AT HOME POLYPHARMACY:

HOW DOES IT AFFECT MY ANESTHESIA?

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DISCLOSURE STATEMENT

- I have no financial conflicts of interest to disclose

- I will not be discussing off-label medication use

OBJECTIVES

At the end of the presentation the attendee will be able to:

- Recognize some of the most common classifications of medications patients are taking prior to the day of surgery.

- Discuss the impact at home polypharmacy can have on a patient.

- Discuss the influence at home polypharmacy can have on anesthesia.

- Develop a patient specific plan of care for based on patient's pre-hospital medications.

PREOP HISTORY

Prescription Medications

- cyclobenzaprine (FLEXERIL) 5 MG tablet
- levothyroxine (SYNTHROID) 88 mcg tablet
- meloxicam (MOBIC) 7.5 mg tablet
- naloxone (NARCAN) 4 mg/actuation nasal spray
- naproxen (NAPROSYN) 500 mg tablet
- orphenadrine (NORFLEX) 100 mg tablet

Prescription Medications

- atorvastatin (LIPITOR) 80 mg tablet
- GLUCOSAMINE HCL/CHONDR SU A NA (OSTEO BI-FLEX ORAL)
- metoprolol (TOPROL-XL) 25 mg 24 hr tablet
- omega-3 fatty acids/dha/epa (MEGARED PLANT-OMEGA-3 ORAL)
- pantoprazole (PROTONIX) 40 mg tablet
- tamsulosin (FLOMAX) 0.4 mg 24 hr capsule
- therapeutic multivitamin (THERAGRAN) tablet

Prescription Medications

- albuterol (PROAIR HFA) 90 mcg/actuation inhaler
- ALLOPURINOL ORAL
- aspirin (ECOTRIN) 81 mg EC tablet
- atorvastatin (LIPITOR) 40 mg tablet
- CPAP
- ezetimibe (ZETIA) 10 mg tablet
- FLUoxetine (PROzac) 20 mg capsule
- fluticasone propionate (FLONASE) 50 mcg/actuation nasal spray
- fluticasone-salmeterol (ADVAIR HFA) 115-21 mcg/actuation inhaler
- gabapentin (NEURONTIN) 300 mg capsule
- inhaler,assist devices,access (MOUTHPIECE)
- meloxicam (MOBIC) 7.5 mg tablet
- metoprolol (LOPRESSOR) 50 mg tablet
- MULTIVITAMIN ORAL
- nitroglycerin (Nitrostat) 0.4 mg SL tablet
- valsartan-hydrochlorothiazide (DIOVAN-HCT) 80-12.5 mg per tablet
- verapamiL (CALAN-SR) 240 mg CR tablet

Past Surgical History:

Procedure

- BACK SURGERY
  L4-5 surgery
- CARDIAC CATHETERIZATION
  1 Stent
- VOCAL CORD INJECTION

Alcohol Use	Yes
• Alcohol/week:	6.0 standard drinks of alcohol
• Types:	6 Cans of beer per week
Comment: less than 6 can of beer. weekly	

Past Medical History:

Diagnosis

- Anxiety
- Arthritis
- Atrial aneurysm
- CAD (coronary artery disease)
- Cardiomyopathy (HCC)
- COPD (chronic obstructive pulmonary disease) (HCC)
- Cough
- Depression
- Esophageal reflux
- Gout
- Heart murmur
- Hiatal hernia
- High blood pressure
- Hypercholesterolemia
- Insomnia
- Irritable bowel syndrome
- Polycythemia vera (HCC)
- Sleep apnea
- Unilateral partial paralysis of vocal cords or larynx

Neuro/Psych History
Psychiatric history
post-traumatic stress disorder
anxiety/panic attacks
depression

Endocrine History
negative endo/other ROS

Hematology History
anticoagulation therapy *(asa 81mg instructions to continue from surgeon)*

Other History
additional ROS findings negative

reports that he has never smoked. His smokeless tobacco use includes chew.

Cardiovascular HIstory
CAD *Tx/Date: stent Mid RCA*
Valvular problems (bicusipid aortic valve)
Hypertension

4.5 Ascending aortic artery
Cardiologist: *Dr Doll Carolina Cardiology*

Prior test: Echocardiogram, cardiac stress test and *catheterization*

Pulmonary History
COPD
Sleep apnea (non compliant)

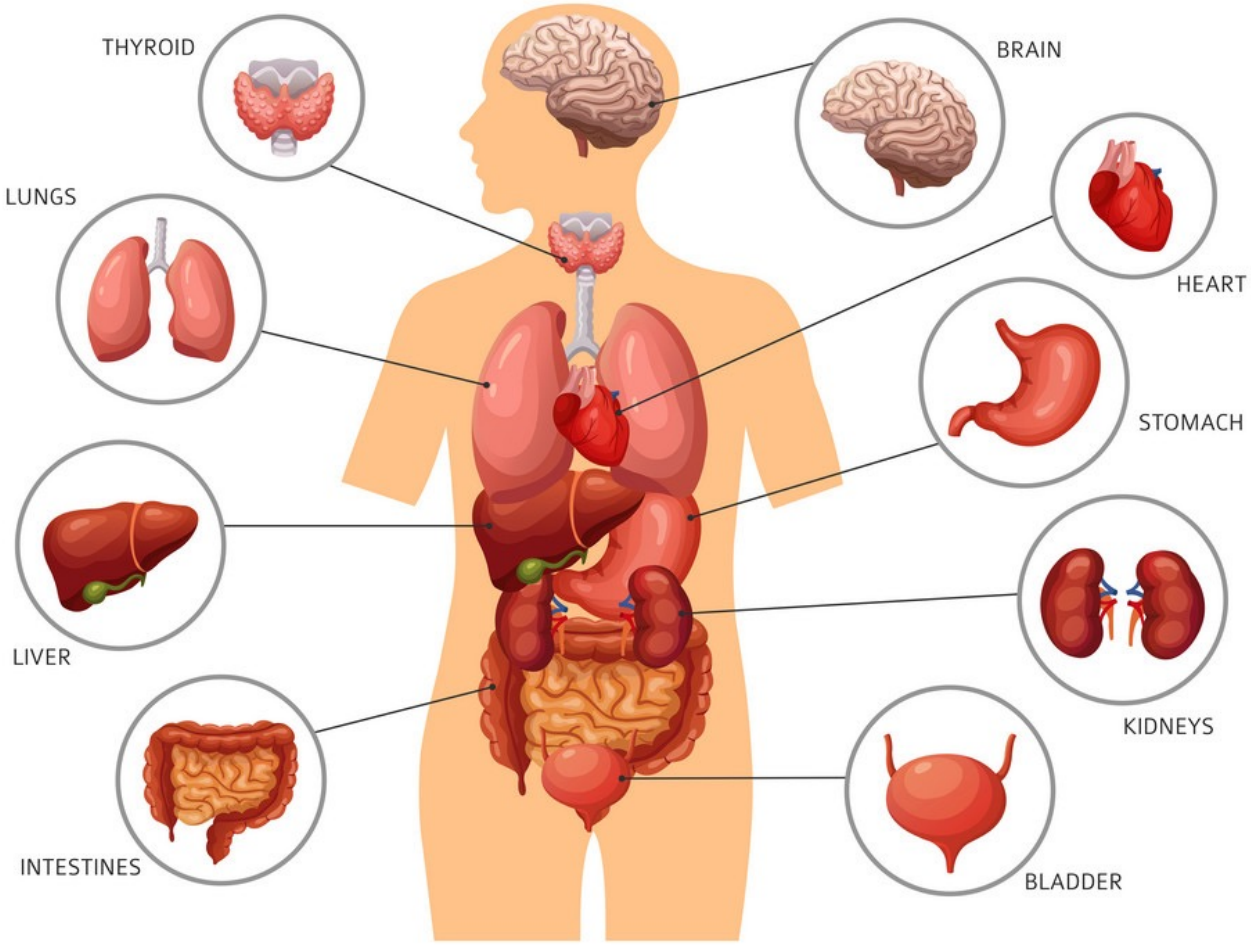
GI/Hepatic/Renal
Hiatal hernia
GERD

PRE-HOSPITAL MEDICATIONS

- Antihypertensives
  - Beta-blockers
  - Calcium channel blockers
  - ACE inhibitors
  - ARB's
  - Diuretics
- Pain
  - Opioids
  - Gabapentin
  - Muscle relaxants
  - NSAIDs
  - Other
- Antianxiety
  - SSRIs
  - Benzodiazepines
  - Sedative/Hypnotics
  - Tricyclic antidepressants
- Respiratory Disorders
  - Bronchodilators
  - Combined inhalers
  - Inhaled corticosteroids
  - Combination inhalers
  - Antibiotics
  - Theophyllines
  - Oral steroids
  - PD4 inhibitors
- Anitarrhythymics
  - Na+ channel blockers
  - Beta-blockers
  - K+ channel blockers
  - Ca++ channel blockers
  - Adenosine
  - Electrolytes
- Supplements
  - Gingko biloba
  - St Johns Wort
  - Fish oil
  - Echinacea
  - Garlic
  - Saw palmetto


Claritin

HUMAN ORGANS

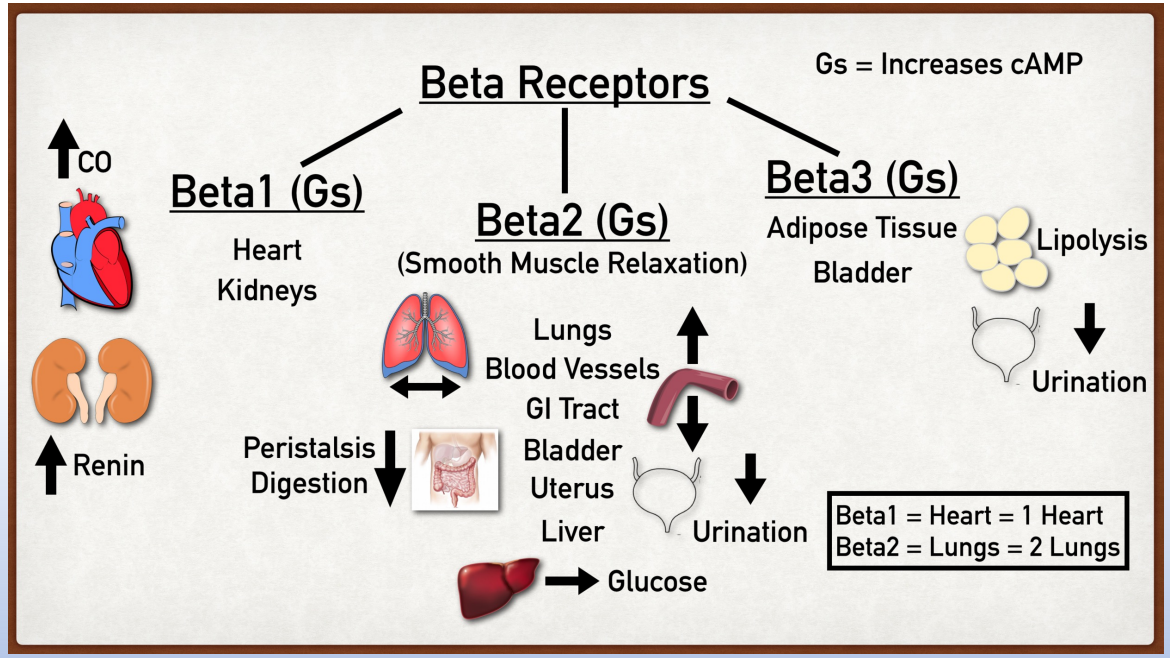


ANTIHYPERTENSIVES

Beta Blockers

- Cardioselective
  - A through N
- Non-cardioselective
  - O through Z

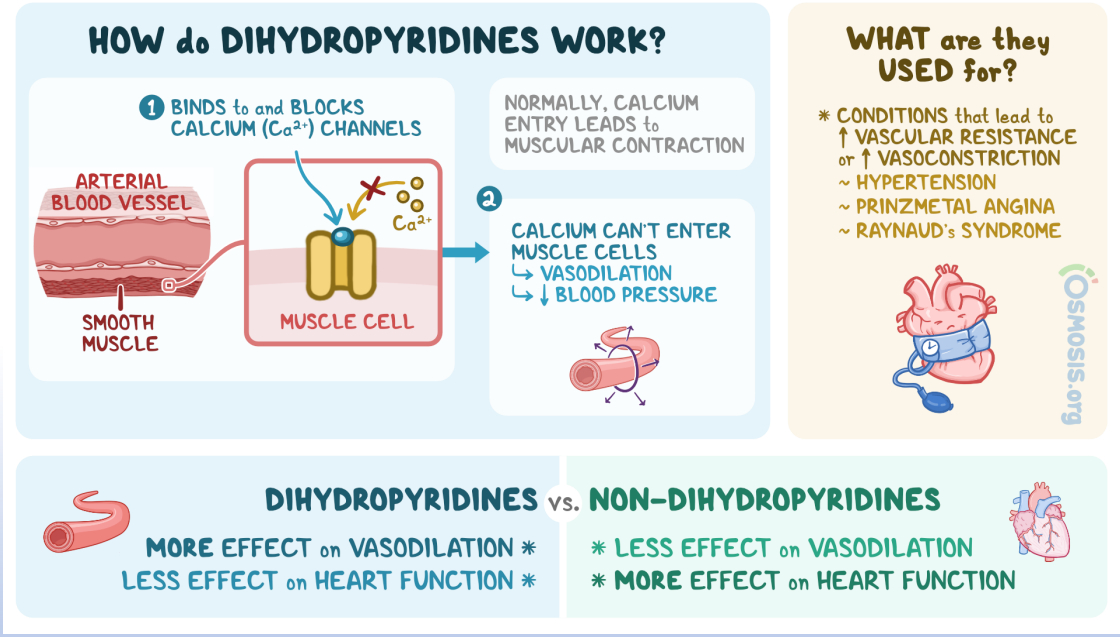
Beta Stimulation



ANTIHYPERTENSIVES

Calcium Channel Blockers

- Dihydropyridines
  - Amlodipine & nifedipine
- Non-Dihydropyridines
  - Verapamil & diltiazem

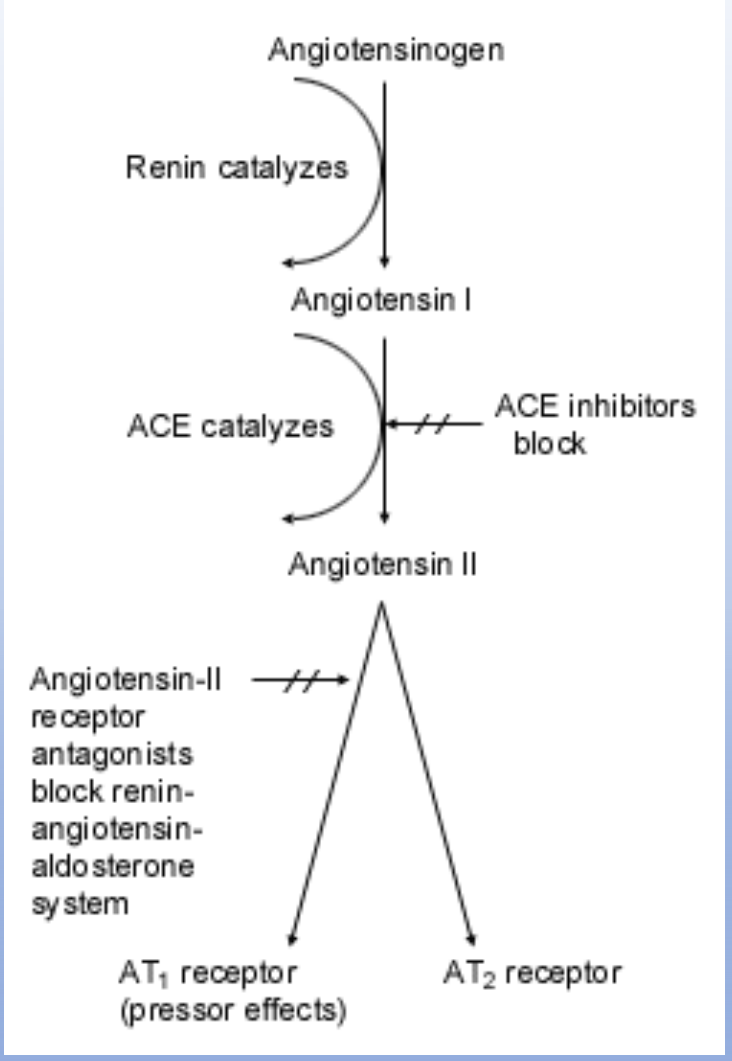


ANTIHYPERTENSIVES

ACE Inhibitors (-prils)

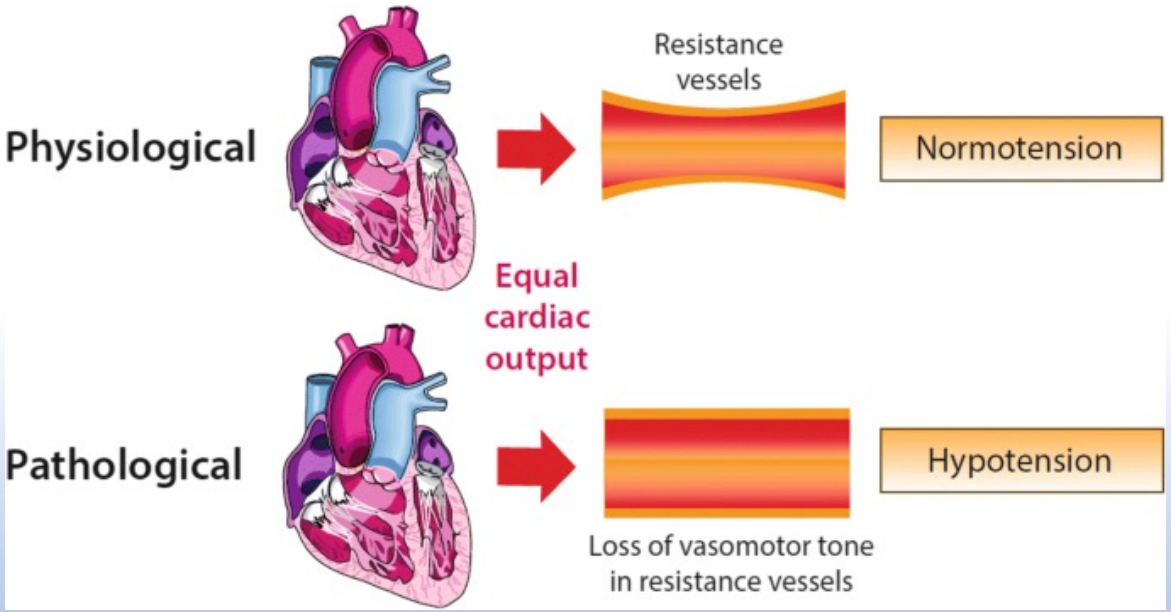
- Discontinue at least 10 hours before surgery
- Hold only for BP and not CHF
- Refractory hypotension or vasoplegic syndrome
- Hyperkalemia

- ARBs (-sartans)
  - Discontinue 24hrs before surgery
  - Refractory hypotension or vasoplegic syndrome

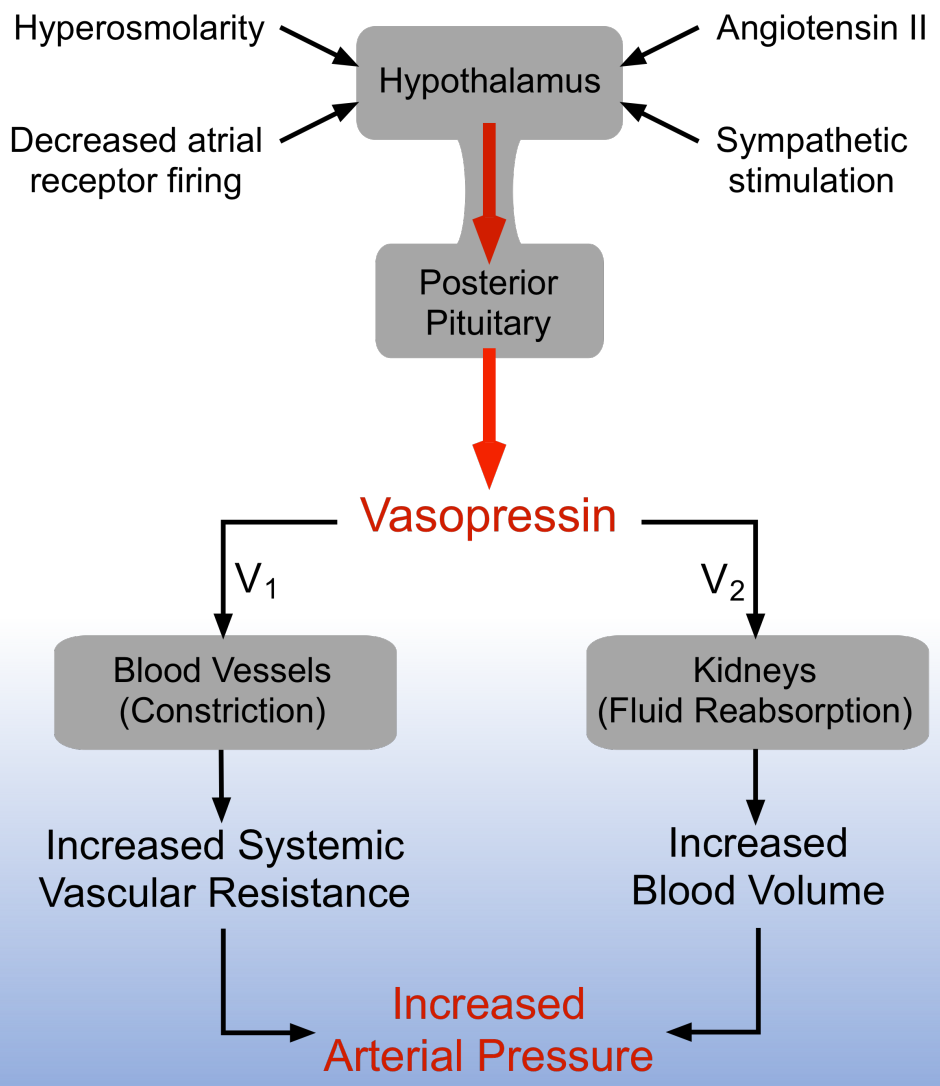


VASOPLEGIC SYNDROME

- High output shock state with poor systemic vascular resistance
- Dysregulation of vasodilatory and vasoconstrictive properties of smooth vascular muscle cells
- Treat with vasopressors



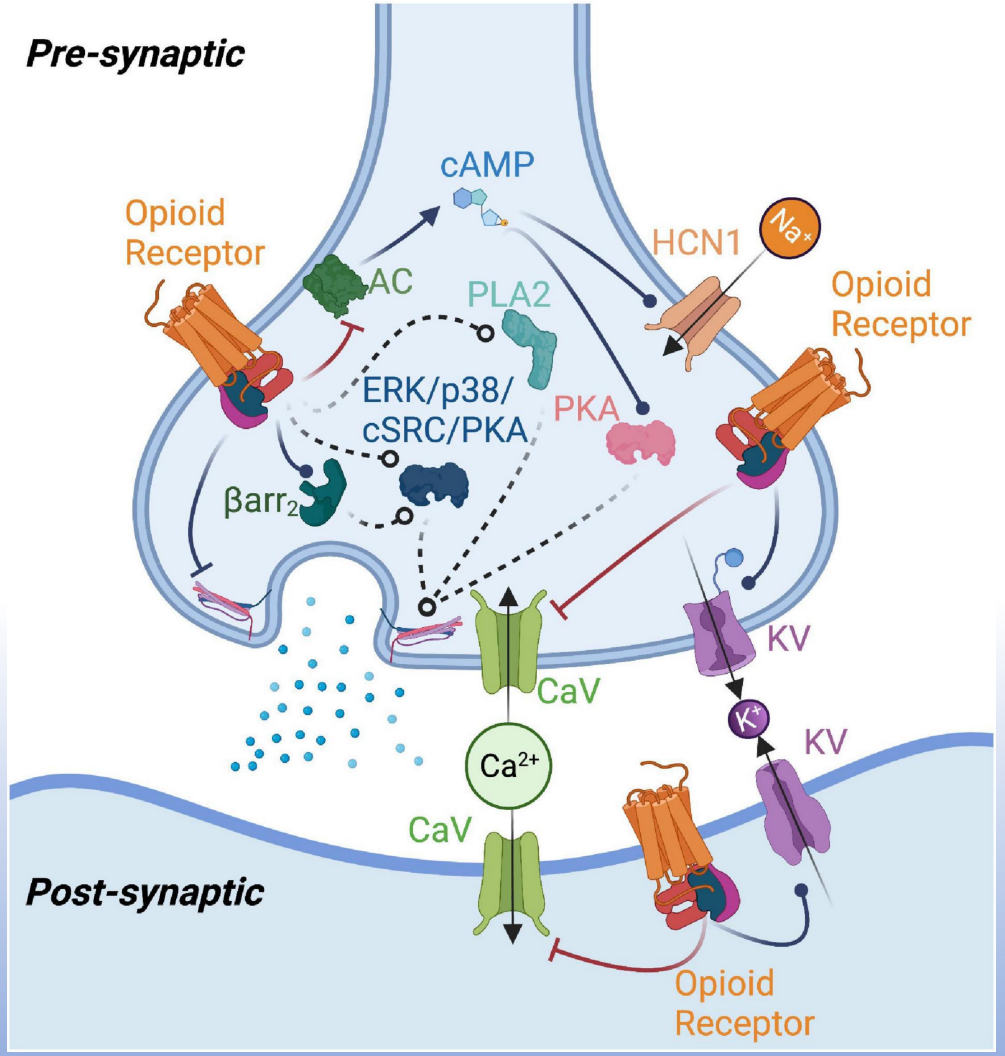
VASOPRESSIN

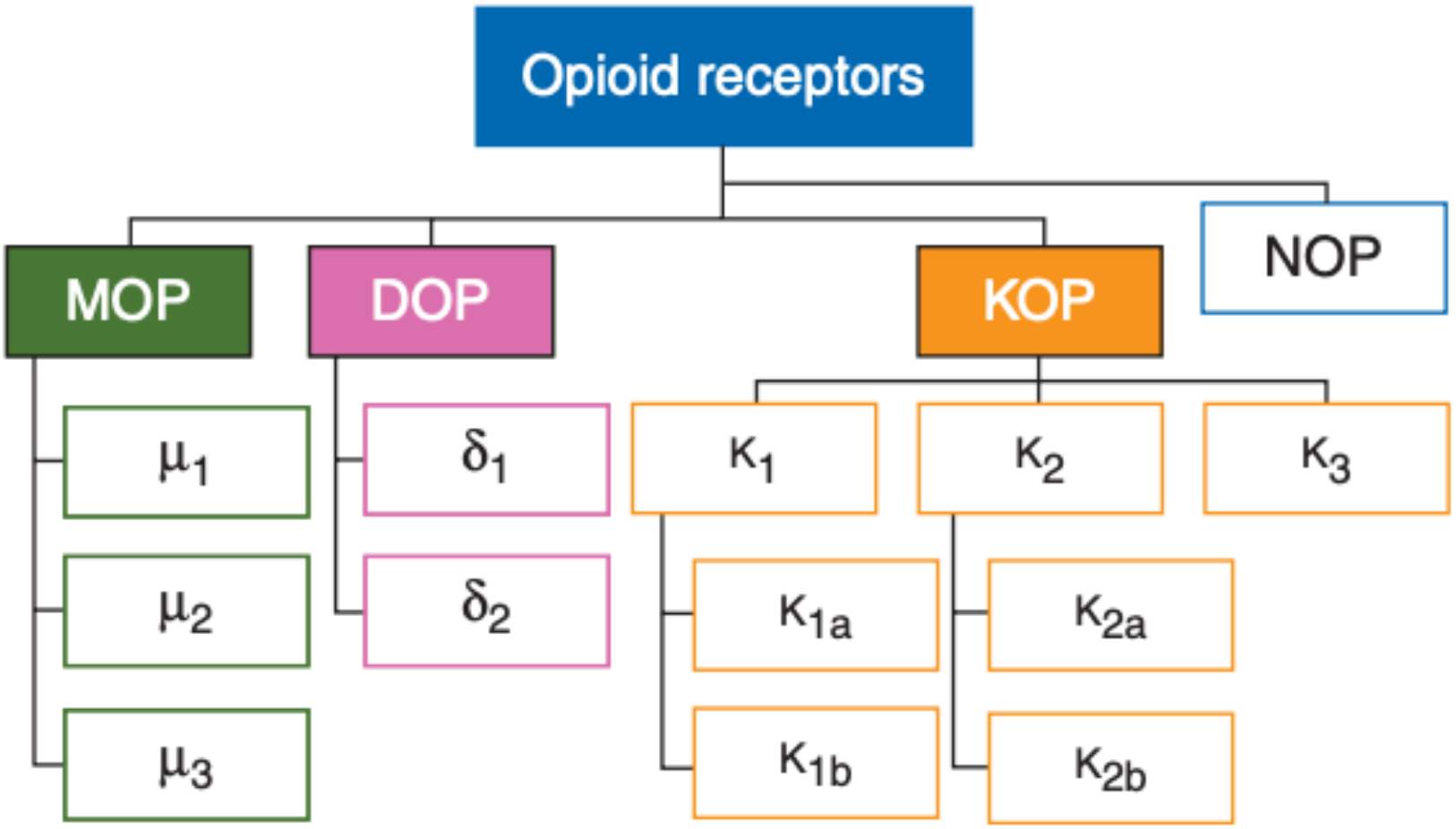


PAIN

Opioids

- Presynaptic inhibition of neurotransmitter release
- Postsynaptic hyperpolarization of neurons
- Can lead to synergism
- May require more postop opioids
- Consider multimodal technique




Opioid receptors
MOP
DOP
KOP
NOP
μ1
μ2
μ3
δ1
δ2
κ1
κ2
κ3
κ1a
κ1b
κ2a
κ2b

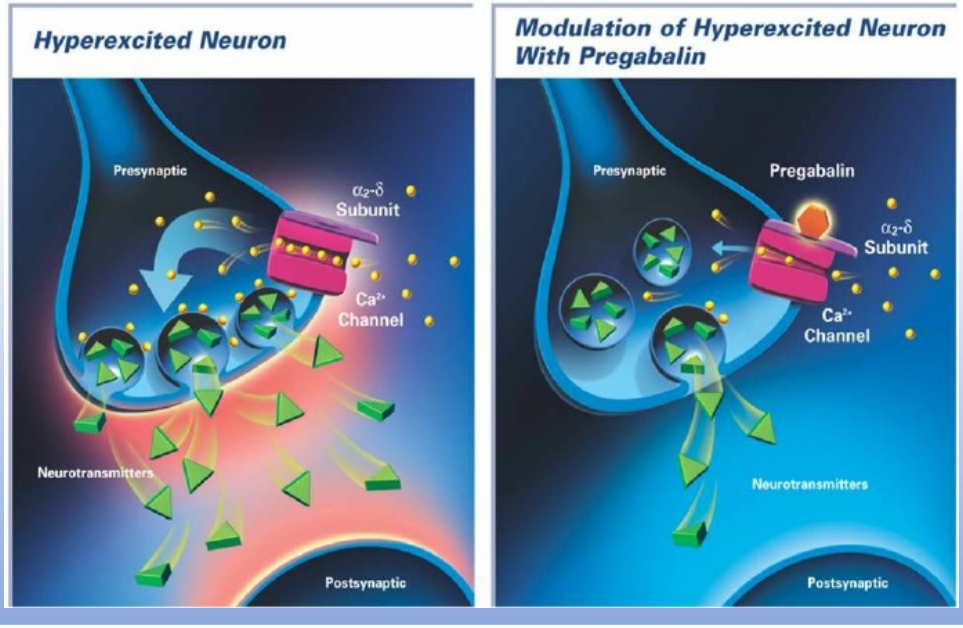
PAIN

Opioids

- Presynaptic inhibition of neurotransmitter release
- Postsynaptic hyperpolarization of neurons
- Can lead to synergism
- May require more postop opioids

Gabapentin

- Anticonvulsant
- Changes the way nerves send messages to the brain
- Blocks tonic phase of nociception
- Slows release of chemicals from presynaptic side that excite the nerve
- Dizziness and drowsiness possible



PAIN

Methadone

- Used to treat Opioid Use Disorder (OUD)
- Full opioid agonist
- Binds to and activates mu opioid receptors centrally and peripherally
- Effects: analgesia, euphoria, constipation, sedation, respiratory depression, nausea, and miosis
- Continue on day of surgery

Buprenorphine

- Partial agonist at mu receptor, weak kappa and delta receptor antagonist
- Works well for those addicted to heroin, fentanyl, hydromorphone and oxycodone
- Blocks euphoric effects
- Should be tapered over 2-4 weeks if possible

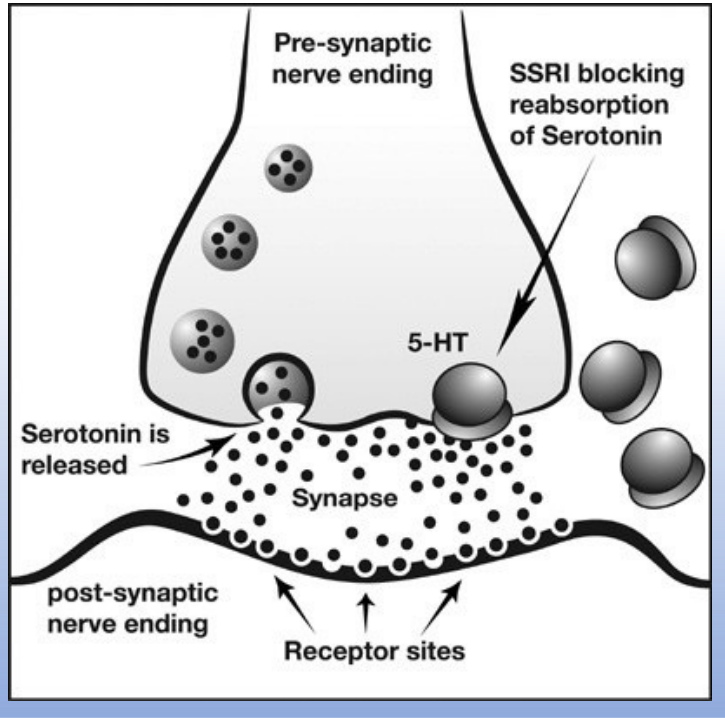
ANTIANXIETY

Benzodiazepines

- Relieve anxiety and muscle spams and reduce seizures
- Slow down messaging to brain
- Enhance GABA at the receptor
- Continue day of surgery

SSRIs

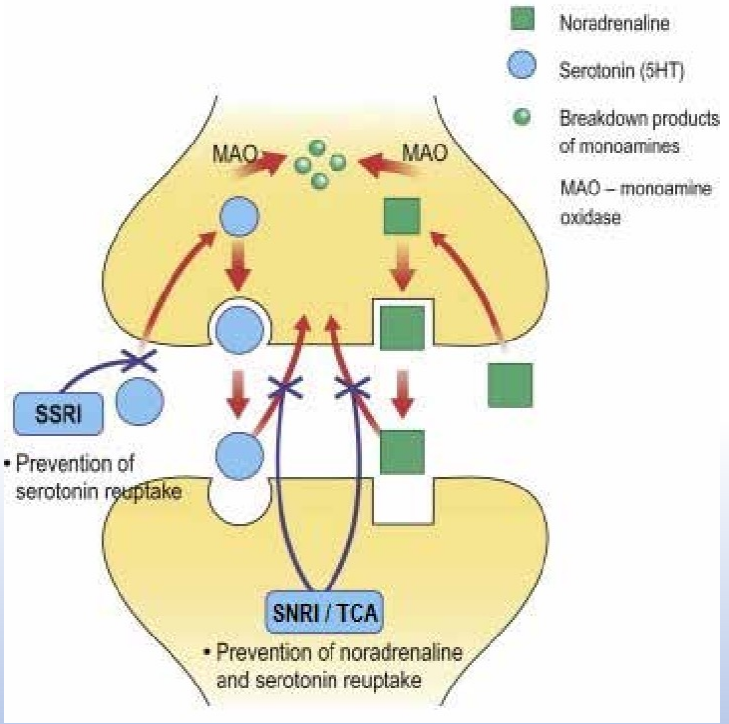
- Inhibit reuptake of serotonin and increase the action of it
- Serotonin is a “happy” neurotransmitter
- Inhibits CYP450
- Synergistic effect on anticoagulants
- Can have intraoperative HOTN and arrhythmias
- Serotonin syndrome concern
  - Opioids and ondansetron



ANTIANXIETY

Tricyclic antidepressants

- Block reuptake of serotonin and norepi
- Lead to postural HOTN
- Risk of serotonin syndrome
- Continue day of surgery
- Risk of exaggerated response to catecholamines, direct and indirect acting sympathomimetics, and ketamine



SEROTONIN SYNDROME

Signs and Symptoms

- Agitation
- Insomnia
- Confusion
- Rapid heart rate and BP
- Dilated pupils
- Loss of muscle coordination and muscle twitching
- High blood pressure
- Muscle rigidity
- Heavy sweating
- Diarrhea
- Headache
- Shivering
- Goosebumps

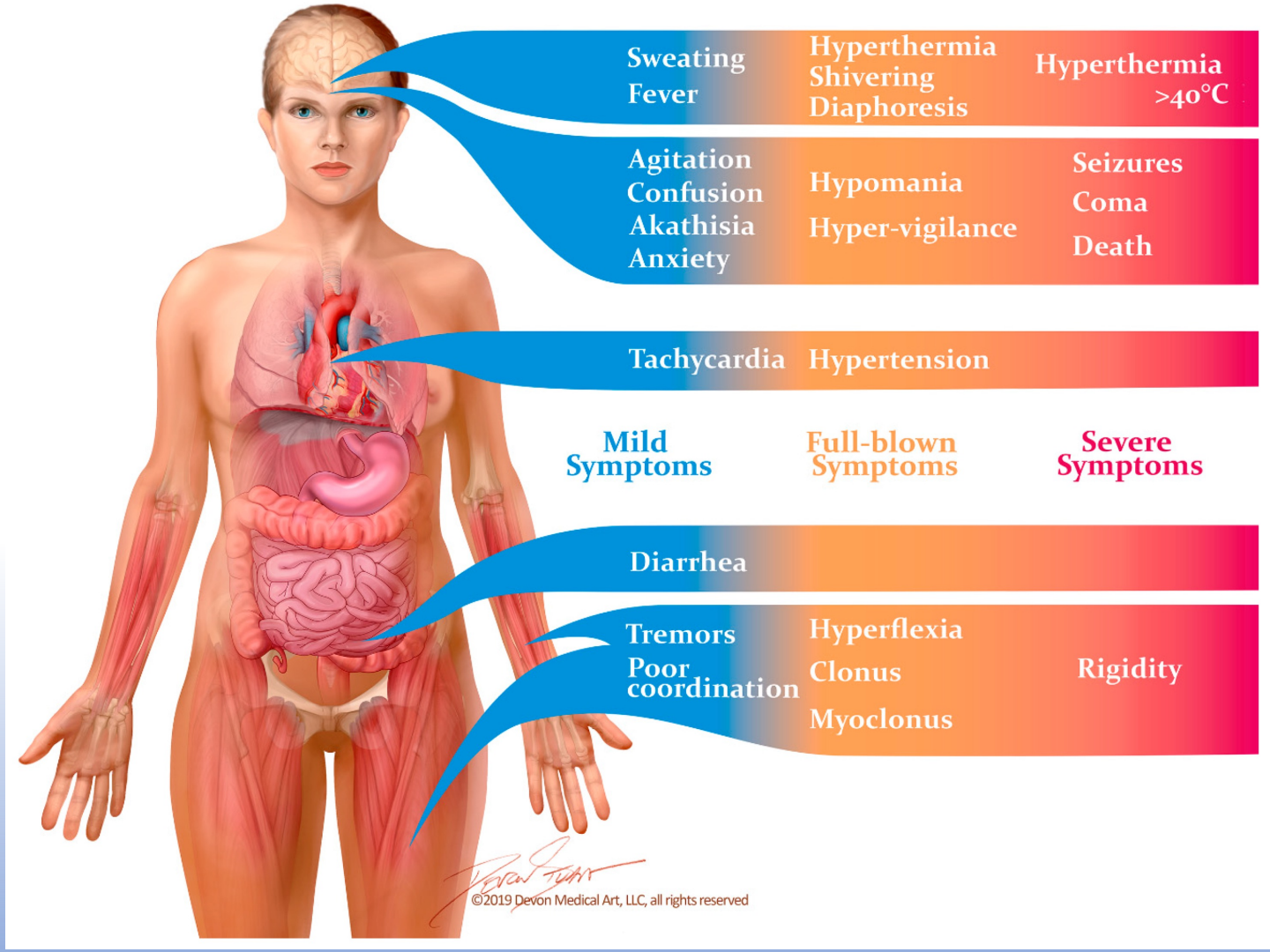
Severe Signs and Symptoms

- High fever
- Tremors
- Seizures
- Irregular heartbeat
- Unconsciousness

Signs and Symptoms under GA

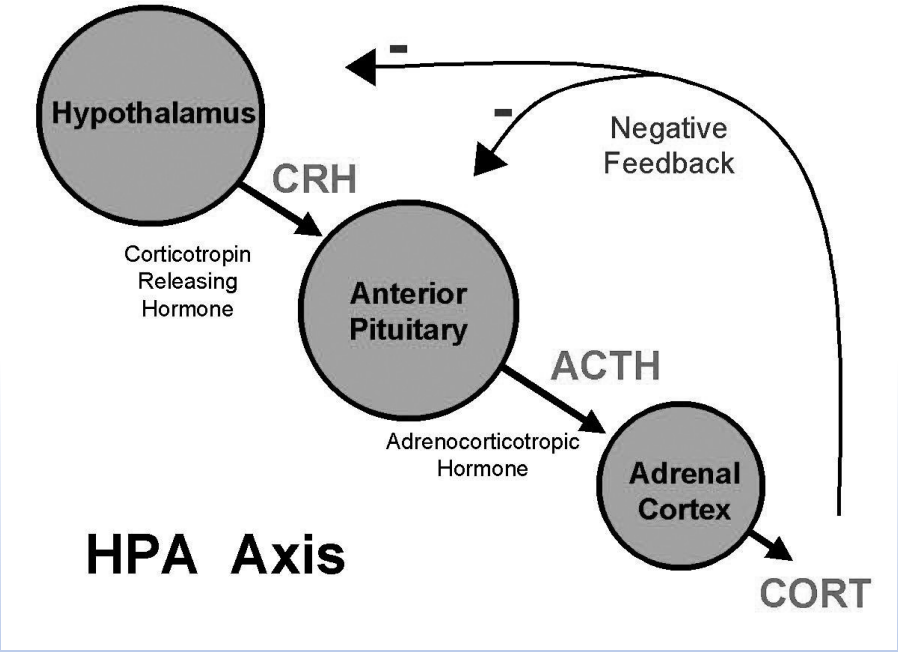
- Altered level of consciousness
- Autonomic dysfunction
- Neuromuscular excitability

SEROTONIN SYNDROME



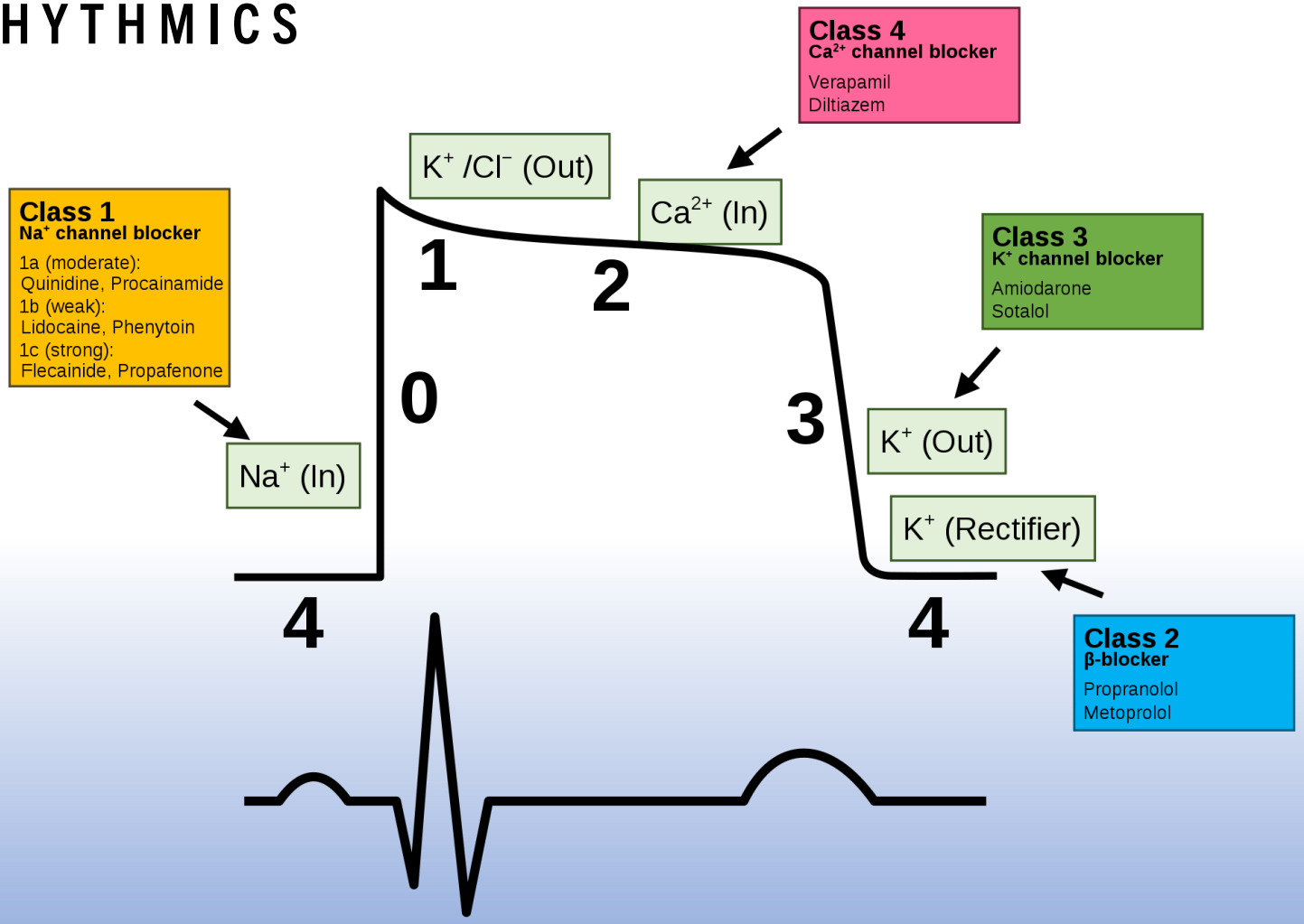
ORAL STEROIDS

- Treat
  - long term or severe exacerbations of asthma
  - autoimmune disorders
  - inflammatory disorders
- Suppresses the HPA axis
- Lead to adrenal insufficiency
- 20-30mg/day x 5 days of prednisone
- May take adrenals days to months to recover
- 25mg-100mg coverage



Level of surgical stress	Daily hydrocortisone equivalent dose	Duration
Minor (e.g., inguinal herniorrhaphy)	25 mg	Day of surgery
Moderate (cholecystectomy, lower extremity revascularization, total joint replacement, abdominal hysterectomy, segmental colon resection)	50–75 mg	1–2 days
Major (e.g., Whipple procedure, total colectomy, esophageal resection, cardiac surgery involving bypass	100–150 mg	2–3 days

ANTIARRHYTHMICS



ANTIARRHYTHMICS

Diltiazem

- Class IV (Calcium channel blocker)
- Treat supraventricular tachycardias
- May contribute to slowing of heart rate in combination with inhalational agent (halo and iso)
- Slows elimination of midazolam and alfentanil

Amiodarone

- Class III (Potassium channel blocker)
- Common for treatment of atrial fibrillation
- Possible issues with sinus beat formation or conduction
- Long elimination half-life

DIABETES

- Goal to maintain 80-180mg/dL

Insulin regimen	Day Before Surgery	Day of Surgery	Notes
Insulin pump	No change	Use "sick day" or "sleep" basal rates	
Long-acting insulins (eg. Glargine, detemir)	No change	Give 75-100% of AM dose on arrival to surgery facility	Reduce PM dose by 25% if history of nocturnal or morning hypoglycemia Long acting insulins have onset of 2-4h, no peak, and duration of up to 24h
Intermediate-acting insulins (NPH)	No change in daytime dosing 75% of usual evening dose if insulin routinely taken in the evening	50% of usual AM dose	See above comments for long-acting insulin
Combination insulins	No change	50% of usual AM dose of intermediate-acting component	Aspart protamine 70/30 is available only in combination. On morning of surgery give 35% of total AM dose as NPH insulin
Rapid acting insulins	No change	Hold dose	
Non-insulin injectables	No change	Hold dose	

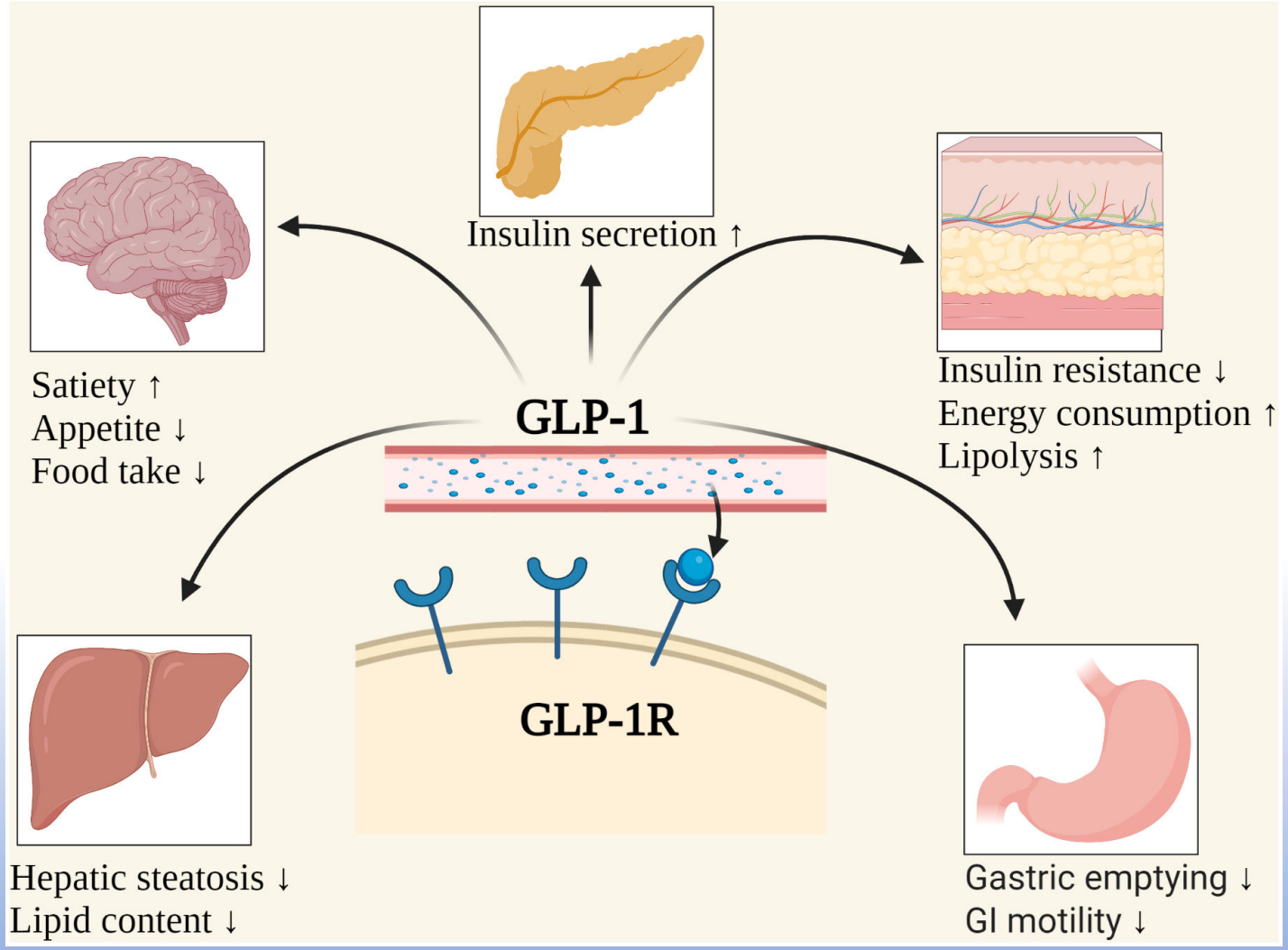
GLP1 AGONISTS

Bind to GLP-1 receptor to stimulate glucose dependent insulin release from pancreatic islets to lower glucose levels

Benefits

- Lowering blood pressure.
- Improving lipid disorders.
- Improving fatty liver disease.
- Reducing your risk of heart disease and kidney disease.
- Delaying the progression of diabetes-related nephropathy.

GLP-1 AGONIST



AANA RECOMMENDATIONS

Because of these risks, providers may need to do additional screenings such as a point-of-care ultrasound of a patient's stomach contents before surgery. If the ultrasound indicates that gastric contents are present or imaging is inconclusive, the surgical team may consider delaying an elective procedure or proceeding as "full stomach" to mitigate the risks of regurgitation and aspiration while intubated for anesthesia care.

The length of time various GLP-1 medications continue to impact a patient were considered in developing these recommendations. Example recommendations include:

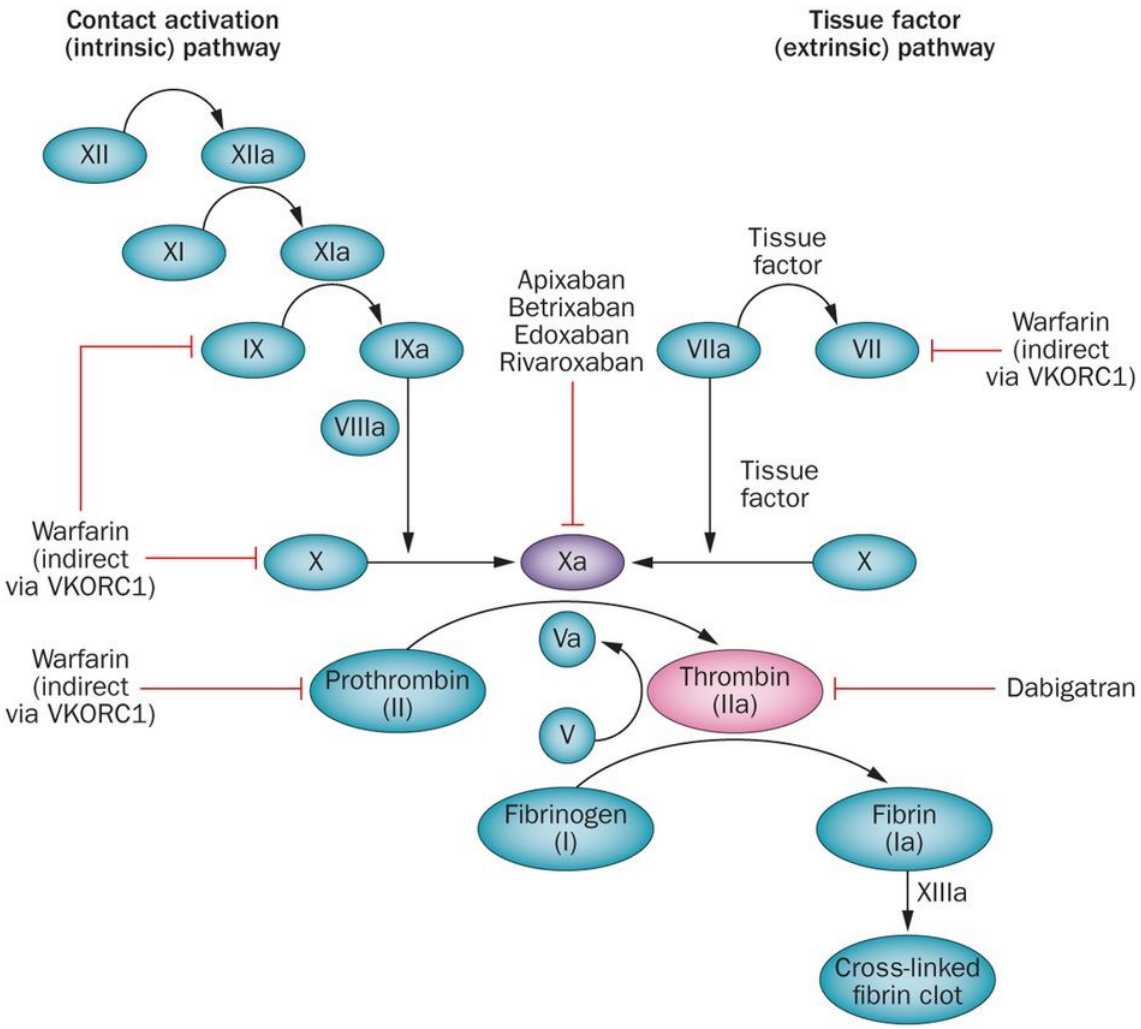
- If daily dose: Consider holding day of surgery/procedure.
- If weekly dose: Consider holding one week before surgery/procedure.

ADDITIONAL ASA GUIDELINES

Day of the Procedure:

- If gastrointestinal (GI) symptoms such as severe nausea/vomiting/retching, abdominal bloating, or abdominal pain are present, consider delaying elective procedure, and discuss the concerns of potential risk of regurgitation and pulmonary aspiration of gastric contents with the proceduralist/surgeon and the patient.
- If the patient has no GI symptoms, and the GLP-1 agonists have been held as advised, proceed as usual.
- If the patient has no GI symptoms, but the GLP-1 agonists were not held as advised, proceed with 'full stomach' precautions, or consider evaluating gastric volume by ultrasound, if possible and if proficient with the technique. If the stomach is empty, proceed as usual. If the stomach is full or if gastric ultrasound inconclusive or not possible, consider delaying the procedure or treat the patient as 'full stomach' and manage accordingly. Discuss the concerns of potential risk of regurgitation and pulmonary aspiration of gastric contents with the proceduralist/surgeon and the patient.
- There is no evidence to suggest the optimal duration of fasting for patients on GLP-1 agonists. Therefore, until we have adequate evidence, we suggest following the current ASA fasting guidelines.

COAGULATION



COAGULATION

aPTT

- Intrinsic
- 25-35 seconds
- Heparin

INR

- Ratio
- <1.2

PT

- Extrinsic pathway
- 12-15 seconds
- Warfarin

Indications for Anticoagulation
Strokes/TIAs
Heart Attacks
Deep Vein Thrombosis
Pulmonary Embolus

ANTICOAGULANTS AND ANTIPLATELETS

Agent	Elimination Half-life	Duration of Platelet Inhibition	Recommended Time for Discontinuation before Surgery
Aspirin	15–20 min[a]	Permanent	7–10 days
Clopidogrel	7–8 hr[b]	Permanent	7–10 days
Ticlopidine	12 hr	Permanent	7–10 days
Ibuprofen	2–4 hr	6–12 hr	10–12 hr
Naproxen	10–20 hr	36–75 hr	72 hr
Ketorolac	4–6 hr	24–48 hr	24 hr
Fenoprofen	2.5–3 hr	6–15 hr	12 hr
Rofecoxib	17 hr	Minimal	2–3 days
Celecoxib	11 hr	Minimal	2–3 days

[a]Parent drug; salicylates are dose dependent (3–10 hr).
[b]Based on the active metabolite.

ANTIDOTES

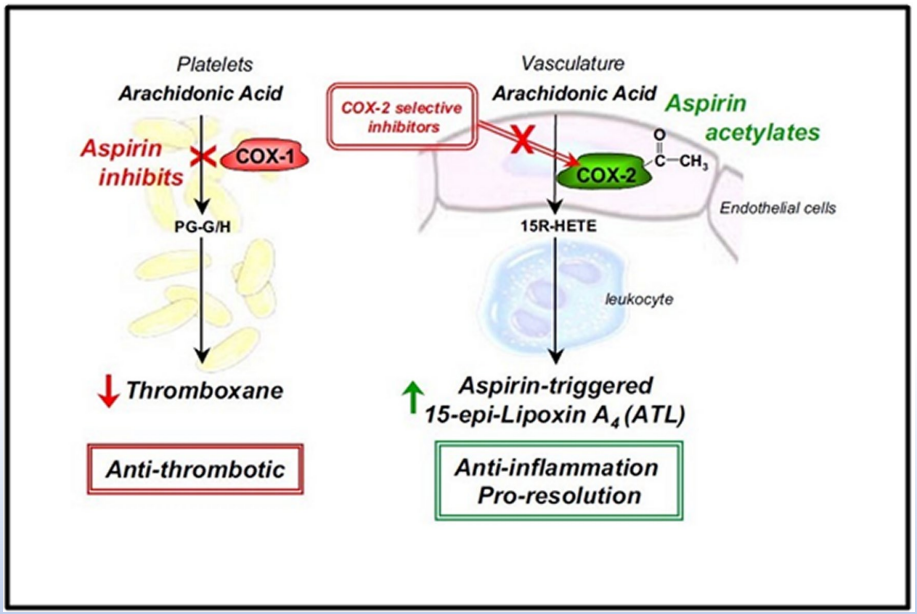
Antiplatelet Agents

Drug	Site of Action	Antidote
Aspirin	COX 1-2	None
Dipyridamole	Adenosine	None
Clopidogrel	ADP	None
Prasugrel	ADP	None
Ticlopidine	ADP	None
Abciximab	GPIIb-IIIa	None
Eptifibatide	GPIIb-IIIa	None
Tirofiban	GPIIb-IIIa	Hemodialysis

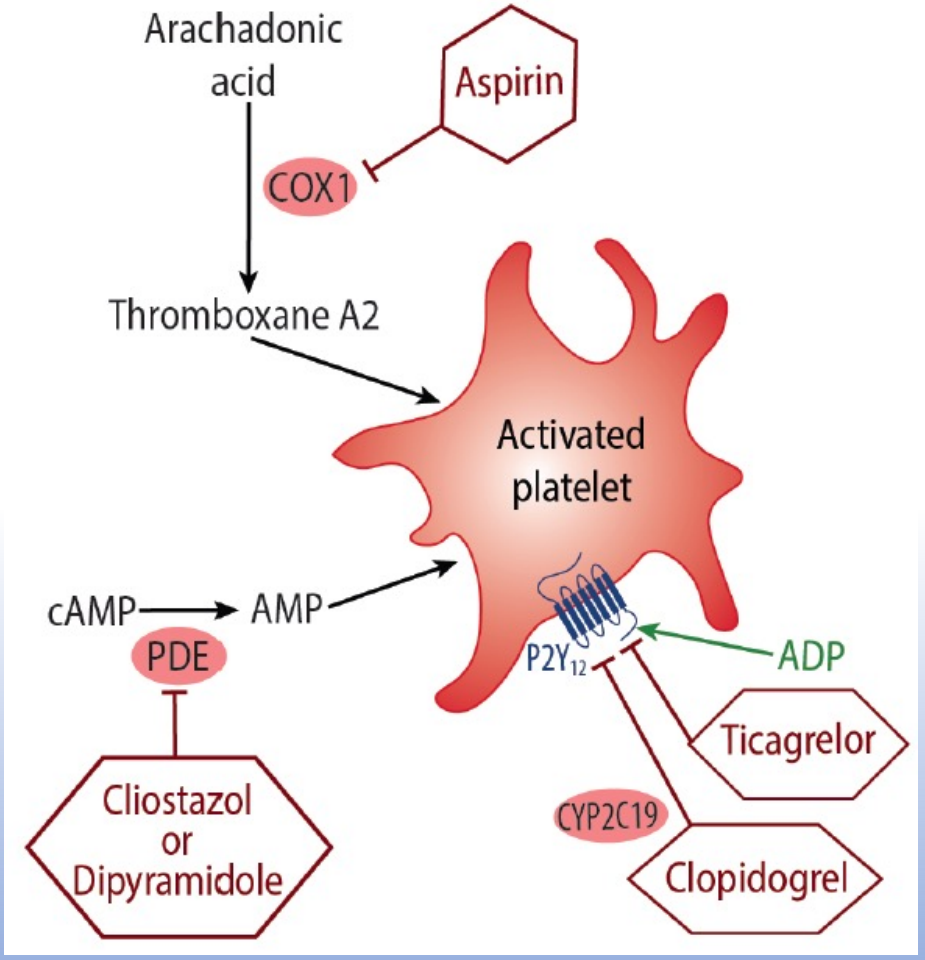
Anticoagulation Agents

Drug	Site of Action	Antidote
Unfractionated heparin	IIa/Xa	Protamine
LMWH	Xa	Protamine (partial reversal)
Streptokinase	Plg	Antifibrinolytics
t-PA	Plg	Antifibrinolytics
Coumarin	Vitamin K–dependent factors	Vitamin K rfVIIa PCCs Plasma
Fondaparinux	Xa	None
Bivalirudin	IIa	None
Argatroban	IIa	None
Lepirudin/ Desirudin	IIa	PMMA, dialysis
Rivaroxaban	Xa	None
Apixaban	Xa	None
Dabigatran	IIa	None

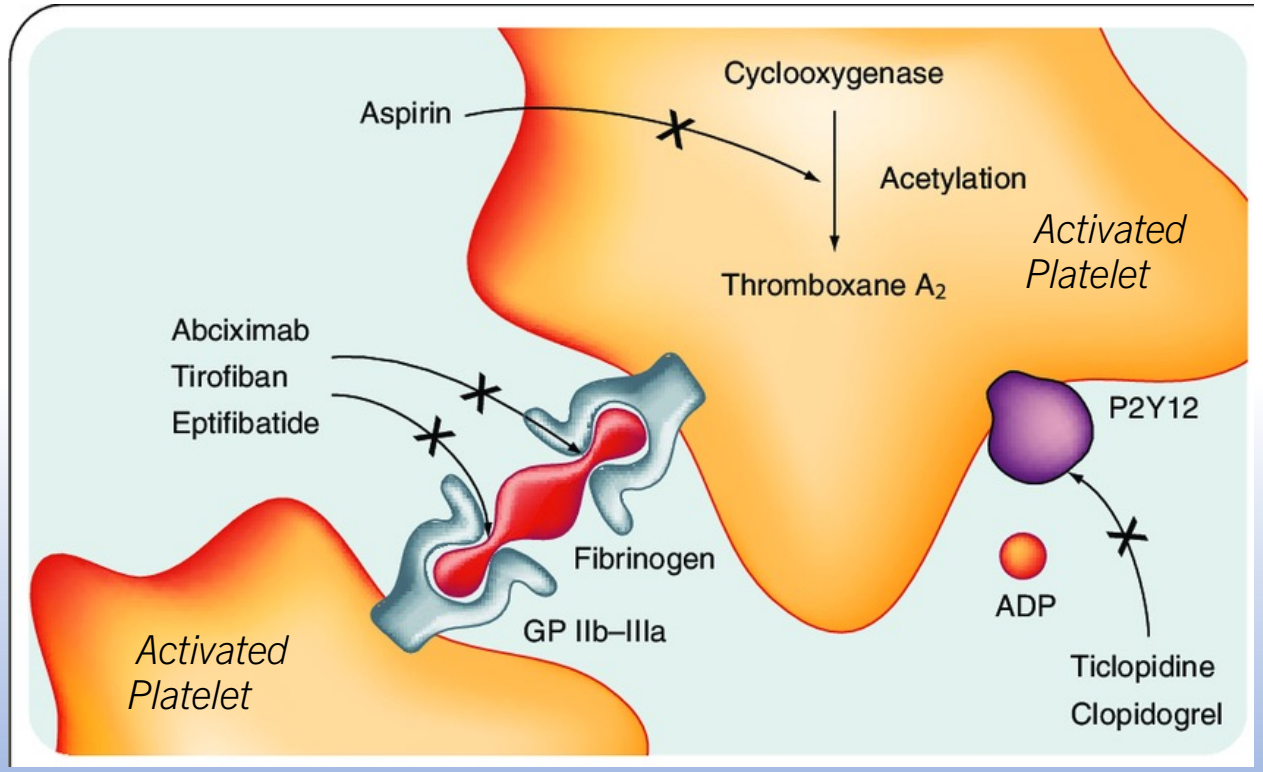
ASPIRIN



ADP RECEPTOR INHIBITORS



GP IIB/IIIA INHIBITORS



BRIDGE THERAPY

Thromboembolic risk in patients with mechanical valve prosthesis and VTE			
Indication of oral anticoagulation	**Low risk**	**Moderate risk**	**High risk****
Mechanical valve prosthesis	• Bileaflet aortic valve prosthesis without other risk factor	• Bileaflet aortic valve prosthesis with 1 or more risk factors*	• Mitral valve prosthesis (any type) • Caged-ball or tilting disc aortic valve prosthesis • Ischemic stroke or TIA within 6 months
VTE	• VTE > 12 months previous	• VTE within the past 3-12 months • Nonsevere thrombophilia • Recurrent VTE • Active cancer	• VTE within the past 3 months • Severe thrombophilia

BRIDGING

Day (around procedure)	Protocol
−5	Stop warfarin
−3	Start bridging agent (LMWH or placebo)
−1	Stop bridging agent 24 hours prior to procedure
0 (procedure day)	
1	Resume warfarin within 24 hours. Resume bridging agent within 12 to 24 hours for low bleed risk
2–3	Resume bridging agent within 48 to 72 hours for high bleed risk procedures
5–10	Stop bridging agent when INR reaches 2.0 or greater

LMWH – low-molecular-weight heparin.

SUPPLEMENTS

Herbal agent	Interacting drugs	Clinical effect
Danshen (*Salvia miltiorrhiza*)	Warfarin	Bleeding
Dong quai	Warfarin	Bleeding
Ephedra	Caffeine, decongestants	Sympathomimetic toxidrome (hypertension, tachycardia, CNS, CVS stimulation)
Garlic	Warfarin	Lowers blood levels
	Chlorpropamide	Hypoglycemia
Ginkgo biloba	Aspirin, clopidogrel, dipyridamole, ticlopidine, warfarin, heparin	Bleeding
	Thiazide diuretic	Elevated blood pressure
	Trazodone	Coma
	Morphine	Lack of effect
Ginseng	Warfarin, ethanol	Lowers blood levels
	Phenelzine	Induces mania
Kava	Benzodiazepines, sedative-hypnotics	CNS depression
	Levodopa	Increased "off" periods
St. John's wort	Antidepressants	Serotonergic stimulation (theoretical)
	Cyclosporin	Decreased effect (cytochrome p450 inducer)
	Digoxin	Decreased serum level
Valerian	Anxiolytics	CNS sedation

CANNABIS

Routes Most Often Used (n = 250)

Route	Percent (number)
Smoking	42.6% (106)
Vape	20.9% (52)
Edible	14.1% (35)
Tincture	8.4% (21)
Oil	4.8% (12)
Capsule	3.6% (9)
Other	3.2% (8)
Topical	2% (5)
Lozenge	0.4% (1)

King, D.D., Gill, C.J., Cadieux, C.S., Singh, N. (2024). The Role of Stigma in Cannabis Use Disclosure: An Exploratory Study. Harm Reduction Journal, 21(21). https://doi.org/10.1186/s12954-024-00929-8.

CANNABIS

Reasons for use

n = 250

Reason	Percent (number)
Anxiety	64.7% (161)
Pain	63.1% (157)
Sleep	56.5% (141)
Depression	43.8% (109)
Recreation/leisure	35.3% (88)
Arthritis	29.3% (73)
PTSD	27.3% (68)
Headache/migraine	24.5% (61)
Muscle spasm	24.9% (62)
Neuropathy	(19.7% (49)

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STIGMA RESULTS

- Healthcare workers will treat me differently
- Healthcare workers will not listen to my concerns
- Healthcare workers will look down on me
- Healthcare workers will give me poor care
- Healthcare workers will think that I cannot be trusted
- Healthcare workers will think that I'm pill shopping, or trying to con them into giving me prescription medications to get high or sell

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PHARMACOKINETICS

Peak Onset

Route	Onset
Rectal	15 min
Inhalation	15-22 min
Sublingual	30 min
Oral	15-120 min
Transdermal	120 min

Duration of Action

Route	Duration
Inhaled	2-4hrs*
Ingested	4-6hrs

* Dose dependent

Regardless of route, cognitive/psychomotor impairment up to 24hrs

Half Life = 20-30hrs (1-2 weeks in chronic users
Elimination = 25-30 days

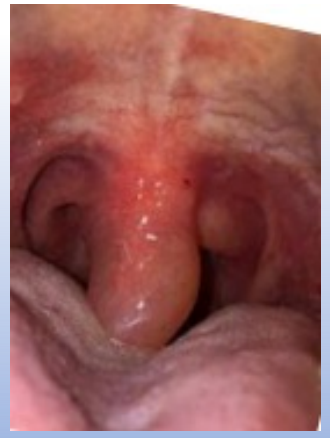
RESPIRATORY EFFECTS

- Coughing
- Wheezing
- Bronchitis
- Increased sputum production
- Asthma exacerbation
- URI
- Bronchospasm
- Laryngospasm
- Emphysema
- Airway edema
- Airway hyperreactivity
- Increased carboxyhemoglobin
- Pneumothorax
- Bullous lung disease
- Uvular edema, uvulitis
- Oropharyngitis

UVULAR EDEMA

- Multiple isolated case reports
- Typically occurs within 4-12 hrs. of inhaled, large quantities of smoke
- More susceptible with intubation?
- Has led to airway obstruction and need for definitive management
- **Treatment**: 10mg dexamethasone IV (0.1mg/kg every 6-12 hours x 1-2 days)

  Also consider methylprednisolone and albuterol



MYOCARDIAL RISK

- Increased platelet aggregation
- Increased carboxyhemoglobin
- Decreased oxygen supply

4.8x risk of myocardial infarction within first hour

2.5-4x increased risk of death if prior MI

Recommendations

- Delay elective cases for smoking <2hrs prior
- Abstinence >/= 24-72hrs associated with overall better surgical outcomes

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