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SP.236 / ESG.SP236 Exploring Pharmacology  
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Show and tell



Mariya bought this for me (Zak) at Shaw's supermarket in Cambridge because she knew I would love it. How did she know?



Notice the active ingredient:

levmetamfetamine

Another way to spell it:

levomethamphetamine

Another equally correct name, which probably wouldn't elicit the desired reaction from supermarket customers:

# Meth

# They sell meth at Shaw's?

Yes, they sell it without a prescription and they don't even keep it behind the counter with the Sudafed. They keep the Sudafed behind the counter and record your driver's license number but the meth is in an aisle and they don't even glance at your ID.

# But...

This inhaler contains only the S enantiomer of methamphetamine (also known as levo-, L-, d-, or (+)-methamphetamine). Most of the “ice”, “crank”, and “speed” on the street is either a 50/50 mix of S and R enantiomers, or it is pure R-(-)-methamphetamine. R-meth is more euphoric, but S-meth (contained in this inhaler) will definitely make you high.

## And also...

This inhaler contains a lot of other crap mixed with the meth, like camphor and menthol. I am guessing the mixture is extremely pungent and bitter. The package states it is only 25% meth by weight.

This inhaler contains 50mg of S-meth, total, and it was \$4.29. The whole inhaler would be a fairly strong dose for most normal adults, if swallowed.

# Surprise!

- Methamphetamine is legal, both OTC and Rx
- Cocaine is legal, Rx
- GHB is legal, Rx
- Heroin is legal in most civilized countries, Rx



# Autonomic Nervous System

- See the Wikipedia article on “parasympathetic” and “sympathetic nervous system”
- Parasympathetic: Rest and digest. Why is it called this?
- Sympathetic: Fight or flight. Another mnemonic is “The 4 F’s: Fight, Flight, Fright, and Sex”

# Vasoconstriction and vasodilation

Vasoconstriction: Less blood flow

Useful during fight and flight

Caused by sympathetic nervous system

Caused by NE and 5-HT

Vasodilation: More blood flow

Useful while resting and digesting,  
secreting

Caused by parasympathetic nervous system

Caused by ACh

# Vasoconstriction and vasodilation

## Vasoconstrictors:

↑ NE type: Cocaine, amphetamine, pseudoephedrine, phenylephrine

↓ ACh type: Diphenhydramine (Benadryl), atropine

Other type: Caffeine, triptans (sumatriptan)

They treat: Nasal congestion, headaches, priapism, bleeding, low blood pressure

# Vasoconstriction and vasodilation

Vasodilators:

↓ NE type: Phentolamine

↑ ACh type: Muscarine, physostigmine, pilocarpine (Salagen)

Other type: Viagra, calcium channel blockers (nimodipine), nitrates (nitroglycerine), papaverine, alprostadil

They treat: Dry mouth, erectile dysfunction, ischemia (insufficient blood flow), high blood pressure, angina, heart attacks

Vasoconstrictors treat/  
vasodilators cause:

- Nasal congestion
- Headaches
- Priapism, anorgasmia
- Bleeding
- Low blood pressure
- N/A
- Asthma

Vasodilators treat/  
vasoconstrictors cause:

- Dry mouth
- Angina (heart ache)
- Erectile dysfunction
- Ischemia
- High blood pressure
- Heart attacks

# Nitroglycerine notes

Very poisonous, but never has a child proof cap or bitter stuff added, why?

Explosive factory workers get headaches on Mondays and heart attacks on Sundays, why?

# Viagra

- Viagra (sildenafil) is a vasodilator. By dilating blood vessels in the penis, it causes erections. This means it is parasympathomimetic. It is a PDE-5 inhibitor, see Wikipedia.

# Sexual arousal notes

Viagra works for women, too. There are other drugs for female sexual dysfunction.

What happens if you show up at the hospital with a four-hour erection? (Answer: They give you Sudafed, or similar drugs, because Sudafed is a vasoconstrictor and counteracts Viagra.)

What will men do for an erection? (List the drugs, note the QALY studies)(Answer: Sacrifice years of life, directly inject the penis, urethral suppositories.)

Young-onset Parkinson's cocktail surprise!



# Caffeine addiction

Caffeine causes particularly bad withdrawal due to headaches, which are caused by abruptly removing the vasoconstrictor caffeine.

Caffeine is added to Excedrin to treat headaches, it works.

# Cocaine notes

Cocaine is not only a vasoconstrictor, it is also a local anesthetic, this makes it ideal for surgery and nose bleeds

Cocaine addicts get high as soon as they feel the numbing

The “Novocaine” at the dentist is similar in structure to cocaine, they have to mix in a vasoconstrictor to keep it from being carried away in your blood

Cocaine not only decreases blood flow to your heart muscle, it also numbs your heart, and makes you more active so that your heart has to work harder.

# Checklist

- Headaches, asthma, allergies, nose bleeds, surgery, local anesthesia (e.g. novocaine), sexual arousal, heart attacks, and iatrogenic infarcts.