

Pain medication

- Tylenol
- Advil
- Midol

Prescription vs OTC

300 billion year vs 25 billion a year

Both are United States

Doctors approval vs no prescription needed (some are behind the counter)

OTC medication are mostly used, cheaper, cost visible.

Top Medication

- Cough and cold (41 billion)
- Pain reliever (2.7 billion)
- Antacid (1.4 billion)

Important consideration when buying OTC medication

- Safety
- Indication
- Counter indication

* dose makes the drug

Side effects

- Info easy to find
- Label or box
- Google

Incidence

- Info hard to find
- Need both to evaluate risk

Indications

- Use
- Wrong drug

Counter indication

Not to use when :

- Conditions
- Combinations
- Foods
- Natural remedies

Pain relievers is the most common medicine bought

2.7 billion

50 billion pills

35,000 tonnes a year

Aspirin one of the most popular drugs



- Alcohol
- Caffeine
- Aspirin
- Nicotine

Salix. → Often linked to aspirin

Genus family (plants)

- Willow (pain relief)
- Poplar
- Beech
- Salicylates (chemicals)

Egyptians used willow for inflammation.

Hippocrates believed willow was good for child birth

The knowledge of herbs lost in dark ages

Reverend Edward Stone 1702-1768

He was a rector in Church of England

Willow has a bitter taste similar to quinine

Doctrine of signatures



Willow cures fever



Malaria was found in swamps, you have a fever when you're infected with malaria etc.

Willow : dried bark, turned bark into powder and given for fever.

Salicin

Henri Leroux 1829

1.5 kg of bark made only 30g of powder (teaspoon)

Fossils was proof of past life

Oil contains molecular fossils

Salicylic acid made from salicin (salicin is synthetic)



Rafaella Piria 1838

- Analgesic
- Antipyretic
- Antinflammatory

Coal tar. → Salicylic Acid

Coal was a 1800's waste product

Coal into coal gas, coal tar (waste)

Coal tar → Kolbe-Schmitt Reaction. → Salicylic Acid

Synthetic vs Natural

58 billions tablets requires 2 million tonnes of bark

No difference in side effects

Synthetic : 1 kg. → Reaction → 300 mg

Many synthetic products can be good. Easier to manufacture
Synthetic made from oil.

Natural means nothing

Salicylic Acid made and sold by dye company



Bayer started as dye company (paints and dye)

Salicylic Acid (Drugs with problems)

- Analgesic (reduce pain)
- Antipyretic (reduce fever)
- Antinflammatory (reduce swelling)

Has a bitter taste and causes stomach irritation.

Felix Hoffman 1868-1946

- His father has arthritis
- Took salicylic acid for pain
- Suffered from stomach problems

He then decided to fix the drug (bitter taste, stomach irritation)
Succeeded but was then not effective for pain.

August 10th 1897



Acetasalicylic Acid (Asprin)

Artificial : made by humans
Small changes require trial and error

Biological assay. → Animal model → Fish gills

Asprin was trade marked (trade name)

Easier to remember
Was initially sold as powder
Pills became more popular

A.S.A → Acetasalicylic Acid (generic name or scientific name)

Benefits

- Pain (works for muscle pain and not organ pain)
- Fever
- Inflammation
- Reduce heart attack

Side effects

- Tinnitus
- Stomach irritation

· Blood clots

Prostaglandins are local hormones
Produced and used same cells

Arachadonic acid. → Cyclooxygenase (enzyme = machines) Asprin blocks. → Prostaglandin

Antibiotic sticks and interfere with producing
Blocks the machines and plugs the machines
Drug blocks machine action *

Asprin and heart disease 1960's

1 Asprin a day for 5 days is said to help someone not have a heart attack.

Asprin at a low dose is a heart attack benefit.

A.S.A + Cancer

Long term use can cause risk of colorectal cancer.

A.S.A + News

Anders Brevik make home made explosives using Asprin (picronitriclum)

Side Effects

death (suicide pill)
More than 60 at once (whole bottle)

Ringing in the ears (Tinnitus)
More than 10 warming of salicylisme

Stomach irritation is excess HCl
Mucus protects the stomach

Prostaglandins (good to have in the stomach)
↓ acid production

↑ Mucus

Headache is a universal side effect

Bufferin (contains antiacid)
Pills dissolve quickly

MgSO₄ (gypsum)

Ways to avoid stomach irritation drink a lot of water.

Asprin

Giving Asprin to kids causes reye syndrome and influenza

Never give Asprin to children

It is no longer for children

A.S.A not in the last 3 months of pregnancy

Asprin is available in 325 mg and 500 ,g

- Tablets
- Caplets
- Gel caps


Transit time not dissolving time is important.

Name brand vs generic

- Same chemical substance
 - Same dose
 - Equivalent bioavailability
 - Sometimes same factory makes same drug
- Use name brand to find generic

Price per 100 tablets

Bayer 325 mg
Bayer 500 mg
Low dose 81 mg
Bufferin
Bayer coated
Generic A.S.A
2.50 at Costco
7.99 at drugstore



1/4

A. Cahn and P. Hepp 1886

- Find vermifuge
- Gave mothballs (naphthalene)
- Noticed it reduced fever
- But the bottle was mis labeled (Ancetanillide)

Antikamnia (anifebrin)



Coal tar

Carl Duisberg

Chemist at Bayer

Needed to dispose 50 tons of amniophenol

New drug → 3 months. → Phenacetin

APC Tablets



- Aspirin
- Phenacetin
- Caffeine

D. Lester and LA Greenberg 1947

Antikamnia. → Acetaminophen. → Phenacetin
↓
Tylenol

Acetaminophen (pain relief)

Raises pain threshold

- Muscle pain
- Visceral pain
- Antipyretic (fever)

Zero cause of rye syndrome

Weak irritation (chronic)

Children's Tylenol is available

Death : more than 60 caplets

Liver toxicity (acetaminophen)

Acetaminophen. → Glucuronyl transferase. → Removed from body



cytochrome. → Toxic metabolite. → Liver damage

Never take acetaminophen for hangovers

* Poisoning is common in Tylenol

Coming acetaminophen in prescription drugs

in OTC drugs (sinus and allergy and Buckley's complete)

Children Tylenol available in small bottles only.

Different flavours : cherry

They don't put enough medicine in bottle to harm a child.

Tylenol

- Extra strength
 - Regular
 - Arthritis
 - Muscle and body
 - Migraine
- Same (650 mg)



500 mg acetaminophen

65 mg caffeine

Excedrin mixes acetaminophen and A.S.A

Midol (menstrual)



15 mg pyrilamine, caffeine and acetaminophen.

Tylenol and cyanide problem 1982

man replaced acetaminophen with cyanide powder in caplets and snuck into store and put them on the shelves.

Killed a lot of people

They replaced caplets to capsules



Added a safety sealed around medication

Generic acetaminophen

Old drug 60 years old

Putting name in box like "migraine" etc. helps people in buying more products

Even tho children's Tylenol is a rip off in price it's worth buying for safety precautions.

Ibuprofen (Advil)

- Created in 1961
- Originally prescribed only became OTC in 1984

Similar to Aspirin
Does not prevent heart attacks
Blood clots and stomach irritation

Advil or Motrin (same thing)



Generic is available

Advil migraine and Advil normal are the same.

Aleve (naproxen)

good for inflammation

Top pain relievers

1. Tylenol 43%
2. A.S.A 28%
3. Advil 26%

Prescription pain killers

Cox 1 vs Cox 2 (different types of enzymes but does the same job in different parts of the body)

Cox 1 (Stomach)

Increases HCl production
Decreases in mucus

Major side effect of Cox 1 : bleeding ulcers (Long term)

Cox 2 (beneficial effects)

Decreases pain
Decreases inflammation

Selective Cox 2 inhibitor for arthritis

Vioxx

- 60 studies
- 5000 patients
- No serious side effects
- No cardiovascular problems

Vigor (marketing)

Vioxx + GI + Outcomes + Research

Lower risk of ulcers

18 months study

Used naproxen as a placebo

Used Vioxx 2x the dose

54% decrease in serious GI side effects with Vioxx

increase in heart attacks

4% Vioxx (45/4047 patients)

0.1 naproxen (19/4029 patients)

Manipulated data from first 10 months of study

Media went crazy about Vioxx problem

FDA did analysis of 1.4 million patients

88,000 heart attacks in 139,000 patients between 1999-2004

Took off of Markets caused lost of job and money.

Benefits outweigh risks

Vioxx similar risk of heart attack similar to ipuprfen (for arthritis)

Merk refuses to re-introduce the drug



Risk outweighs the benefits

> 10,000 lawsuits

Vioxx to improve label and MD education

* know your stats and risks

Raw data is informative.