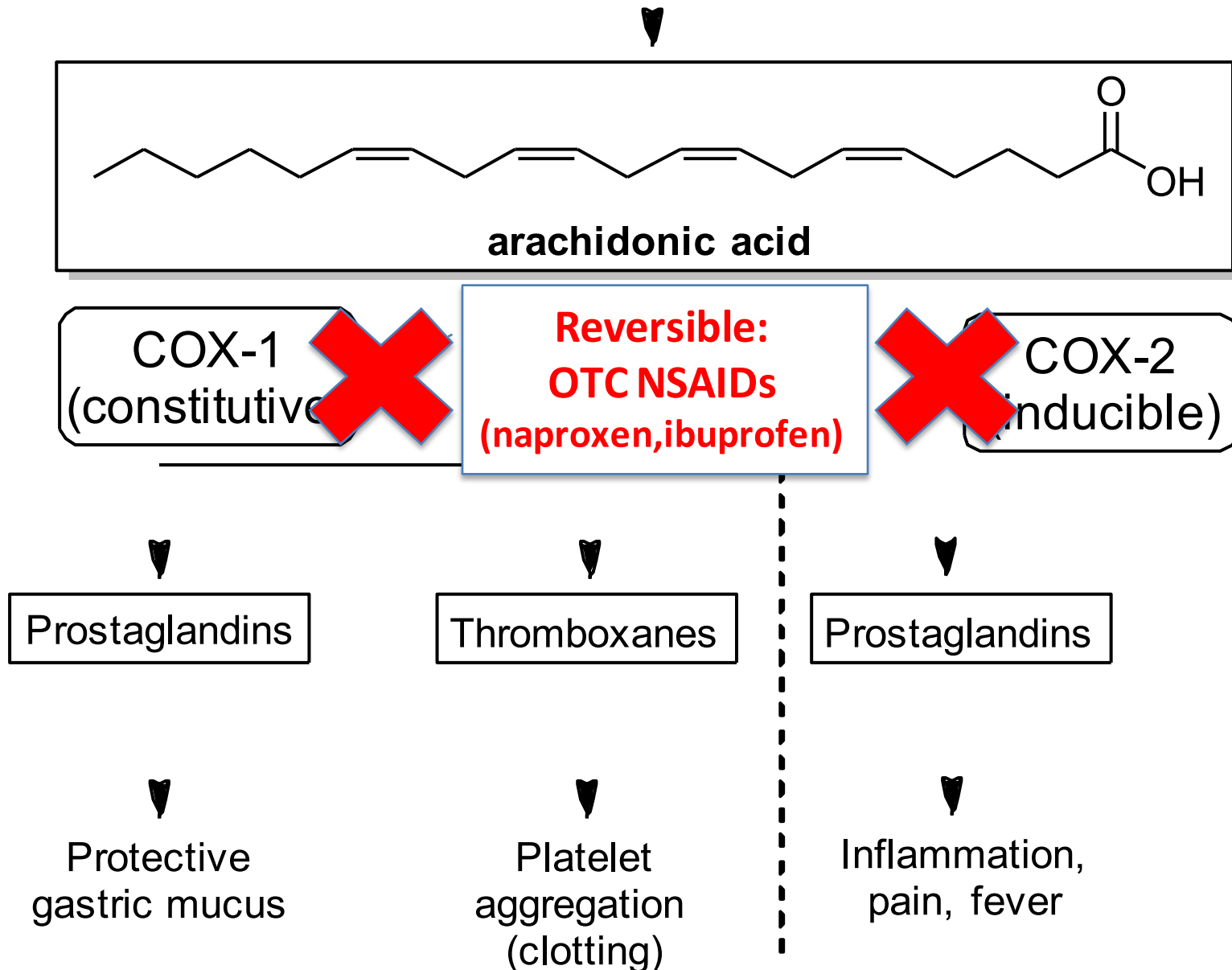
COX Pathways and NSAID Action

Phospholipid membranes



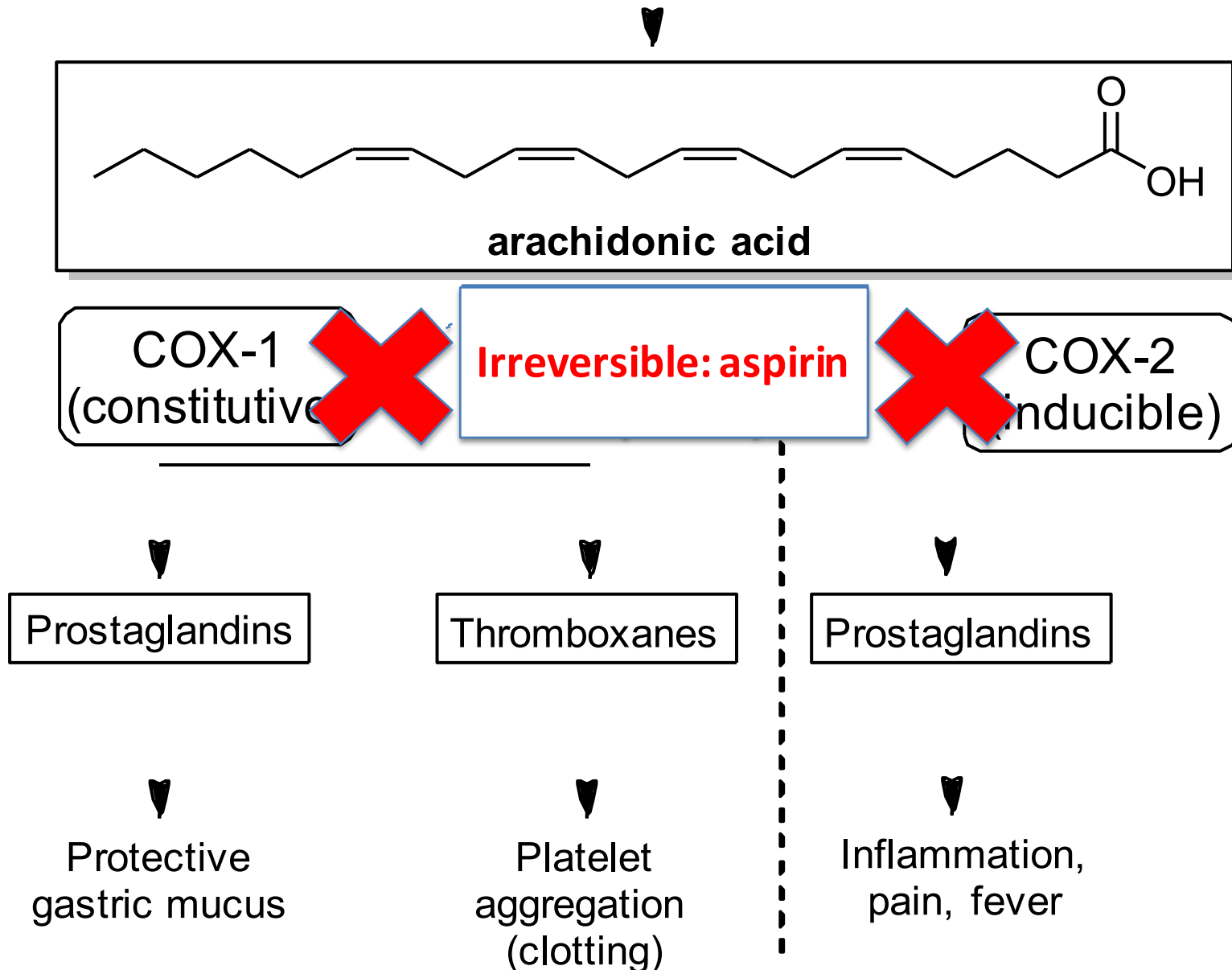
COX Pathways and NSAID Action

Phospholipid membranes



COX Pathways and NSAID Action

Phospholipid membranes



NSAIDS: Be Careful!

Common Side Effects:

- GI upset (heartburn, nausea, cramping) **Take with food!**
- Fluid retention, edema
- Dizziness, headache, tinnitus
- Pruritus

Serious Adverse Effects:

- GI ulcers, bleeding, perforation
- Acute renal failure

FDA Black Box Warnings:

- **ULCERS:**
 - May increase risk of GI irritation, inflammation, ulceration, bleeding, and perforation
- **CLOTS:**
 - Associated with increased risk of adverse cardiovascular thrombotic events, including fatal MI and stroke
 - Risk increases with duration and in patients with CV disease
 - Contraindicated for treating perioperative pain in the setting of coronary artery bypass graft (CABG) surgery

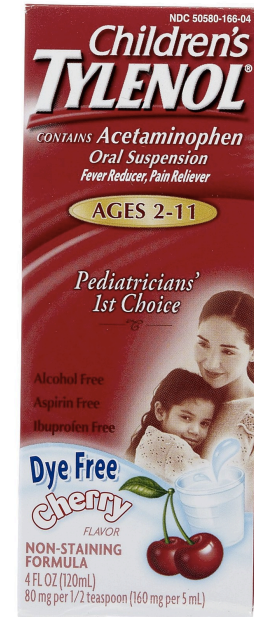
NSAIDs: Dosing

Product	Maximum for adults (per 24 hours)	Onset of Analgesia	Duration of Analgesia
Ibuprofen (Motrin, Advil)	1200 mg	<1 hr	4-6 hrs
Naproxen (Aleve)	660 mg		
Aspirin*	4 grams	~1 hr • Chewable: faster • Enteric-Coated (EC): slower	

*Limit self-treatment to <10 days

Acetaminophen/APAP (Tylenol)

- **Functions:**
 - Analgesic
 - Antipyretic
- **Mechanism of Action:**
 - Not fully understood
 - Inhibits prostaglandins in CNS, blocks pain impulse generation, inhibits hypothalamic heat regulation center



Acetaminophen/APAP: Be Careful!

Common Side Effects:

- Nausea, Vomiting, Constipation
- Headache, Insomnia
- Pruritus

Serious Adverse Effects:

- Liver toxicity (dose-dependent)
- Severe dermatological reactions

FDA Black Box Warnings:

- **ACUTE LIVER FAILURE: (IV form, but still)**
 - APAP has been associated with acute liver failure, at times resulting in liver transplant and death. Hepatotoxicity is usually associated with APAP intake (>4g/day in adults), and often involves more than one product that contains acetaminophen

Acetaminophen/APAP: Dosing

Patients	Max Dose for adults (per 24 hours)	Onset of Analgesia	Duration of Analgesia
Adults	3000 mg*	<1 hr	4-6 hrs
Heavy drinkers (≥3 drinks/day)	2000 mg		
Watch out for combination products containing acetaminophen (Excedrin, Nyquil Cold & Flu...)			

*Limit self-treatment to <7 days for pain, <3 days for fever

Topical Therapies:

Trolamine Salicylate, Methyl Salicylate



- **Salicylate Mechanism of Action:**
 - Counterirritant: agonizes and desensitizes pain receptors
- **Salicylates vs Topical NSAIDs**
 - Salicylates are not categorized as topical NSAIDs
 - However, if toxic amounts absorbed/ingested, toxicity similar to NSAID toxicity
 - Note: Topical NSAIDs (e.g., diclofenac, ibuprofen) are R_x only

Topical Therapies: Menthol, Camphor



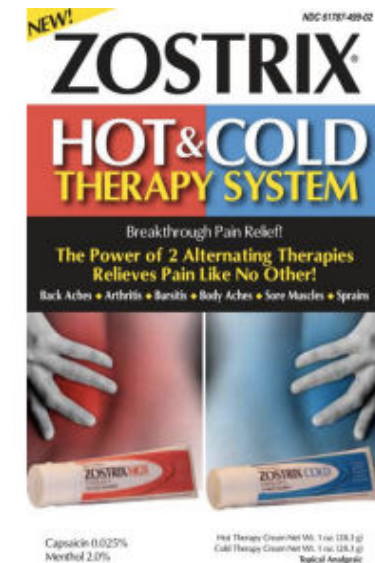
- **Cooling/Warmth sensation**
 - Interact with thermoreceptors in skin
- **Counterirritant at higher concentrations (5-10%)**
- **Local anesthetic at higher concentrations (5-10%)**

Topical Therapies: Capsaicin

- **Mechanism:**
 - Counterirritant
 - Depletion of substance P (sensory neuropeptide) over time with repeated use
 - Initial burning and stinging sensation; subsides with continued use as nerves desensitize
- **Onset:**
 - 1-2 weeks
- **Peak effect:**
 - 4-6 weeks
- **Adverse effects:**
 - No serious systemic adverse effects
 - Denervation may not always be reversible
 - Caution in patients with diabetes, other neuropathies



Topical Therapies: Combinations



Topical Therapies: Be careful!

- 2012 FDA Warning regarding **chemical burns**
 - 43 cases of 1st- to 3rd-degree burns
 - Wash hands before and after use
 - Do not apply to damaged skin or to mucous membranes
 - Do not apply tight bandages or dressings over treated area
 - Do not apply heat to treated area
 - If pain, swelling, or blistering occur, stop and see doctor
- Wait at least one hour to shower after applying
- Do not apply over large areas
- Do not apply more often than directed (usually 4 times/day)
- Do not ingest (can be fatal)
- Keep away from children
- Limit self-treatment to <7 days

Cold/Sinus/Allergy Medications

- **OTC Remedies**
 - Antihistamines
 - Decongestants
 - Cough suppressants

Antihistamines

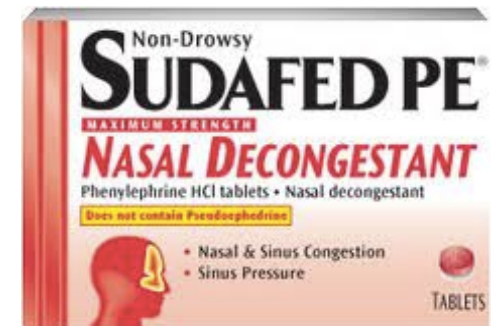
- **Mechanism of Action:**
 - Histamine H₁ receptor antagonists
 - Prevent H₁ receptor effects in brain, blood vessels, respiratory, and GI tracts:
 - Itching
 - Vasodilation, leaky vessels
 - Bronchoconstriction
 - GI contractility
- **1st-generation antihistamines (e.g., Benadryl):**
 - used for allergic reactions, motion sickness, sleep aid
 - penetrate easily into the central nervous system
 - bind to many different receptor types in addition to H₁
- **2nd-generation antihistamines (e.g., Allegra):**
 - used for seasonal allergic rhinitis, urticaria
 - do not cross the blood-brain barrier as easily
 - more specific for H₁-receptor

Antihistamines: Side Effects

- Side effects more likely in 1st generation
- (Some) side effects are (sometimes) desirable
 - Sedation, impaired performance
 - Orthostatic hypotension
 - Anticholinergic side effects (= decreased **SLUDGE**)
 - » Dry mouth (decreased **S**alivation)
 - » Blurry vision (decreased **L**acrimation)
 - » Urinary retention (decreased **U**rination)
 - » Constipation (decreased **D**efecation)
 - » GI upset (**G**I upset -- happens either way)
 - » Anti-emesis (decreased **E**mesis)

Decongestants

- **Available OTC:**
 - Pseudoephedrine (Sudafed)
 - Phenylephrine (Sudafed PE)
- **Mechanism of Action:**
 - Vasoconstriction via alpha-1 receptor activation
 - Decreased pressure and edema in sinus
- **Adverse Effects:**
 - Hypertension, palpitations, tachycardia
 - Insomnia, tremor, anxiety
- **Efficacy:**
 - Pseudoephedrine >>> Phenylephrine



Cough Suppressants: Dextromethorphan (DM)



- **Mechanism of Action**
 - Depresses medullary cough center via sigma-receptor stimulation
- **Adverse Effects**
 - Confusion, excitement, irritability
 - High doses: hallucinations, tachycardia, hypertension, psychosis

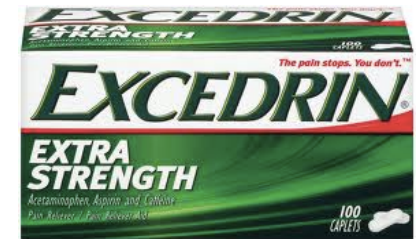
OTC Sleep remedies



- Typically 1st-generation antihistamines
- “Hangover” effect
- Tolerance to drowsiness develops within 3-4 days

Important Reminder:

- Many OTC combo products: watch cumulative doses, especially for **acetaminophen**



Implications for Physical Therapists

- **NSAIDS/APAP**
 - When should patient take them relative to PT treatments?
- **Topical analgesics**
 - Avoid applying to warm skin (heating pads, whirlpools...)
 - Numbness: dangerous during PT sessions? How to distinguish from numbness due to pathology?
- **Antihistamines**
 - Will dizziness/orthostatic hypotension interfere with exercises?
 - Will drowsiness?
- **Decongestants**
 - Are vigorous exercises safe with hypertension/tachycardia?

Alternative Medications: Herbals and Dietary Supplements

- Many products available
- More and more patients seeking alternative therapies
- Physicians often perceived as less open or less informed
- Regulation and standardization differ markedly from other OTC and R_x drugs
- With so much information available, where can healthcare professionals access reliable, unbiased information?

Alternative Medications:

Common Examples

- Garlic: taken to lower cholesterol (poor evidence for efficacy)



- Ginkgo biloba: taken to improve memory and cognition (poor evidence for efficacy)



Both supplements have been shown to have significant antiplatelet effects, which could be additive if taken with other antiplatelet or anticoagulant medications!

Alternative Medications: Common Examples(2)

- Glucosamine sulfate: taken to reduce symptoms of knee osteoarthritis (good evidence for efficacy)
- Can take up to two months for demonstrable clinical improvement in pain and function
- Adding chondroitin sulfate may provide additional benefit



Alternative Medications: Reliable Sources of Information

- Natural Medicines Database (available through UCSF library website)
- NCCIH (nccih.nih.gov) – formerly NCCAM
- US Food and Drug Administration (www.fda.gov/food/dietarysupplements)

As with any therapies, the rule is: first, do no harm!

Implications for Physical Therapists

- **Alternative Medications**

- Are patients taking (or thinking about taking) any herbal or dietary supplements that might interfere with their other medications and thus PT treatments?
- Although advising patients on supplement use (or non-use) might be beyond the PT's scope of practice, can you find reliable resources to provide for patients?

References

- Gahbauer, Alice. “Common OTC Medications.” March 2014
- Beechinor, Ryan. “OTC Pain Treatment for the Physical Therapy Student.” March 2013.
- Tran, Tina. “Agents for Respiratory Diseases.” April 2013.
- Eccles R. Menthol and Related Cooling Compounds. J Pharm Pharmacol. 1994; 46: 618-630.
- Richardson GS, Roehrs TA, Rosenthal L, Koshorek G, Roth T. Tolerance to daytime sedative effects of H1 antihistamines. J Clin Psychopharmacol. 2012; 22(5): 511-5.
- Bryner JK, Wang UK, Hui JW, Bedodo M, MacDougall C, Anderson IB. Dextromethorphan Abuse in Adolescence, An Increasing Trend: 1999-2004. Arch Pediatr Adolesc Med. 2006; 160(12):1217-1222.
- U.S. Food and Drug Administration. FDA Drug Safety Communication: Prescription Acetaminophen Products to be Limited to 325 mg Per Dosage Unit; Boxed Warning Will Highlight Potential for Severe Liver Failure.
<http://www.fda.gov/drugs/drugsafety/ucm239821.htm>, Last Updated 1/17/14, Accessed 3/4/14.

References (2)

- U.S. Food and Drug Administration. FDA Drug Safety Communication: Rare cases of serious burns with the use of over-the-counter topical muscle and joint pain relievers. <http://www.fda.gov/Drugs/DrugSafety/ucm318858.htm> Last Updated 9/17/12, Accessed 3/4/14.
- Katzung G, Masters SB, Trevor AJ. Basic and Clinical Pharmacology, 11th ed. New York: McGraw-Hill Medical, 2009.
- Panus CP, Katzung B, Jobst EE, Tinsley SL, Masters SB, Trevor AJ. Pharmacology for the Physical Therapist. New York: McGraw-Hill Medical, 2009.
- Eccles R. Substitution of phenylephrine for pseudoephedrine as a nasal decongestant. An illogical way to control methamphetamine abuse. Br J Clin Pharmacol. 2007; 63(1):10-14.
- Altman RD, Barthel HR. Topical Therapies for Osteoarthritis. Drugs. 2011;71(10):1259-1279.
- Lexi-Comp
- Micromedex