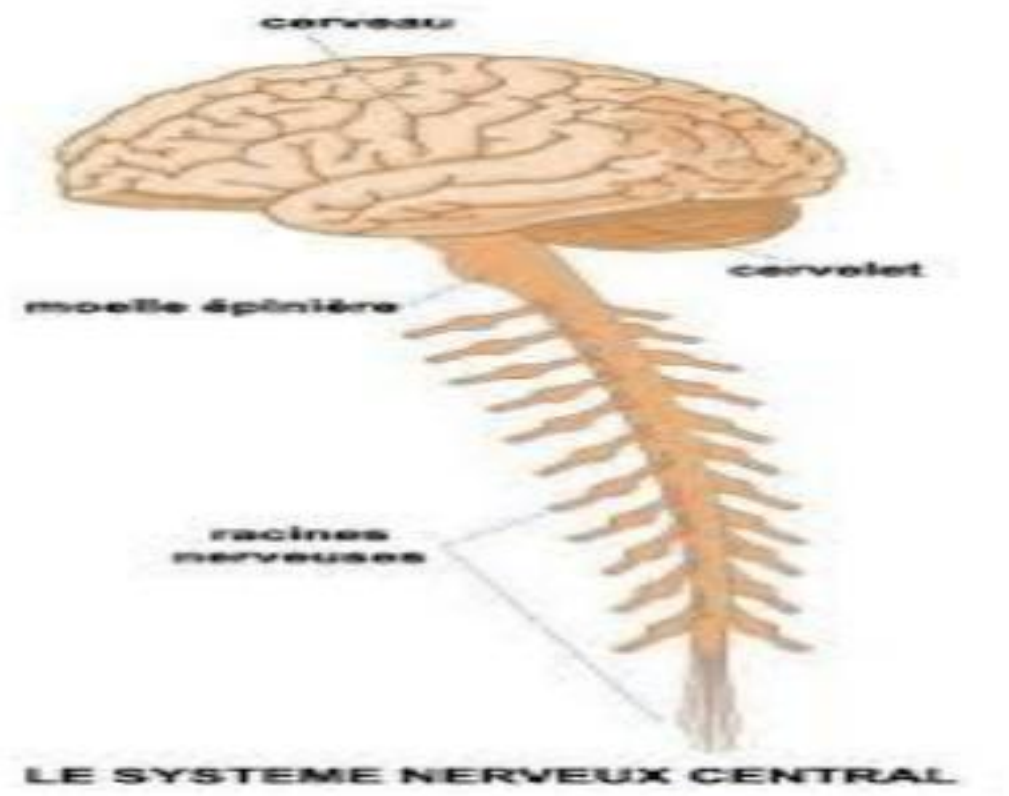
Central Nervous System Medications

Introduction:

The central nervous system (or neuraxis) – sometimes referred to by its abbreviation, CNS – is the part of the nervous system comprising the brain and spinal cord. The central nervous system is so named because it contains the majority of the nervous system, but also, and more importantly, because it integrates the information it receives and coordinates these central signals to influence the activity of all parts of the body.



Central nervous system (CNS) medications encompass a wide range of therapeutic classes. They are designed to selectively influence the body by relieving pain, reducing fever, inducing sleep or wakefulness, and treating anxiety, mania, depression, or schizophrenia, without altering consciousness. Frequent use can lead to physical dependence or toxic effects, including potentially fatal overdose.

Classes of CNS Medications:

- Analgesic
- Anesthetic
- Antidepressant
- Antiepileptic
- Antiparkinsonian
- Antipyretic
- Cannabinoid
- Nootropic
- Psycholeptic

Analgesic

Definition

Refers to a medication used to relieve pain. There are several types of analgesics, which are prescribed depending on the type of pain experienced.

The WHO (World Health Organization) has classified them into three levels:

- Level 1: Peripheral analgesics (for mild to moderate pain)

• Level 2: Weak central analgesics (for moderate to severe pain)
• Level 3: Strong central analgesics (for very severe or intractable pain)

Peripheral analgesics (Level 1)

FAMILLE	NOM	ACTION	CONTRE INDICATION	EFFETS SECONDAIRES
Les Salycilés	Aspégic Catalgine Solupsan	antalgique antipyrétique anti-inflammatoire anti-agrégant plaquettaire inhibition de l'acide urique	ulcère traitement AVK métrorragie allergie grossesse	troubles digestifs syndrome hémorragique allergie insuffisance hépatique baisse de l'acuité visuelle céphalées bourdonnement d'oreille
Les Indoliques	Indocid Arthrocid Voltarène			Digestif : nausées, douleurs abdominales, diarrhée, ulcération gastrique, hémorragie digestive Rénale : insuffisance rénale fonctionnelle, syndrome néphrotique, rétention hydrosodée, hyponatrémie, hypokaliémie, élévation de la tension artérielle Respiratoire : bronchospasme Neurologie: vertiges, céphalées, surdité Cutanée : allergie prurigineuse, érythème Hématologie : anémie, agranulocytose, thrombopénie Hépatique : hausse des transaminases, hépatite réactionnelle Grossesse : allongement du temps de travail
Les Arylcarboxyliques	Profénid Apranax		gastrite déshydratation	
Les Fénamates	Nurofen Brufen Nifluril	anti-inflammatoire anti-pyrétique antalgiques	traitements diurétiques hypertension artérielle asthme	
Les Oxicams	Feldène Cycladol Tilcotil		sujets âgés	

These can be considered common medications because they are the ones that every household keeps in its medicine cabinet. Indeed, they are used to treat mild to moderate pain. Several classes of medications are used as peripheral analgesics, including NSAIDs (Non-Steroidal Anti-Inflammatory Drugs):
NSAIDs
They are used either in addition to simple pain relief or alone because they have combined anti-inflammatory and antipyretic effects.

Note: Paracetamol overdose

Paracetamol overdose occurs too frequently because this medication is available without a prescription and is one of the most commonly used products for self-medication. A person uninformed about the correct daily dose risks experiencing the following symptoms within the first 24 hours in case of an overdose:
• Nausea, vomiting
• Loss of appetite, paleness
• Abdominal pain
• Risk of liver cell damage, the severity of which depends on the amount ingested (increased risk >10 g)

Central analgesics, level 2

FAMILLE	NOM	ACTION	CONTRE INDICATION	EFFETS SECONDAIRES
Codéine seule	Dicodin	Antalgique	hypothyroïdie allergie insuffisance respiratoire asthme insuffisance hépatocellulaire et/ou rénale grave	Digestif : constipation, nausées, vomissements Respiratoire : bronchospasme, dépression respiratoire Neurologie : somnolence, vertiges Cutané : allergie > dose normale: risque de dépendance et de syndrome de sevrage
Codéine + paracétamol	Efféralgan codéiné Codoliprane Lindilane	Antalgique Anti-pyrétique	allergie insuffisance respiratoire asthme	idem Codéine seule + urticaire, thrombopénie rare

These weak opioid analgesics are often combined with other substances. Pure codeine or dextropropoxyphene are rarely found on the market; their action is often coupled with that of a peripheral analgesic.

Codeine
Adults:
• Acute respiratory depression, pulmonary edema
• Drowsiness, ataxia
• Skin rash, pruritus
Children:
• Bradypnea
• Miosis
• Convulsions
• Puffy face, urticaria
• Urinary retention
• Collapse
Tramadol
Note: Tramadol Overdose
Signs:
• miosis, vomiting,

• cardiovascular collapse
• respiratory depression or even arrest
• coma, seizures

Powerful Central Analgesics (Level III)

The poppy is a product dating back to antiquity, where it was used for its calming properties. Opium, the substance with analgesic power thanks to morphine, its principal alkaloid, was extracted from this plant. Other substances today reproduce the effects of morphine; these are called opioid substances. Morphine is a centrally acting analgesic. Its effect is due to its agonist action on opioid receptors, specifically the μ (mu), delta, and kappa receptors, located in the spinal cord and supraspinal region. Opioid analgesics are classified according to their action on opioid receptors; thus, we distinguish several classes:

• Agonist action: Pure agonists like morphine bind directly to opioid receptors and reproduce all the effects of morphine. Increasing the dose can lead to a maximum effect.

• Agonist/antagonist or partial agonist action: These have limited effectiveness because they have a ceiling effect, even with increased doses. They do not reproduce all the effects of morphine, and if they replace a pure agonist, they reduce its effect.

• Antagonist action: (Naloxone) These bind to one of the opioid receptors but do not activate it, thus preventing agonists from acting. Therefore, they are the antidote to morphine in cases of overdose.

But in addition to its analgesic effects, morphine has pharmacological properties that most often cause adverse effects such as constipation, nausea, and vomiting. Through its action on mu receptors, it can lead to respiratory depression (bronchoconstriction) and a sedative effect. Another action on sigma opioid receptors explains the psychological effect, namely a disturbance of mental activity, which explains the misuse of certain medications by drug addicts. Morphine is minimally metabolized in the body; it is primarily excreted in the urine, both in its original form and as a conjugated form.

Co-analgesic Treatments

Antidepressants

Actions

Antidepressants correct the deficiency of biogenic amines at the level of brain synapses.

There are two main groups: MAOIs (monoamine oxidase inhibitors) and tricyclic antidepressants, plus newer non-MAOI, non-tricyclic families.

Their primary indication is to treat depressive syndrome by reducing symptoms (sadness, loss of interest, insomnia, anorexia, motor and mental retardation, apathy, etc.).

Indications

In the context of analgesia, they are used for refractory pain to treat reactive depression triggered by pain and possibly through an unproven analgesic effect.

Antispasmodics

Actions

Antispasmodics act on the smooth muscles of the digestive tract, urinary tract, and uterine muscle. There are two main classes of antispasmodics:

Musculotropics and anticholinergics

Anticholinergics are different because they slow gastric emptying and decrease gastric, salivary, lacrimal, and sweat secretions, in addition to their primary action. They also promote rapid gastrointestinal absorption but cause partial hepatic inactivation.

Both types cross the placental barrier and are excreted in breast milk.

Indications

They are primarily used for pain syndromes affecting the digestive, urinary, and biliary tracts, as well as the genital area, and also in pre-anesthetic preparation for the protection of vasovagal cardiac events.

Muscle relaxants

Actions

They have a muscle-relaxing effect by inhibiting polysynaptic spinal reflexes or reticular reflexes. Some also have an anti-spastic effect.

Indications

They are used in the treatment of rheumatological conditions such as painful muscle contractures associated with spinal disorders (torticollis, back pain, lower back pain), spastic states, or dysmenorrhea, and they are increasingly used in the treatment of spasticity in multiple sclerosis.