

Get rid of all the medical journals in the waiting room.
They give my patients too many ideas.

WORLD OF
SURGERY



America's Other Drug Problem

More over-the-counter
drugs. More do-it-your-
self doctoring.



Active Ingredient

OTC Confusion?



OTC Confusion?





Analgesics

- drugs which relieve pain without loss of consciousness



Analgesics / Antipyretics --> also drugs that reduce fever

(1) acetaminophen (APAP) / (Tylenol)



(2) aspirin (ASA)

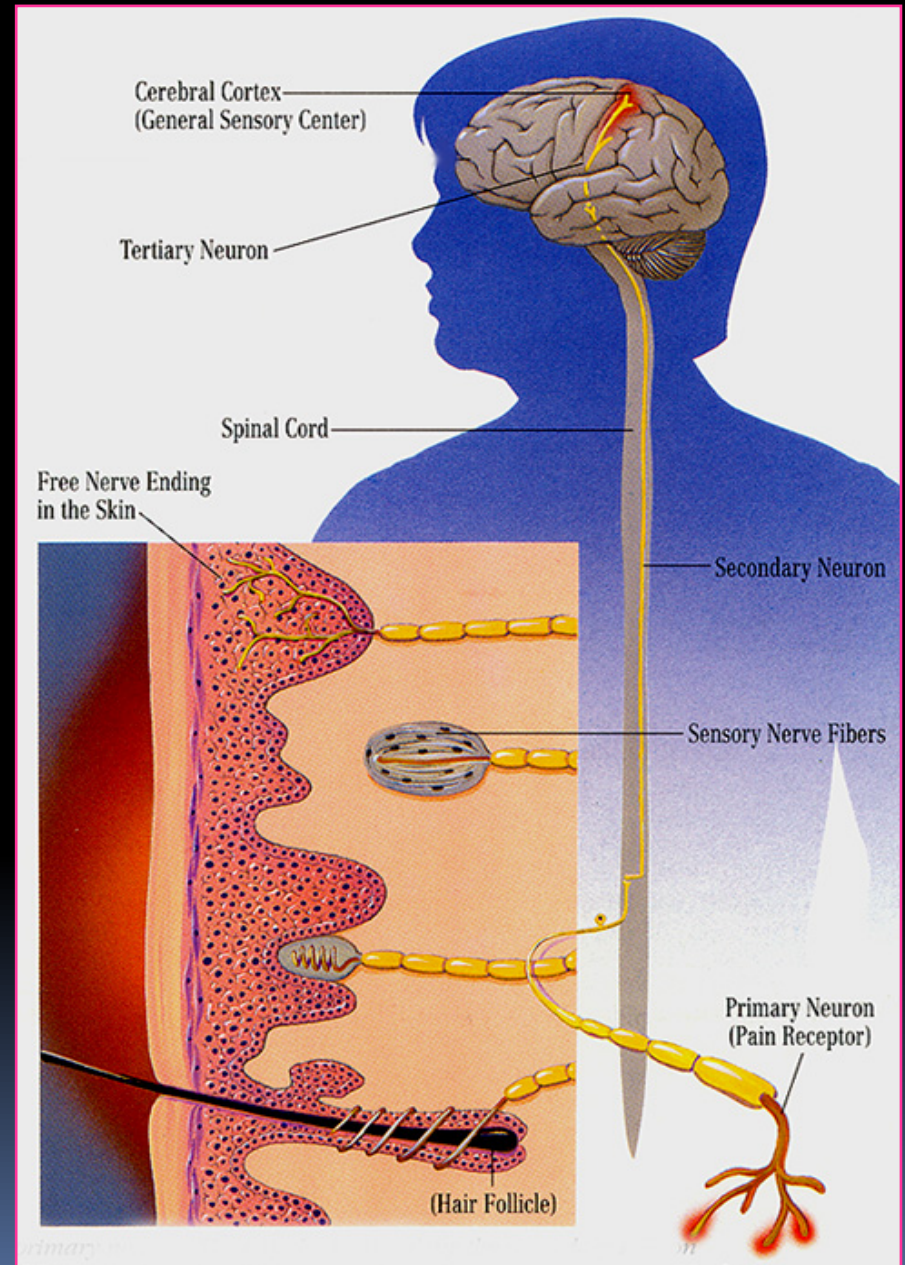


(3) NSAIDs (non-steroidal anti-inflammatory drugs)

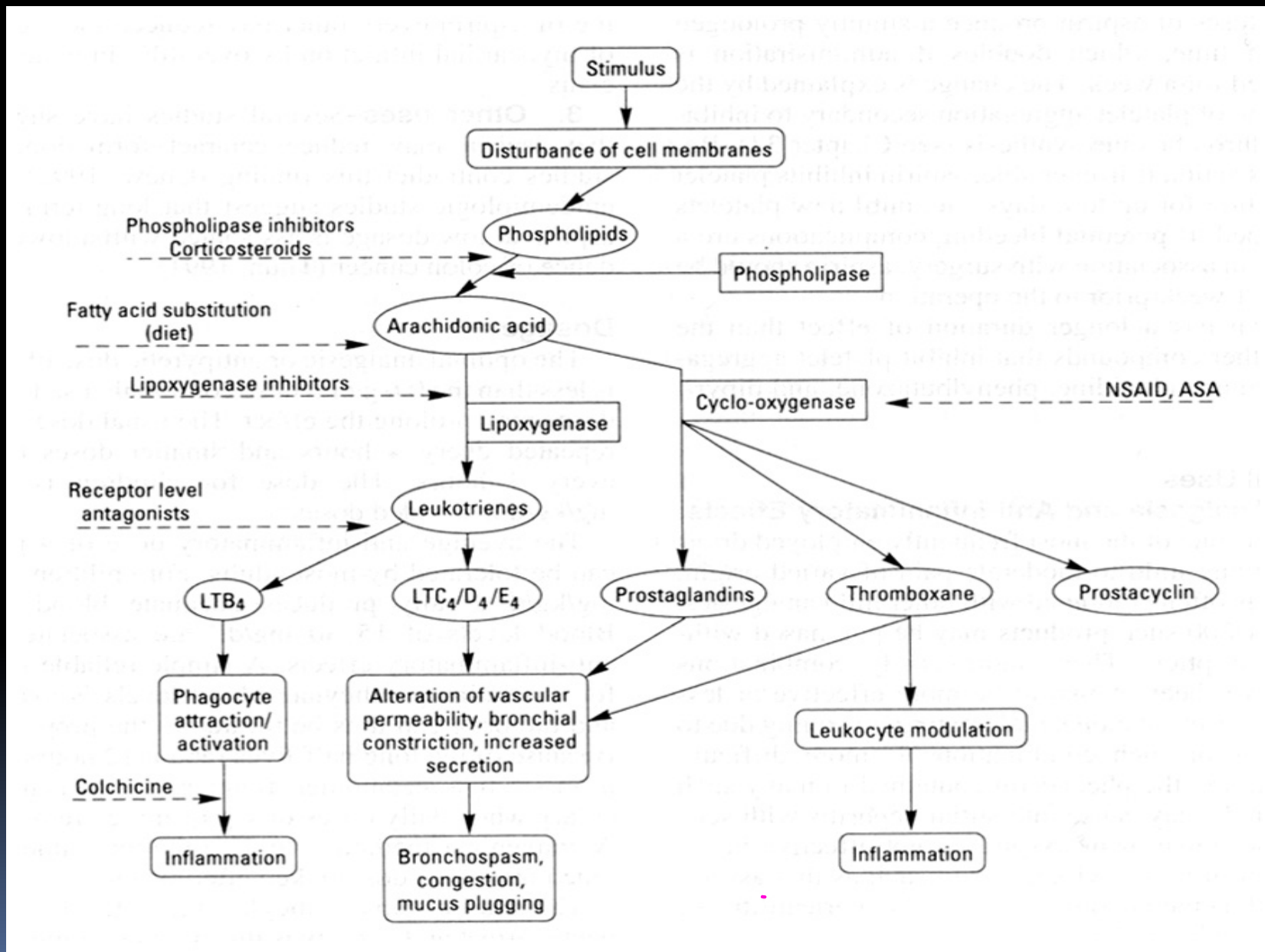


NSAIDs

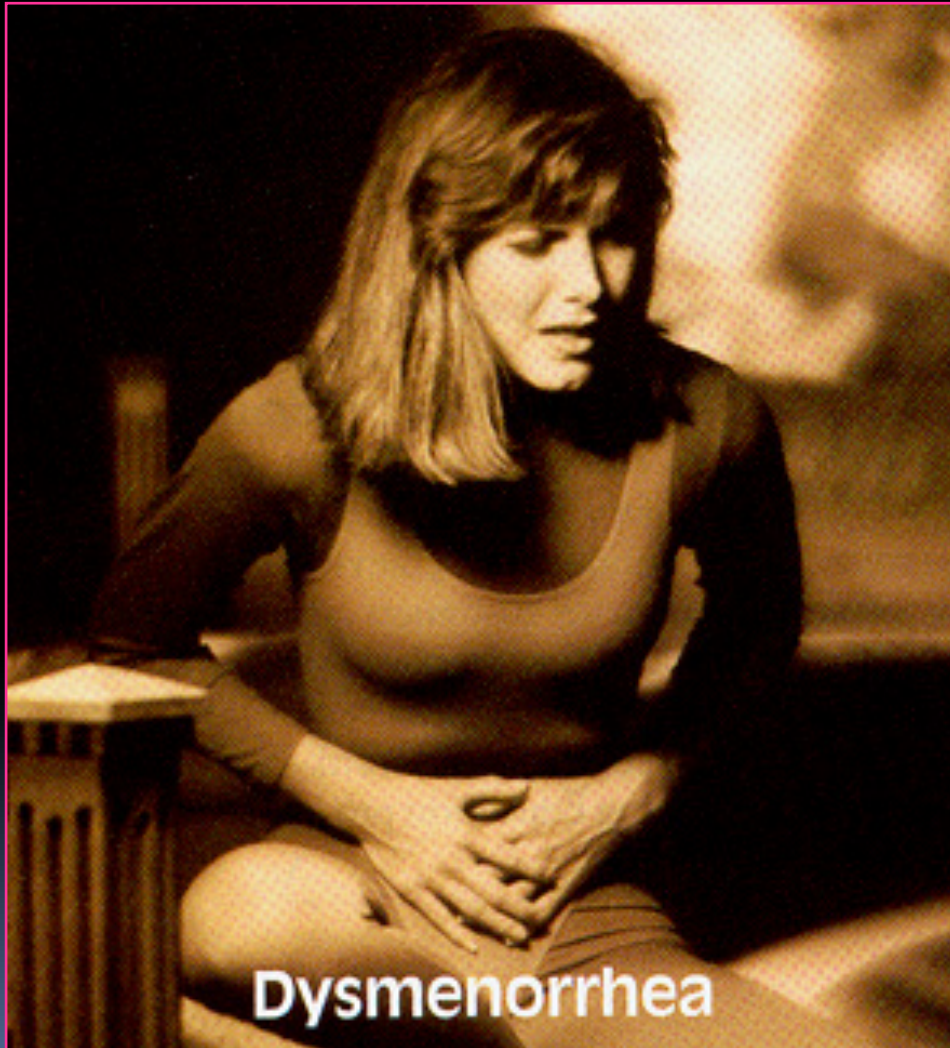
→ Reduce inflammation which leads to pain



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Ibuprofen



ADVIL® FIRST... FOR DISTINCT ADVANTAGES

- NO OTC ANALGESIC HAS BEEN PROVEN**
 - MORE EFFECTIVE
 - LONGER LASTING
- CONFIRMED GI TOLERABILITY**
 - In a 4-week study, reported GI side effects (ie, nausea, dyspepsia) were comparable to acetaminophen¹
 - In an endoscopic study, after both 4 and 8 days of dosing, ibuprofen 1200 mg/day had a significantly lower mean gastric mucosal injury score than Rx naproxen 1000 mg/day²
- SENSIBLE DOSING: FLEXIBILITY FOR OPTIMAL PAIN RELIEF**

*Rx study comparing ibuprofen 1200 mg/day and acetaminophen 4200 mg/day

References: 1. Bradley JD, Brandt KD, Katz BR et al. Comparison of an antiinflammatory dose of ibuprofen, an analgesic dose of ibuprofen, and acetaminophen in the treatment of patients with osteoarthritis of the knee. *N Engl J Med.* 1991;325:87-91. 2. Lanza FL, Lockhart EA, Furey SA, et al. A double-blind endoscopic evaluation of naproxen and nonprescription ibuprofen. *Clin Pharmacol Ther.* 1994;55:185.

Please advise patients to read and follow product labeling. Appearance of the brown ADVIL tablet and coplet is a trademark of Whitehall Laboratories, Madison, N.J.

WHITEHALL-ROBINS HEALTHCARE
A DIVISION OF AMERICAN HOME PRODUCTS
© 1995 Whitehall Laboratories

Advil®

OTC IBUPROFEN 200 MG

SHOULD BE YOUR #1 OTC ANALGESIC CHOICE



Aleve (naproxen)

ibuprofen vs naproxen



- more potent
- longer DOA

**A MORE COMPLETE
OTC ANALGESIC.**

ALEVE IS THE ONLY OTC ANALGESIC WITH:

THE **ENDURANCE**
OF 8-12 HOUR DOSING.

THE **TOLERABILITY**
THAT'S COMPARABLE TO IBUPROFEN
AND EVEN ACETAMINOPHEN.

AND THE **SPEED**
AND ACTIVITY OF NAPROXEN SODIUM.

INSTEAD OF ADVIL OR TYLENOL
RECOMMEND
ALEVE
NAPROXEN SODIUM 220 MG
PAIN RELIEVER/FEVER REDUCER
A MORE COMPLETE
OTC ANALGESIC.

©1995 Procter-Syntex Health Products Company VAR0043

A Bold, New Look for Recurrent MI and Stroke Prevention

Aspirin Regimen BAYER[®] ASPIRIN

(formerly BAYER[®] Enteric)

- New product name reinforces regular, regimen use
- Enteric "safety" coated for GI protection
- Available in 81mg and 325mg strengths to meet the dosing needs of your recurrent MI and stroke patients
- From a name your patients trust for quality



BAYER[®] Children's Chewable

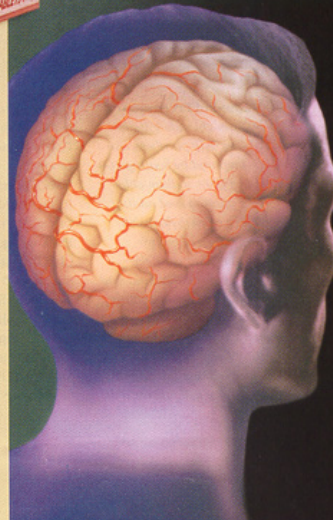
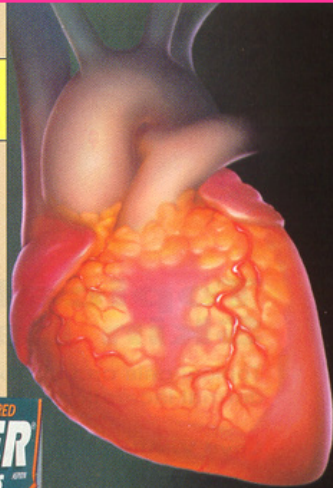
- Low strength – 81mg; for adult regimen use
- Pleasant tasting – orange and cherry flavors

Genuine BAYER[®] Aspirin

- The original, pure aspirin standard



Bayer Corporation is a proud contributor to the fight against America's No. 1 killer as a sponsor of the American Heart Association's educational programs.



A Powerful, New Line-Up for Pain Relief Combining Strength and Safety

The Extra Strength BAYER[®] Aspirin Family

- **Extra Strength BAYER[®] Aspirin**
The trusted, pain relieving power of BAYER Aspirin, 500mg strong
- **Extra Strength BAYER[®] Arthritis Pain Regimen Formula Aspirin**
Effective relief of arthritis pain and inflammation, enteric "safety" coated for GI protection



- **Extra Strength BAYER[®] Plus Aspirin**
Buffered to help minimize stomach upset
- **Extended-Release BAYER[®] 8-hr. Aspirin**
The only 8-hour aspirin, for long-lasting pain relief

Genuine BAYER[®] Aspirin

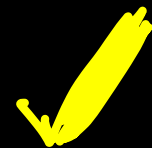
- The original, pure aspirin standard



Aspirin (ASA)

- reduces fever
- decreases inflammation at higher doses
- most common side effect → GI upset
 - GI bleeding
 - ulcer formation

Bufferin / Ascriptin (buffered ASA)



= ASA + Antacid



Enteric-Coated ASA

(e.g., Ecotrin)

- ✓ causes less GI upset
- dissolves in small intestine
- absorbed in small intestine



SB Regular Strength

#1 Aspirin Brand Recommended By Doctors

Ecotrin[®]

With SensiCoat[®] Stomach Protector

Enteric Coated Aspirin

For Aspirin Therapy Users

THIS PACKAGE FOR HOUSEHOLDS WITHOUT YOUNG CHILDREN

100
325 mg Tablets

PAIN RELIEVER

ASPIRIN REGIMEN

BAYER[®] 81_{mg}

ADULT LOW STRENGTH

ENTERIC SAFETY COATED 120 DELAYED RELEASE ASPIRIN 81mg TABLETS

PAIN RELIEVER

ASPIRIN REGIMEN

BAYER[®] 325

REGULAR STRENGTH

ENTERIC SAFETY COATED CAPLETS

BAYER. Powerful pain relief AND SO MUCH MORE.™

Aspirin (cont.)

Stroke / Heart Attack Prevention

✓ ASA (81 mg/day)

→ prevents platelet aggregation

→ prevents thromboembolic events



A Bold, New Look for Recurrent MI and Stroke Prevention

Aspirin Regimen BAYER®
ASPIRIN
(formerly BAYER® Enteric)

- New product name reinforces regular, regimen use
- Enteric "safety" coated for GI protection
- Available in 81mg and 325mg strengths to meet the dosing needs of your recurrent MI and stroke patients
- From a name your patients trust for quality

ASPIRIN REGIMEN BAYER®
ADULT **LOW 81_{mg} STRENGTH**
SAFETY COATED TABLETS
ENTERIC COATED TABLETS DELAYED RELEASE ASPIRIN
Doctor Recommended for Regular Use

ORANGE FLAVORED BAYER CHILDREN'S®
ASPIRIN
Low Strength Chewable Aspirin TABLETS 81mg

ASPIRIN REGIMEN BAYER®
ADULT **REGULAR 325_{mg} STRENGTH**
SAFETY COATED CAPLETS
ENTERIC COATED CAPLETS DELAYED RELEASE ASPIRIN
Doctor Recommended for Regular Use

CHERRY FLAVORED BAYER CHILDREN'S®
ASPIRIN
Low Strength Chewable Aspirin TABLETS 81mg

GENUINE BAYER® ASPIRIN
Fast, Safe Pain Relief
COATED 325mg TABLETS

BAYER® Children's Chewable
ASPIRIN

- Low strength – 81mg; for adult regimen use
- Pleasant tasting – orange and cherry flavors

Genuine BAYER® Aspirin

- The original, pure aspirin standard

American Heart Association. Fighting Heart Disease and Stroke. Bayer Corporation is a proud contributor to the fight against America's No. 1 killer as a sponsor of the American Heart Association's educational programs.

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Aspirin & Pregnancy

✓ *APAP recommended in pregnancy*

→ Increased risk of bleeding in fetus and mother (esp. during 3rd trimester)



Aspirin (cont.)

Reye's Syndrome

- rare, potentially fatal condition characterized by vomiting, lethargy, delirium and coma; this syndrome is associated with ASA given to children infected with the flu

→ NSAIDs } O.K. to
→ APAP } use in
 } pediatrics

A child's safety will always come first.

Children's and Junior Strength
TYLENOL
 acetaminophen
First

No antipyretic/analgesic is safer.

The recommended dosage range for acetaminophen is 10 mg/kg to 15 mg/kg. Doses should be administered 4 or 5 times daily. Do not exceed five doses in 24 hours.
 References: 1. Amadio P. J. Am J Med. 1984;77 (3A):17-20. 2. Aspirin or paracetamol? Lancet. 1981; 2:287-289. 3. Sempione GA. Am J Med. 1983;74(8A):102-103. 4. Watson PD et al.

Down With Fever!

- More Effective**
 - Greater fever reduction than acetaminophen at OTC label dosing
- Faster, Longer Lasting**
 - Lower temperature at 1 hour vs acetaminophen
 - Up to 8 hours of action — longer than acetaminophen
- Proven Safety Profile**
 - Demonstrated in an 83,915 pediatric patient study¹

Children's & Junior Strength Motrin[®]
 ibuprofen

To encourage compliance —
 The *only* ibuprofen available OTC in: Drops, Suspension, Chewables, and Caplets

The Leader in Fast and Lasting Fever Relief

McNEIL McNeil Consumer Products Company
 Division of McNeil-PPC, Inc.
 Fort Washington, PA 19034 U.S.A.

IMPORTANT: Children who are allergic to aspirin should not use Children's Motrin since they may also be allergic to it. Also, do not give Children's Motrin to a child who is dehydrated from vomiting, diarrhea, or lack of fluid intake. Do not use Children's Motrin for more than 3 days for pain or fever unless directed by a doctor. Do not use for stomach pain unless directed by a doctor.
 Reference: 1. Lesko SM, Mitchell AA. An assessment of the safety of pediatric ibuprofen. A practice-based randomized clinical trial. JAMA. 1995;273(12):929-933. ©AMN-PPC Inc. 1997.

✓ no GI upset (A)
safe in pregnancy (B)
Acetaminophen (APAP)

but, no anti-inflammatory effects

(1) examples: Tylenol,
Anacin-3,
Panadol, etc...

(2) 325mg / 500 mg
tablets or capsules


(3) advantage over
NSAIDs




Cold and flu time is

TYLENOL[®] TIME.

She's 38.
Has cold/flu symptoms.
And she's aching
for pain relief that won't
irritate her stomach.



- Fast and effective pain relief for colds and flu
- Unsurpassed efficacy versus OTC NSAIDs
- Won't irritate the stomach or exacerbate GI upset due to colds and flu



Sig: 1000 mg: 2 (500 mg) Gels tabs or Caplets q4 to 6h prn
Sig: 1300 mg: 2 (650 mg) Caplets q6h prn

TYLENOL. First choice in pain relief. First choice in safety.

Do not exceed eight Gels tabs or Caplets per 24-hour period. Do not take for pain for more than 10 days or for fever for more than 3 days unless directed by a physician. In case of accidental overdose, contact a physician or poison control center immediately. Prompt medical attention is critical for adults as well as for children even if you do not notice any signs or symptoms. Do not use with other products containing acetaminophen.

McNEIL-PPC, Inc. 1996 Printed in U.S.A. Oct 1996

Acetaminophen (cont.)

disadvantage: APAP
minimum anti-inflammatory
properties



Acetaminophen (cont.)

(5) APAP overdose

✓ → hepatotoxicity

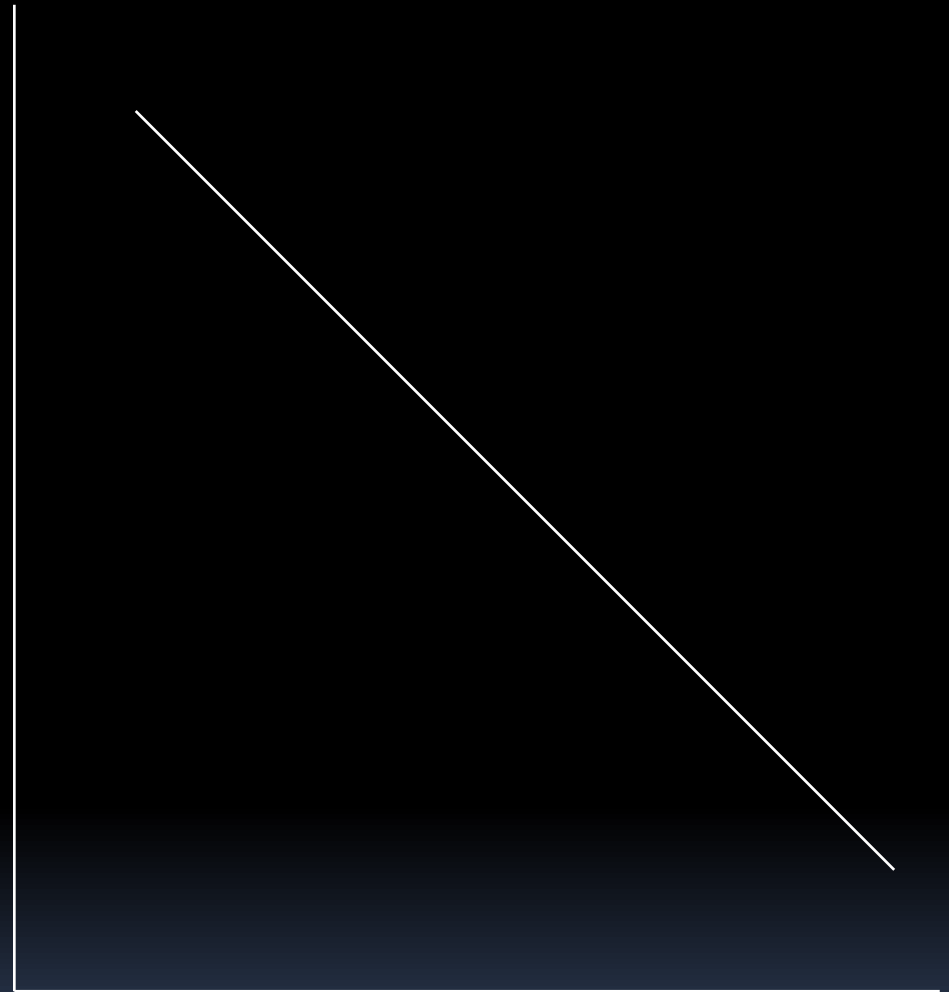
→ death

Treatment

→ IV acetylcysteine
(Mucomyst)

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Ibuprofen (Advil, Motrin)

- (1) 1- 2 tabs --> equivalent to 5-8 tabs of ASA
- (2) less GI upset than equivalent dose of ASA
- (3) indicated for mild-moderate pain due to arthritis, osteoarthritis, and menstrual cramps



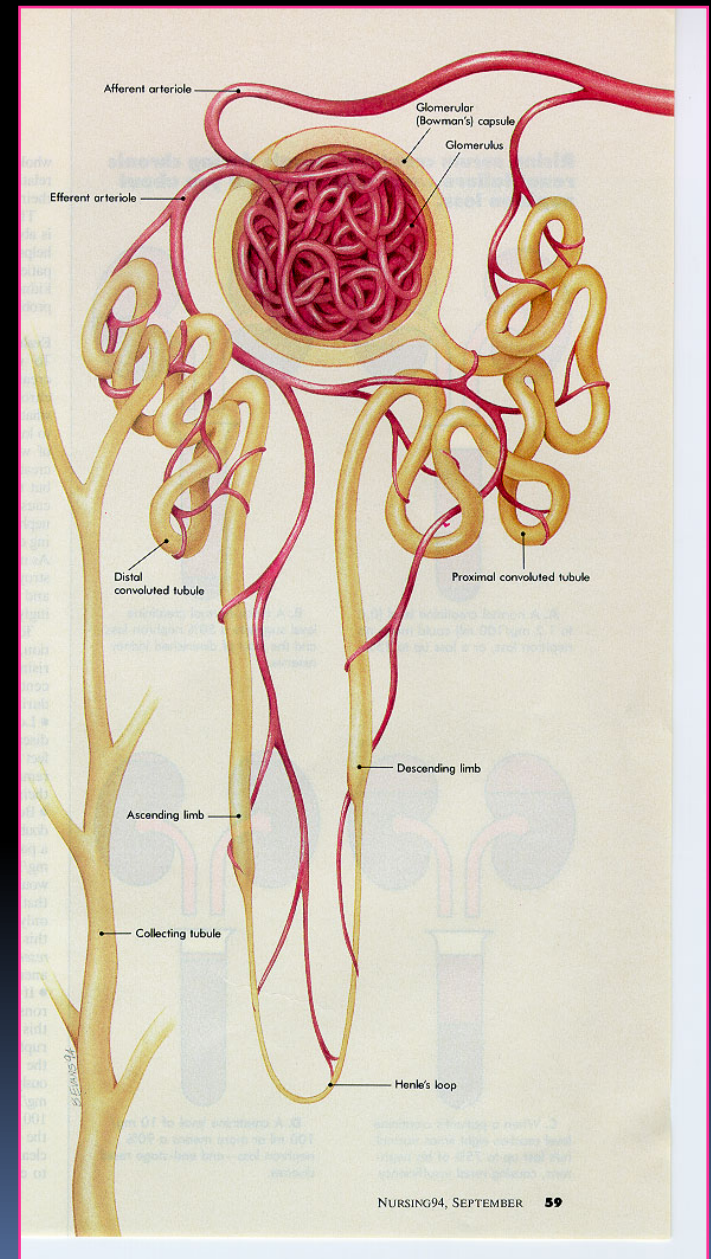
Naproxen

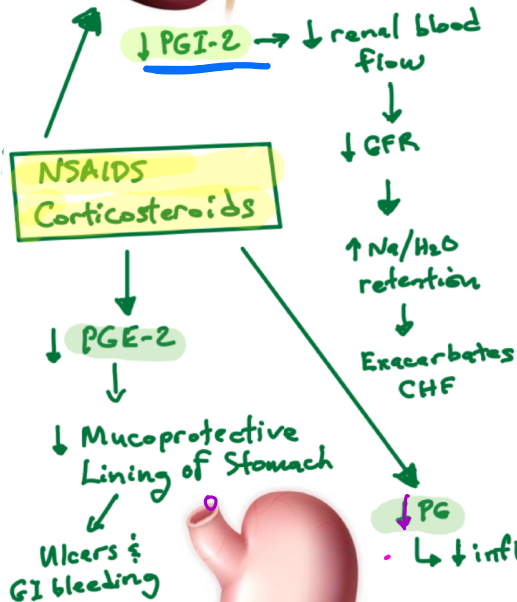
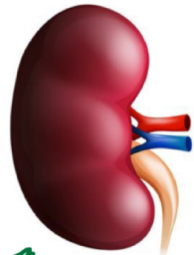
} NSAIDs ✓

Ibuprofen (cont.)

RGF ↓

NSAIDs inhibit renal
prostaglandins → reduce
kidney blood flow → increase
fluid retention (esp. in
geriatric patients and patients
with cardiovascular disorders
and chronic kidney disease)





✓
 Prednisone
 NSAIDs

- inhibit PGE
- inhibit PGI
- inhibit PG

↓ inflammation
 ↓ pain

✓ Can be used to target pain as long as each drug has a different MOA (mechanism of action)

Severe musculoskeletal injury



Narcotic Analgesics

→ Inhibit pain impulse
in the CNS

Example: **Norco**

(APAP/Hydrocodone)



Norco - 5
(Hydrocodone/APAP)

analgesic, antipyretic,
no anti-inflammatory effects

FREEDOM FROM PAIN!

Central & peripheral extra strength pain relief.

No extra prescribing
restrictions.

- ▶ Telephone prescribing in most states
- ▶ Up to five refills in 6 months
- ▶ No triplicate Rx required

Centrally acting hydrocodone
plus the peripheral action
of acetaminophen.

- Excellent patient acceptance—nausea, sedation and constipation have rarely been reported.¹
- Four to six hours of extra strength pain relief from a single dose.
- The heritage of VICODIN*—over two billion doses prescribed.²
- The 4th most frequently prescribed medication in America.³
- 17 years of proven clinical experience.

vicodin ES 

(hydrocodone bitartrate 7.5mg [Warning: May be habit forming] and acetaminophen 750mg)

Extra strength pain relief
you can phone in.

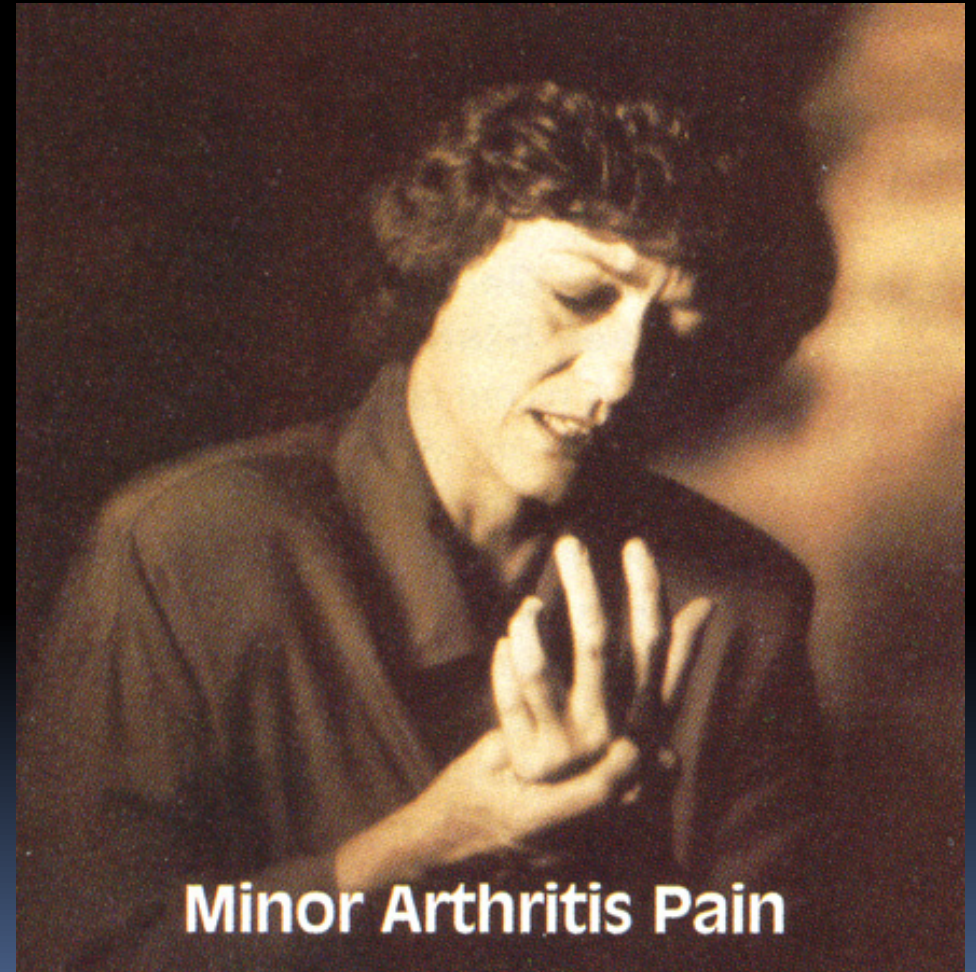
¹Data on file, Knoll Pharmaceutical Company
²Standard industry new prescription audit
³Hydrocodone bitartrate 5mg [Warning: May be habit forming] and acetaminophen 500mg



Anti-Arthritic Drugs

(1) NSAIDs

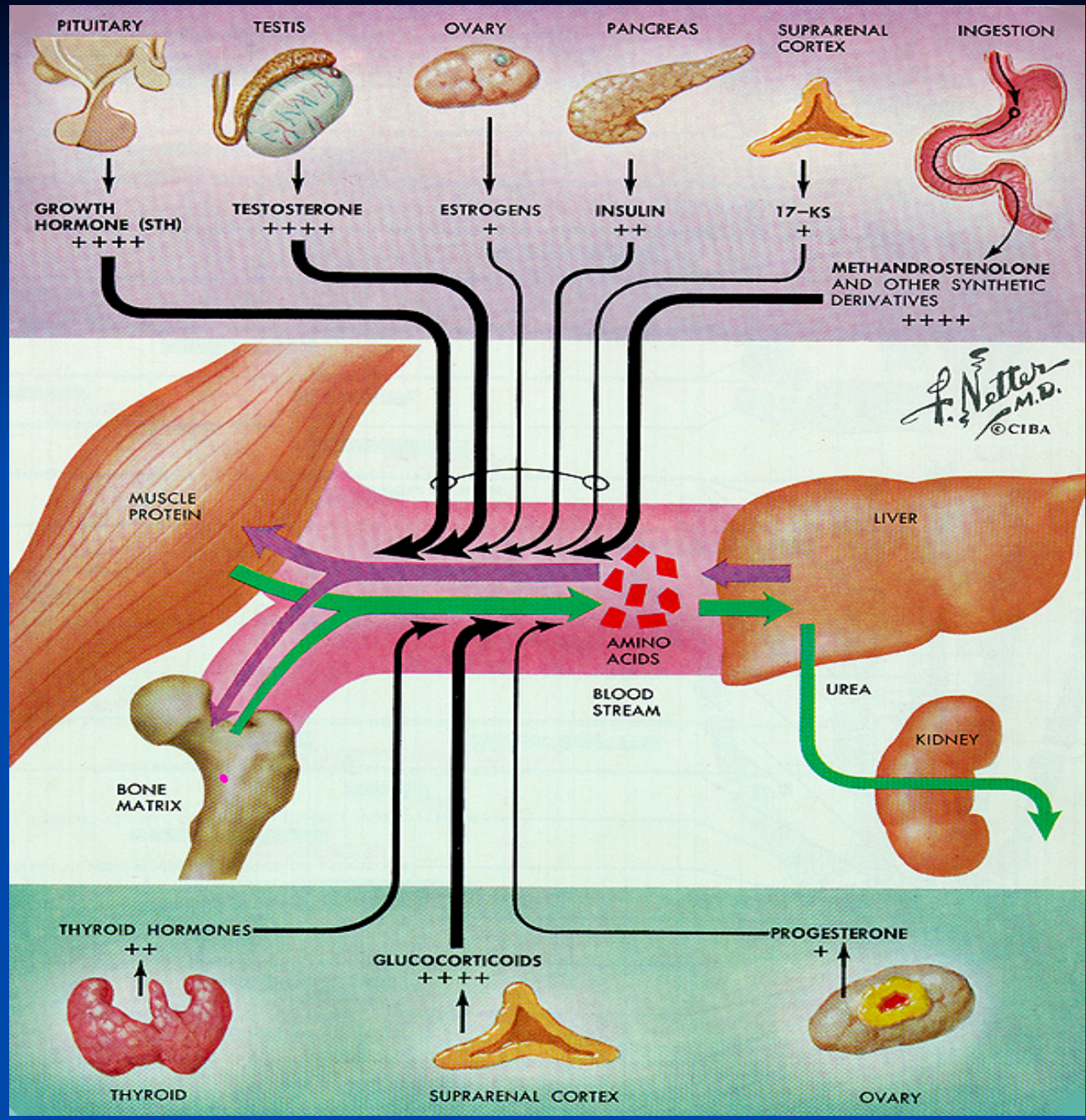
(2) Corticosteroids
(Prednisone)



Minor Arthritis Pain

ANABOLIC EFFECTS versus CATABOLIC EFFECTS

- GROWTH HORMONE
- TESTOSTERONE
- ESTROGEN
- GLUCOCORTICOIDS
- THYROID HORMONE (LEVOETHYROXINE)
- PARATHYROID HORMONE



Summary Statements: ASA, Acetaminophen, NSAIDs, Glucocorticoids, and Opioids

Acetaminophen (Tylenol)

- Properties: antipyretic and analgesic
- Disadvantage: no anti-inflammatory properties
- Advantage: does not cause GI upset, gastritis, GI bleeding/ulcers
- Acetaminophen (APAP) does not exert antiplatelet effect
- APAP overdose --> hepatotoxicity

• recommended in pregnancy

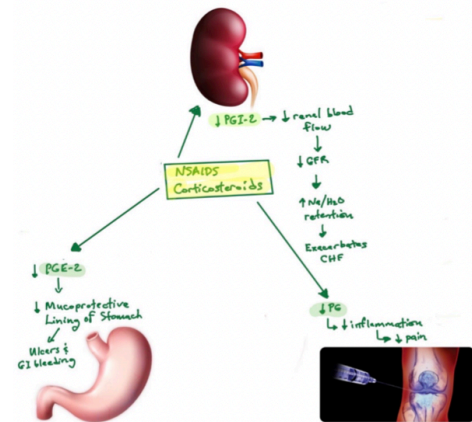
Aspirin (ASA)

- Pharmacologic effects are dose-dependent
 - ASA 81 mg/day --> antiplatelet effect --> reduces risk of recurrent thromboembolic events in post-stroke / post-MI patients.
 - ASA 325-500 mg/dose --> analgesic effect (e.g., headache)
 - ASA 1000 mg/dose --> anti-inflammatory effect
- Disadvantages
 - PGE₂ inhibition (stomach) --> decreases muco-protective lining --> GI upset, gastritis, GI bleeding / ulcers
 - PGI₂ (prostacyclin) inhibition --> decreases renal blood flow --> decreases GFR --> increases sodium/water retention --> exacerbates HTN / CHF

✓
NSAIDs
ASA
Prednisone

NSAIDs: Ibuprofen (Motrin, Advil) and Naproxen (Naprosyn)

- Properties: antipyretic, analgesic, and anti-inflammatory.
- Disadvantages
 - PGE₂ inhibition (stomach) --> decreases muco-protective lining --> GI upset, gastritis, GI bleeding / ulcers
 - PGI₂ (prostacyclin) inhibition (kidneys) --> decrease renal blood flow --> decrease GFR --> increases sodium/water retention --> exacerbates HTN/CHF
- Naproxen (Aleve is OTC, Naprosyn is Rx) is a more potent NSAID than ibuprofen (Advil, Motrin)
- Naproxen (BID dosing) has a longer duration of action than ibuprofen (TID-QID dosing).



Glucocorticoids = Corticosteroids = Anti-Inflammatory Steroids (Example: Prednisone)

- Properties: potent anti-inflammatory agents; no antipyretic effects.
- Disadvantages
 - PGE₂ inhibition --> decreases muco-protective lining (stomach) --> GI upset, gastritis, GI bleeding / ulcers
 - PGI₂ (prostacyclin) inhibition (kidneys) --> decreases renal blood flow --> decreases GFR --> increases sodium/water retention --> exacerbates HTN / CHF
 - Systemic adverse effects with short-term and long-term use: HPA-axis suppression, immunosuppression, cataract formation, osteoporosis, myopathy, weight gain, hypertension, hyperglycemia, etc ...

Opioids: Morphine, Codeine, Hydrocodone, etc...

- Properties: potent analgesic effects; no antipyretic effects and no anti-inflammatory properties.
- Disadvantages: drug tolerance, drug dependence, and potential for opioid addiction.

✓
Norco -5
(hydrocodone/APAP)

Match each active ingredient with its corresponding drug classification / property.

Aspirin (ASA)

Naproxen (Aleve, Naprosyn)

Acetaminophen (Tylenol)

Prednisone

Morphine

- ✓ [Choose]
- ▶ Analgesic / Antipyretic / Anti-Inflammatory
- ▶ Anti-inflammatory / Corticosteroid
- ▶ Analgesic / Antipyretic
- ▶ Antiplatelet, Antipyretic, Analgesic, Anti-Inflammatory
- ▶ Analgesic

[Choose]

[Choose]

[Choose]

COLD
&
FLU



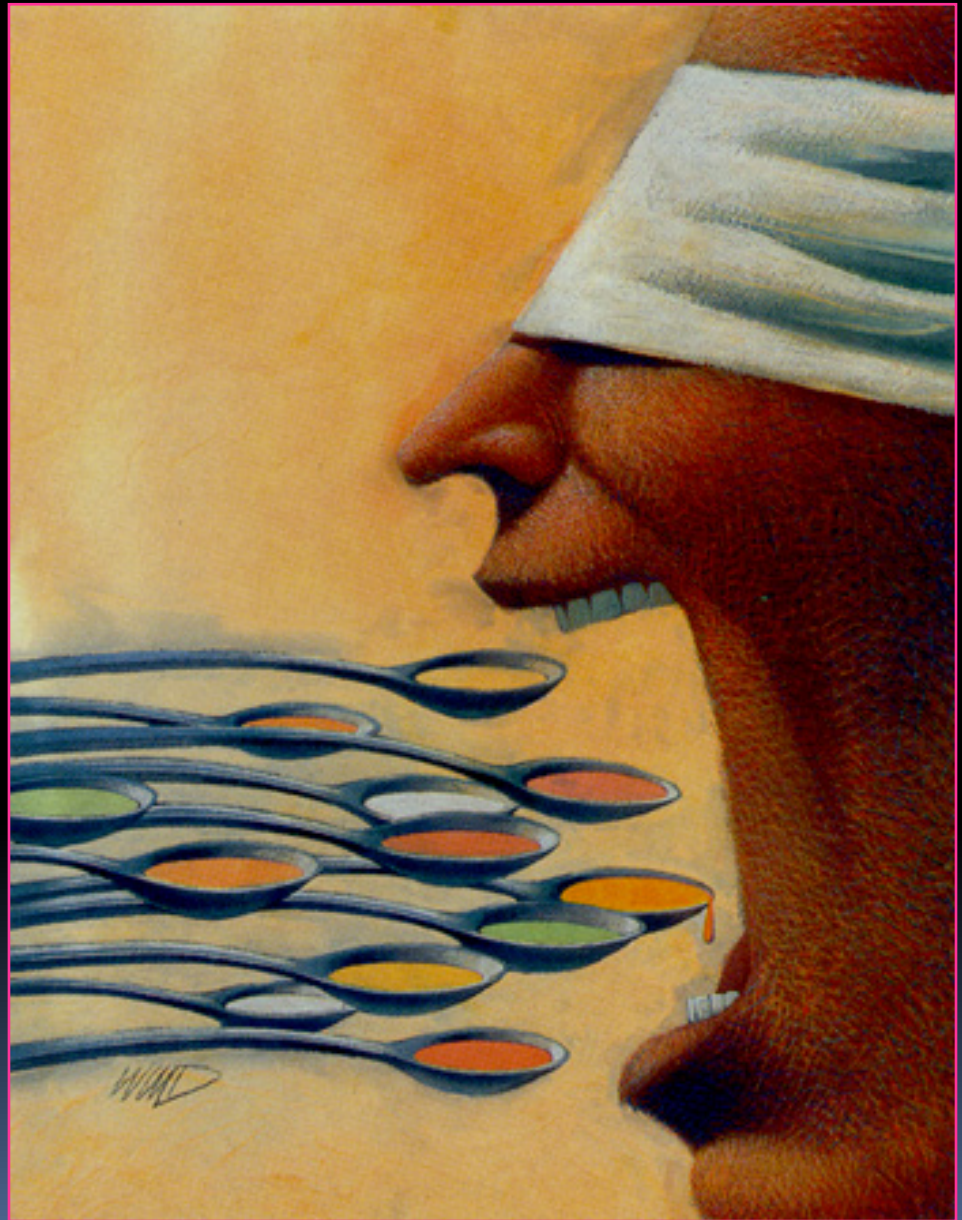


Last night, he took
his pharmacist's advice



He didn't.

COLD & FLU PRODUCTS



Antihistamines

- dry up respiratory secretions
- main side effect --> sedation

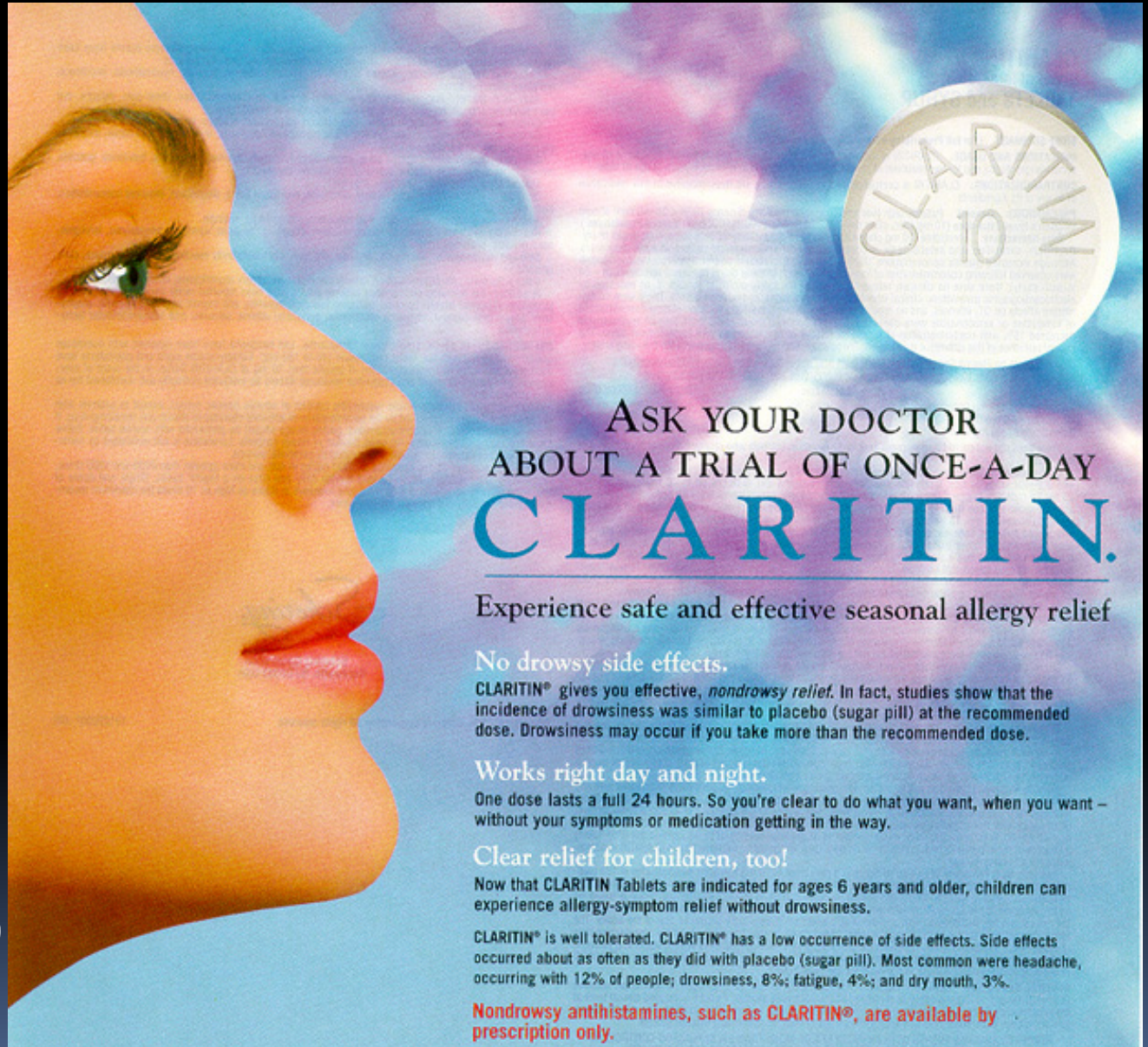


Antihistamines (continued)

Non-Sedating Antihistamines

Examples

- Claritin ✓
(loratidine)
- Allegra
(fexofenadine)



CLARITIN
10

ASK YOUR DOCTOR
ABOUT A TRIAL OF ONCE-A-DAY
CLARITIN.

Experience safe and effective seasonal allergy relief

No drowsy side effects.
CLARITIN® gives you effective, *nondrowsy relief*. In fact, studies show that the incidence of drowsiness was similar to placebo (sugar pill) at the recommended dose. Drowsiness may occur if you take more than the recommended dose.

Works right day and night.
One dose lasts a full 24 hours. So you're clear to do what you want, when you want – without your symptoms or medication getting in the way.

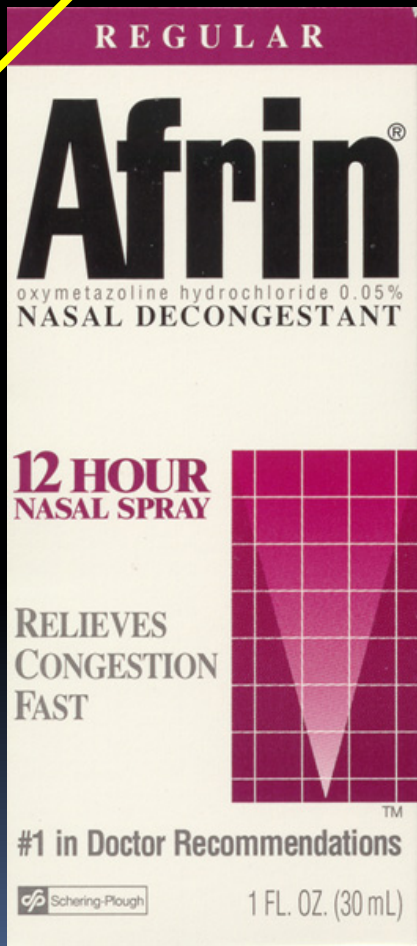
Clear relief for children, too!
Now that CLARITIN Tablets are indicated for ages 6 years and older, children can experience allergy-symptom relief without drowsiness.

CLARITIN® is well tolerated. CLARITIN® has a low occurrence of side effects. Side effects occurred about as often as they did with placebo (sugar pill). Most common were headache, occurring with 12% of people; drowsiness, 8%; fatigue, 4%; and dry mouth, 3%.

Nondrowsy antihistamines, such as CLARITIN®, are available by prescription only.

Decongestants

Rebound
congestion"
longer
than
5 days



examples: ~~phenylephrine~~
pseudoephedrine

COLD & Flu Combination Products

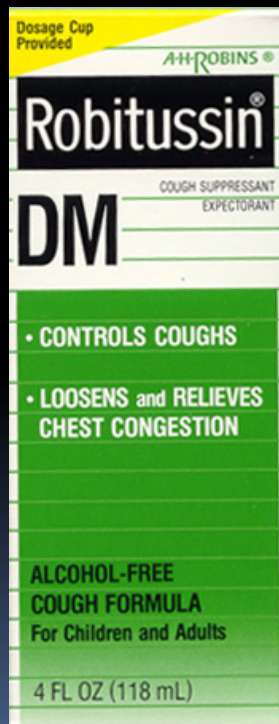


ibuprofen + pseudoephedrine

Antitussives

(1) Dextromethorphan (DM)

DM ✓
most effective OTC ↗



✓
codeine
most effective Rx

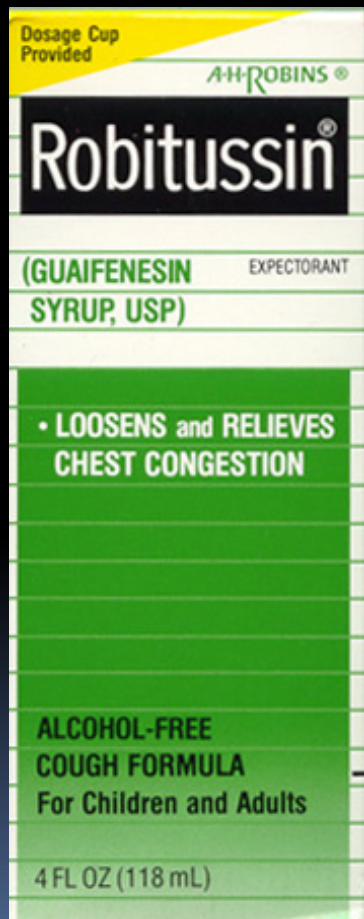
(mild antitussive)
(2) Diphenhydramine



(3) Codeine (Robitussin AC)

Expectorant (Guaifenesin)

✓ thins and loosens thick mucus secretions



Robitussin (Plain) Syrup

Combination Products



Match each pharmacologic agent with its corresponding drug classification/indication.

Pseudoephedrine (Sudafed)

Dextromethorphan (Robitussin DM)

Diphenhydramine (Benadryl, Nytol)

Guaifenesin (Robitussin Plain Syrup)

Loratadine (Claritin)

- ✓ [Choose]
- ▶ Antihistamine (Non-Sedating)
- ▶ Antihistamine, Hypnotic Agent, Mild Antitussive
- ▶ Antitussive (OTC)
- ▶ Decongestant
- ▶ Expectorant

[Choose]

[Choose]

[Choose]

→
Hypnotics

✓
sedatives → anxiety
hypnotics → insomnia



acetaminophen
+
diphenhydramine

✓
diphenhydramine
↓ ↓ ↓
allergies cough insomnia

Appetite Suppressants



FDA RECALL

- (1) Phen-Fen
- (2) Pondimin
- (3) Redux



① Phen-Fen consists of phentermine (Fastin) plus fenfluramine (Pondimin).

increases norepinephrine in appetite center.

increases serotonin (SE) in appetite center.

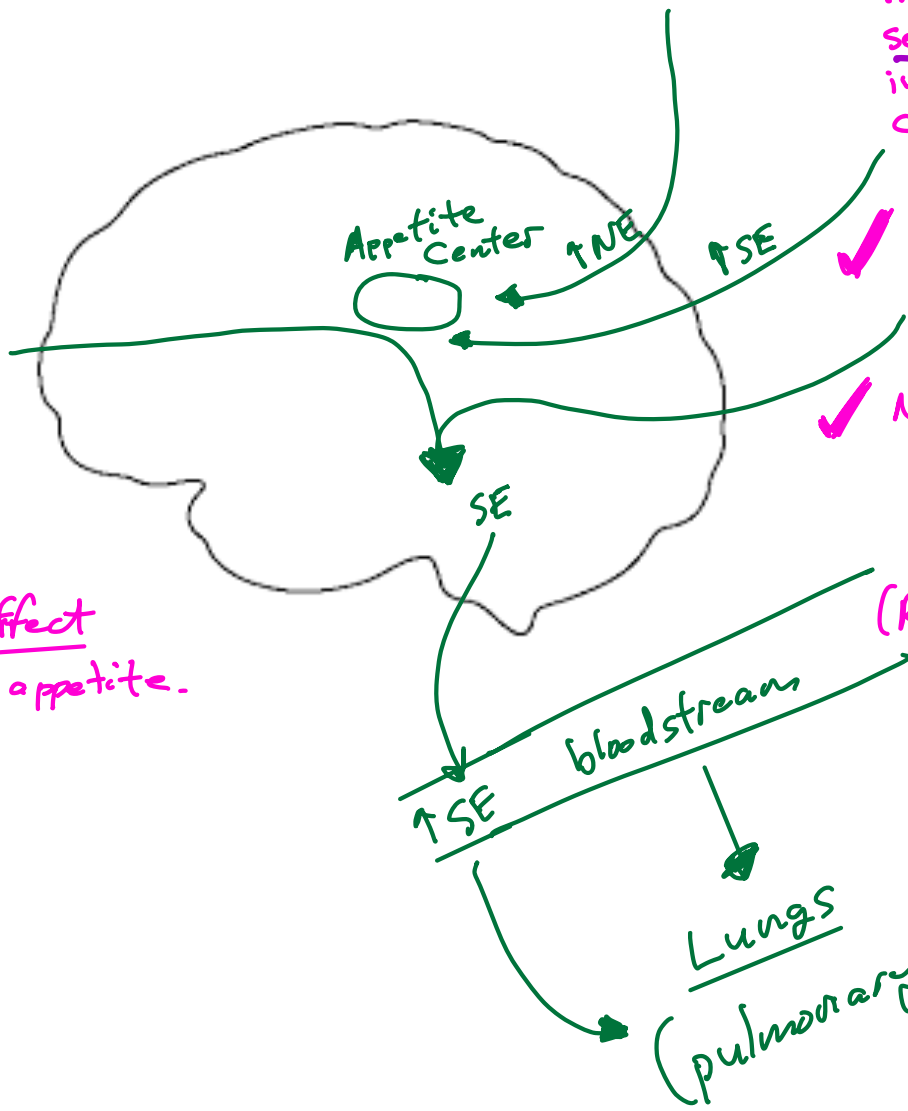
② Redux (dexfenfluramine)

increases serotonin (SE) in appetite center.

capable of causing pulmonary HTN

capable of causing pulmonary HTN

Note: pulmonary HTN only associated with SE drugs (Redux, Pondimin)



③ Phen-Fen produced a synergistic effect on inhibiting appetite.

$$A + B = + \uparrow$$

(+1)(+1)

Appetite Suppressants

Phen-Fen



Get Fit For Summer! Let Us Help.

**1 Month
Phen-Fen
Including
Medications
& Office
Visits
\$69**

**1 Month
Phen-Fen,
Including
Medications
& 1 Hour
Massage
\$100**



EMS
(Electrical Muscle Stimulation)
causes up to 20
muscles to
contract and relax
900 times in just
one session,
strengthening,
tightening, and
firming your body
and increasing
muscular endurance
with each
progressive
treatment.

**1st Session
Free**

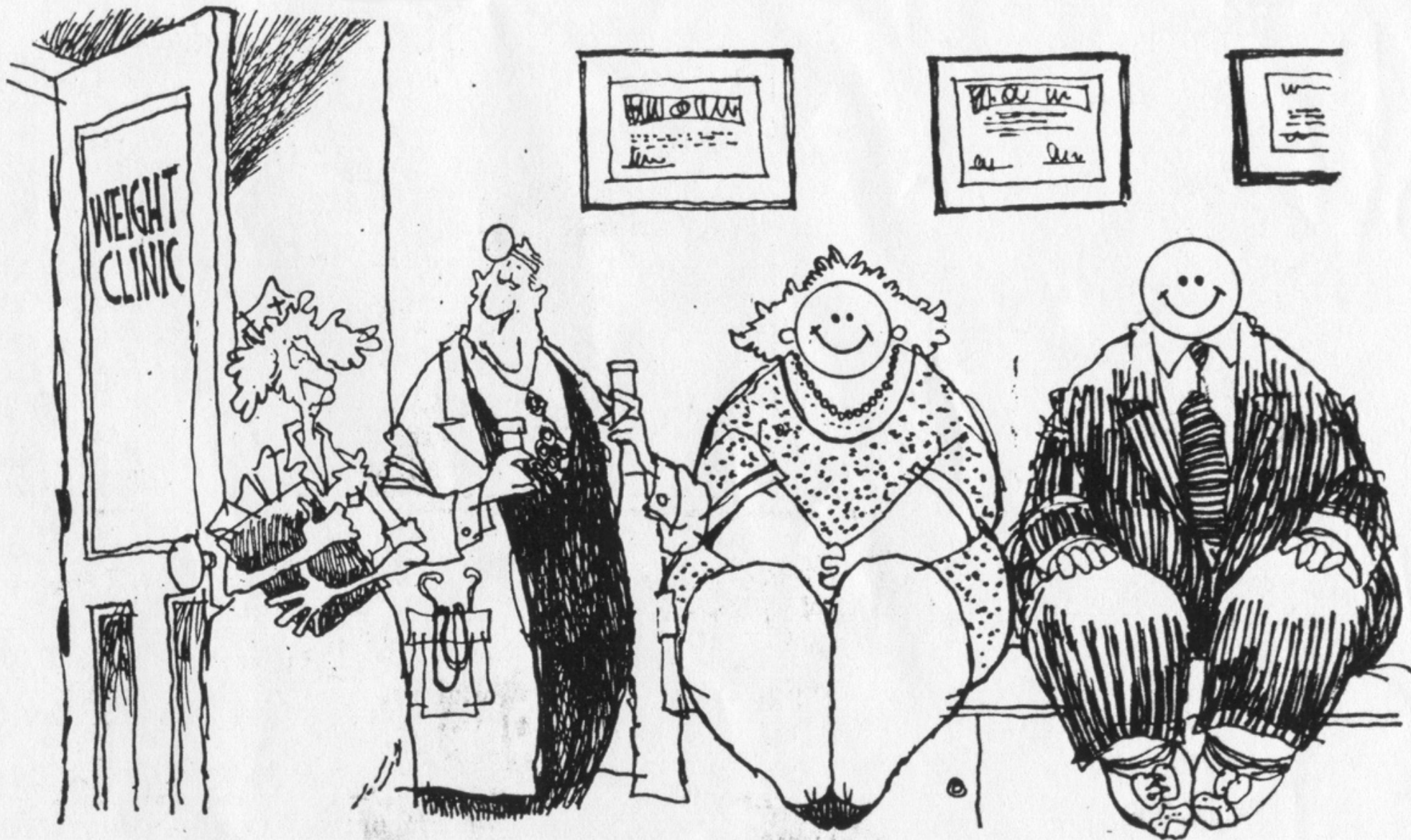
- **Phen-Fen** medically supervised weight loss program
- **Redux Diet**
- **Weight Loss**
- **Inch Loss**
- **Free Body Fat Analysis**

**Health
Insurance
Accepted**

- **Build or Define Muscles**
- **Improve Strength**
- **Reduce back, neck or shoulder pain**
- **Reduce recovery time of sports injuries**
- **Increase circulation & energy**
- **Tighten up after Pregnancy**
- **Therapeutic Massage**

Body Trends
Your Affordable One Stop
Body Shop

• **714.979.4663**
3744 S. Bristol St.
(at MacArthur behind Bank of America)



"THE ALTERNATIVE TO PHEN-FEN IS TO MIX A DIET DRUG WITH PROZAC...
THEY'RE STILL OVERWEIGHT, BUT, NOW THEY DON'T CARE..."

Diet drug options confusing

Informed pharmacists can help guide patients to the right treatment

By Mark R. Vogel

Pharmacy Today Staff

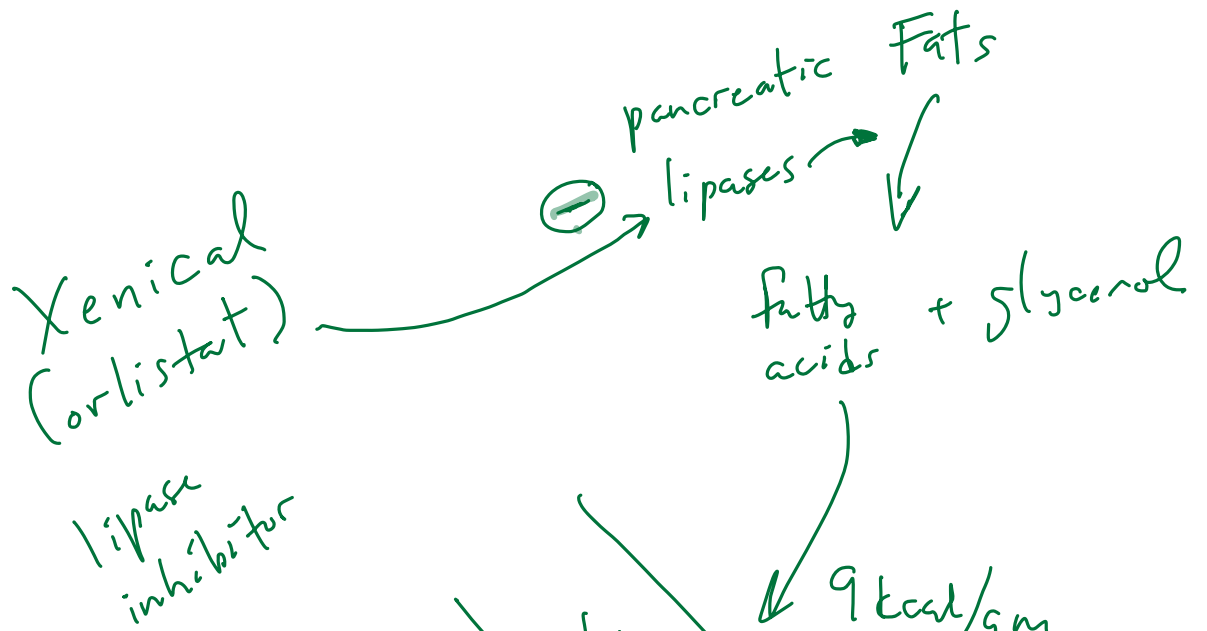
If approved by FDA, Roche's new antiobesity drug orlistat (Xenical) will offer patients another option among the many OTC and prescription treatments that promise weight reduction. Orlistat, a fat blocker rather than appetite suppressor, is likely to be a major contender among the leading prescription weight-loss drugs:



fenfluramine (Pondimin), dexfenfluramine (Redux), and the combination of fenfluramine and phentermine (e.g., Fastin) known as "fen-phen." But as the array of antiobesity medications increases, con-

fused patients will likely turn to their pharmacists to explain the pros and cons of various treatment options.

Obesity continued on page 11



① depletion of fat-soluble vitamins vit A, D, E, K

Steatorrhea

② fluid & electrolyte depletion

③ K⁺ potassium depletion (electrolyte depletion)

Xenical side effects

Appetite Suppressants

GLP-1
Receptor
Agonists



Increase Insulin Release
PLUS

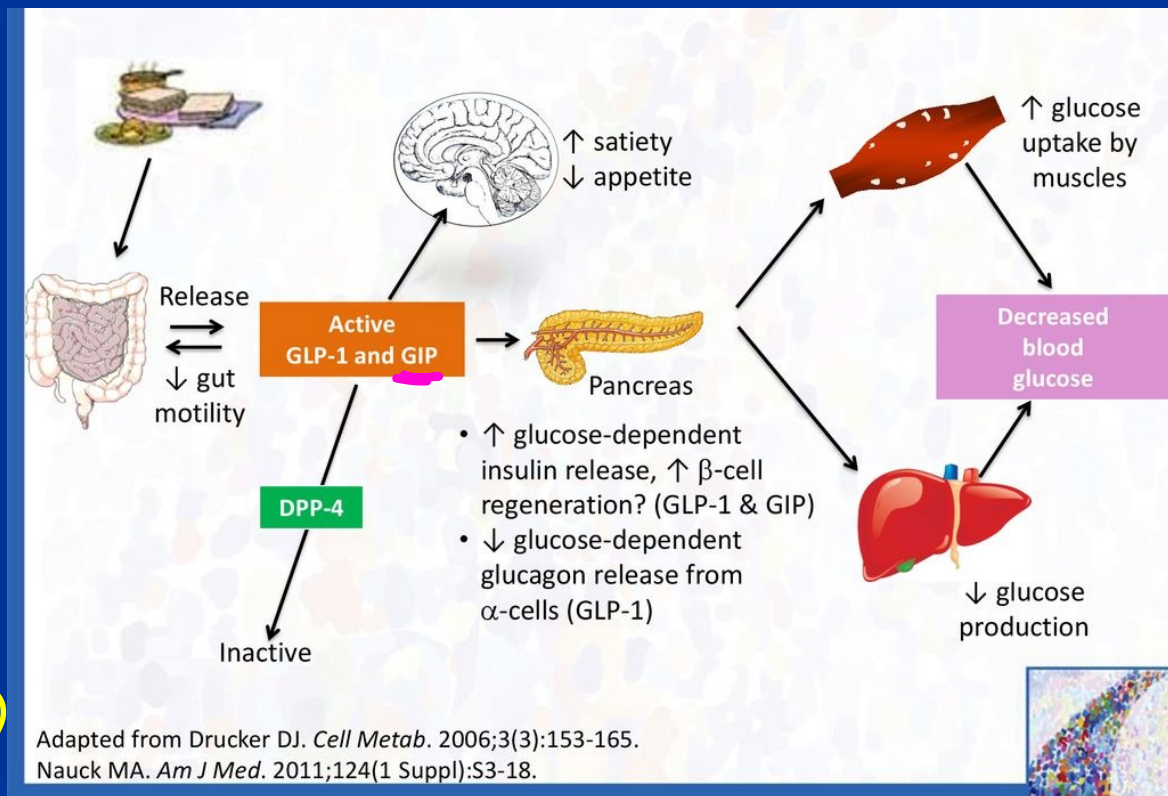
Decrease Glucagon Release
PLUS

Increases Satiety
PLUS

Slows Gastric
Emptying Time

(decreasing GI motility)

Semaglutide (Ozempic, Wegovy)
Dulaglutide (Trulicity)
Liraglutide (Victoza)
Tirzepatide (Mounjaro)



Sample Caloric Requirement (BEE) Calculation for Stressed Patients

Female: $655 + (9.6 \times \text{wt. in kg}) + (1.85 \times \text{ht. in cm}) - (4.7 \times \text{age})$

Male: $66 + (13.7 \times \text{wt. in kg}) + (5.00 \times \text{ht. in cm}) - (6.8 \times \text{age})$

Sample Calculation (based on patient-specific parameters: ht, wt, age, and disease state)

S.Y. is a 64 year-old female patient with major sepsis. Calculate her caloric requirement based on her pathologic condition. Her height is 5'4" and body weight is 140 pounds.

Conversion Factors:

- body weight from pounds to kg. : $140 \text{ lbs} / 2.2 = 63.64 \text{ kg}$
- height from inches to cm. : $5'4" = 64 \text{ inches} \times 2.54 = 162.56 \text{ cm}$

$$\text{BEE} = 655 + (9.6 \times \mathbf{63.64}) + (1.85 \times \mathbf{162.56}) - (4.7 \times \mathbf{64})$$

$$= (655 + 610.94 + 300.74) - (300.8)$$

$$= 1265.88 \text{ kcal / day}$$

Multiply the BEE value by the appropriate “disease stress factor”, which provides additional calories to account for the degree of physiologic stress (based on increased metabolic requirement during pathologic condition – i.e., major sepsis).

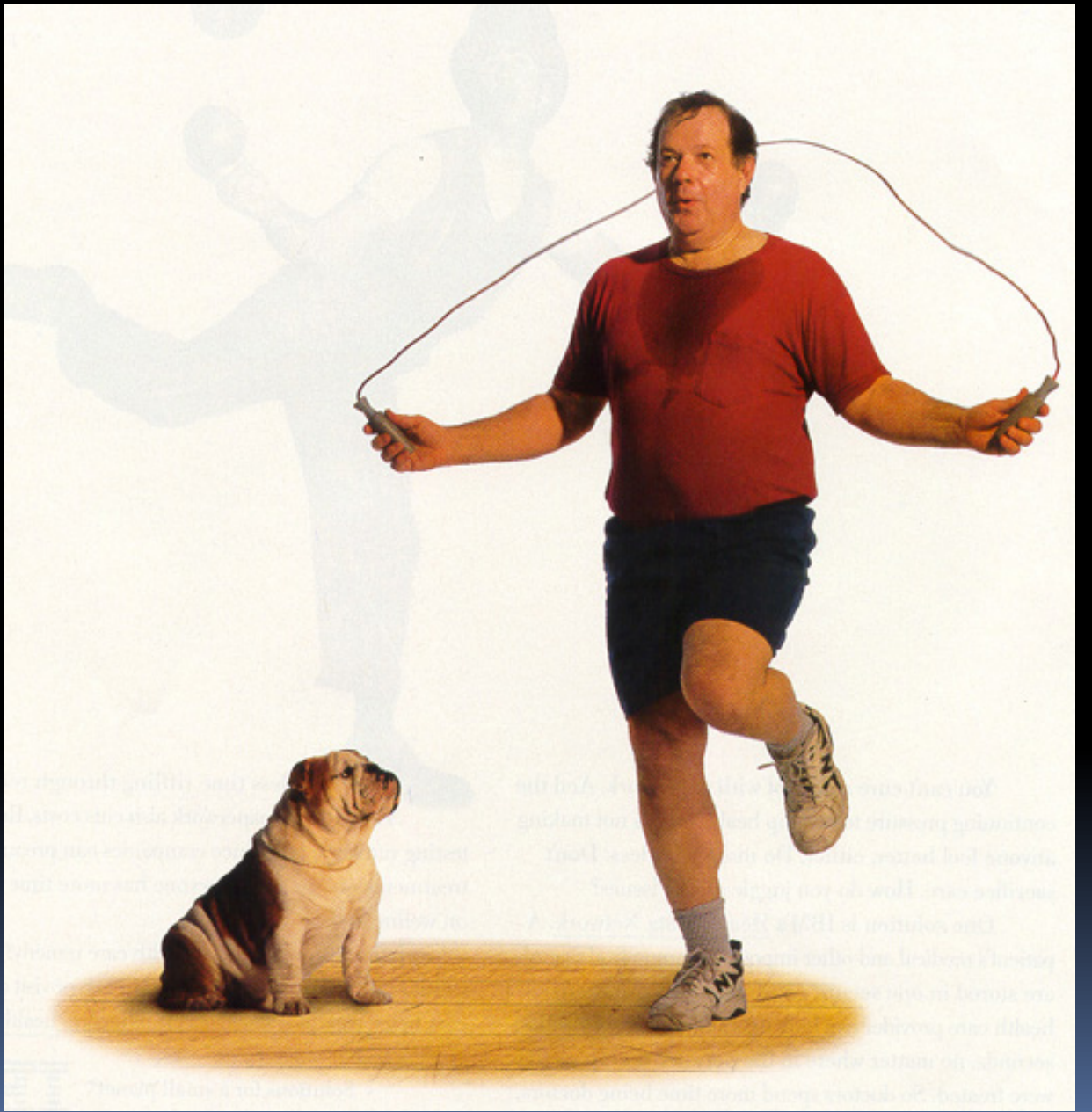
$$\text{BEE for major sepsis} = 1.5 \times 1265.88$$

$$\text{Answer} \rightarrow 1898.82 \text{ kcal / day}$$

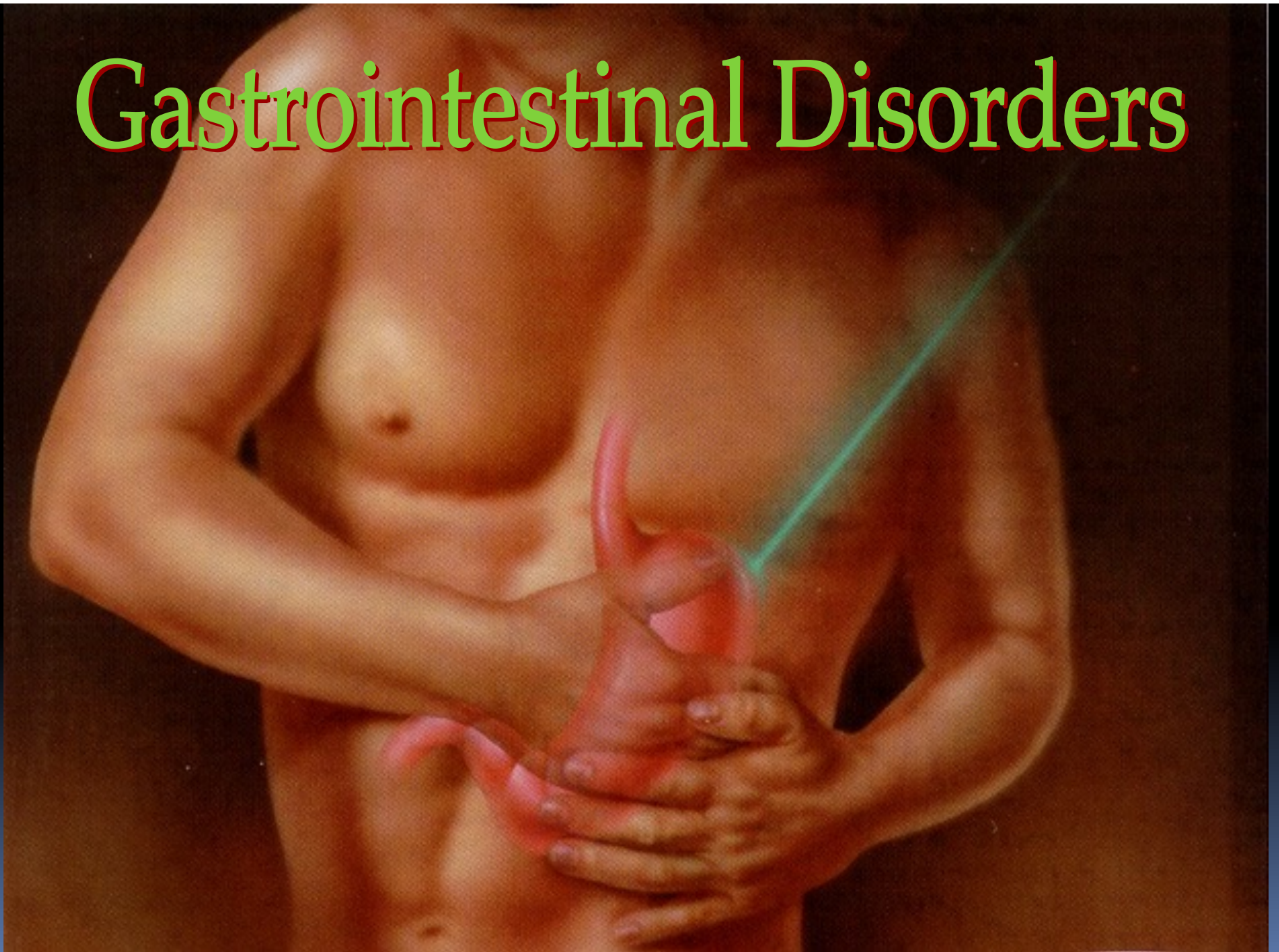
*Look for the Golden Arches
... where McMemories are made.*



**E
X
E
R
C
I
S
E**



Gastrointestinal Disorders



Antacids: Maalox / Mylanta

✓ Maalox Plus contains magnesium, aluminum, and simethicone → neutralize stomach acidity
→ "breaks up" gas bubbles

MOA: Neutralize Gastric Acidity

Active Ingredients
(neutralizing agents)

- (1) magnesium
(SE: osmotic diarrhea)
- (2) aluminum
(SE: constipation)

* SE = Side Effect(s)



Match each pharmacologic agent with its corresponding indication, drug class, or mechanism of action (MOA).

Famotidine (Pepcid)

Sucralfate (Carafate)

Simethicone (Mylicon)

Misoprostol (Cytotec)

Omeprazole (Prilosec)

✓ [Choose]

▶ Synthetic PGE Analog: indicated for NSAID-induced ulcers.

▶ Surfactant: breaks up gas bubbles in stomach --> relieves gas.

▶ Histamine-2 Receptor Antagonist (H-2 RA).

▶ Proton-Pump Inhibitor (PPI)

▶ Cytoprotective Agent: binds to gastric ulcer forming a protective barrier.

[Choose]

[Choose]

[Choose]

Match each pharmacologic agent with its corresponding adverse effects, toxicities, and/or cautionary considerations.

Famotidine (Pepcid)

Calcium Carbonate (TUMS)

Misoprostol (Cytotec)

Sodium Bicarbonate (Alka Seltzer)

Magnesium (Milk of Magnesia)

✓ [Choose]

▶ High sodium content --> fluid retention --> exacerbates hypertension.

▶ Tachyphylaxis with long-term use (2-6 weeks).

▶ Osmotic ~~diuresis~~ *diarrhea*

▶ "Milk-Alkali Syndrome" --> kidney failure.

▶ Teratogen: Contraindicated in pregnancy.

[Choose]

[Choose]

[Choose]

Antacids (cont.)

Milk of Magnesia (magnesium)

- magnesium → neutralizes hyperacidity
- magnesium → treats constipation

Amphojel (aluminum hydroxide)

- aluminum → neutralizes hyperacidity
- neutralizing agent → treats diarrhea



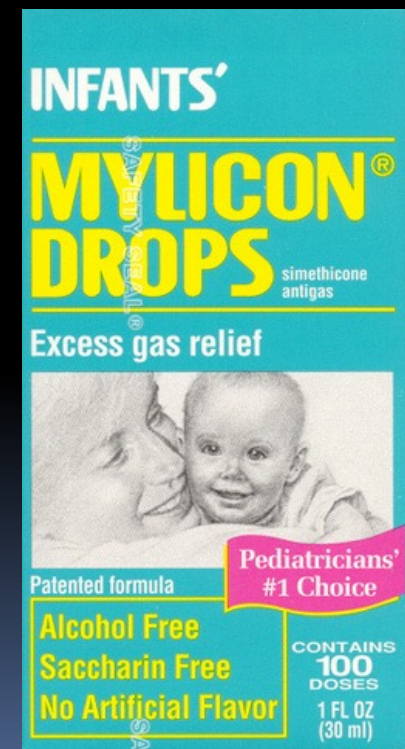
Antacids (Maalox, Mylanta)

- Onset: immediate (minutes)
- Duration: 30 minutes on an empty stomach, but 3 hours when taken within 1 hour of meals
- Alginic acid may be added to antacids → forms a viscous solution that floats on top of gastric contents → protects the esophageal mucosa from acid reflux
- Simethicone (surfactant) may be added to antacids → "breaks up" gas bubbles → relieves gas
- Caution: small amounts of aluminum and magnesium are absorbed and can accumulate in renal insufficiency → toxicity
 - Magnesium: avoid in patients with $\text{CrCl} < 30 \text{ ml/min}$
 - Aluminum: avoid in patients with renal failure ($\text{CrCl} < 15 \text{ ml/min}$)

Antacids (cont.)

Simethicone (Mylicon)

Simethicone (surfactant) → decreases surface tension of gas bubbles
→ breaks up gas bubbles → relieves gas



Antacids (cont.)

Calcium Carbonate (TUMS)

- moderate neutralizing capacity, compared to Maalox/Mylanta
- $\text{CaCO}_3 \rightarrow$ gas formation
 \rightarrow burping / flatulence
- high-doses (4-8 grams/day)
 \rightarrow hypercalcemia / metabolic alkalosis
“milk-alkali syndrome” \rightarrow kidney failure



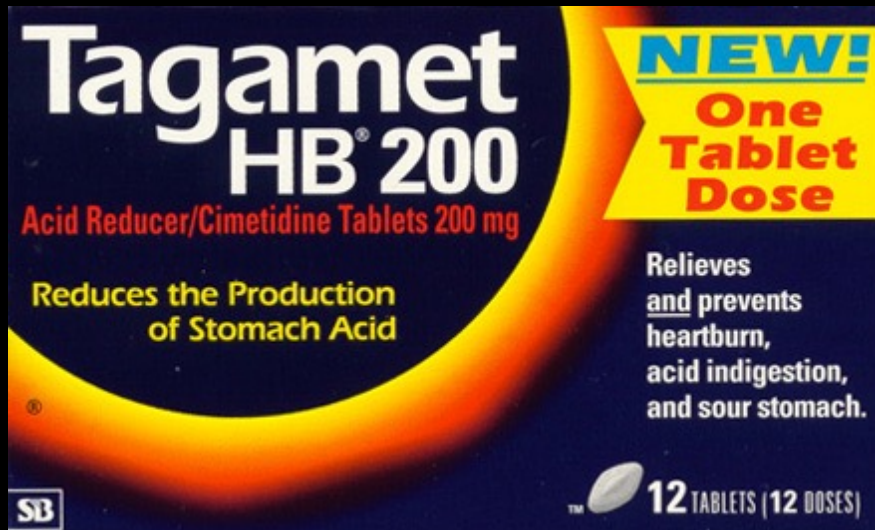
Antacids (cont.)

Sodium Bicarbonate
(Alka-Seltzer)

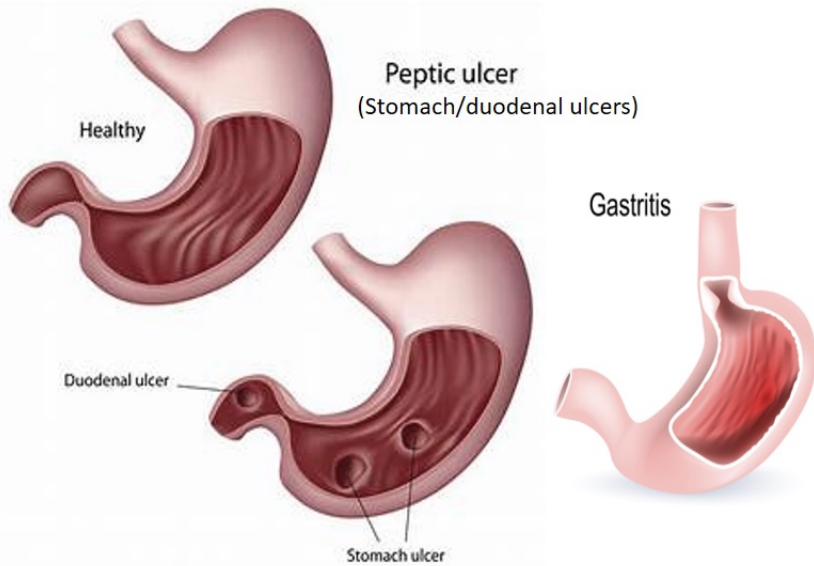
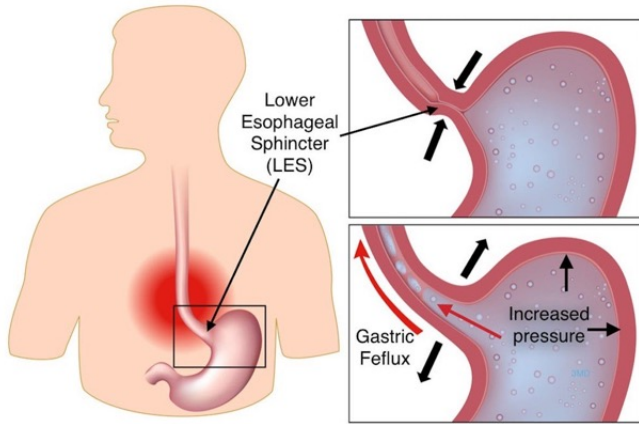
High sodium content (567 mg per tablet) → Na⁺/H₂O retention → exacerbates hypertension, heart failure, chronic kidney disease



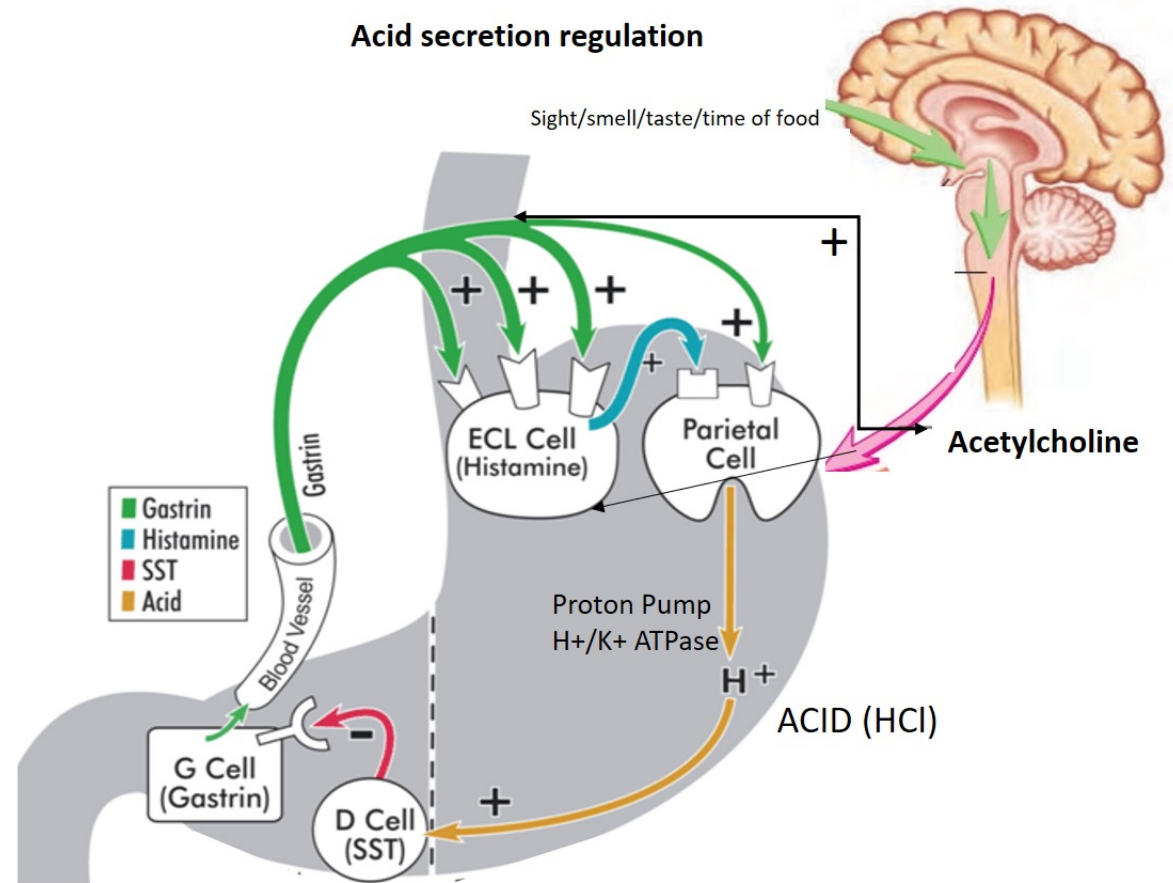
H₂ Receptor Antagonists (H₂RAs)



Gastroesophageal Reflux Disease (GERD)

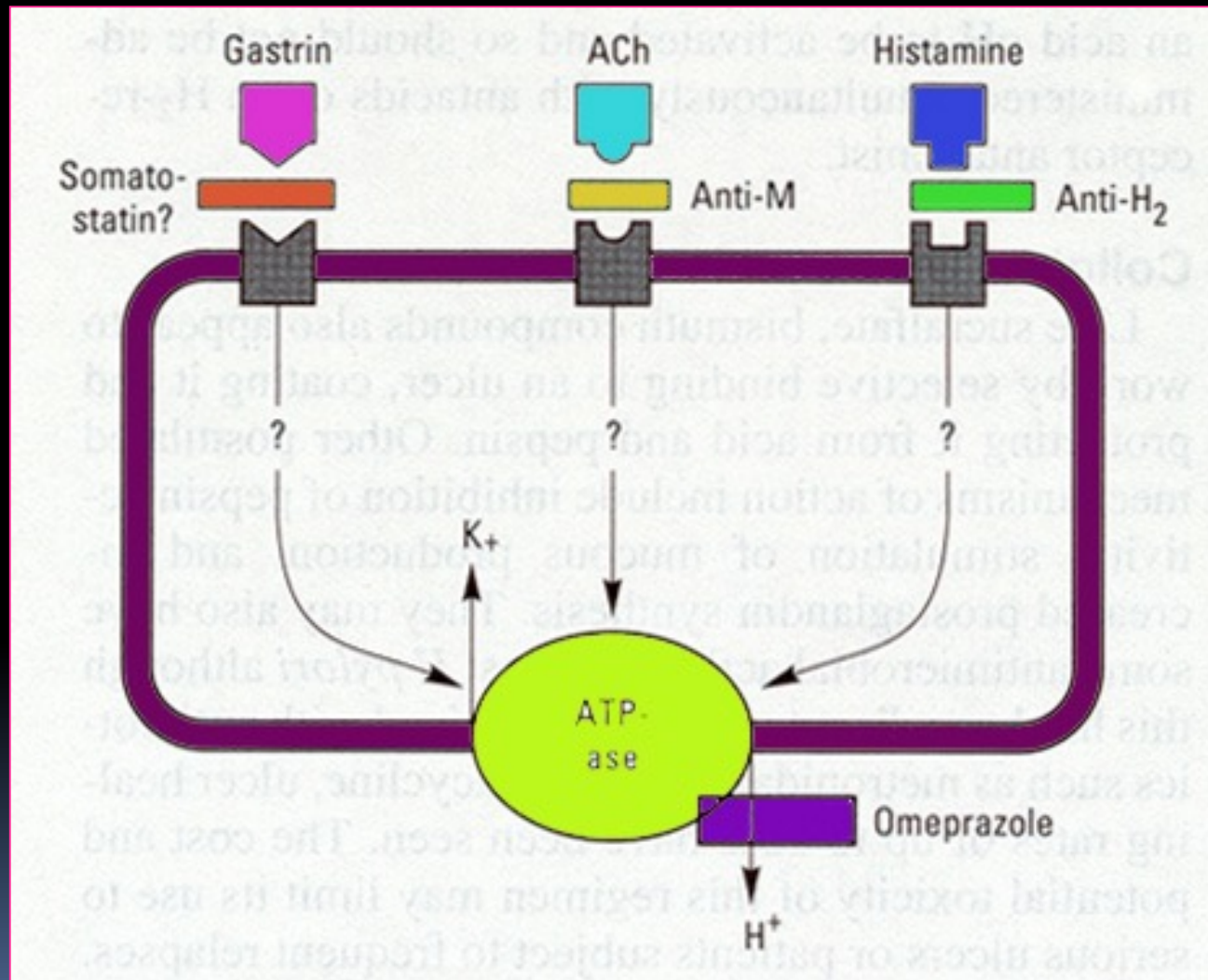


Acid secretion regulation



G-cells (antrum) → produce gastrin. D-cells protect stomach from overproduction of gastric acid by releasing somatostatin (SST) → inhibits production of gastrin. ACh and gastrin → increase release of histamine-2 from enterochromaffin-like (ECL) cells. Gastrin, Histamine-2, ACh (acetylcholine) → bind to receptors on parietal cells → gastric acid secretion

H₂ Receptor Antagonists (H₂RAs)



Histamine-2 Receptor Antagonists (H₂RA)

- H₂RAs are remarkably safe
- Oral absorption is rapid → peak serum drug concentration: 1-3 hours
- Side Effects (SEs)
 - GI Discomfort: diarrhea, constipation
 - CNS Effects: headache, dizziness, drowsiness, lethargy
 - Dermatologic Effects: rash
 - Hematologic Effect: thrombocytopenia (1%) is reversible upon discontinuation of H₂RA
- ✓ Cimetidine (Tagamet) has the greatest potential for drug-drug interactions → inhibits hepatic cytochrome P-450 isoenzymes
 - inhibits metabolism of theophylline, phenytoin, warfarin
 - drug toxicities

Histamine-2 Receptor Antagonists (H₂RA)

- Tachyphylaxis or tolerance may develop after 2-6 weeks of H₂RA therapy due to upregulation of H₂ receptor sites.



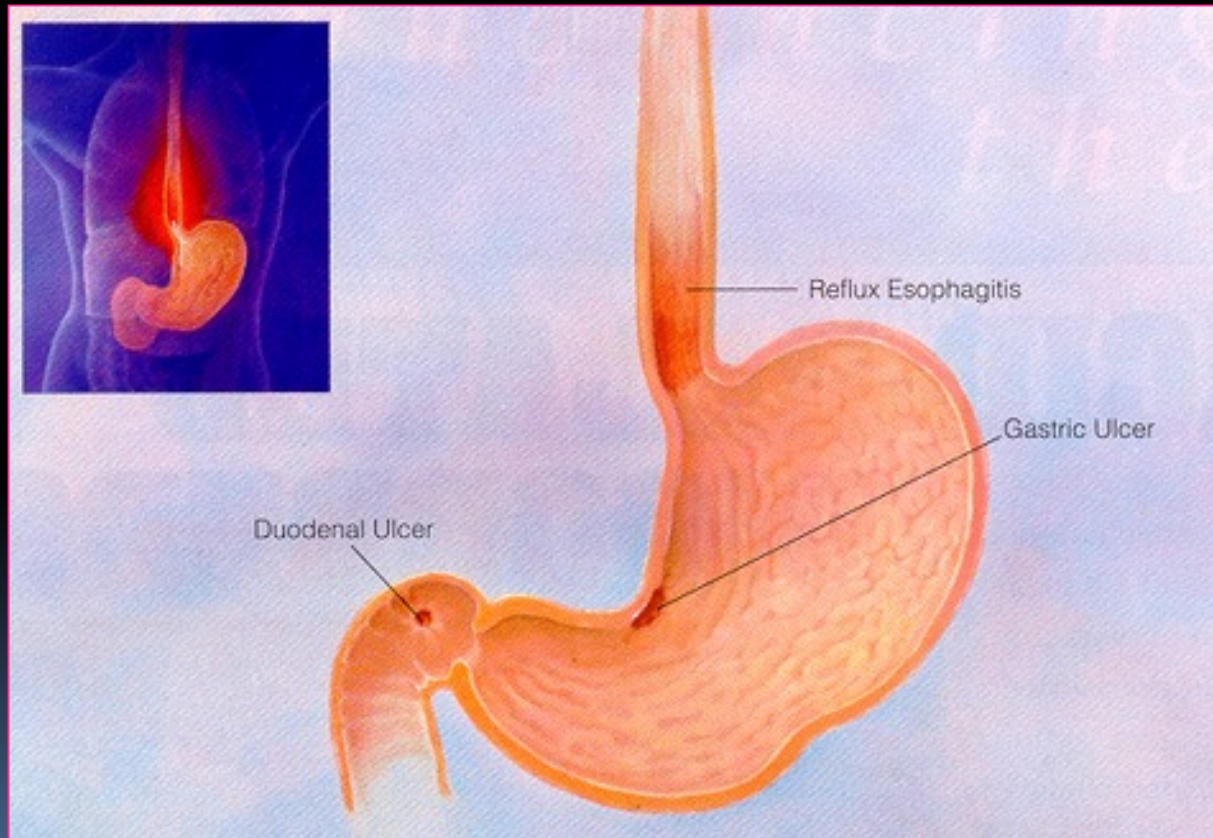
- Development of tachyphylaxis limits the use of H₂RAs in management of GERD and other conditions requiring long-term therapy.

↳ PPI are favored in GERD and conditions requiring long-term therapy

Sucralfate (Carafate)

(cytoprotective agent)

MOA: binds to gastric ulcer forming a protective barrier



Sucralfate (Carafate)

- Sucralfate may also have protective effect by stimulating release of mucosal prostaglandins (PGE)
- SE: constipation (1-3%) due to aluminum content
- Caution: aluminum content may accumulate in patients with renal insufficiency → “aluminum encephalopathy” (i.e., dementia), and anemia
- Aluminum binds dietary phosphate (GI tract) → hypophosphatemia
- Sucralfate tablets are large and may be difficult for geriatrics to swallow → use liquid formulation



Misoprostol (Cytotec)

MOA: synthetic prostaglandin (PG) analog

- stimulates the production of mucus and bicarbonate (“mucoprotective shield”)
- improves mucosal blood flow
- reduces mucosal cell turnover
- mildly inhibits gastric acid secretion (less than H₂RAs)

SE: diarrhea (up to 30%), abdominal cramping

- take with food and reduce daily dose to minimize incidence of diarrhea

Caution: misoprostol is contraindicated in pregnancy.

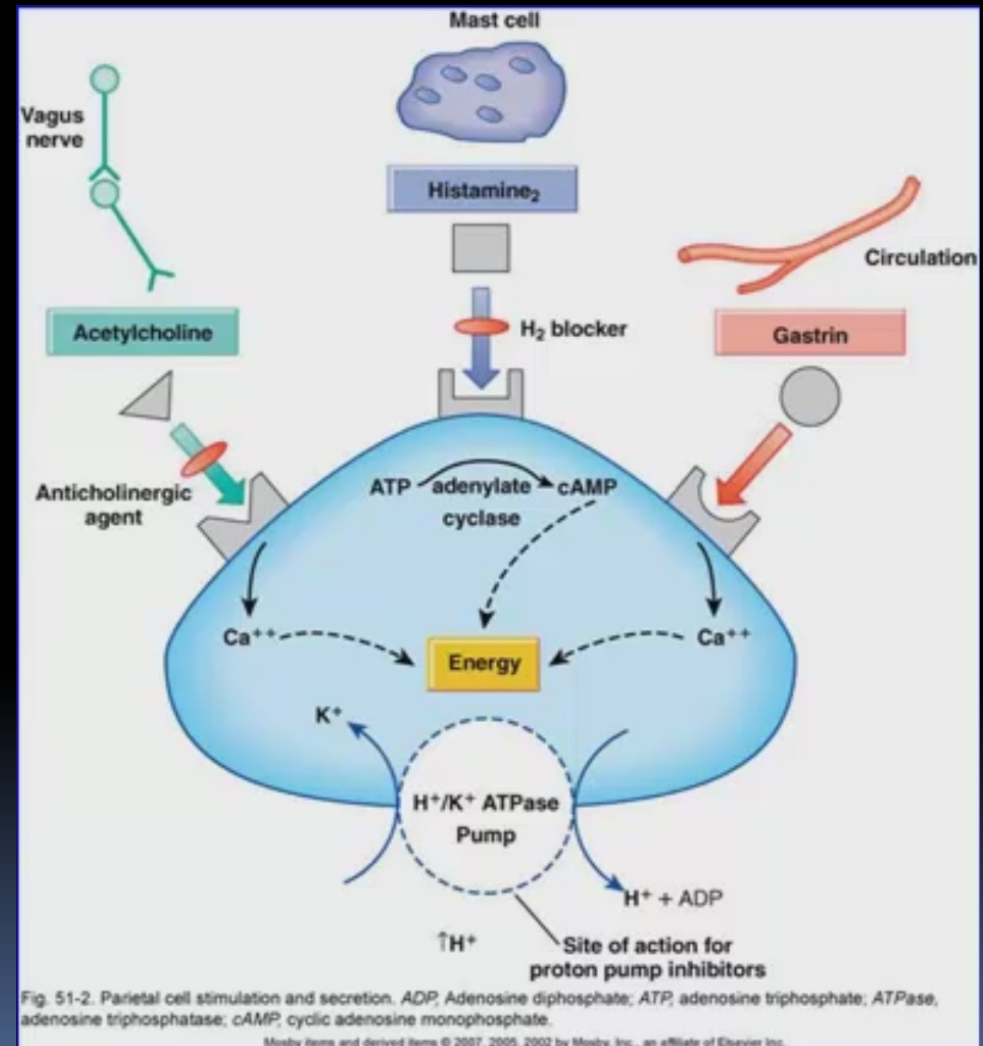
- use in women in childbearing years requires negative serum pregnancy test and adequate contraception



Proton Pump Inhibitors (PPIs)

MOA:

- PPIs irreversibly bind to the proton pump and inhibit gastric acid secretion
- PPIs are the most potent inhibitors of gastric acid secretion (superior to H₂RAs)
- PPIs are indicated for patients who experienced tx failure with maximum doses of H₂RA
- Dosage reduction of PPIs is not required in renal insufficiency



Proton Pump Inhibitors (PPIs)

Table 1. Availability, Formulations, and Dosages for Proton Pump Inhibitors in Adults

<i>Drug</i>	<i>Availability</i>	<i>Route of administration</i>	<i>Starting dosage*</i>	<i>Cost of generic (brand)†</i>
Dexlansoprazole (Dexilant)	Prescription	Oral	30 mg per day	NA (\$153)
Esomeprazole (Nexium)	Prescription	Oral or IV	Oral: 20 mg per day IV: 20 mg per day for 10 days	Oral: NA (\$201) IV: NA (\$381)‡
Lansoprazole (Prevacid)	Prescription	Oral	15 mg per day	\$106 (\$196)
Lansoprazole (Prevacid 24H)	Over-the-counter	Oral	15 mg per day for 14 days§	NA (\$13)
Omeprazole (Prilosec, Zegerid)	Prescription	Oral	20 mg per day	\$33 (\$196)
Omeprazole (Prilosec OTC, Zegerid OTC)	Over-the-counter	Oral	20.6 mg (Prilosec OTC) or 20 mg (Zegerid OTC) per day for 14 days§	\$7 (\$13)
Pantoprazole (Protonix)	Prescription	Oral or IV	Oral: 40 mg per day IV: 40 mg per day for 7 to 10 days	Oral: \$16 (\$186) IV: \$42 (\$42)‡
Rabeprazole (Aciphex)	Prescription	Oral	20 mg per day	NA (\$250)

IV = intravenous; NA = not available.

*—Number of weeks of recommended treatment varies.

†—Estimated retail price of one month's treatment (unless otherwise specified) based on information obtained at <http://www.drugstore.com> (accessed January 31, 2012) or at a national retail chain.

‡—Estimated wholesale price based on information obtained at Red Book online. Micromedex 2.0. Micromedex Healthcare Series [Internet database]. Greenwood Village, Colo.: Thomson Reuters (accessed January 31, 2012).

§—Patients should not take more often than 14 days per month every four months.

Proton Pump Inhibitors (PPIs)

Short-Term SEs of PPIs (infrequent and comparable to H₂RAs)

- GI discomfort: nausea, diarrhea, abdominal pain
- CNS: headache, dizziness

✓ Long-Term SEs of PPIs (usually with high doses)

- Atrophic gastritis has been “rarely” associated with patients on long-term therapy PPIs for *Helicobacter pylori*.
- Risk of *C. difficile* and other enteric infections has been observed due to ability of pathogens to survive in a less acidic GI environment; however the overall risk is low.
- Vit B₁₂ deficiency, since gastric acid is required to extract Vit B₁₂ from dietary sources. Monitor Vit B12 levels in PPI patients.

Long-Term SEs of PPIs

- Hypomagnesemia may occur with long-term use of PPIs due to reduced intestinal absorption. Monitoring serum magnesium levels is recommended in patients on long-term PPI therapy.
- Hypocalcemia and increase risk of fractures is associated with reduced calcium absorption due to hypochlorhydria. Since calcium citrate does not require acid for absorption, it is the recommended calcium supplement in patients on long-term PPI therapy.
- Iron malabsorption secondary to long-term gastric acid suppression with PPIs, however this does not appear to be of clinical significance unless a patient requires oral iron supplementation. Higher doses and longer duration of iron supplementation are recommended in these patients.

Guidelines for Self-Medication

- (1) read the label carefully
- (2) follow the directions for use
- (3) if symptoms persist, seek professional advice
- (4) OTC drugs do not cure illness
- (5) don't use expired or old medications
- (6) store medications properly
- (7) avoid OTC products with identical medications

Guidelines for Self-Medication (cont.)

- (8) consult a pharmacist or a physician assistant for information on OTC drugs
- (9) select an economical generic OTC product when available (generic vs brand)

