Anti-Epileptic Drugs

1. **Phenytoin (Dilantin)**
   1. MOA: Enhances Na+ efflux from neuron making it less excitable
   2. Dosing: 15-20mg/kg bolus dose not given faster than 50mg/min (can cause hypotension. Max 2g for load. Check level 1hour post load. Maintenance dose 5mg/kg/day divided TID
   3. Levels: total 10-20mcg/ml. Free 1-2.5mcg/ml. Adjusting for low albumin and renal insufficiency: **Measured level/[(adjustment factor x albumin) +0.1]**. AF = 0.2 for normal kidney, 0.1 for CrCl <20.
   4. **Caution**: can cause hypotension, heart block, thrombophlebitis. Can cause severe dermatologic reactions (SJS, TEN). Lower doses in elderly and those with hepatic dysfunction.
2. **Fosphenytoin (Cerebyx)**
   1. MOA: Prodrug of phenytoin
   2. Dosing: 15-20mg/kg PE (phenytoin equivalent) no faster than 150mg PE/min. 1.5mg fosphenytoin = 1mg phenytoin. Scheduled dosing 4-6mg/kg/day divided
   3. Levels: per phenytoin
   4. **Caution**: fewer side effects than phenytoin. Can cause pruritis.
3. **Levetiracetam (Keppra)**
   1. MOA: exact unknown – may inhibit Ca2+ channels and be GABA agonist
   2. Dosing: 500-1000mg IV/PO BID. Can load with up to 20mg/kg. Max recommended daily 3grams
   3. Levels: not routine
   4. **Caution**: can cause somnolence. Can cause agitation especially in those with a significant ETOH history.
4. **Lacosamide (Vimpat)**
   1. MOA: Enhances slow inactivation of Na+ channels
   2. Dosing: 50mg IV/PO BID. Max 400mg/day
   3. Levels: none
   4. Caution: May prolong PR interval. Max dose 300mg/day in those with severe hepatic dysfunction or CrCl <30
5. **Valproic Acid (Depakote)**
   1. MOA: increase GABA levels; also effects Na= and Ca2+ channels
   2. Dosing: 15-20mg/kg IV loading dose. 10-15mg/kg/day divided BID/TID. Max dosage 60mg/kg/day
   3. Levels: 50-100 mcg/mL
   4. **Caution**: Can cause hepatotoxicity and hyperammonemia, nausea, pancreatitis and thrombocytopenia. Teratogenic.
6. **Carbamazepine (Tegretol)**
   1. MOA: probably inhibits Na+ influx
   2. Dosing: 200mg po BID. Max dose 1600mg/day
   3. Levels: 4-12mcg/mL
   4. **Caution**: can cause SJS, aplastic anemia. Avoid in patients with hepatic dysfunction. Can cause heart block, hyponatremia, renal dysfunction.
7. **Topiramate(Topamax)**
   1. MOA: blocks voltage gated Na+ channels; augments GABA activity
   2. Dosing: 25-50mg po/day Max 400mg day divided
   3. Levels: none
   4. Caution: cut dosage in half for renal insufficiency, hepatic dysfunction and elderly. Can cause somnolence, renal calculi, metabolic acidosis and hyperammonemia.
8. **Pregabalin (Lyrica)**
   1. MOA: GABA analog that binds to subunit of Ca2+ channel
   2. Dosing: 50mg po TID. Max 600mg/day divided
   3. Levels: none
   4. Caution: Can cause somnolence, weight gain, peripheral edema, myopathy. Dosing needs to be adjusted with renal insufficiency.
9. **Phenobarbital**
   1. MOA: barbiturate (sedative/hypnotic)
   2. Dosing: Loading dose 10-20mg/kg PO/IV with max 50-100mg BID/TID. Max 3mg/kg/day.
   3. Levels: 10-40mcg/mL (higher levels often used)
   4. Caution: low SE profile in therapeutic range.
10. **Pentobarbital**:
    1. MOA: barbiturate (sedative /hypnotic)
    2. Dosing: start 5-10mg/kg boluses until burst suppression then start drip at 1mg/kg/hr. Max dose around 4mg/kg/hr.
    3. Levels: not routinely done during treatment, but can be done at completion of treatment to assess rate of clearance
    4. **Caution**: can produce severe neurologic dysfunction mimicking brain death. Can cause immunosuppression, ileus, hypotension, hypothermia, bradycardia, hepatotoxicity, respiratory depression.
11. **Ketamine (Ketalar)**
    1. MOA: Anesthetic. NMDA receptor antagonist. GABA and Ach receptor agonist at high doses
    2. Dosing: not established. 10-100mcg/kg/min IV. Bolus dosing 1-2mg/kg IV.
    3. Levels: none
    4. **Caution**: prolonged duration of action in patients with hepatic dysfunction. Can cause hypotension/hypertension, tachycardia, laryngeal spasm, pulmonary edema. Emergence reactions; dosed with a benzo.
12. **Propofol (Diprivan)**
    1. MOA: Anesthetic that decreases effects of glutamate
    2. Dosing: Load 1-1.5mg/kg Infusion rates at 50-200mcg/kg/min. Rates >80mcg/kg/min for >48 hours are at significantly increased risk for PRIS
    3. Levels: none
    4. **Caution**: Hypotension (dose and rate related), hypertriglyceridemia, urine discoloration. Avoid in those with egg and soybean allergies. Propofol Related Infusion Syndrome (PRIS) – metabolic acidosis/lactic acidosis, renal failure, myocardial dysfunction, agranulocytosis.
13. **Lorazepam (Ativan) only class IA recommendation\***
    1. MOA: GABA agonist
    2. Dosing: 0.1mg/kg IV up to 4mg/dose repeat q5-10min
    3. Levels: none
    4. **Caution**: sedation, respiratory depression; propylene glycol diluent can cause hypotension. Better for hepatic dysfunction as metabolism is conjugation and then enterohepatic recirculation.
14. **Midazolam (Versed) only class IA recommendation\***
    1. MOA: GABA agonist
    2. Dosing: 0.2mg/kg IV boluses q15 minutes to max 1mg/kg. Infusion 0.05-2mg/kg/hr titrating by 0.1mg/kg/hr q3 hours. Unlikely to control refractory SE if bolused 1mg/kg and patient still with seizures.
    3. Levels: none
    4. **Caution**: can cause respiratory depression. Tachyphylaxis can develop. Has an active metabolite. Caution in renal insufficiency.