Barbiturates

Barbiturates are medications with a wide range of use and side effects. They can be remembered by having "barb" in their names, such as phenobarbital and pentobarbital. They are indicated for seizure treatment, and are effective against simple and complex partial seizures, as well as generalized tonic-clonic seizures. The barbiturate thiopental is a very fast acting medication used for anesthesia induction. These drugs work by potentiating $GABA_A$, leading to increased chloride channel opening duration. This increased chloride channel opening duration leads to decreased neuronal firing. It should be remembered that barbiturates increase the **duration** of chloride channel opening, whereas benzodiazepines increase the **frequency** of chloride channel opening. Side effects of this class of drug include sedation and grogginess. A severe side effect is respiratory and cardiac depression, which can progress to respiratory arrest and low blood pressure in patients who overdose or recreationally use barbiturates. CNS depression may also occur, and abuse with ethanol can cause additive adverse effects, as barbiturates and ethanol both act on $GABA_A$ receptors. Finally, these drugs induce the cytochrome P450 enzyme complex and may affect the metabolism of other medications.

PLAY PICMONIC

Barb- Drug Names

Barb-wire Barbara-dolls

Barbiturates can be remembered for having "barb" in their names. Common examples are phenobarbital, pentobarbital, and secobarbital, with the anesthetic thiopental being the exception.

Indications

Seizure Treatment

Caesar

Barbiturates such as phenobarbital are indicated for seizures. They are used to treat epilepsy and are effective against simple and complex partial seizures as well as generalized tonic-clonic seizures..

Anesthesia Induction

A-nest Induction-duck

Ultra-short-acting barbiturates can be used for anesthesia induction, exemplified by thiopental. Thiopental is administered intravenously and has been nicknamed the "truth serum" as it may influence patients to divulge sensitive information.

Mechanism of Action

Increased Duration of Cl- Channel Opening

Up-arrow Open-late-clock on Chlorine-dispenser Channel

Barbiturates work by allosterically modulating $GABA_A$ receptors. This modulation leads to increased efficacy of GABA, causing an increase in the **duration** of Cl^- channel opening. In contrast to these drugs, **benzodiazepines increase the frequency** of Cl^- channel opening.

"Barb opens her chloride channel for a long duration, nice and slow."

Decrease Neuron Firing

Throwing out Down-arrow Nerve on Fire

By increasing Cl^- channel opening duration, neuronal firing is decreased.

Side Effects

Sedation

Sedation-dart

Barbiturates, in the past, were used to treat insomnia and anxiety. They are no longer for these purposes, as patients were left sedated and groggy. Patients often complain of feeling "hungover."

Cardiovascular and Respiratory Depression

Deflated Heart and Lungs

Barbiturates often mimic ethanol and can lead to severe respiratory and cardiovascular depression. This effect is often displayed as respiratory arrest and low blood pressure in patients who abuse these drugs.

CNS Depression

Deflated CNS-brain

This side effect occurs with overdose and can also be seen with concurrent ethanol use. Barbiturates bind to $GABA_A$, as does ethanol, explaining their additive effects. Patients can display ataxia, dizziness, impaired judgment, and can progress to death.

P450 inducer

Pea-450 Inducer-rocket

These medications induce cytochrome P450. P450 enzymes assist in removing many drugs from the bloodstream. When these enzymes are increased, the clearance of such drugs from the blood is also increased. Therefore, barbiturates can shorten the effects of other administered drugs, making them less effective.