

Anti-seizure Medication Recommendations

Background:

Use of anti-seizure medications is the standard of care in the treatment of individuals with a seizure disorder. However, like every other medications, anti-seizure medications are associated with multiple potential side effects. Some of the side effects are seen commonly, others are less frequent or rare. Most of the side effects are only seen while taking the medication, and go away if the medication is stopped. However, some of the side effects may lead to a permanent damage or death.

Each individual taking a given medication may or may not experience one or more of the side effects associated with that particular medication. In individuals with a developmental disability and limited communication skills, medication side effects may be difficult to detect.

The information provided in this paper will identify side effects commonly seen, and those side effects which have the potential to cause permanent injury or death. This is not an exhaustive list of potential side effects, and a physician should always be consulted should you have concerns about a specific medication. The potential side effects will first be listed by medication in alphabetical order of their generic name (with the common brand name in parenthesis) then their potential side effects.

Anti-seizure Medications

1. Carbamazepine (Tegretol)

Common side effects:

Lethargy, confusion, cognitive impairment (usually minor)

Mood disturbance, depression

Heat intolerance

Imbalance, in-coordination, dizziness

Blurred vision, double vision

Osteopenia, osteoporosis

Stomach upset with nausea and vomiting, constipation

Hyponatremia

Infrequent or life threatening side effects:

Skin rashes, including Stevens-Johnson Reaction and others, which may be life threatening.

Hepatotoxicity, Bone marrow suppression and other blood dyscrasias

Intoxication: (signs suggestive of overdose)

Somnolence, unsteady gait, slurred speech, confusion, poorly coordinated movements, increased seizure activity

Hypotension, decreased respiratory drive, and cardiac arrhythmias, the risk increases with increasingly higher levels of medication in the blood.

2. Clonazepam (Klonopin)

Common side effects:

Lethargy, confusion

Mood disturbance, irritability, insomnia, hyperactivity, aggression

Infrequent or life threatening side effects:

Skin rashes

Physical or psychologic dependence

Intoxication:

Somnolence, unsteady gait, slurred speech, confusion

Hypotension, decreased respiratory drive, and cardiac arrhythmias, the risk increases with increasingly higher levels of medication in the blood.

3. Clorazepate (Tranxene)

Common side effects:

Lethargy, confusion

Mood disturbance, irritability, insomnia, hyperactivity, aggression

Infrequent or life threatening side effects:

Skin rashes

Physical or psychologic dependence

Intoxication:

Somnolence, unsteady gait, slurred speech, confusion

Hypotension, decreased respiratory drive, and cardiac arrhythmias, the risk increases with increasingly higher levels of medication in the blood.

4. Diazepam (Valium)

Common side effects:

Lethargy, confusion

Mood disturbance, irritability, insomnia, hyperactivity, aggression

Physical or psychologic dependence

Infrequent or life threatening side effects:

Skin rashes

Intoxication:

Somnolence, unsteady gait, slurred speech, confusion

Hypotension, decreased respiratory drive, and cardiac arrhythmias, the risk increases with increasingly higher levels of the medication in the blood.

5. Ethosuximide (Zarontin)

Common side effects:

Stomach upset with nausea and vomiting, anorexia, diarrhea

Lethargy, headaches, dizziness

Mood disturbances, irritability, aggression, insomnia

Infrequent or life threatening side effects:

Skin rashes, including Stevens-Johnson Reaction and others, which are potentially life threatening

Bone marrow suppression or other blood dyscrasias

Intoxication:

Somnolence, unsteady gait, slurred speech, confusion, poorly coordinated movements

Hypotension, decreased respiratory drive, and cardiac arrhythmias, the risk increases with increasingly higher levels of the medication in the blood.

6. Felbamate (Felbatol)

Common side effects:

Insomnia, lethargy (less likely)

Anorexia, stomach upset with nausea and vomiting

Dizziness, headaches, nervousness

Infrequent or life threatening side effects:

Skin rashes, including Stevens-Johnson Reaction and others, which may be life-threatening

Hepatotoxicity

Bone marrow suppression and other blood dyscrasias

Intoxication:

Stomach upset with nausea and vomiting

Mild increase in heart rate

Overdosages encountered have not been life threatening

7. Gabapentin (Neurontin)

Common side effects:

Lethargy

Dizziness

Peripheral edema

Blurred vision

Infrequent or life threatening side effects:

None documented

Intoxication:

Somnolence, unsteady gait, blurred vision, increased respiratory rate. Overdosages encountered have not been life threatening.

8. Lamotrigine (Lamictal)

Common side effects

Insomnia, lethargy is less likely

Headaches

Stomach upset with nausea, vomiting, or anorexia

Infrequent or life threatening side effects:

Skin rashes, including Stevens-Johnson reaction and others, which may be life-threatening

Intoxication:

Somnolence, unsteady gait, slurred speech, confusion.

Hypotension, decreased respiratory drive, and cardiac arrhythmias, the risk increases with increasingly higher levels of the medication in the blood.

9. Levetiracetam (Keppra)

Common side effects:

General feeling of discomfort

Lethargy

Dizziness, nervousness

Mood disturbances including depression, suicidal thoughts, irritability with aggression

Infrequent or life threatening side effects:

Bone marrow suppression and other blood dyscrasias

Major depression with suicidal thoughts

Intoxication:

Somnolence, unsteady gait, slurred speech, confusion.

Hypotension and decreased respiratory drive, the risk increases with increasingly higher levels of the medication in the blood.

10. Lorazepam (Ativan)

Common side effects:

Lethargy, confusion

Mood disturbance, irritability, insomnia, hyperactivity, aggression

Physical or psychological dependence

Infrequent or life threatening side effects:

Skin rashes

Intoxication:

Somnolence, unsteady gait, slurred speech, confusion

Hypotension, decreased respiratory drive, and cardiac arrhythmias, the risk increases with increasingly higher levels of the medication in the blood.

11. Methsuximide (Celontin)

Common side effects:

Stomach upset with nausea, vomiting, diarrhea, and anorexia

Lethargy, cognitive impairment, confusion

Dizziness, imbalance, in-coordination, unsteady gait

Irritability, insomnia, hyperactivity, aggression

Infrequent or life threatening side effects:

Bone marrow suppression and other blood dyscrasias

Skin rashes, including Stevens-Johnson Reaction and others, which may be life threatening.

Intoxication:

Somnolence, unsteady gait, slurred speech, confusion

Hypotension, decreased respiratory drive, and cardiac arrhythmias, the risk increases with increasingly higher levels of the medication in the blood.

12. Oxcarbazepine (Trileptal)

Common side effects:

Lethargy, confusion, cognitive impairment (usually minor)

Mood disturbance, depression

Heat intolerance

Imbalance, in-coordination, dizziness

Blurred vision, double vision

Osteopenia, osteoporosis

Stomach upset with nausea and vomiting, constipation

Hyponatremia

Infrequent or life threatening side effects:

Skin rashes, including Stevens-Johnson Reaction and others, which may be life threatening.

Intoxication:

Somnolence, unsteady gait, slurred speech, confusion

Hypotension, decreased respiratory drive, and cardiac arrhythmias, the risk increases with increasingly higher levels of the medication in the blood.

13. Phenobarbital

Common side effects:

Lethargy, confusion, cognitive impairment

Irritability, mood changes, insomnia, hyperactivity, manic behavior

Osteopenia, osteoporosis

Constipation

Infrequent or life threatening side effects:

Skin rashes, including Stevens-Johnson Reaction and others, which may be life threatening.

Physical or psychologic dependence

Blood dyscrasias, Hepatotoxicity

Intoxication:

Somnolence, unsteady gait, slurred speech, confusion.

Hypotension, decreased respiratory drive, and cardiac arrhythmias, the risk increases with increasingly higher levels of the medication in the blood.

14. Phenytoin (Dilantin)

Common side effects:

Somnolence, cognitive impairment (minor)

Gum hypertrophy, coarsening of facial features, hirsutism

Stomach upset with nausea and vomiting

Imbalance, in-coordination, dizziness

Blurred vision, double vision

Osteopenia, osteoporosis

Infrequent or life threatening side effects:

Skin rashes, including Stevens-Johnson Reaction and others, which may be life threatening

Hepatotoxicity, bone marrow suppression and other blood dyscrasias, systemic lupus erythematosus, periarteritis_nodosa

Long term Phenytoin use may cause atrophy of the cerebellum or peripheral neuropathy

Intoxication:

Somnolence, unsteady gait, slurred speech, confusion

Hypotension, decreased respiratory drive, and cardiac arrhythmias, the risk increases with increasingly higher levels of the medication in the blood.

15. Pregabalin (Lyrica)

Common side effects:

Lethargy, confusion, cognitive impairment

Dizziness, imbalance, in-coordination, blurred vision

Increased appetite with weight gain

Peripheral edema

Infrequent or life threatening side effects:

Prolonged PR interval, which may increase the risk for cardiac arrhythmias in susceptible patients

Skin rashes, including Stevens-Johnson Reaction and others, which may be life threatening

Intoxication:

Somnolence, unsteady gait, blurred vision, increased respiratory rate. Overdosages encountered have not been life threatening.

16. Primidone (Mysoline)

Common side effects:

Lethargy, confusion, cognitive impairment

Irritability, mood changes, insomnia, hyperactivity, manic behavior

Osteopenia, osteoporosis

Constipation

Infrequent or life threatening side effects:

Skin rashes, including Stevens-Johnson Reaction and others, which may be life threatening.

Physical or psychological dependence

Blood dyscrasias, Hepatotoxicity

Intoxication:

Somnolence, unsteady gait, slurred speech, confusion.

Hypotension, decreased respiratory drive, and cardiac arrhythmias, the risk increases with increasingly higher levels of the medication in the blood.

17. Tiagabine (Gabitril)

Common side effects:

Lethargy, confusion, cognitive impairment

Dizziness, imbalance, in-coordination, blurred vision

Tremulousness

Stomach upset with nausea and vomiting

Infrequent or life threatening side effects:

Skin rashes, including Stevens-Johnson Reaction and others, which may be life threatening.

Intoxication:

Somnolence, unsteady gait, blurred vision, increased respiratory rate. Over dosages encountered have not been life threatening.

18. Topiramate (Topamax)

Common side effects:

Lethargy, confusion, unsteady gait

Decreased speech, impairment of ability to recall words

Stomach upset with anorexia, nausea, vomiting

Heat intolerance

Infrequent or life threatening side effects:

Kidney stones

Glaucoma

Skin rashes

Intoxication:

Somnolence, unsteady gait, blurred vision, slurred speech, and metabolic acidosis. Over dosages encountered have not been life threatening.

19. Valproate (Depakote)

Common side effects:

Lethargy, confusion, cognitive impairment

Dizziness, imbalance, in-coordination, blurred vision

Tremulousness

Stomach upset with nausea and vomiting

Appetite stimulation with weight gain

Peripheral edema

Hair loss, acne

Mood disturbances with depression, aggression

Hyponatremia

Infrequent or life threatening side effects:

Skin rashes, including Stevens-Johnson Reaction and others, which may be life threatening

Hepatotoxicity, bone marrow suppression and other blood dyscrasias

Pancreatitis

Intoxication:

Somnolence, unsteady gait, slurred speech, confusion.

Hypotension, decreased respiratory drive, and cardiac arrhythmias, the risk increases with increasingly higher levels of the medication in the blood.

20. Zonisamide (Zonegran)

Common side effects:

Lethargy, confusion, cognitive impairment

Irritability, mood changes, insomnia, hyperactivity, manic behavior

Stomach upset with anorexia, nausea, vomiting

Imbalance, in-coordination, dizziness

Infrequent or life threatening side effects:

Kidney stones, Hepatotoxicity, bone marrow suppression and other blood dyscrasias

Skin rashes, including Stevens-Johnson Reaction and others, which may be life threatening

Intoxication:

Somnolence, unsteady gait, slurred speech, confusion.

Hypotension, decreased respiratory drive, and cardiac arrhythmias, the risk increases with increasingly higher levels of the medication in the blood.

Potential Side Effects

General side effects:

Lethargy with confusion, cognitive impairment (common):

| Common | occasionally | unlikely |
|---------------|---------------------|-----------------|
| Carbamazepine | gabapentin | ethosuximide |
| Clonazepam | levetiracetam | felbamate |
| Clorazepate | methsuximide | Lamotrigine |
| Diazepam | oxcarbazepine | |
| Lorazepam | pregabalin | |
| Phenobarbital | tiagabine | |
| Phenytoin | Valproate | |
| Primidone | Zonisamide | |
| Topiramate | | |

Paradoxical reaction with irritability, insomnia, hyperactivity

Common

Clonazepam

Clorazepate

Diazepam

Ethosuximide

Felbamate

Lorazepam

Phenobarbital

Primidone

Occasionally

Carbamazepine

methsuximide

oxcarbazepine

Phenytoin

Valproate

Zonisamide

Unlikely

Gabapentin

Lamotrigine

levetiracetam

pregabalin

tiagabine

Topiramate

Eye (vision) problems:

Blurred vision or double vision

Common

Carbamazepine

Ethosuximide

Levetiracetam

Methsuximide

Oxcarbazepine

Phenobarbital

Phenytoin

Pregabalin

Tiagabine

Zonisamide

Glaucoma:

Topiramate

Gastrointestinal:

Stomach upset with potential for significant anorexia:

Ethosuximide

Felbamate

Lamotrigine

Topiramate

Zonisamide

Appetite stimulation:

Pregabalin

Valproate

Heat Intolerance:

Carbamazepine

Oxcarbazepine

Topiramate

Hematologic (blood dyscrasias, bone marrow suppression, etc):

Reported

Carbamazepine

Ethosuximide

Felbamate

Levetiracetam

Methsuximide

Phenytoin

Phenobarbital

Primidone

Valproate

Zonisamide

not reported

Clonazepam

Clorazepate

Diazepam

Gabapentin

Lamotrigine

Lorazepam

Oxcarbazepine

Pregabalin

Tiagabine

Topamax

Hepatotoxicity:

Carbamazepine

Felbamate (high potential)

Phenobarbital (low)

Phenytoin

Valproate

Zonisamide

Hyponatremia (low sodium/salt):

Carbamazepine

Oxcarbazepine

Valproate

Imbalance, in-coordination, dizziness:

All of the anti-seizure medications can cause problems with imbalance, in-coordination, and dizziness, especially if the dose is too high.

Kidney Stones

Topiramate

Zonisamide

Mood Disturbances (irritability, aggression, depression):

Carbamazepine

Clonazepam

Clorazepate

Diazepam

Levetiracetam

Lorazepam

Phenobarbital

Primidone

Valproate

Zonisamide

Osteopenia or osteoporosis (thinning of the bones):

Carbamazepine

Phenobarbital

Phenytoin

Primidone

Valproate

Most of the other anti-seizure medications have not been tested with regard to their potential for causing osteopenia or osteoporosis.

Peripheral Edema:

Gabapentin

Valproate

Physical or Psychological Dependence:

Clonazepam

Clorazepate

Diazepam

Lorazepam

Phenobarbital

Primidone

Skin rashes, including Stevens-Johnson Reaction and others, which may be life threatening:

High potential

Carbamazepine

Ethosuximide

Lamotrigine (highest potential)

Methsuximide

Oxcarbazepine

Phenobarbital

Phenytoin

Primidone

Valproate

Zonisamide

Low potential

Clonazepam

Clorazepate

Diazepam

Felbamate

Gabapentin

levetiracetam

Lorazepam

Pregabalin

Tiagabine

Topiramate

Blood Testing

Individuals taking medications associated with bone marrow suppression, blood dyscrasias, or hepatotoxicity should have blood testing to assess for these potential side effects on an annual basis, unless otherwise instructed by the prescribing physician.

Individuals taking only one anti-seizure medication only need to have their blood tested annually if:

- they have not had other medications added or discontinued (with the potential to interact with the anti-seizure medication)
- they have not had a change in their anti-seizure medication dose

Individuals taking only one anti-seizure medication should have their blood tested 2 to 4 weeks after:

- a medication has been added or discontinued (with the potential to interact with the anti-seizure medication),
- a change in their antiseizure medication dose,

Individuals taking more than one anti-seizure medication only need to have their blood tested annually if :

- they have not had any other medications added or discontinued, (with the potential to interact with the anti-seizure medications),
- or if they have not had an adjustment in one of their anti-seizure medications.

Individuals taking more than one anti-seizure medication should have their blood tested 2 to 4 weeks after:

- a medication has been added or discontinued (with the potential to interact with the anti-seizure medication),
- a change in their antiseizure medication dose.

Individuals taking one or more anti-seizure medications should have their blood tested if they show signs suggesting intoxication.

Medical Terminology

Cognitive: The ability to think, reason, remember, learn, or use language.

Osteopenia: A condition of the bones in which the amount of calcium in the bone is decreased.

Osteoporosis: A significant decrease in the amount of calcium in the bones to the point that the bone is easy to break.

Hyponatremia: The sodium in the blood is too low.

Stevens-Johnson Reaction: A severe allergic reaction to a medication, which causes a severe skin rash involving also the lining of the mouth, the palms of the hands, and the soles of the feet. This is a condition which can lead to death.

Hepatotoxicity: Liver damage due to a medication. This can lead to death in rare instances.

Dyscrasias: An abnormal bodily condition, especially of the blood.

Somnolence: A state of drowsiness; sleepiness.

Hypotension: Abnormally low blood pressure.

Arrhythmias: An irregularity in the force or rhythm of the heartbeat.

Insomnia: Chronic inability to fall asleep or remain asleep for an adequate length of time.

Hyperactivity: A general restlessness or excess of movement, as that in children with minimal brain dysfunction or hyperkinesias.

Irritability: Abnormal or excessive sensitivity, grouchiness.

Anorexia: Refusal to eat, despite weight loss.

Peripheral Edema: Peripheral edema is the swelling of tissues, usually in the lower limbs, due to the accumulation of fluids.

Hypertrophy: Enlargement of an organ or tissue due to an increase in the size of the tissue's cells, not related to tumors/cancer.

Coarsening: To make or become coarse.

Imbalance: Lack of balance when standing or walking.

Lupus Erythematosus: A disorder of the immune system affecting many organs of the body including, but not limited to, the joints, kidneys, skin, and heart.

Periarteritis Nodosa: Inflammation and death of tissue within the medium-sized, and small arteries. Also called *Kusmaul's disease*.

Cerebellum: A large portion of the brain, serving to coordinate voluntary movements, posture, and balance in humans, being in back of and below the cerebrum and consisting of two lateral lobes and a central lobe.

Peripheral Neuropathy: A disease of the peripheral nerves (the nerves that run from the spinal cord to the muscles and other organs to control motor, sensory and vasomotor activity) which causes a dieing back of the nerves and loss of function, (weakness, pain, numbness, loss of muscle mass).

PR interval: The time measured between the P wave, and the beginning of the QRS complex in an EKG (electrocardiogram).

Tremulousness: Is when a person develops a constant tremor.

Metabolic Acidosis: Decreased pH and bicarbonate concentration of the body fluids caused either by the accumulation of excess acids stronger than carbonic acid or by abnormal losses of bicarbonate from the body.

Pancreatitis: Inflammation of the pancreas.

Paradoxical Reaction: A paradoxical reaction is the result of a medical treatment that yields the exact opposite of normally-expected results. An example of a paradoxical reaction is when a pain relief medication causes much more pain.

Gastrointestinal: Relating to the stomach and the intestines.

Hematologic: Relating to the blood, and blood forming organs.