

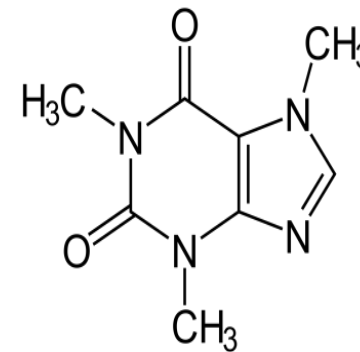
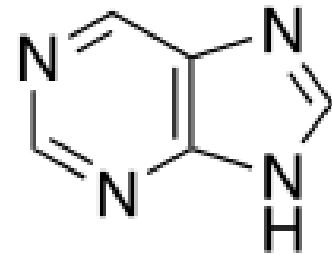
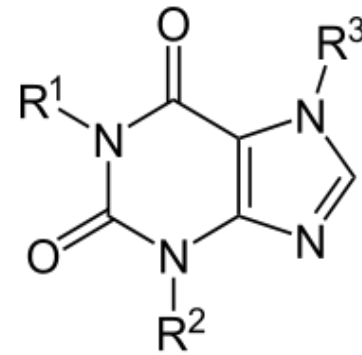
Extraction of Caffeine



Caffeine

- is a naturally occurring alkaloid found in over 60 plant species, its belong to a family compounds known as **xanthine** (**Purine base**) the oldest known stimulants CNS

- Its **1,3,7-trimethylxanthine**

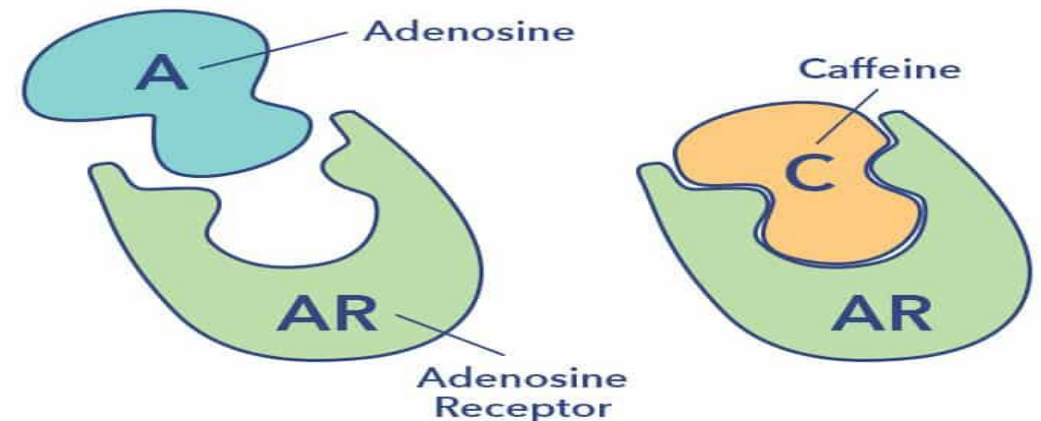
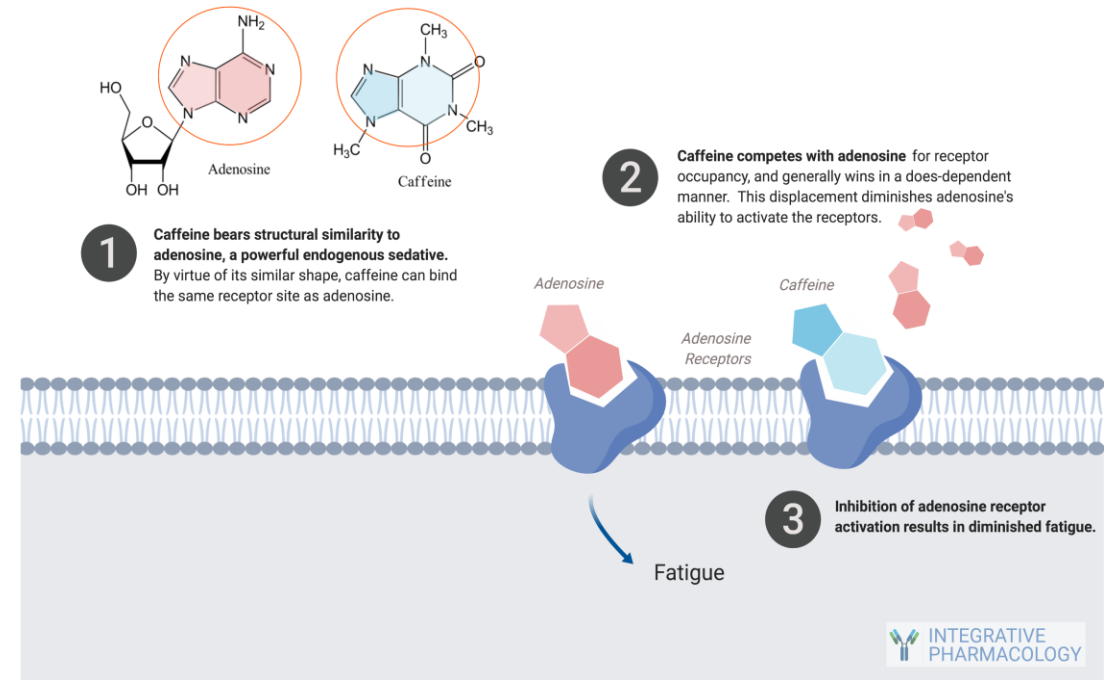


Caffeine effects

- Caffeine is the most powerful xanthine in its ability to increase alertness, put off sleep and increase the capacity for thinking.
- Caffeine is a vasodilator (relaxes the blood vessels).
- Diuretic (increases urination).

How caffeine effect on our body:

- Caffeine is chemically similar to adenosine, a type of sugar that plays a central role in providing energy to your body's cells. Adenosine also plays a role in the transmission of nerve signals. When adenosine attaches itself to neural receptors in your brain, you begin to feel lethargic and sleepy. Caffeine, because it's similar to adenosine on a chemical level, attaches itself to the same neural receptors that adenosine does. When caffeine binds itself to these neural receptors, it blocks adenosine so that it cannot affect your central nervous system



Half life

Caffeine continues to affect your brain as long as it remains in your blood. While the average half life of caffeine in the adult bloodstream is about four hours, the length of time can vary considerably depending on the metabolism of the caffeine user. Those with low metabolisms will feel the effects of caffeine for much longer than those with high metabolisms. Nicotine also has an effect on caffeine metabolism. Smokers metabolize caffeine twice as fast as non smokers.

| AGE | HALF-LIFE |
|------------|------------------|
| NEWBORN | UP TO 97.5 HOURS |
| 3-5 MONTHS | ABOUT 14 HOURS |
| 6+ MONTHS | 2.6 HOURS |
| ADULT | 4.9 HOURS |

Reference: Hale 2017

- Caffeine has been shown to act on the part of the brain that's sensitive to levels of carbon dioxide in your blood. That's why caffeine is often included as an ingredient in over the counter cold remedies. Caffeine makes your brain even more sensitive to levels of carbon dioxide in the blood, which causes increased depth of breathing and therefore higher levels of blood oxygen. While this makes caffeine an effective treatment for those who suffer from breathing problems and breathlessness, it can also lead to hyperventilation if too much caffeine is consumed.



Properties of caffeine:

- C. f. is **C₈H₁₀N₄O₂**.
- M.P. 235-23 C
- Solubility of caf. In water is 22mg/ml at 25 C and in dichloromethane 140 mg/ml.

Drugs contain caffeine

- is **Excedrin** (Acetaminophen, Aspirin and Caffeine) treat pain caused by tension headaches.

Plants contain caffeine

Coffee bean : *Coffea arabica*



Cacao

Theobroma cacao



Mate

Ilex paraguariensis



Tea

Camellia sinensis

White Tea

Green Tea

Black Tea

Oolong Tea

Tea contain caff. and smaller amount of other xanthine such as: theophylline and theobromine (differ in number and position of methyl) also contain tannins and chlorophyll.



Brewed teas →



Tea leaves →



White

Yellow

Green

Oolong

Black

Post-fermented

Six types of tea

Procedure:

- Put 100 ml of water in Becker and heat it until boiling
- Add 5 bags of tea to the boiling water
- Take 50 ml of extract in other becker and add 0.25 gm of sodium carbonate NaCO_3 , stirring mixture until all the NaCO_3 dissolves
- The aqueous tea solution cooled to 15-20°C then dichloromethane is added
- Transfer the solution into a separating funnel and add 10 ml of dichloromethane and gently swirl for 5 min, take the organic layer.
- Repeat this 2 time.
- Evaporate the dichloromethane solvent in hot water
- When the solvent removed will observe residue white crystalline caffeine.

Detection:

• Caffeine + tannic acid.



• white precipitate with