1. **Aceclofenac** [103, 104]

![Chemical structure of aceclofenac](image)

**Figure 1: Chemical structure of aceclofenac**

**Chemical name**: 2-[(2,6-dichlorophenyl)amino] phenylacetoxy acetic acid

**Molecular weight**: 354.1 g/mol

**Solubility**: Practically insoluble in water, freely soluble in acetone, soluble in alcohol

**Molecular formula**: $C_{16}H_{13}Cl_2NO_4$

**Description**: White or almost white, crystalline powder

**Melting Point**: 149-153 °C

**pKa**: 4.7

**Category and mechanism of action**: Non steroidal anti-inflammatory and analgesic. Acts by selectively inhibiting cyclooxygenase II enzyme. It has a half life of 2 hr and maximum plasma concentration is achieved in 30 to 60 min. The drug is orally well absorbed.
2. **Amitriptyline hydrochloride** [103, 105]

![Chemical structure of amitriptyline hydrochloride](image)

**Figure 2: Chemical structure of amitriptyline hydrochloride**

- **Chemical name**: 3-(10,11-dihydro-5H-dibenzo[\(a,d\)]cyclohept-5-ylidene)-propyl dimethyl amine hydrochloride
- **Molecular weight**: 313.8 g/mol
- **Solubility**: Soluble in water, alcohols, acetonitrile
- **Molecular formula**: C\(_{20}\)H\(_{24}\)NCl
- **Description**: It is a white, odorless, crystalline compound.
- **Melting Point**: 190 °C
- **pKa**: 9.4
- **Category and mechanism of action**: Tricyclic antidepressant and used in prophylactic treatment of migraine. Amitriptyline hydrochloride is metabolized to nortriptyline which inhibits the reuptake of norepinephrine and serotonin almost equally. Amitriptyline hydrochloride inhibits the membrane pump mechanism responsible for uptake of norepinephrine and serotonin in adrenergic and serotonergic neurons. Pharmacologically this action may potentiate or prolong neuronal activity since reuptake of these biogenic amines is important physiologically in terminating transmitting activity. It has a half life of 16 hr and maximum plasma concentration is achieved in 3.6 hr min. The drug is orally well absorbed.
3. Carbamazepine [103, 105]

Figure 3: Chemical structure of carbamazepine

Chemical name : 5H-di-benzo[b,f]azepine-5-carboxamide

Molecular weight : 236.2g/mol

Solubility : Slightly soluble in water, freely soluble in methylene chloride, sparingly soluble in acetone and in alcohol

Molecular formula : C_{15}H_{12}N_{2}O

Description : White amorphous powder

Melting Point : 191 - 192 °C

pKa : 13.9

Category and mechanism of action : Anticonvulsant acts by stabilizing the inactivated voltage gated sodium channels. It potentiates GABA receptors. It has a half life of 15 hr and maximum plasma concentration is achieved in 4-8 hr. The drug is orally well absorbed.
4. **Duloxetine hydrochloride** [106, 107]

![Chemical structure of duloxetine hydrochloride](image)

**Figure 4: Chemical structure of duloxetine hydrochloride**

- **Chemical name**: (+(S)-N-Methyl-3-(naphthalene-1-yloxy)-3-(thiophen-2-yl)propan-1-amine hydrochloride
- **Molecular weight**: 297.4 g/mol
- **Solubility**: Soluble in water, methanol and DMSO
- **Molecular formula**: C\textsubscript{18}H\textsubscript{20}NOSCl
- **Description**: White amorphous powder
- **Melting Point**: 169-171°C
- **pKa**: 9.7
- **Category and mechanism of action**: Anticonvulsant and analgesic used to treat diabetic neuropathic pain. It acts by inhibiting the reuptake of serotonin and norepinephrine (NE) in the central nervous system. Duloxetine hydrochloride increases dopamine (DA) specifically in the prefrontal cortex where there are few DA reuptake pumps via the inhibition of NE reuptake pumps which hold a greater affinity to DA than for NE thus allowing greater diffusion of DA in this brain region. The analgesic properties of duloxetine hydrochloride in the treatment of diabetic neuropathy and central pain syndromes such as fibromyalgia are believed to be due to sodium ion channel blockade. It has a half life of 8-10 hr and maximum plasma concentration is achieved in 60 min. The drug is orally well absorbed.
5. Flunarizine dihydrochloride [108, 109]

![Flunarizine dihydrochloride chemical structure]

Figure 5: Chemical structure of flunarizine dihydrochloride

**Chemical name**: 1-[bis (4-fluorophenyl)methyl]-4-[(2E)-3-phenylprop-2-en-1-yl] piperazine dihydrochloride

**Molecular weight**: 404.5 g/mol

**Solubility**: Soluble in DMSO, ethanol, methanol, 0.1 N HCl, and chloroform / methanol. Insoluble in water and dilute aqueous base

**Molecular formula**: C₂₆H₂₈F₂N₂Cl

**Description**: White or almost white amorphous powder, hygroscopic.

**Melting Point**: 251-255 °C

**pKa**: 7.0

**Category and mechanism of action**: H₁ receptor and Calcium channel blocker. Acts by blocking calcium histamine H₁ receptor nonselectively. It is effective in the prophylaxis of migraine and vertigo of central and peripheral origin, and as an adjuvant in the therapy of epilepsy. It has been suggested that influx of calcium ions into those muscle cells may stabilise vasomotricity, thus avoiding or reducing pain. It can also influence the release of transmitters such as dopamine and met-enkephalin which could be involved in the pathogenesis of migraine. It has a half life of 4 hr and maximum plasma concentration is achieved in 90 min. The drug is orally well absorbed.

![Chemical structure of gabapentin]

**Figure 6: Chemical structure of gabapentin**

**Chemical name**: 2-[1-(aminomethyl) cyclohexyl]acetic acid

**Molecular weight**: 171.3 g/mol

**Solubility**: Freely soluble in water and methanol

**Molecular formula**: C₉H₁₇NO₂

**Description**: White to off-white crystalline solid

**Melting Point**: 162-166 °C

**pKa**: 4.63

**Category and mechanism of action**: Anticonvulsant. Gabapentin modulates the action of glutamate decarboxylase and branched chain amino transferase - two enzymes involved in GABA biosynthesis. It has a half life of 5-7 hr and maximum plasma concentration is achieved in 3 min. The drug is orally well absorbed.
7. **Levetiracetam** [108, 111, 112]

![Chemical structure of levetiracetam](image)

**Figure 7: Chemical structure of levetiracetam**

- **Chemical name**: (S)-2-(2-oxopyrrolidin-1yl)butamide
- **Molecular weight**: 170.2 g/mol
- **Solubility**: Soluble in water, freely soluble in chloroform
- **Molecular formula**: C₈H₁₄N₂O₂
- **Description**: White and odorless powder
- **Melting Point**: 118-119 °C
- **pKa**: 9.2
- **Category and mechanism of action**: Anticonvulsant, prophylactic drug in migraine

Acts by inhibiting pre-synaptic calcium channels, reducing neurotransmitter release and hence acting as a neuromodulator. This is believed to impede impulse conduction across synapses. Hence used in migraine pain management. It has a half life of 7 hr and maximum plasma concentration is achieved in 30 to 60 min. The drug is orally well absorbed.
8. **Paracetamol** [103, 104]

![Chemical structure of paracetamol](image)

**Figure 8: Chemical structure of paracetamol**

**Chemical name**: 4-hydroxy acetanilide

**Molecular weight**: 151.1 g/mol

**Solubility**: Freely soluble in ethanol, and in acetone; sparingly soluble in water, very slightly soluble in dichloromethane and in ether

**Molecular formula**: C₈H₉NO₂

**Description**: It is white crystalline powder

**Melting Point**: 169 °C

**pKa**: 9.4

**Category and mechanism of action**: Analgesic and antipyretic. It is a non selective cyclooxygenase enzyme inhibitor. It has a half life of 2 hr and maximum plasma concentration is achieved in 30 to 60 min. The drug is orally well absorbed.
9. **Pregabalin** [103, 113]

![Chemical Structure of Pregabalin](image)

**Figure 9: Chemical structure of pregabalin**

**Chemical name**: (S)-4-amino-3-(2-methyl propyl) butyric acid

**Molecular weight**: 159.2 g/mol

**Solubility**: Freely soluble in water

**Molecular formula**: C₈H₁₇NO₂

**Description**: White to off-white, crystalline solid

**Melting Point**: 194 °C-197 °C

**pKa**: 4.2

**Category and mechanism of action**: Anticonvulsant, used to manage diabetic neuropathic pain. It binds to α₂ and δ sub unit of voltage gated calcium channels pre-synaptically, which in turn leads to reduced release of neurotransmitters. It has a half life of 6 hr and maximum plasma concentration is achieved in 2.5 hr. The drug is orally well absorbed.
10. **Propranolol hydrochloride** [103, 104]

![Chemical structure of propranolol hydrochloride](image)

**Figure 10:** Chemical structure of propranolol hydrochloride

- **Chemical name**: (RS)-1-[(1-methyl ethyl) amino]-3-(naphthalen-1-yl oxy) propan-2-ol hydrochloride
- **Molecular weight**: 254 g/mol
- **Solubility**: Readily soluble in water and ethanol
- **Molecular formula**: C_{16}H_{22}NO_{2}Cl
- **Description**: White to off-white, crystalline powder, almost odorless, and having a mucilaginous taste
- **Melting Point**: 96 °C
- **pKa**: 9.5
- **Category and mechanism of action**: Anti hypertensive, used in migraine management.
  It acts by antagonizing beta adrenergic receptor non-selectively. It can cause vasodilatation and hence used in migraine management. It has a half life of 2 hr and maximum plasma concentration is achieved in 30 to 60 min. The drug is orally well absorbed.