

CNS stimulant and Nootropic

Drugs that have a predominantly stimulant effect on the CNS may be broadly divided into:

1. *Respiratory stimulants*
Doxapram, nikethamide
2. *Psychomotor stimulants*
Amphetamine, cocaine
methylxanthines
3. *Convulsants*
Leptazol, strychnine.

Respiratory stimulants are also called *analeptics*. These drugs stimulate respiration and are sometimes used to treat respiratory failure. Though they may bring about temporary improvement in respiration, the mortality is not reduced. They have a low safety margin and may produce convulsions.

Doxapram appears to act mainly on the brainstem and spinal cord and increase the activity of respiratory and vasomotor centres.

Adverse effects are nausea, cough, restlessness, hypertension, tachycardia, arrhythmias and convulsions.

Uses

1. Doxapram is occasionally used IV as an analeptic in acute respiratory failure.
2. Apnoea in premature infants not responding to theophylline.

Nikethamide is not used because of the risk of convulsions.

Psychomotor stimulants Amphetamine and dextroamphetamine are sympathomimetic Drugs.

Cocaine is a CNS stimulant, produces euphoria and is a drug of abuse .

Methylxanthines Caffeine, theophylline and theobromine are the naturally occurring xanthine alkaloids. The beverages – coffee contains caffeine; tea contains theophylline and caffeine; cocoa has caffeine and theobromine.

Actions

CNS Caffeine and theophylline are CNS stimulants. They bring about an increase in mental alertness, a reduction of fatigue, produce a sense of well being and improve motor activity and performance with a clearer flow of thought. Caffeine stimulates the respiratory centre. Higher doses produce irritability, nervousness, restlessness, insomnia, excitement and headache. High doses can result in convulsions.

CVS Methylxanthines increase the force of contraction of the myocardium and increase the heart rate and therefore increase the cardiac output. But, they also produce peripheral vasodilatation which tends to decrease the BP. The changes in BP are therefore not consistent. Caffeine causes vasoconstriction of cerebral blood vessels

Kidneys The xanthines have a diuretic effect and thereby increase the urine output.
Smooth muscle Xanthines cause relaxation of smooth muscles especially the bronchial smooth muscle.

Skeletal muscle Xanthines enhance the power of muscle contraction and thereby increase the capacity to do muscular work

GI tract Xanthines increase the secretion of acid and pepsin in the stomach and are gastric irritants.

Adverse effects include nervousness, insomnia, tremors, tachycardia, hypotension, arrhythmias, headache, gastritis, nausea, vomiting, epigastric pain and diuresis. High doses produce convulsions. Tolerance develops after sometime. Habituation to caffeine is common.

Uses

(i) **Headache** Because of the effect of caffeine on cerebral blood vessels, it is combined with ergotamine for the relief of migraine headache. Caffeine is also combined with aspirin/paracetamol for the treatment of headache.

(ii) **Bronchial asthma** Theophylline is used in the treatment of bronchial asthma.

NOOTROPICS

Nootropics are drugs that improve memory and cognition. They are also called cognition enhancers.

Piracetam – described as a ‘nootropic agent’ is thought to protect cerebral cortex from hypoxia and improve learning and memory. In higher doses it also inhibits platelet aggregation. Adverse effects include insomnia, weight-gain, nervousness, depression and gastrointestinal disturbances. Piracetam has been tried in dementia, myoclonus, stroke and other cerebrovascular accidents; alcoholism, behavioural disorders and learning problems in children and in vertigo.