



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

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

O
T
C
D
R
U
G
S



America's Other Drug Problem

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

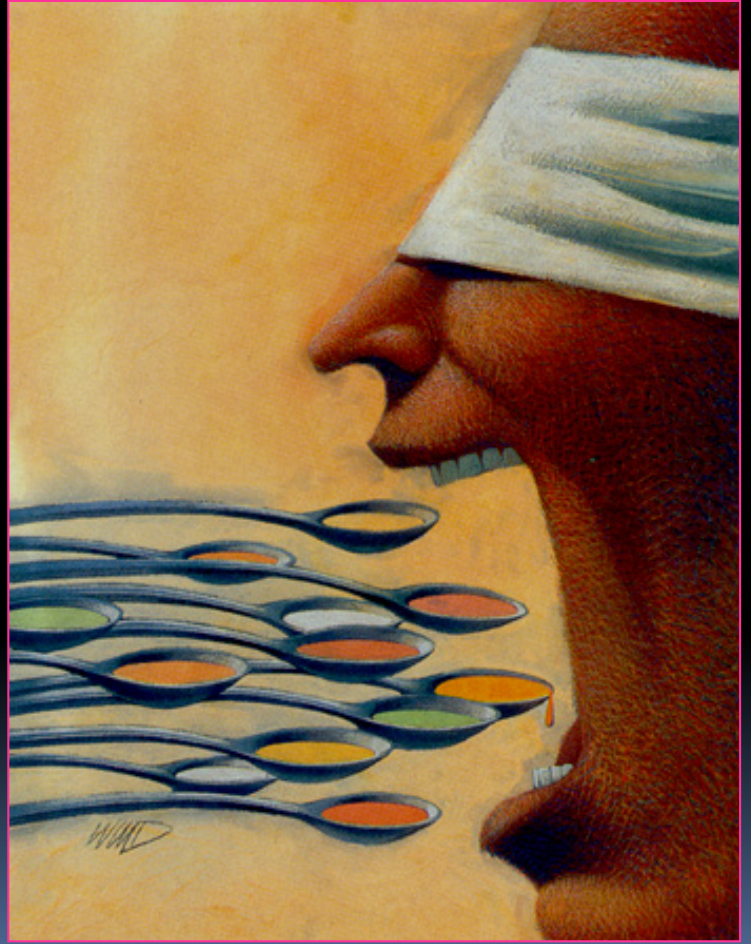


Active Ingredient

OTC Confusion?



OTC Confusion?





Analgesics

- drugs which relieve pain without loss of consciousness



Analgesics / Antipyretics --> also drugs that reduce fever

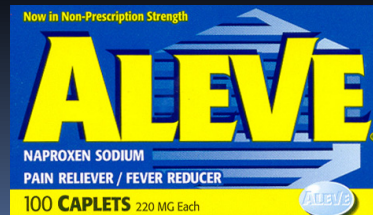
(1) acetaminophen (APAP) / (Tylenol)



(2) aspirin (ASA)

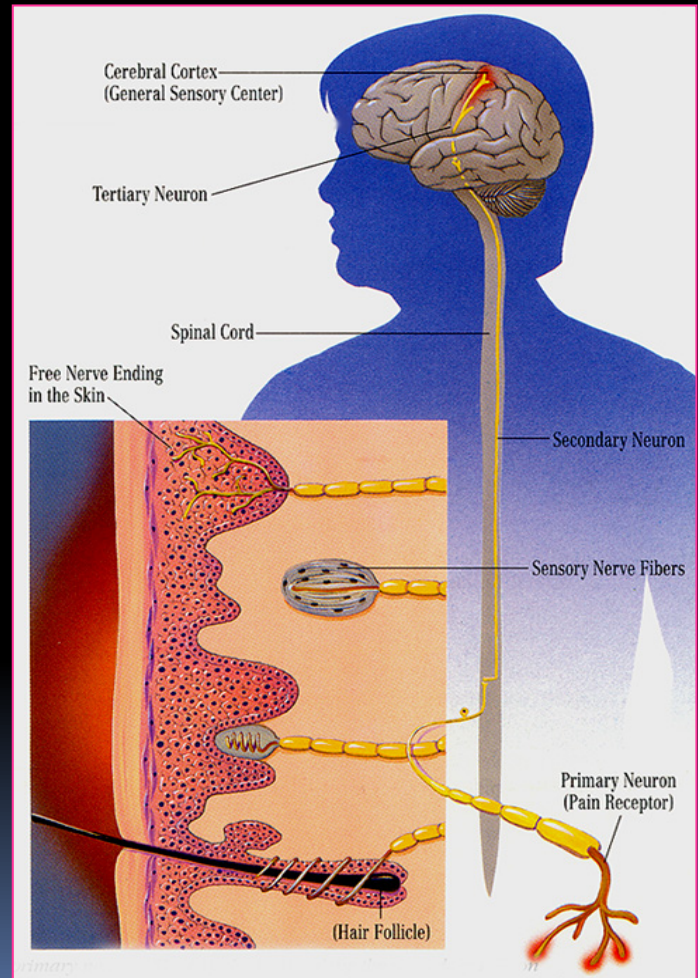


(3) NSAIDs (non-steroidal anti-inflammatory drugs)

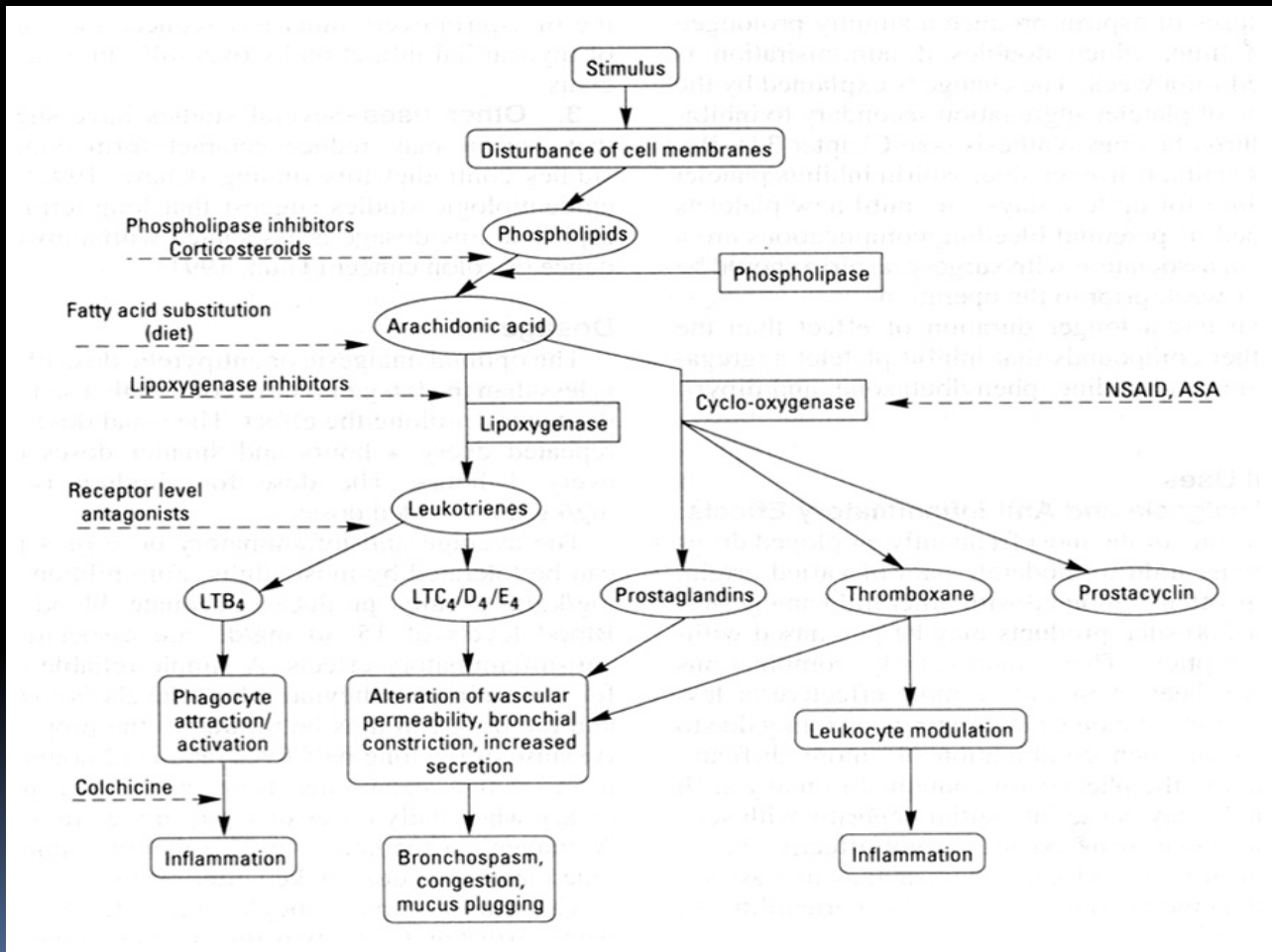


NSAIDs

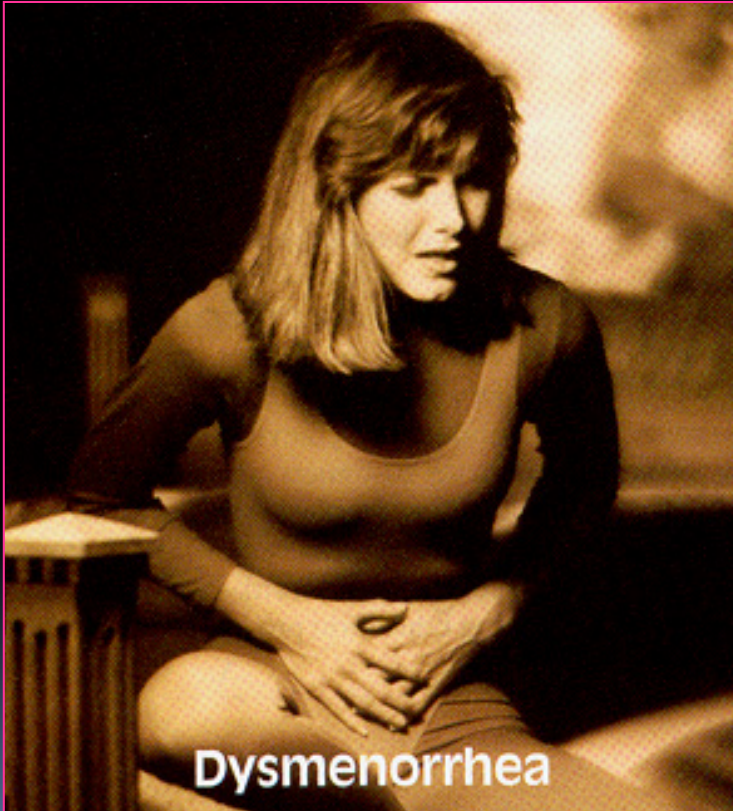
→ Reduce inflammation
which leads to pain



m
e
c
h
a
n
i
s
m



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 acetaminophen*
 - 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 3200 mg/day
References: 1. Bradley JD, Brandt KD, Katz BR et al. Comparison of an anti-inflammatory 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. Lopez FL, Luchinat FA, Furey SA, et al. A double-blind endoscopic evaluation of naproxen and nonprescription ibuprofen. *Clin Pharmacol Ther.* 1994;55:155.

Please advise patients to read and follow product labeling.
Appearance of the brown ADVIL tablet and caplet is a trademark of Whitshall Laboratories, Madison, NJ.
WHITSHALL ROBIN HEALTHCARE
A DIVISION OF AMERICAN HOME PRODUCTS
© 1995 Whitshall Laboratories

Advil®

OTC IBUPROFEN 200 MG

SHOULD BE YOUR #1 OTC ANALGESIC CHOICE

Aleve
(naproxen)

**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-Synthe Health Products Company V8R0043

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)



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 ASPIRIN ADULT LOW STRENGTH

ENTERIC SAFETY COATED 120 DELAYED RELEASE ASPIRIN 81mg TABLETS

PAIN RELIEVER ASPIRIN REGIMEN BAYER 325 ASPIRIN 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®
(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
DOCTOR RECOMMENDED FOR REGULAR USE
ENTERIC COATED TABLETS RELATED TO ASPIRIN

ORANGE FLAVORED BAYER® CHILDREN'S
ASPIRIN
LOW STRENGTH CHEWABLE ASPIRIN TABLETS

ASPIRIN REGIMEN BAYER®
REGULAR 325_{mg} STRENGTH
SAFETY COATED CAPLETS
DOCTOR RECOMMENDED FOR REGULAR USE
ENTERIC COATED CAPLETS RELATED TO ASPIRIN

CHERRY FLAVORED BAYER® CHILDREN'S
ASPIRIN
LOW STRENGTH CHEWABLE ASPIRIN TABLETS

GENUINE BAYER® ASPIRIN
FAST, SAFE PAIN RELIEF
CONTROL 325_{mg} 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
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.

© 1996 Bayer Corporation JA-PHVP

Aspirin & 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

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. Do not exceed 5 doses in 24 hours.
 References: 1. *Annals* P. 31. *Am J Med*. 1984;77:1243-1245. 2. *Annals of Pharmacology*. *Lancet*. 1981; 2:787-789. 3. *Georgia*. GA. *Am J Med*. 1983;74:641-102-109. 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. *Lancet* 358: 1081-1084. An assessment of the safety of pediatric ibuprofen: A population-based investigation of the *LANE*. 1996;37(12):309-333. ©McNeil-PPC, Inc. 1997.

Acetaminophen (APAP)

(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 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 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. Proper 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

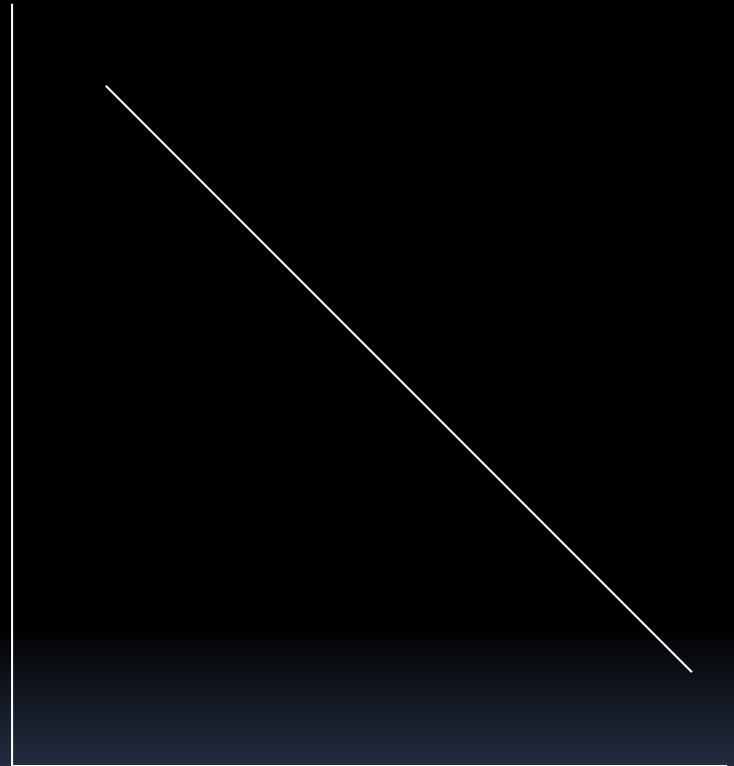
→ death

Treatment

→ IV acetylcysteine
(Mucomyst)

D
R
U
G

C
O
N
C



T
I
M
E

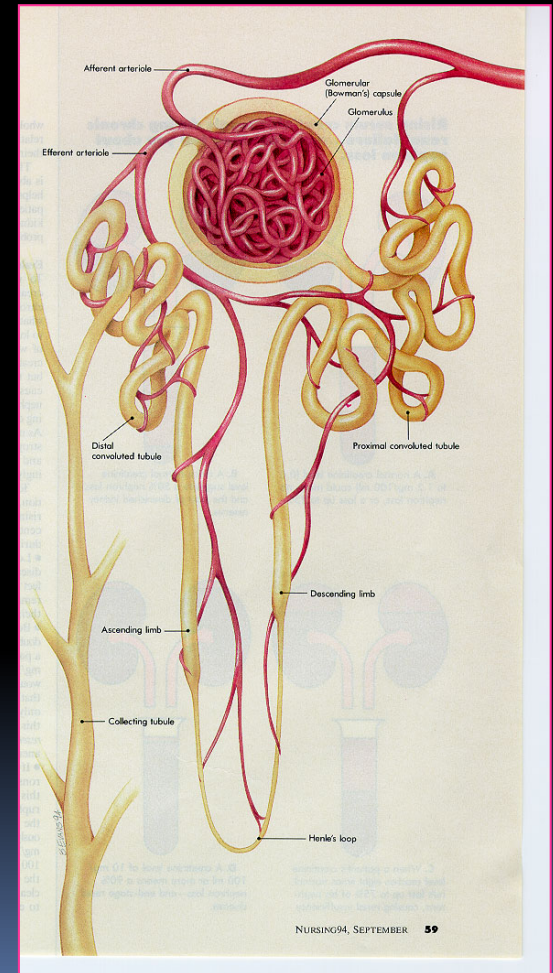
Ibuprofen (Advil, Motrin)

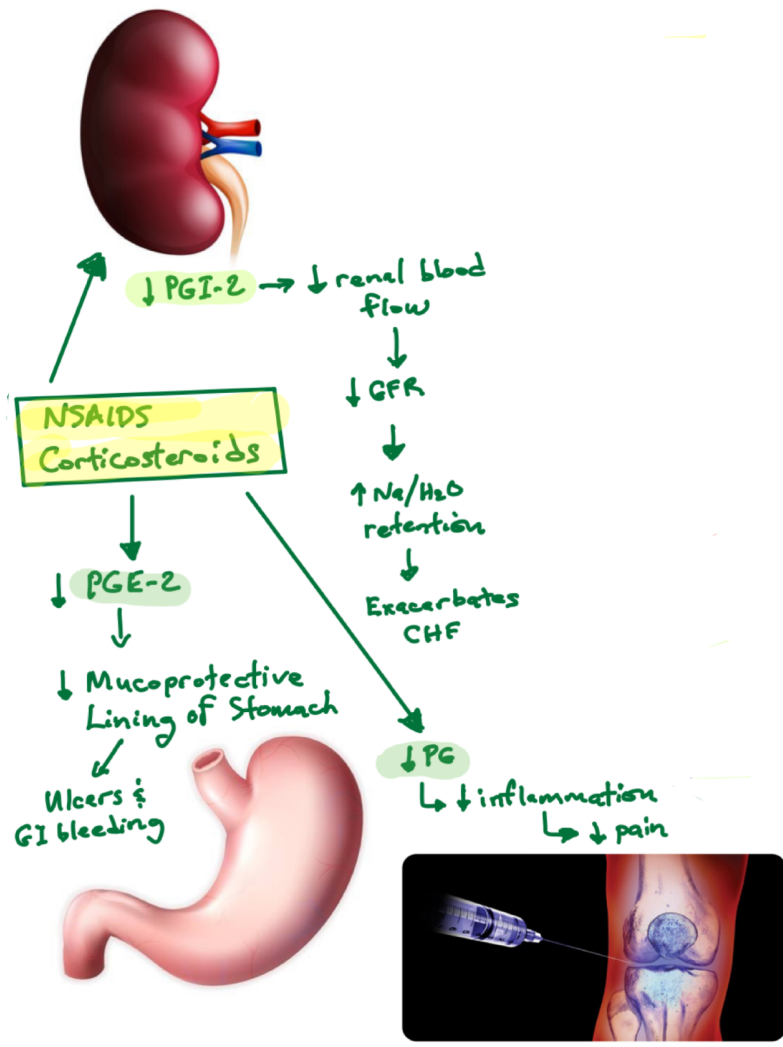
- (1) 1- 2 tabs --> equivalent to 5-8 tabs of ASA
- (2) less GI upset than equivalent dose of ASA
- (3) indicated for mild-moderate pain due to arthritis, osteoarthritis, and menstrual cramps



Ibuprofen (cont.)

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



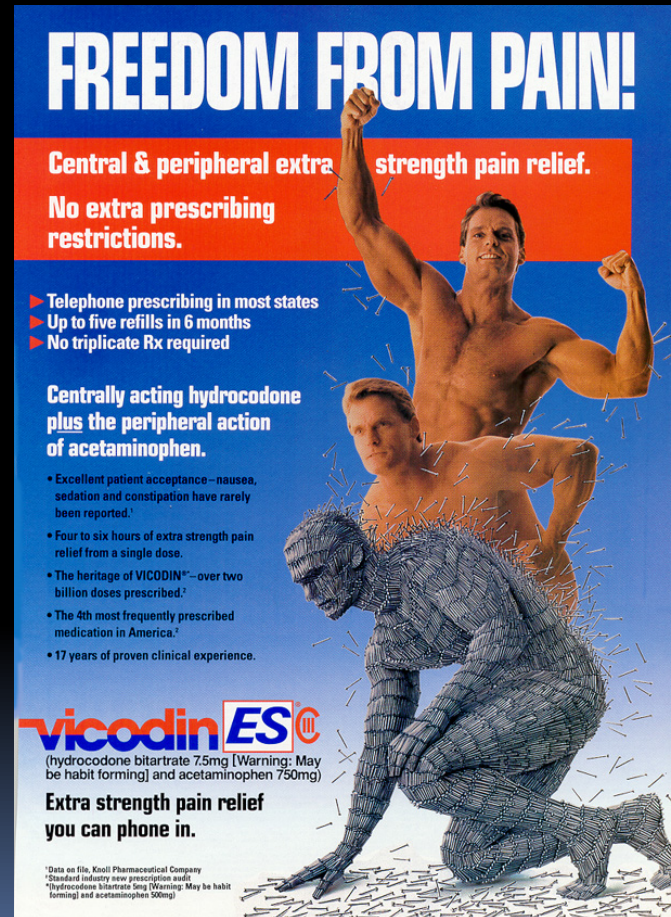




Narcotic Analgesics

→ Inhibit pain impulse
in the CNS

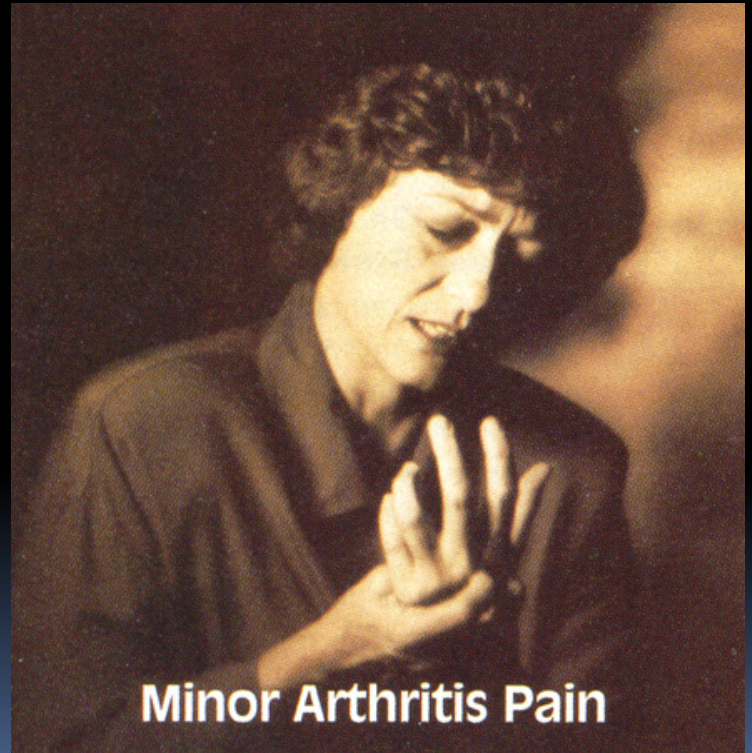
Example: **Norco**
(APAP/Hydrocodone)

The advertisement features a blue background. At the top, the text 'FREEDOM FROM PAIN!' is written in large, white, bold letters. Below this, a red banner contains the text 'Central & peripheral extra strength pain relief. No extra prescribing restrictions.' To the right, two muscular men are shown flexing their muscles. In the foreground, a man is depicted as a wireframe, composed of many small white pills, kneeling on a floor also covered with pills. On the left side, there are three bullet points: '▶ Telephone prescribing in most states', '▶ Up to five refills in 6 months', and '▶ No triplicate Rx required'. Below these, the text reads 'Centrally acting hydrocodone plus the peripheral action of acetaminophen.' Further down, there are four bullet points: '• Excellent patient acceptance—nausea, sedation and constipation have rarely been reported.', '• Four to six hours of extra strength pain relief from a single dose.', '• The heritage of VICODIN®—over two billion doses prescribed.', and '• The 4th most frequently prescribed medication in America.*' and '• 17 years of proven clinical experience.' At the bottom left, the 'vicodin ES' logo is displayed, with 'ES' in a red box and a blue circle containing a white 'C'. Below the logo, the text reads '(hydrocodone bitartrate 7.5mg [Warning: May be habit forming] and acetaminophen 750mg)'. At the bottom center, the text says 'Extra strength pain relief you can phone in.' At the very bottom, there are three small footnotes: '*Data on file, Knoll Pharmaceutical Company', '†Standard industry new prescription audit', and '‡Hydrocodone bitartrate 5mg [Warning: May be habit forming] and acetaminophen 500mg'.

Anti-Arthritic Drugs

(1) NSAIDs

(2) Corticosteroids
(Prednisone)



Minor Arthritis Pain

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

Acetaminophen (Tylenol)

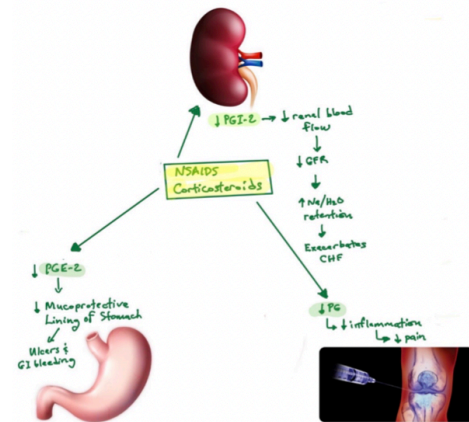
- Properties: antipyretic and analgesic
- Disadvantage: no anti-inflammatory properties
- Advantage: does not cause GI upset, gastritis, GI bleeding/ulcers
- Acetaminophen (APAP) does not exert antiplatelet effect
- APAP overdose --> hepatotoxicity

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: 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.

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

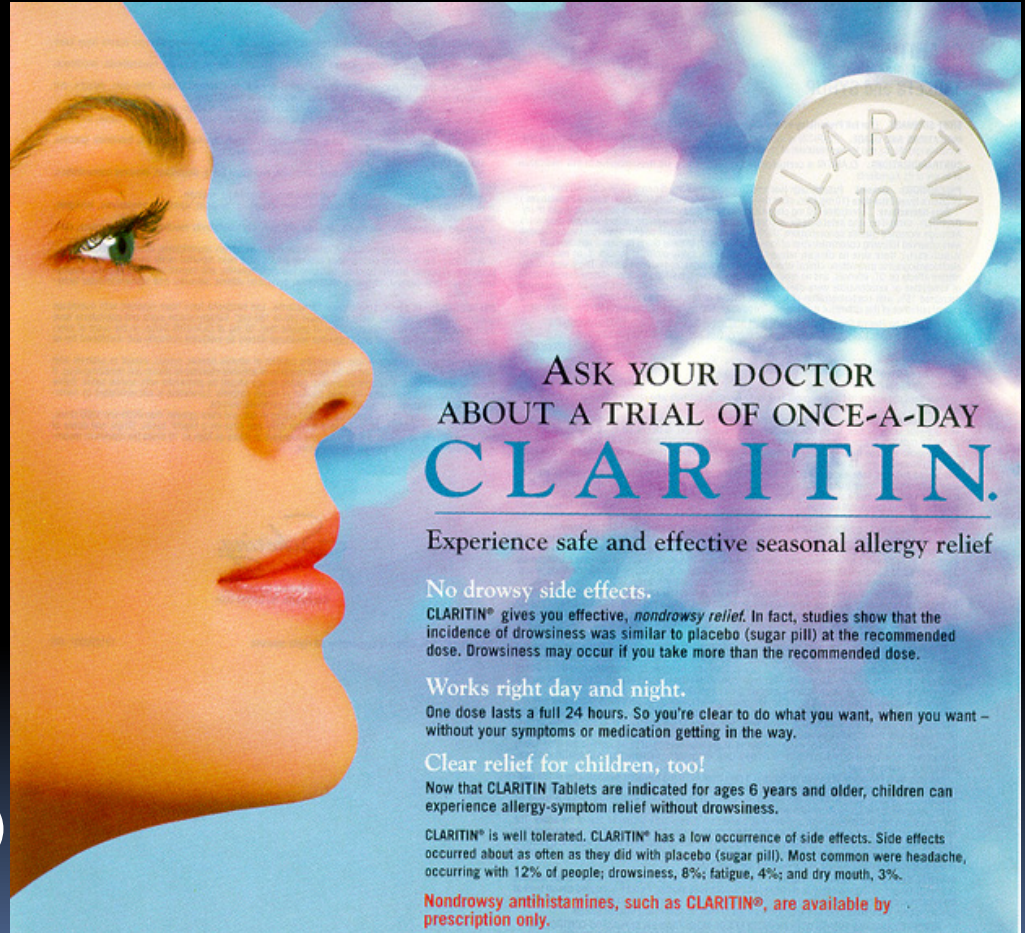


Antihistamines (continued)

Non-Sedating Antihistamines

Examples

- Claritin
(loratidine)
- Allegra
(fexofenadine)



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



examples: phenylephrine
pseudoephedrine

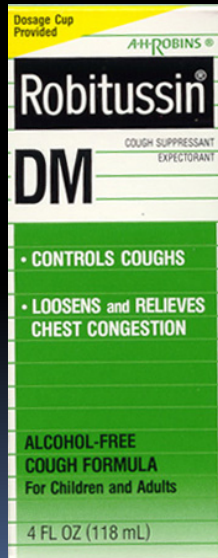
COLD & Flu Combination Products



ibuprofen + pseudoephedrine

Antitussives

(1) Dextromethorphan (DM)

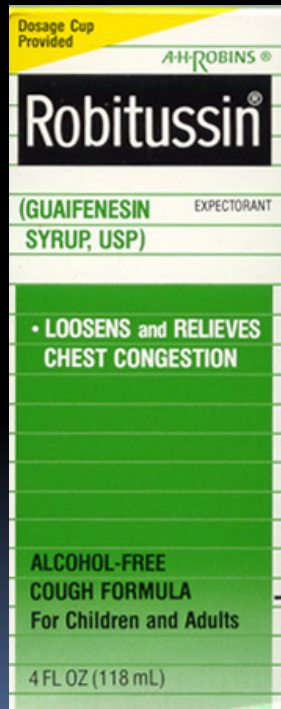


(2) Diphenhydramine



(3) Codeine (Robitussin AC)

Expectorant (Guaifenesin)



Robitussin (Plain) Syrup

Combination Products



Hypnotics



acetaminophen
+
diphenhydramine



diphenhydramine

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.

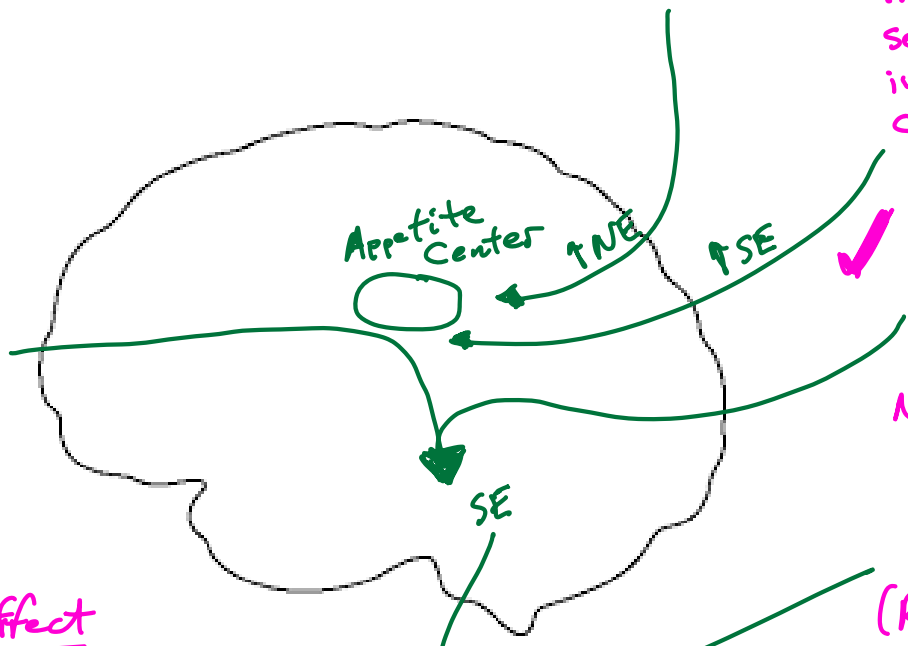
increases serotonin (SE) in appetite center.

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)

↑SE
bloodstreams
Lungs
(pulmonary hypertension)

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

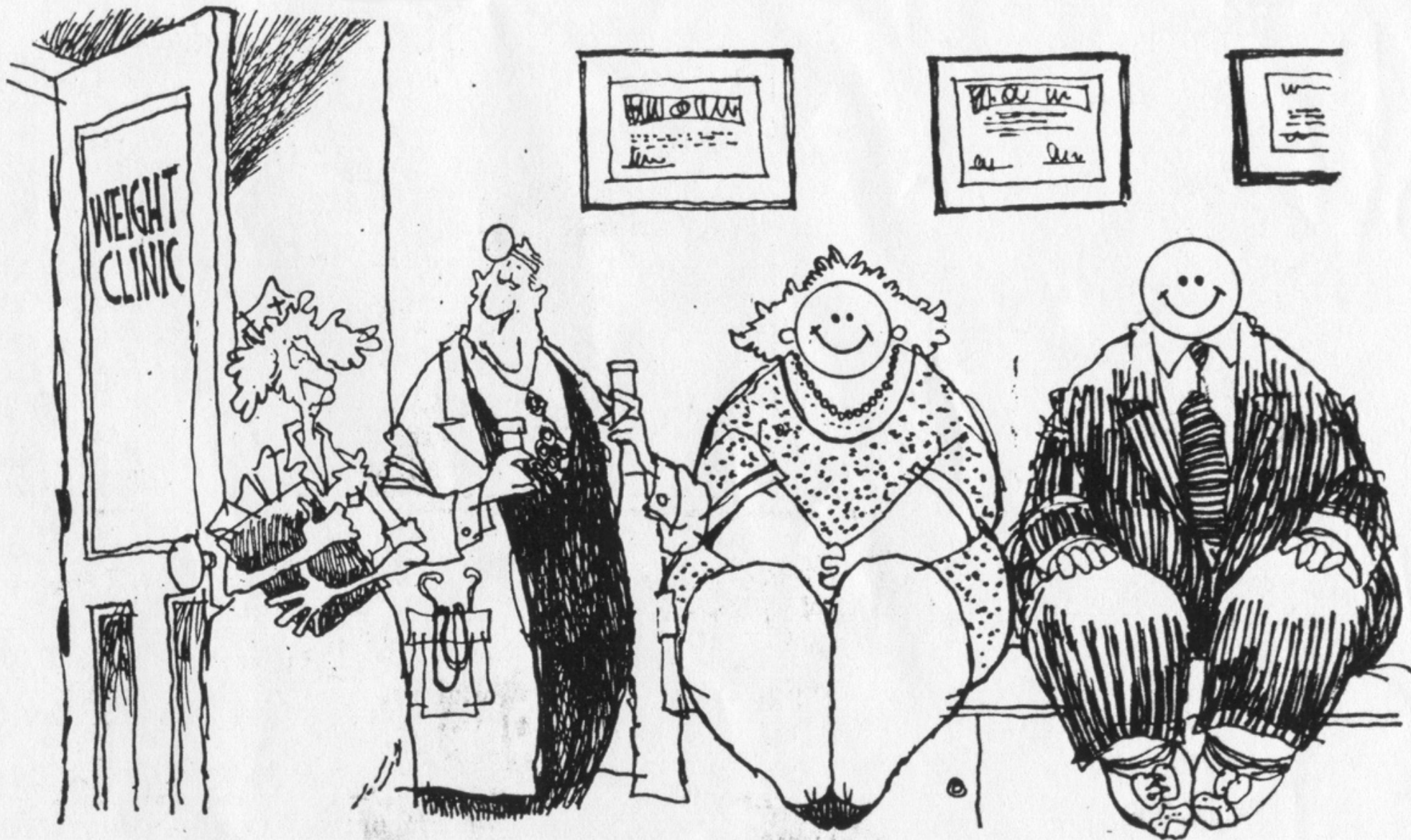
- **Phen-Fen** medically supervised weight loss program
- **Redux Diet**
- **Weight Loss**
- **Inch Loss**
- **Free Body Fat Analysis**

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

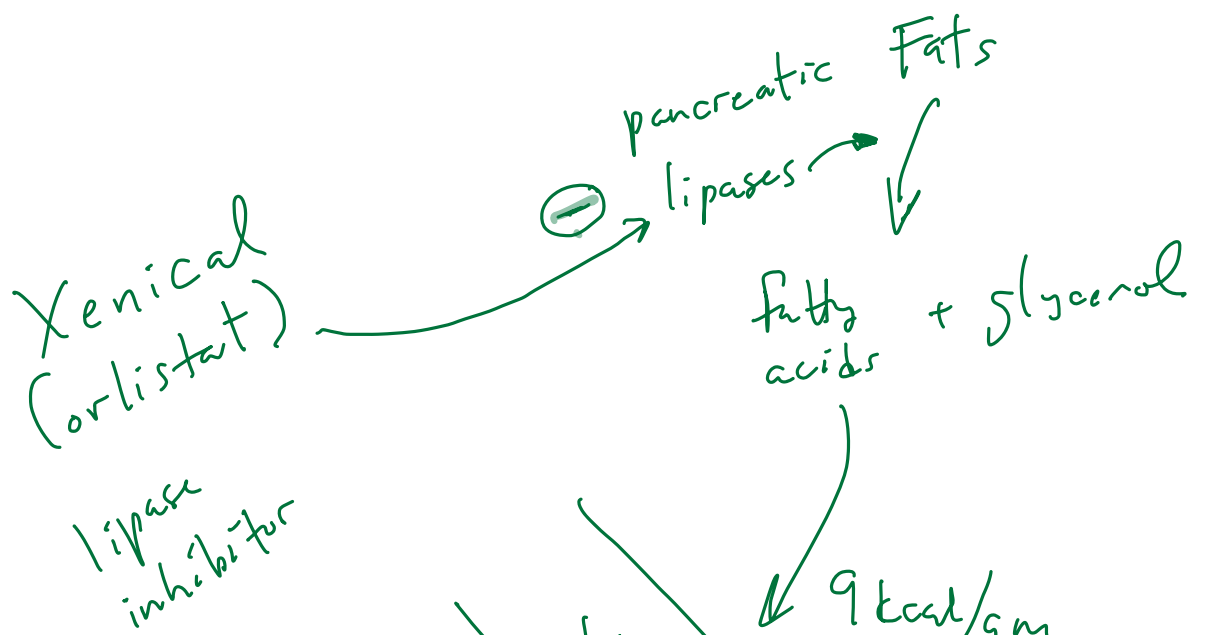
Pharmacy Today Staff

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, confused 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

• fluid & electrolyte depletion

• K⁺ potassium depletion (electrolyte depletion)

Xenical side effects

Appetite Suppressants

GLP-1
Receptor
Agonists



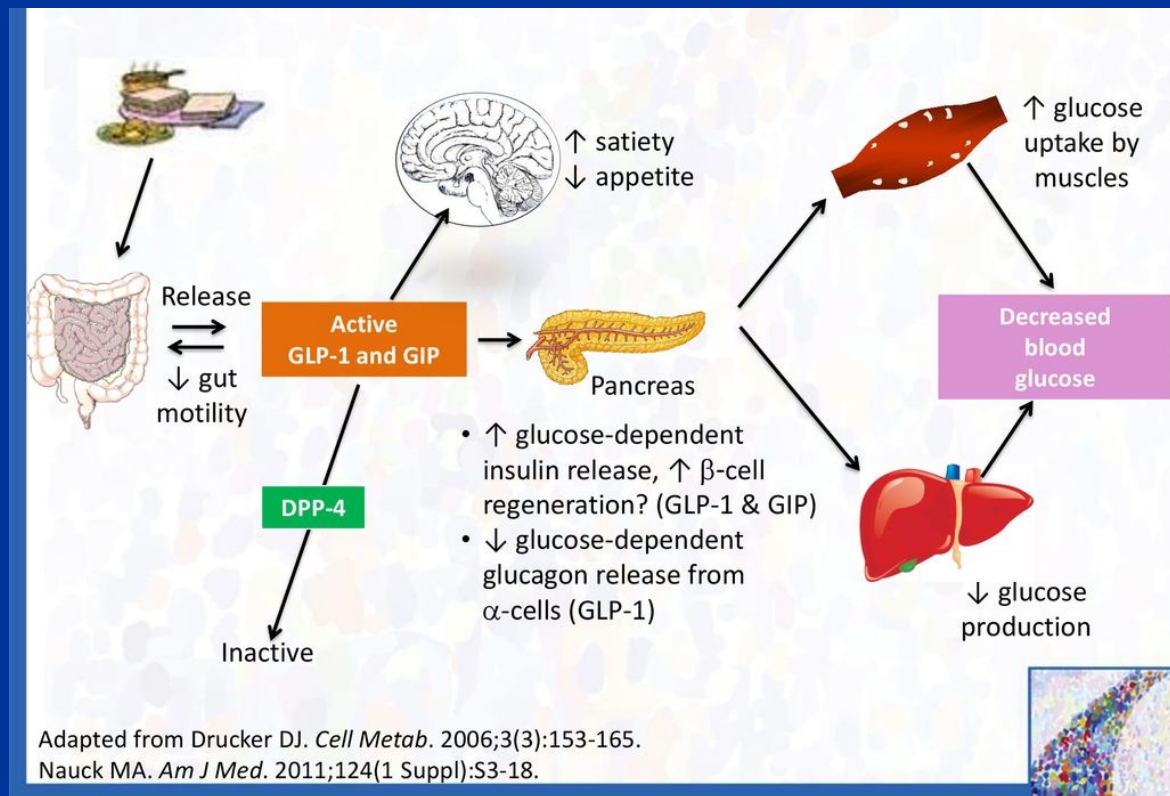
Increase Insulin Release
PLUS

Decrease Glucagon Release
PLUS

Increases Satiety
PLUS

Slows Gastric
Emptying Time

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).

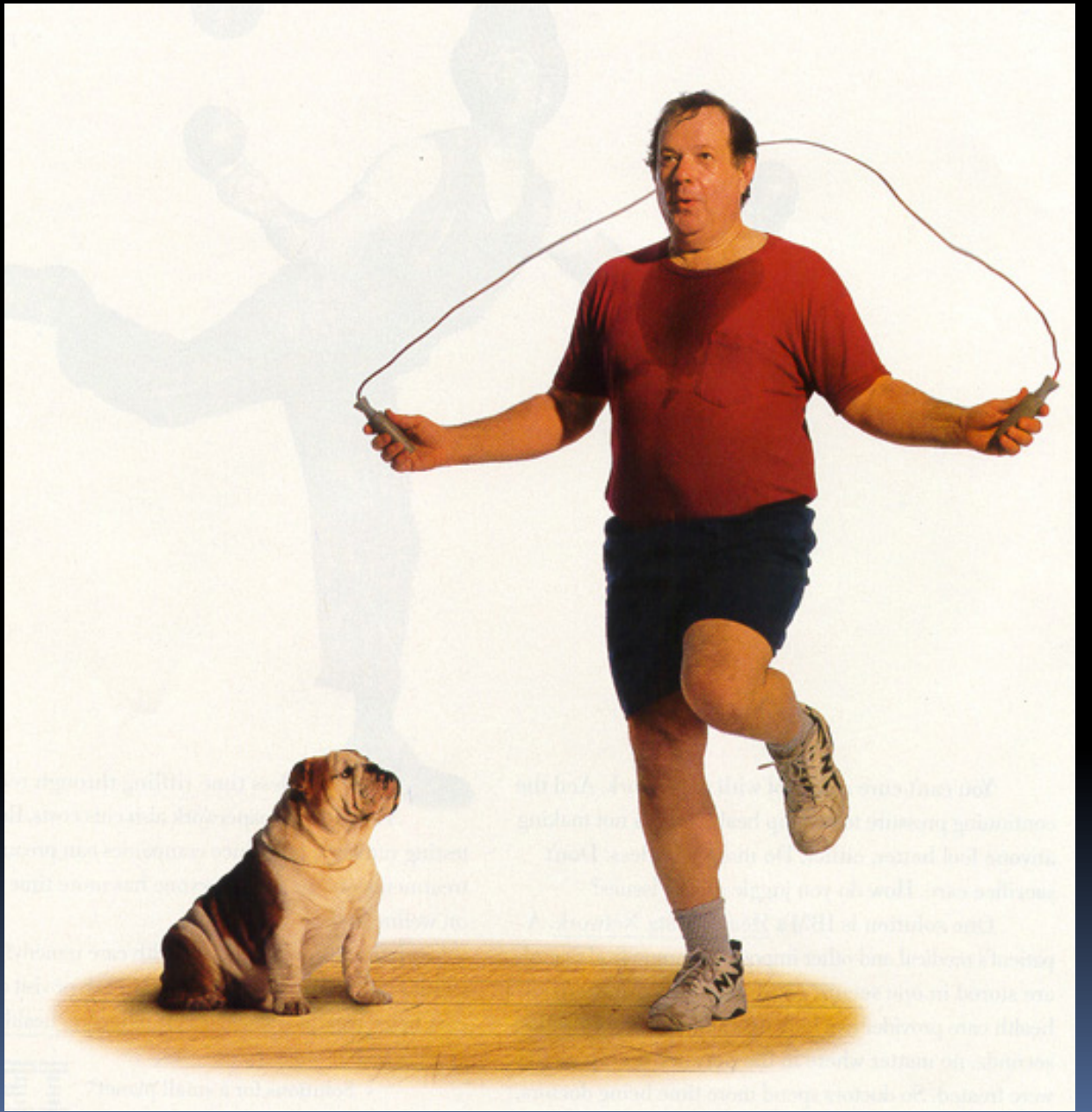
$$\text{BEE for major sepsis} = 1.5 \times 1265.88$$

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

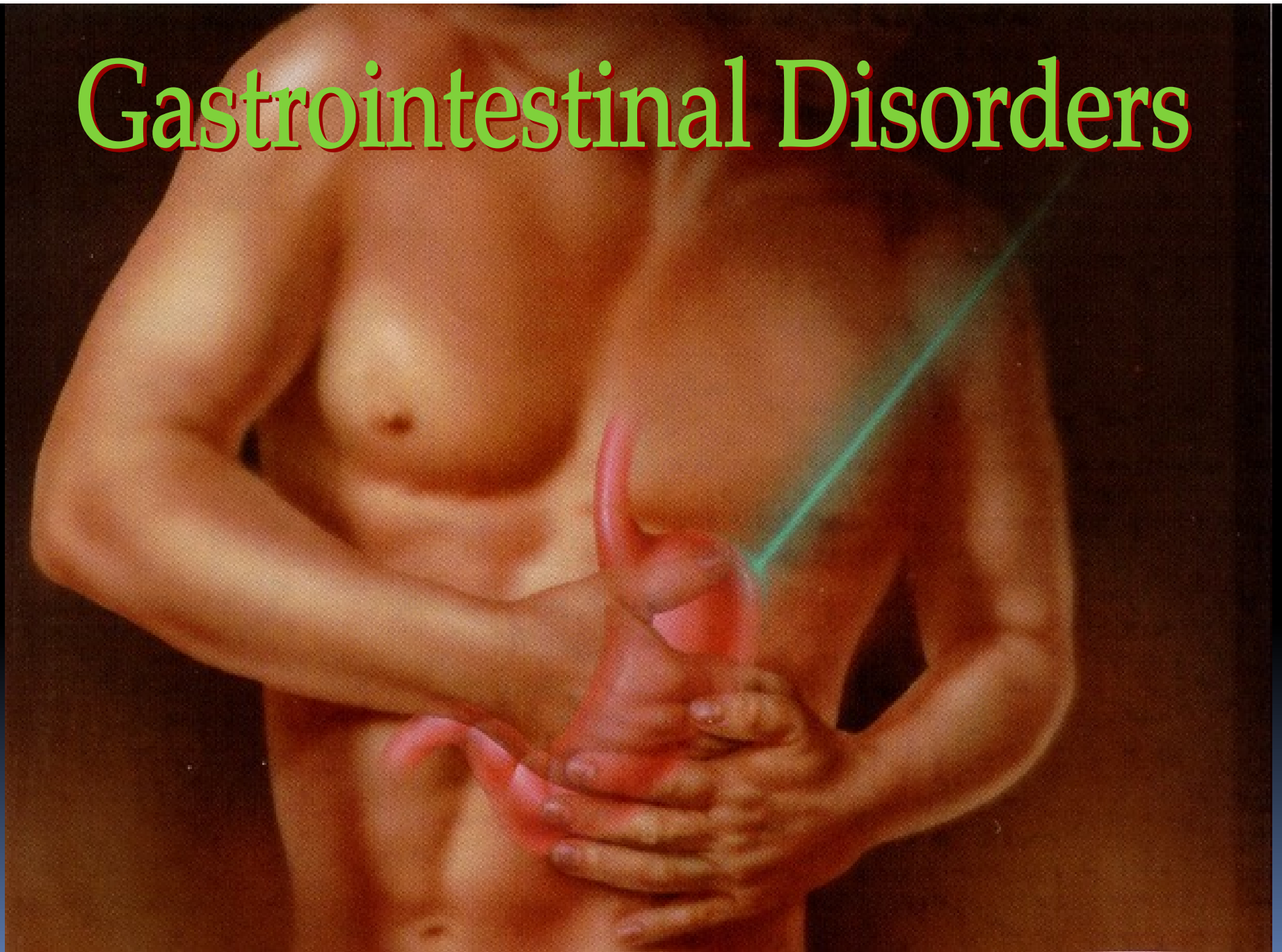
*Look for the Golden Arches
... where McMemories are made.*



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



Gastrointestinal Disorders



Antacids: Maalox / Mylanta

MOA: Neutralize Gastric Acidity

Active Ingredients
(neutralizing agents)

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

* SE = Side Effect(s)



Antacids (cont.)

Milk of Magnesia (magnesium)

- magnesium → neutralizes hyperacidity
- magnesium → treats constipation

Amphojel (aluminum hydroxide)

- aluminum → neutralizes hyperacidity
- neutralizing agent → treats diarrhea



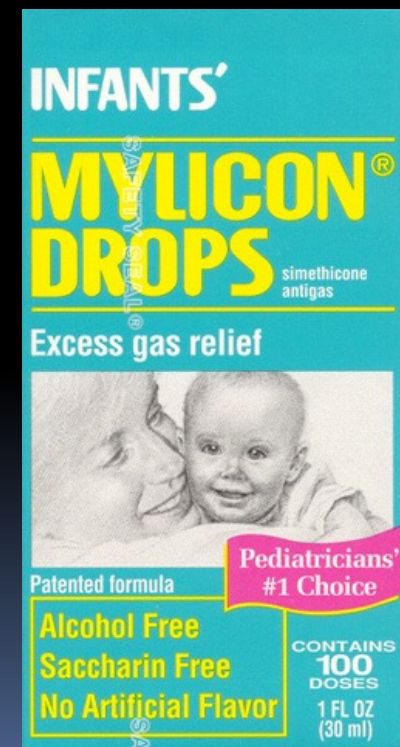
Antacids (Maalox, Mylanta)

- 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



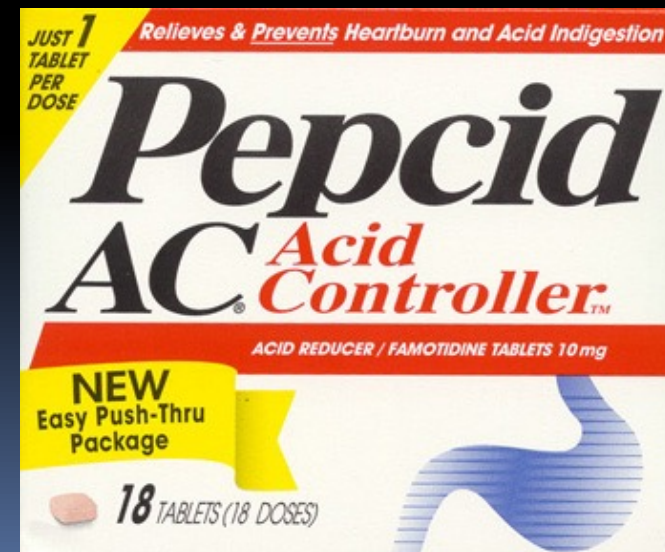
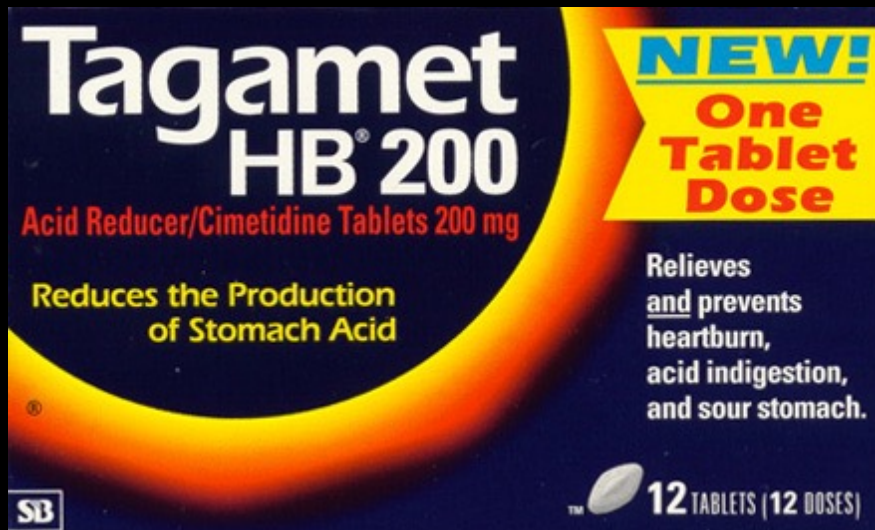
Antacids (cont.)

Sodium Bicarbonate
(Alka-Seltzer)

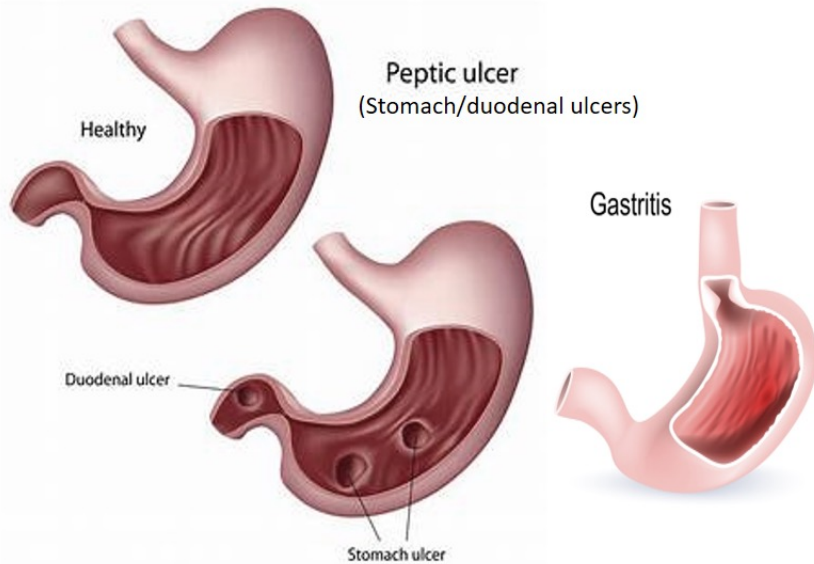
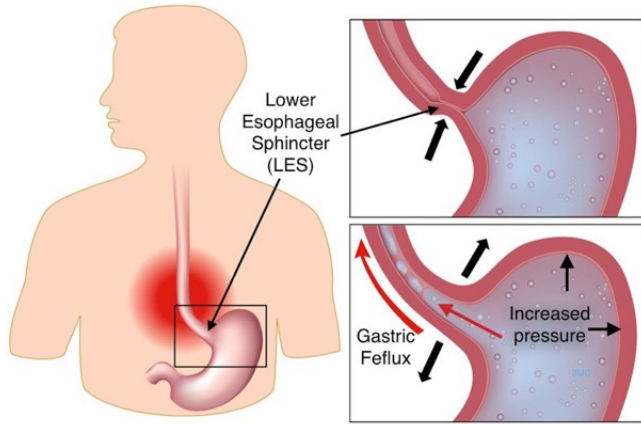
High sodium content (567 mg per tablet) → Na⁺/H₂O retention
→ exacerbates hypertension, heart failure, chronic kidney disease



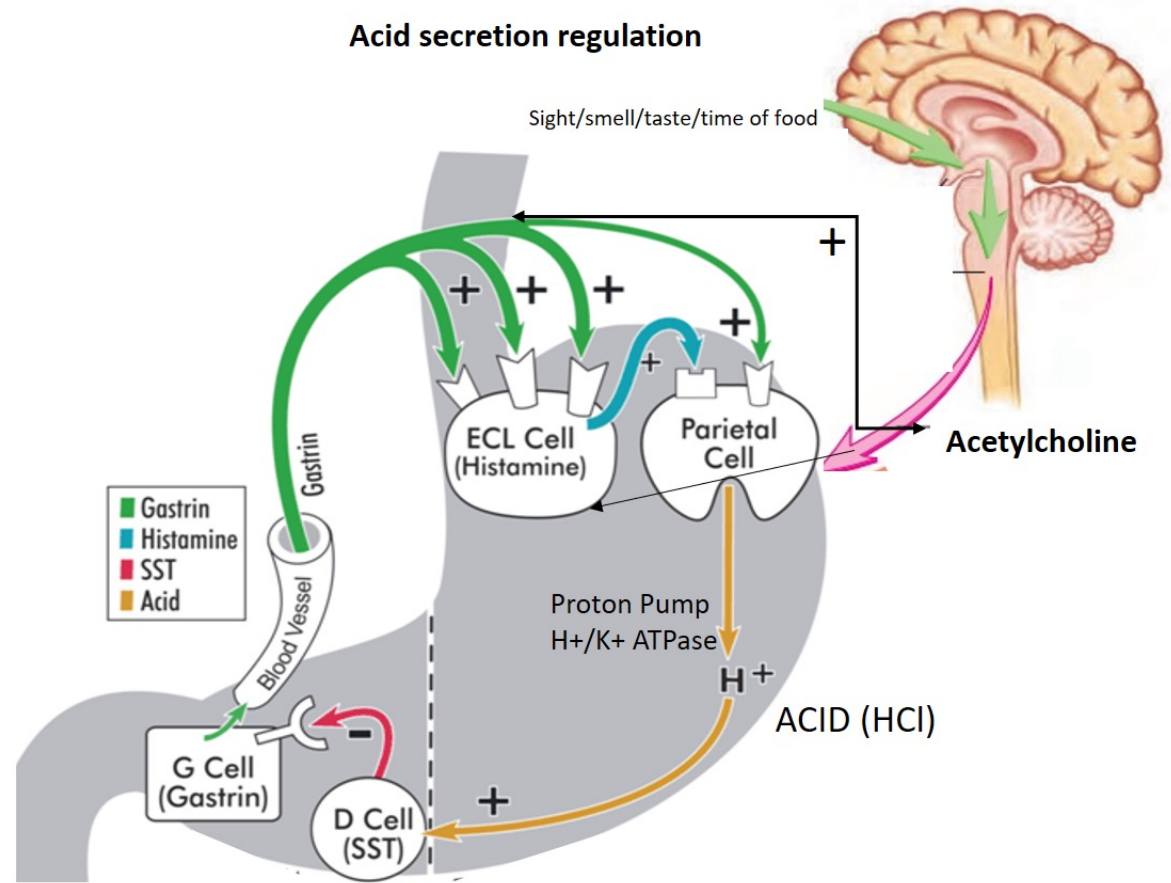
H₂ Receptor Antagonists (H₂RAs)



Gastroesophageal Reflux Disease (GERD)

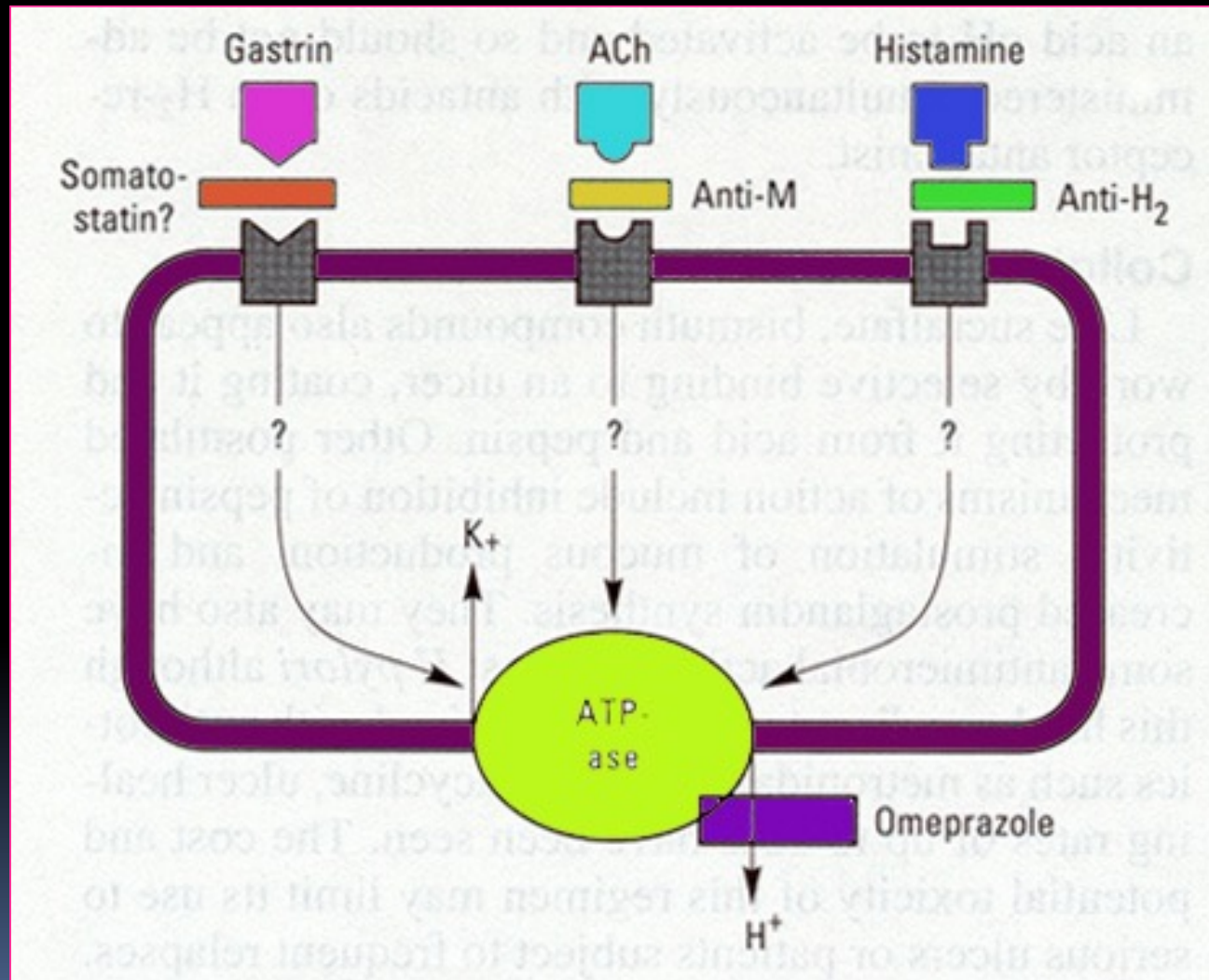


Acid secretion regulation



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

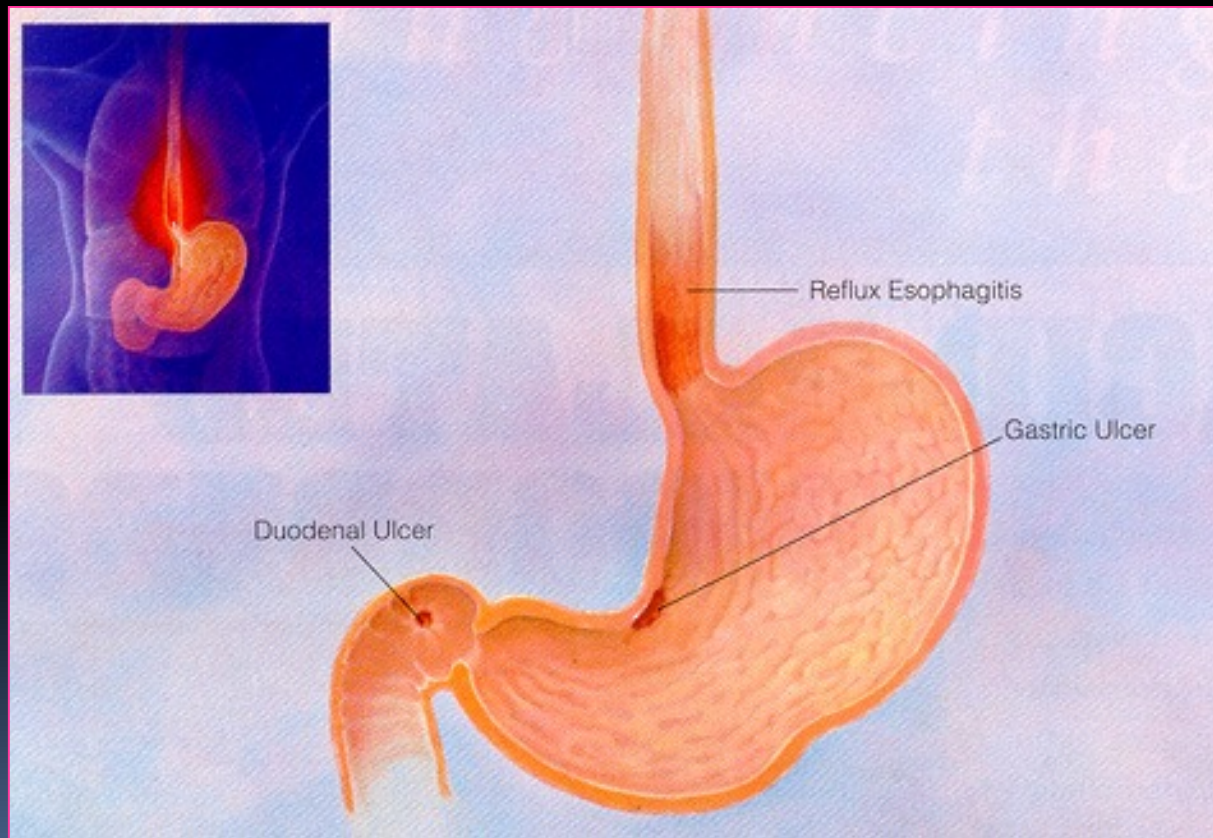
Histamine-2 Receptor Antagonists (H₂RA)

- 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.

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.

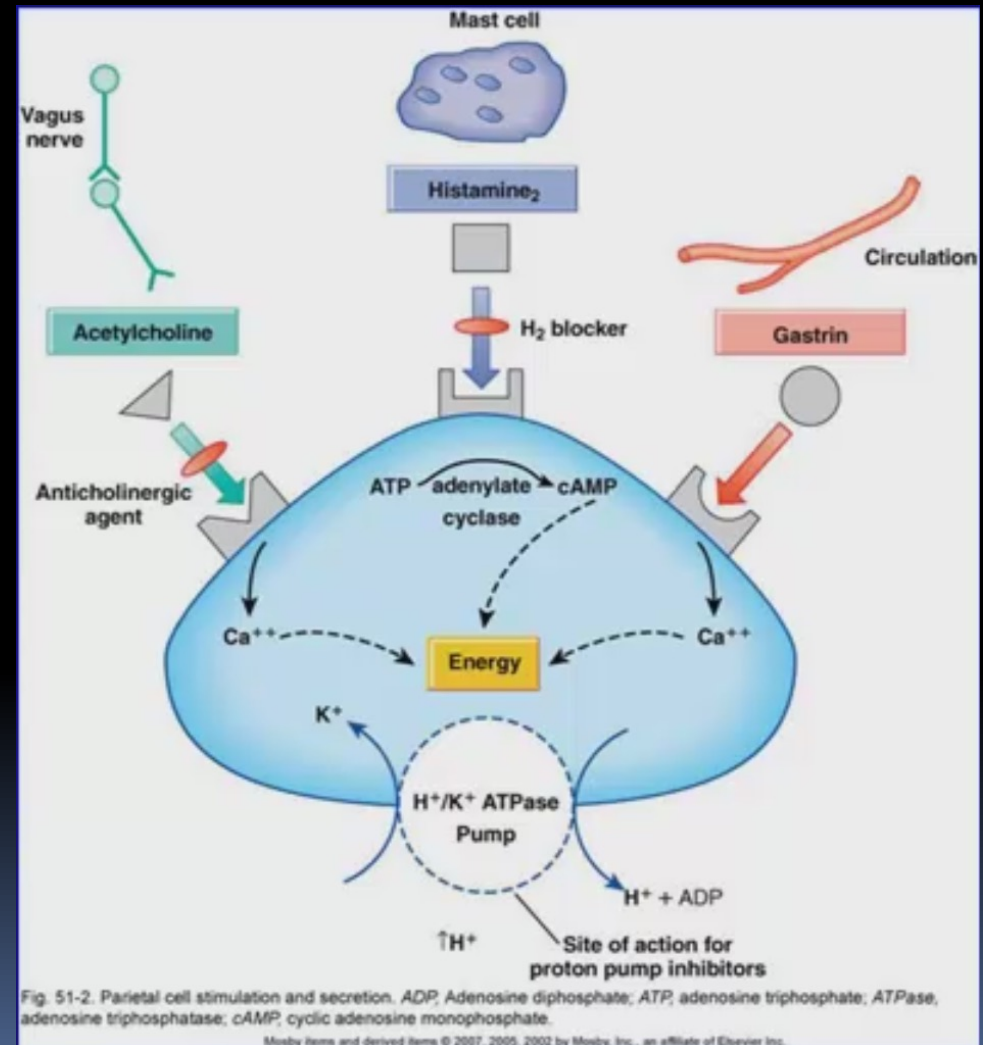
- use in women in childbearing years requires negative serum pregnancy test and adequate contraception



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)

