Anaestheasier

Graphical Flashcards

Pharmacology

For the Primary FRCA

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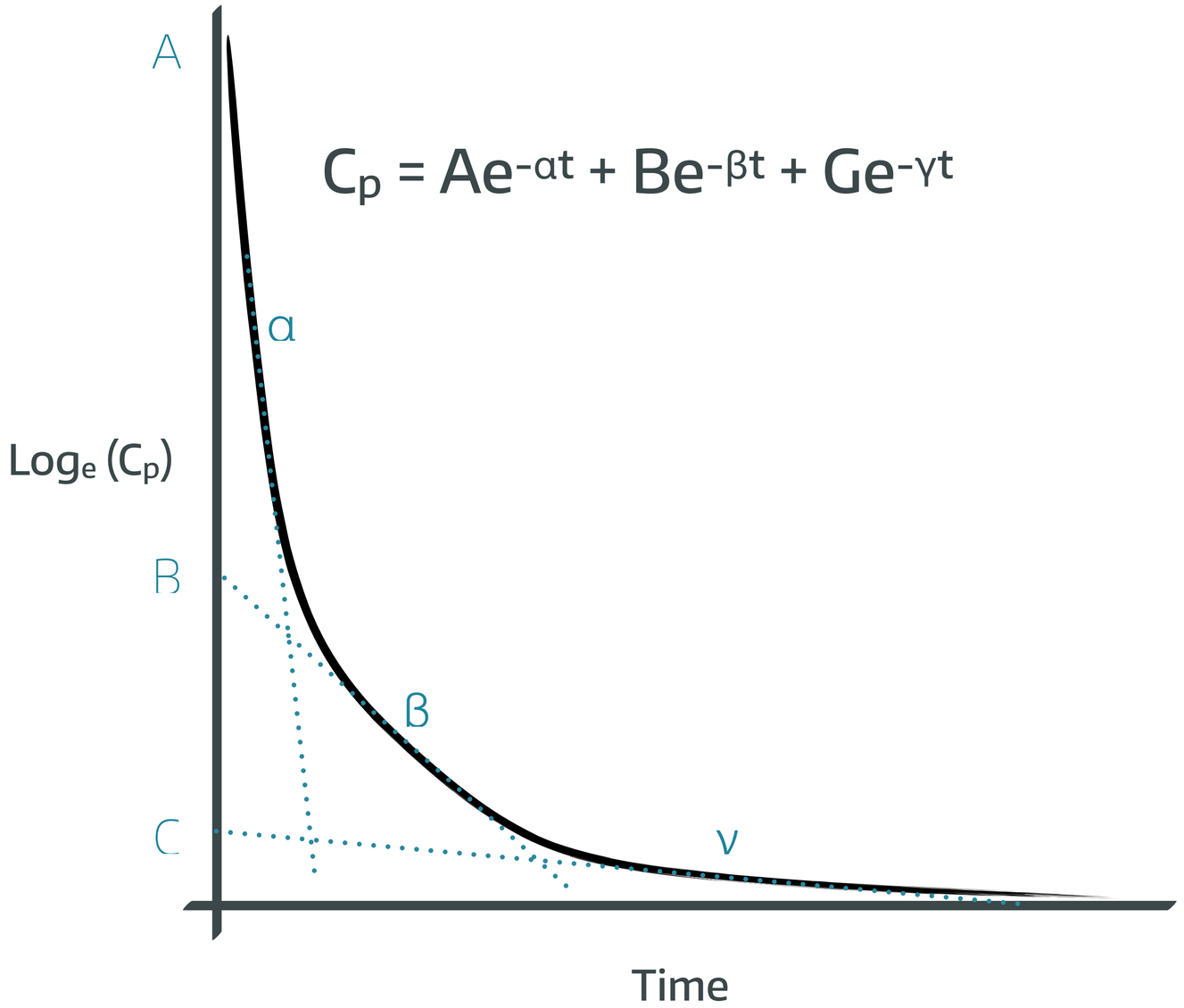
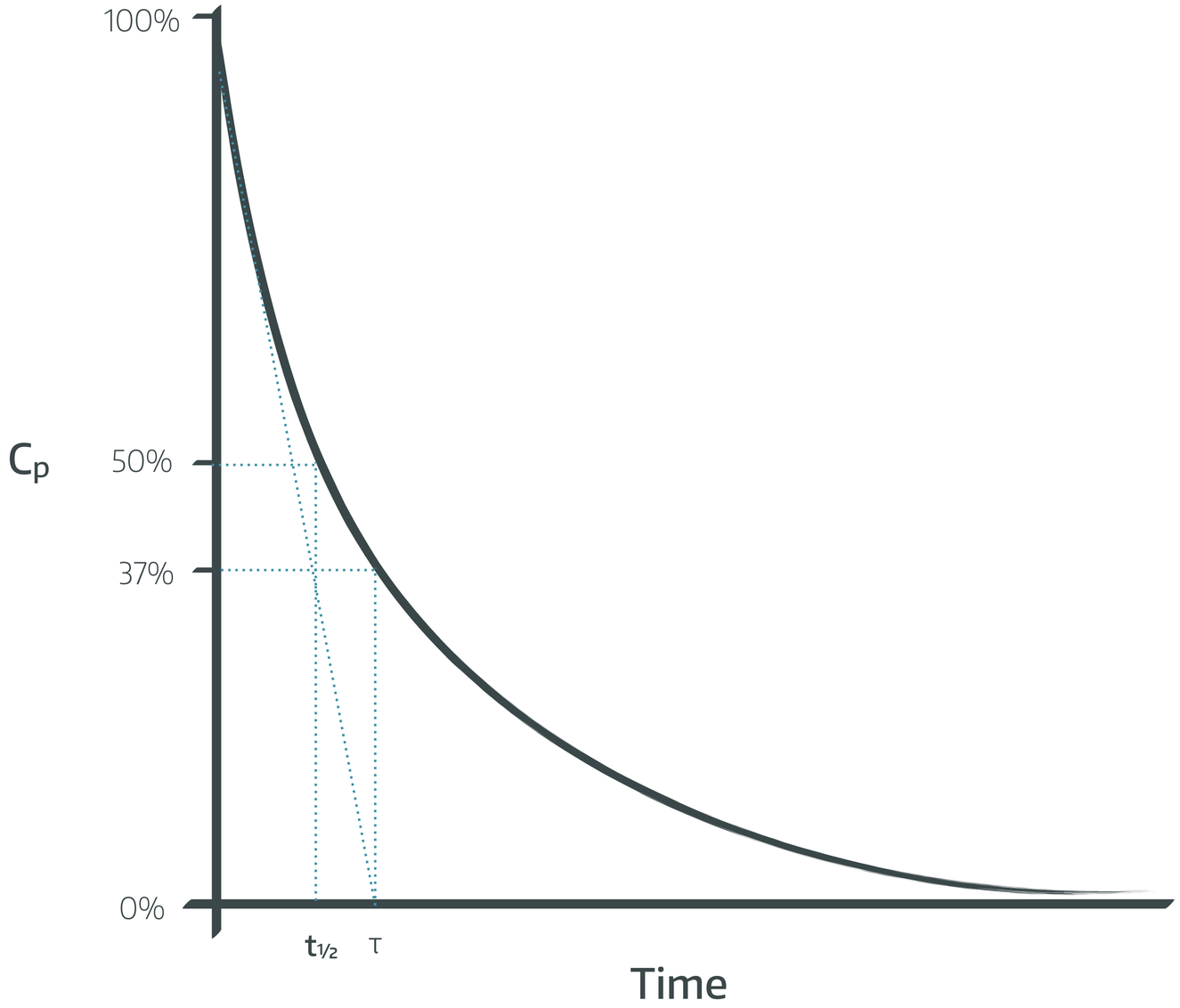
PHARMACOKINETICS

Tri-exponential Decline in Plasma Concentration of Drug

$$C_p = Ae^{-\alpha t} + Be^{-\beta t} + Ge^{-\gamma t}$$



PHARMACOKINETICS



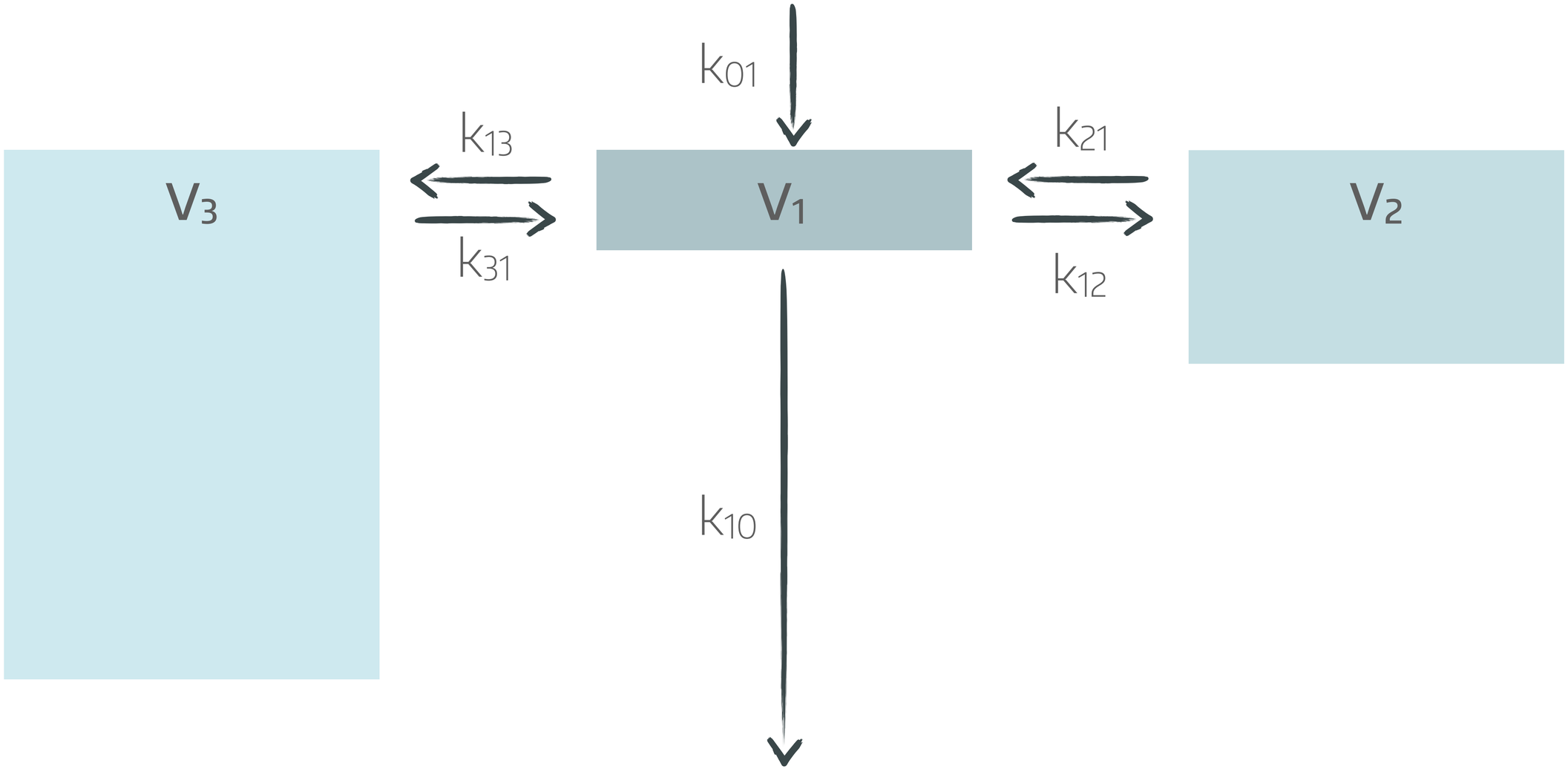
$$t_{1/2} = 0.693 \times \tau$$

$$k = \tau^{-1}$$

$$C_p = C_0 \,.\, e^{-kt}$$

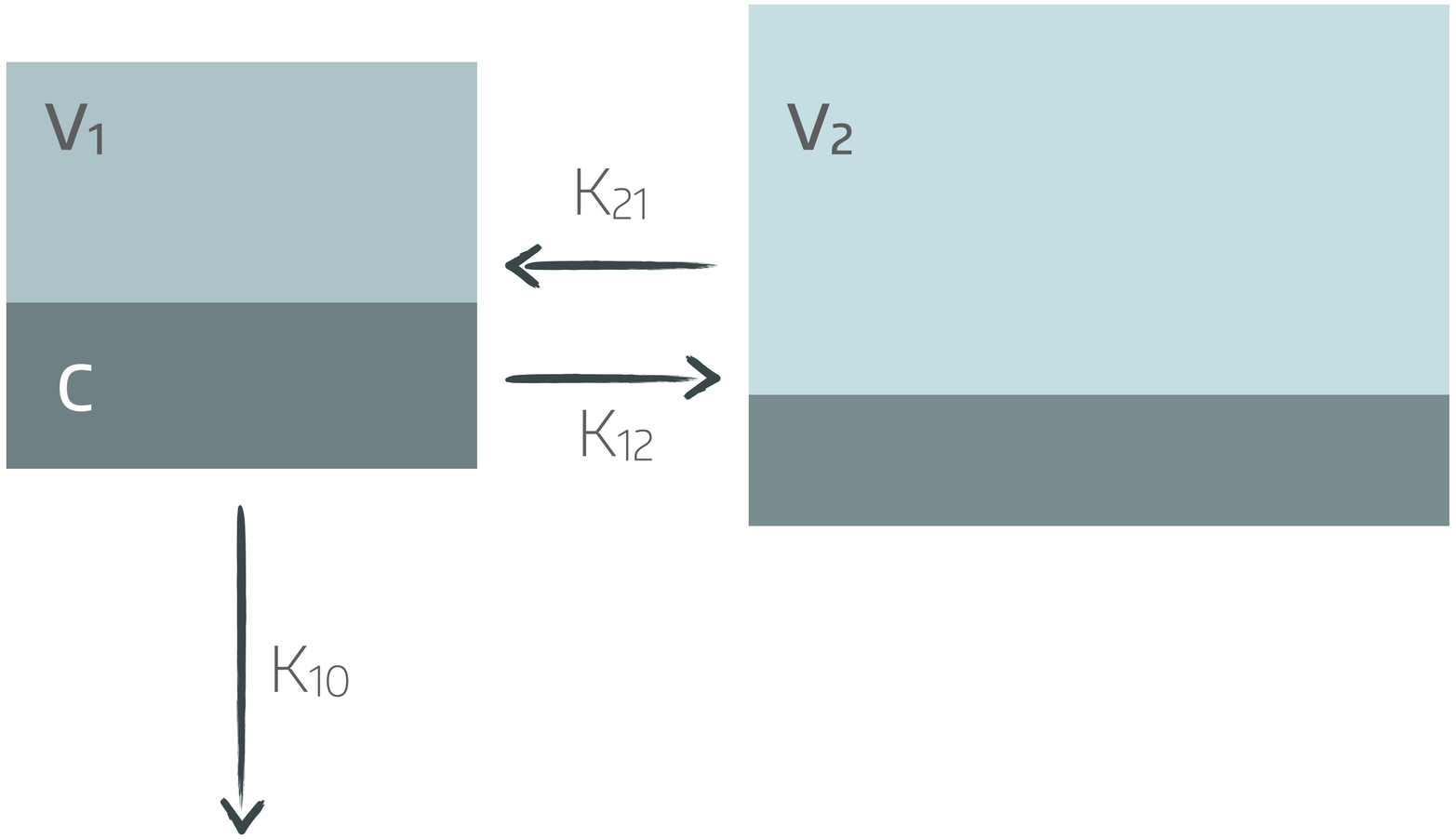
PHARMACOKINETICS

The 3-Compartment Model

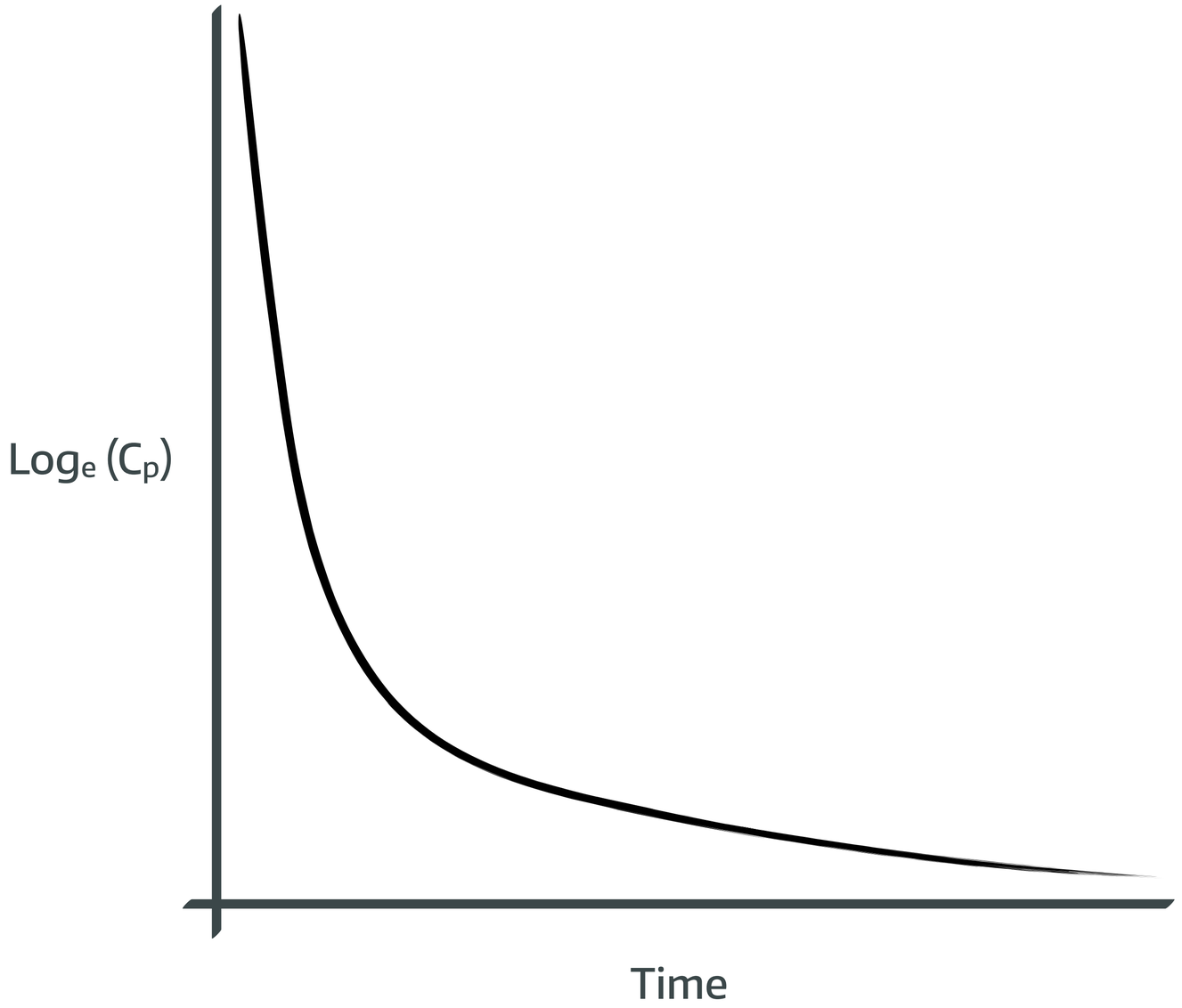


PHARMACOKINETICS

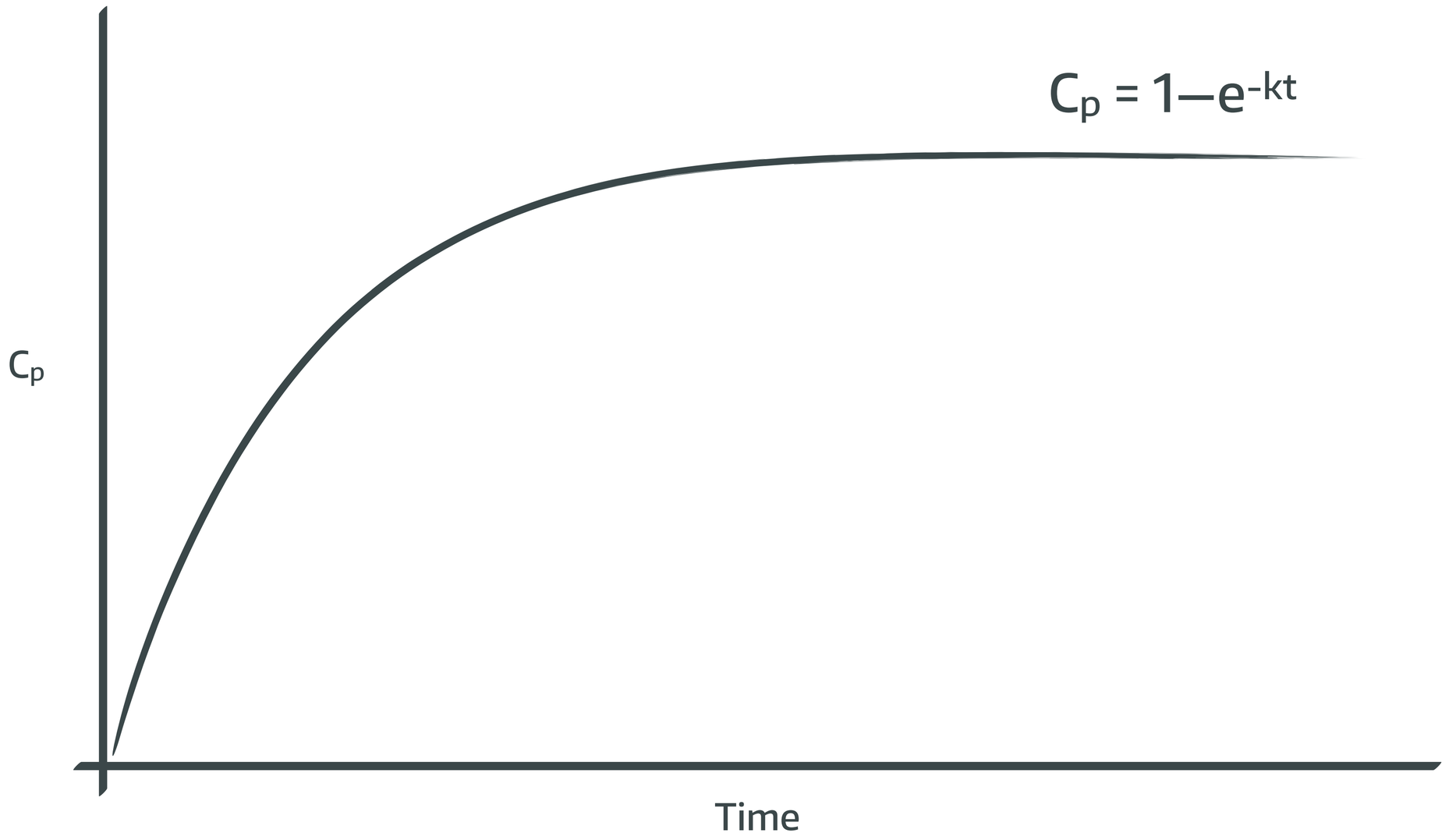
The 2-Compartment Model



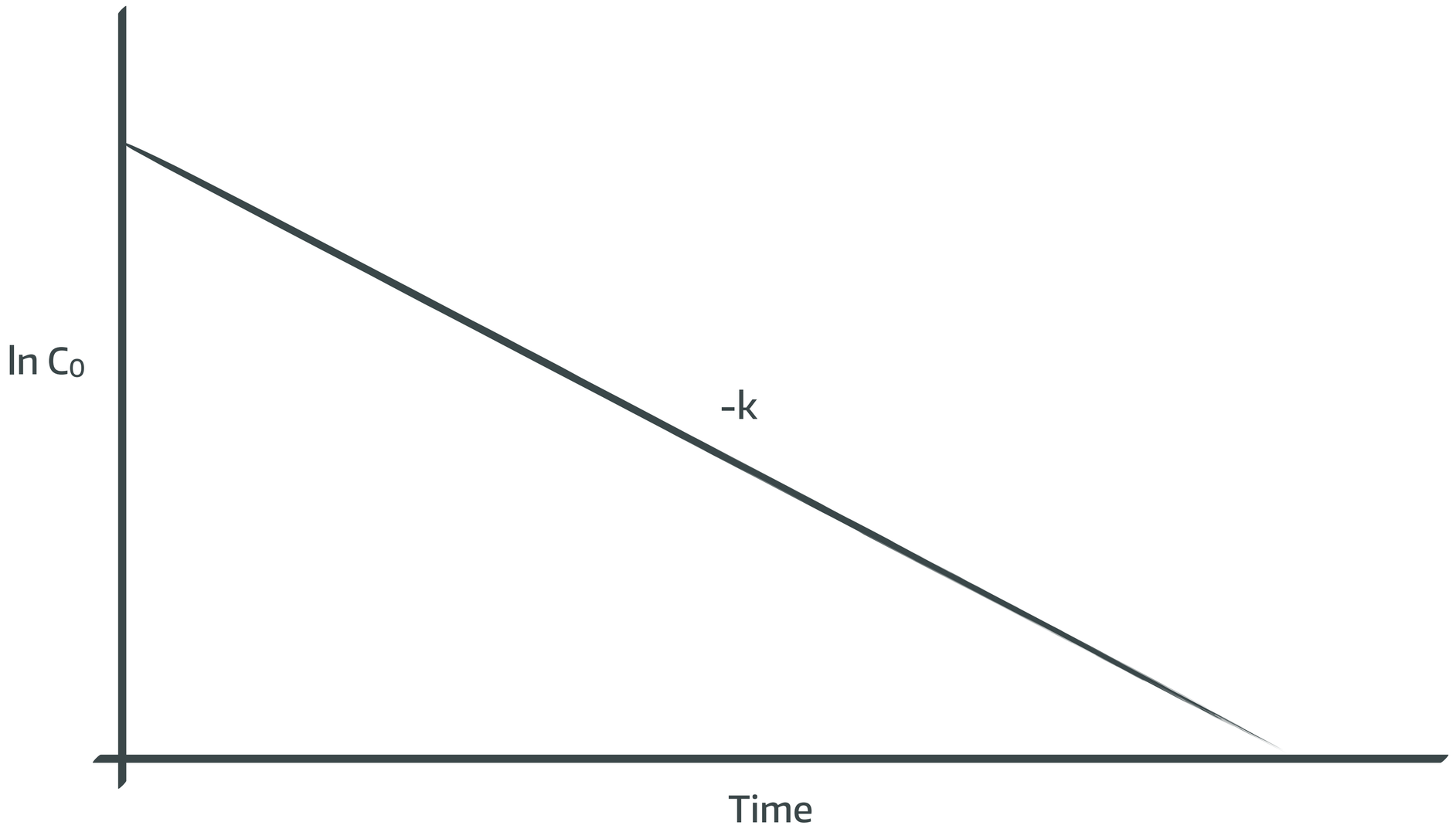
Bi-exponential Decline in Plasma Concentration of Drug



Wash-in Curve for Infusion Building to Steady State

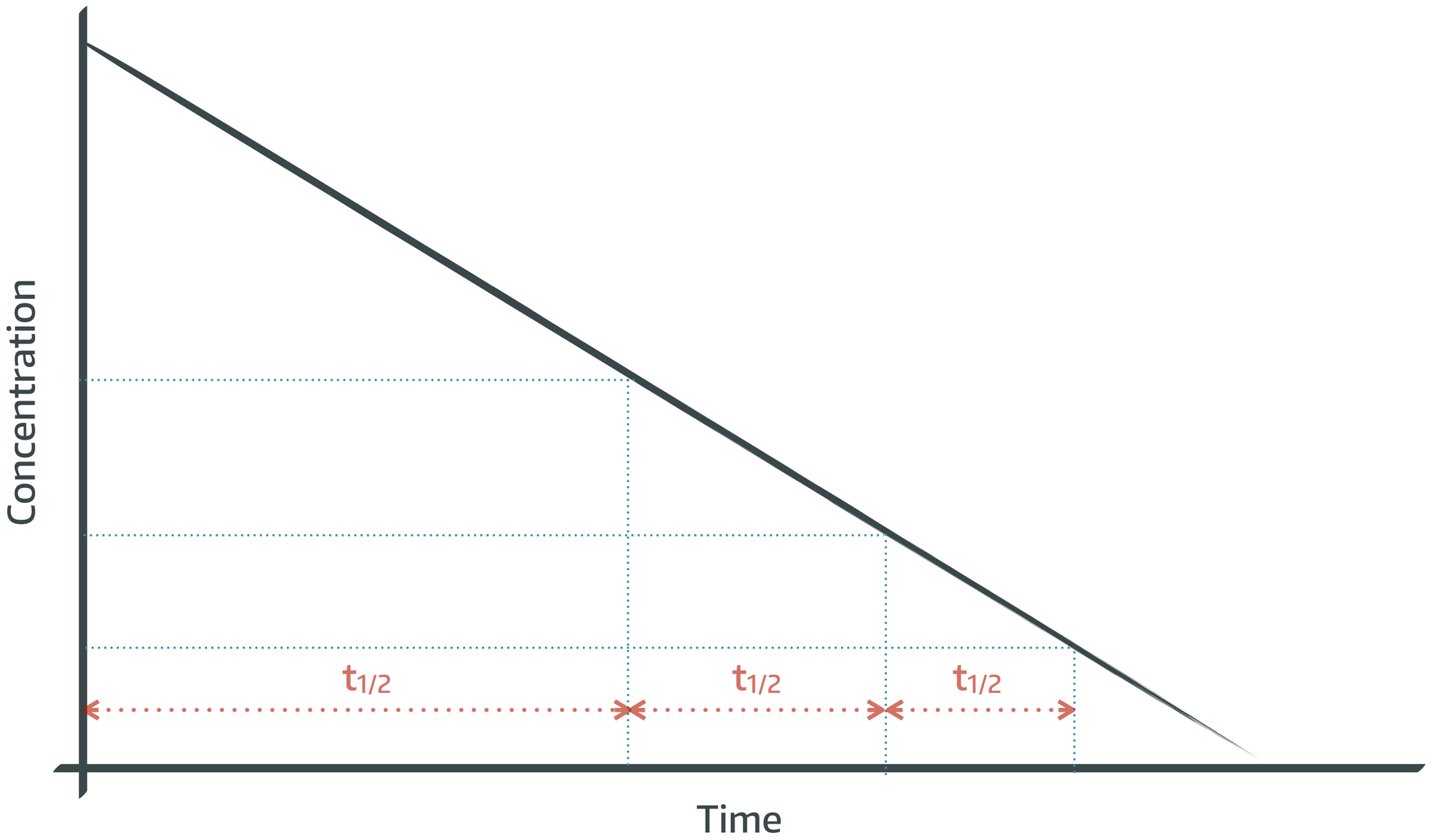


PHARMACOKINETICS



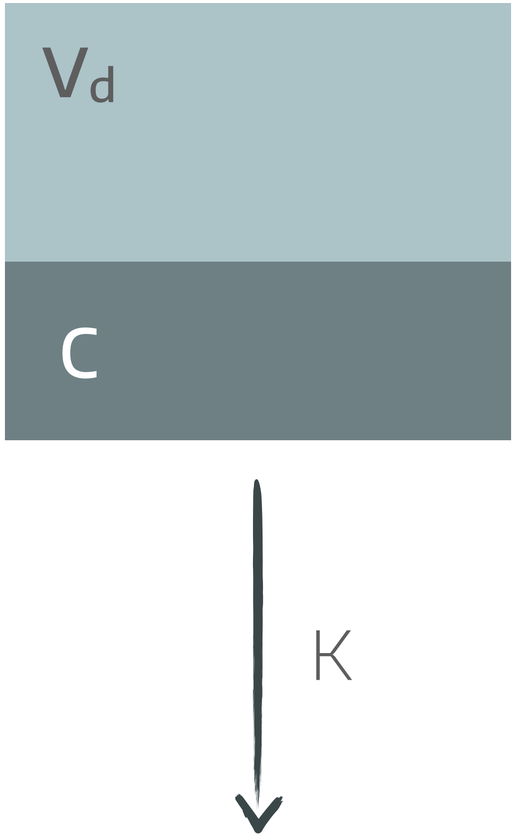
PHARMACOKINETICS

Zero Order Kinetics



PHARMACOKINETICS

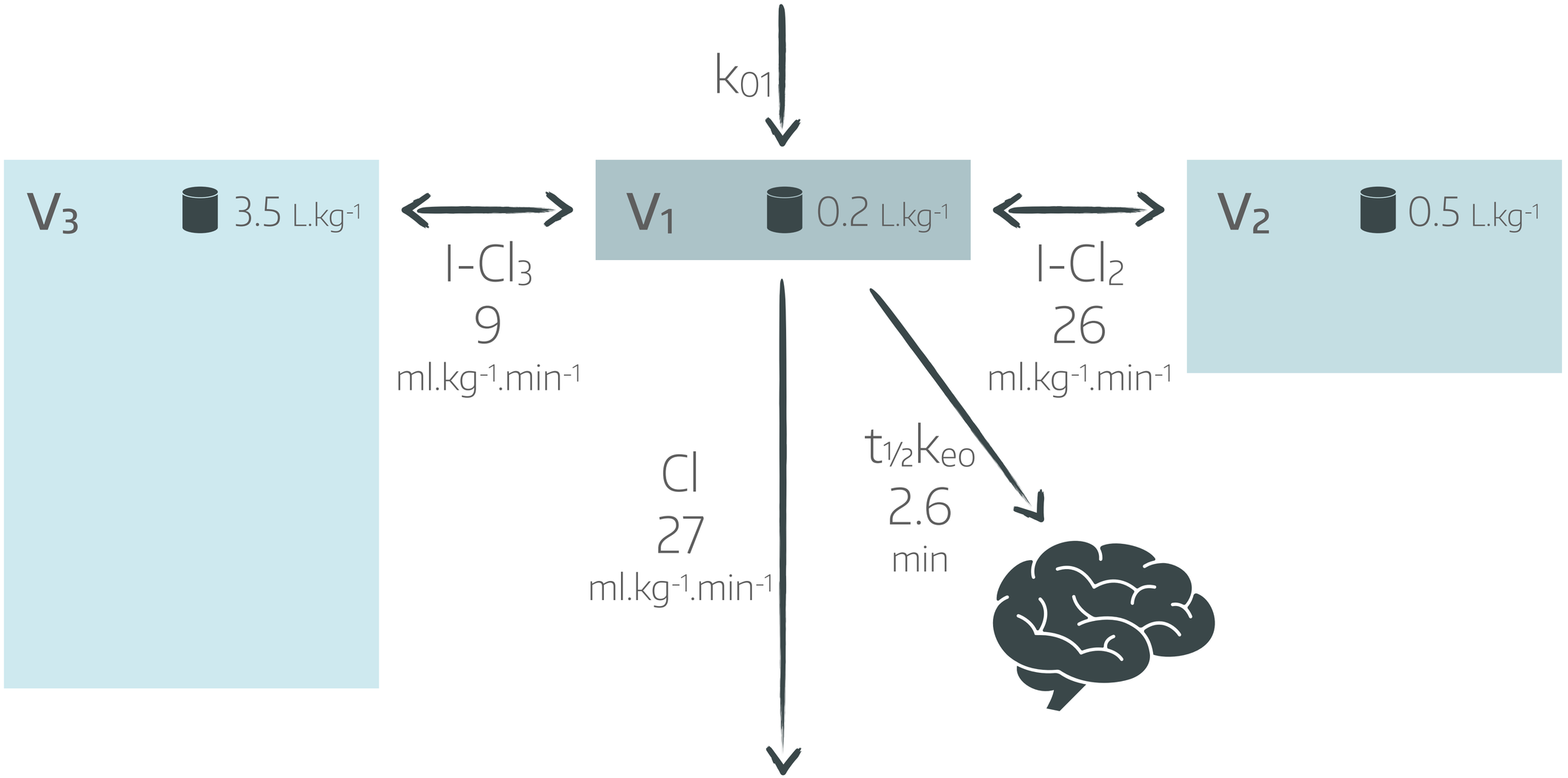
The 1-Compartment Model



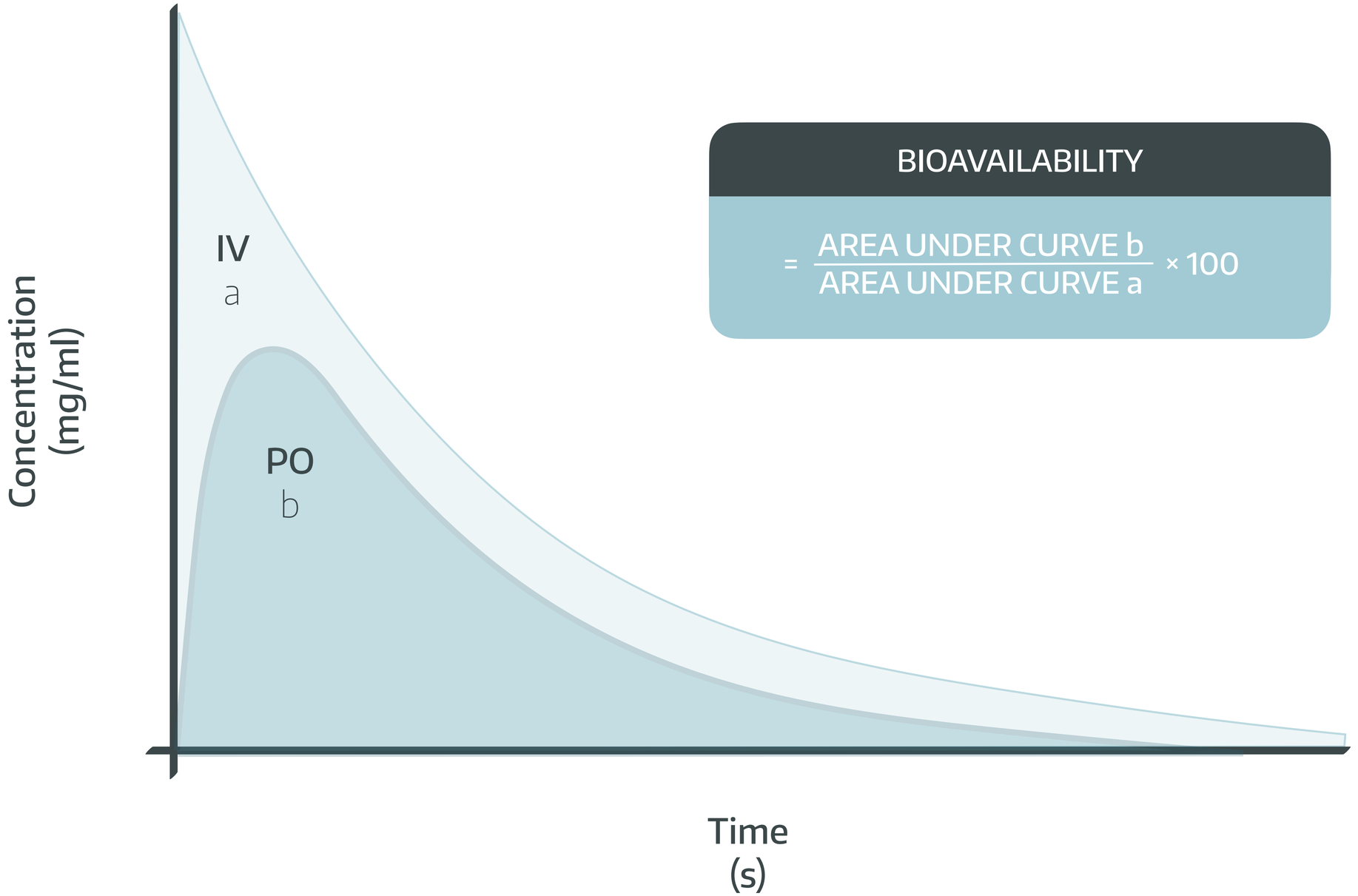
$$V_d = \frac{\text{Dose}}{\text{Concentration}}$$

PHARMACOKINETICS

PROPOFOL: The 3-Compartment Model + Effect Site



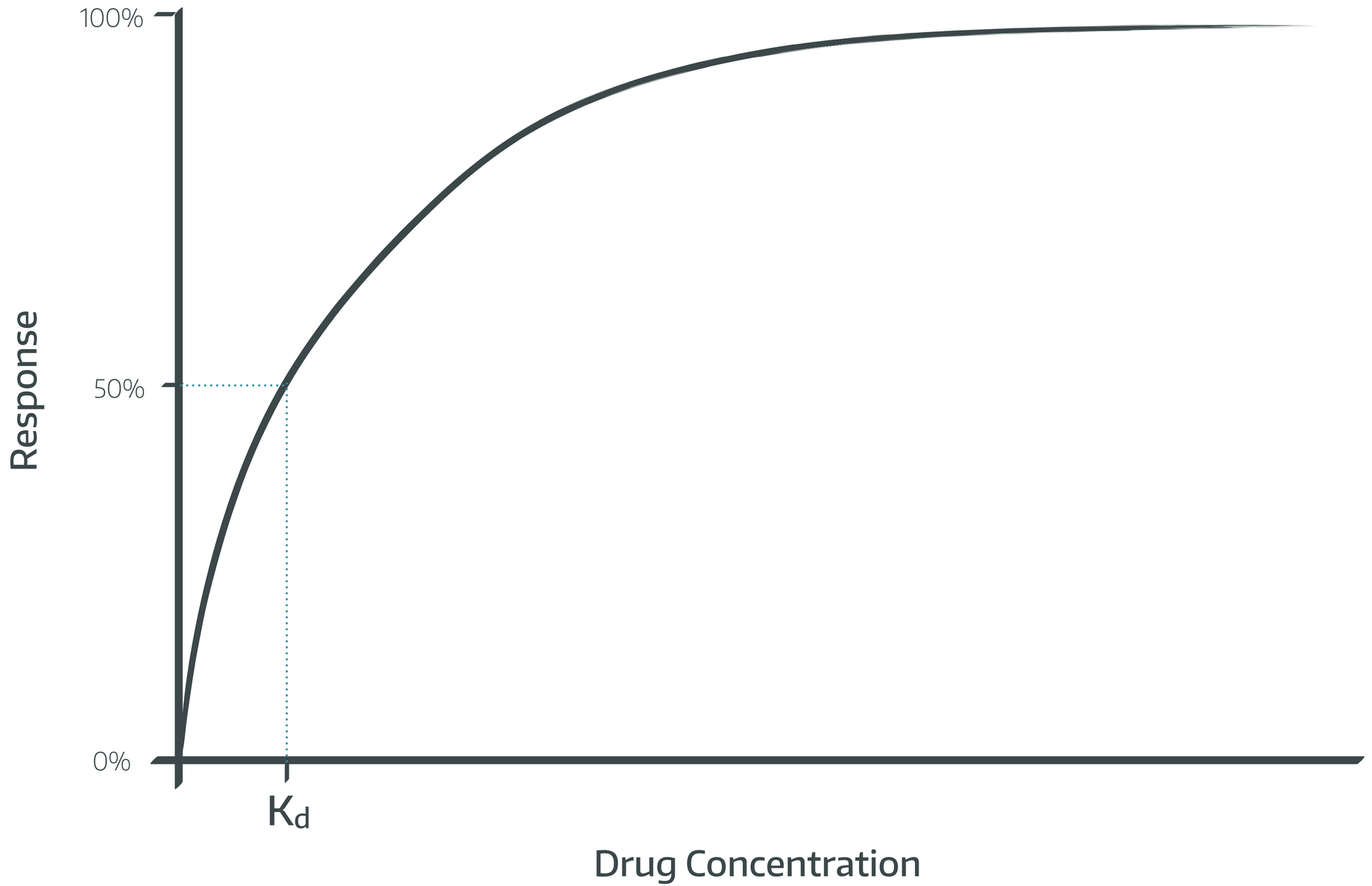
PHARMACOKINETICS



BIOAVAILABILITY

$$= \frac{\text{AREA UNDER CURVE b}}{\text{AREA UNDER CURVE a}} \times 100$$

PHARMACODYNAMICS



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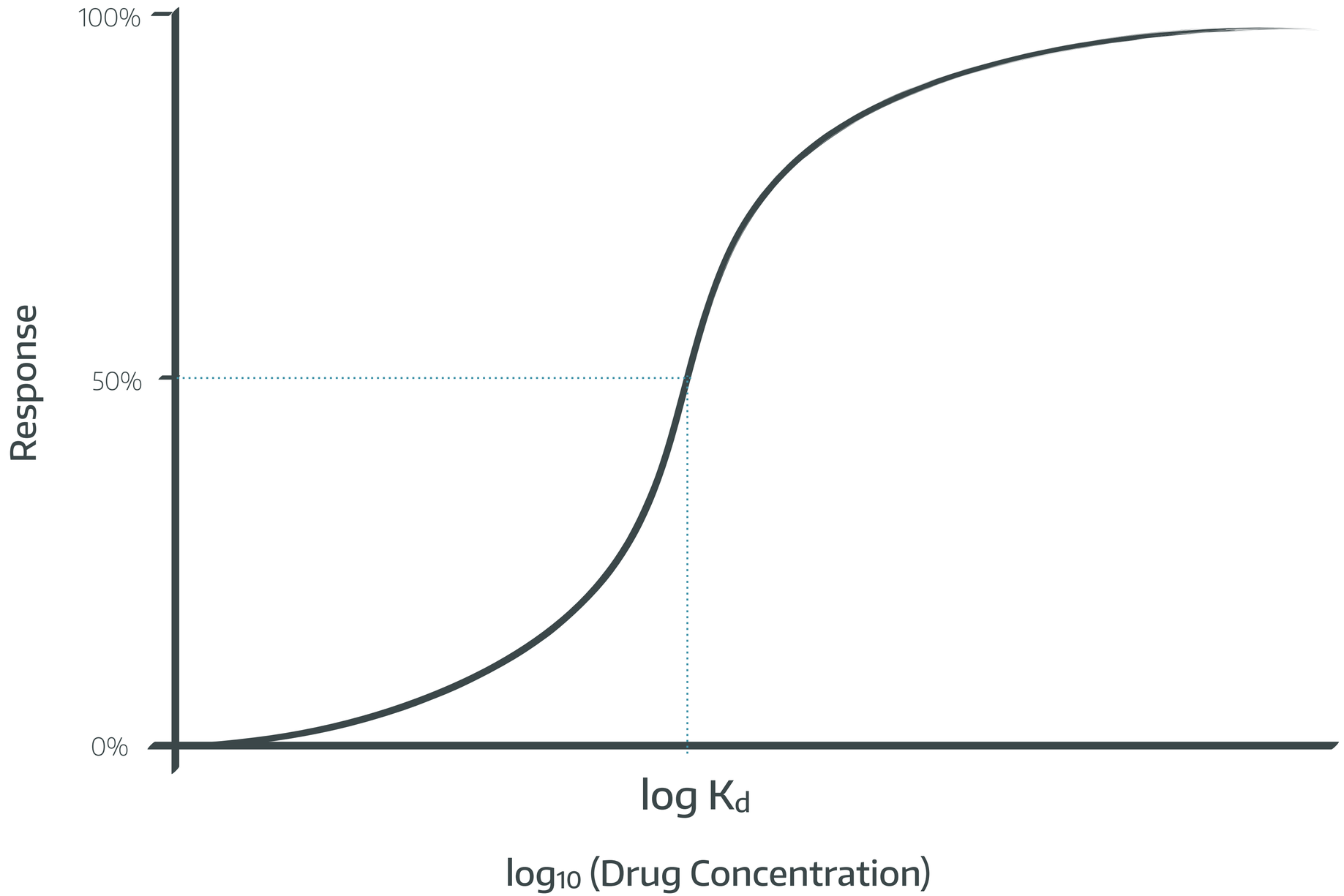

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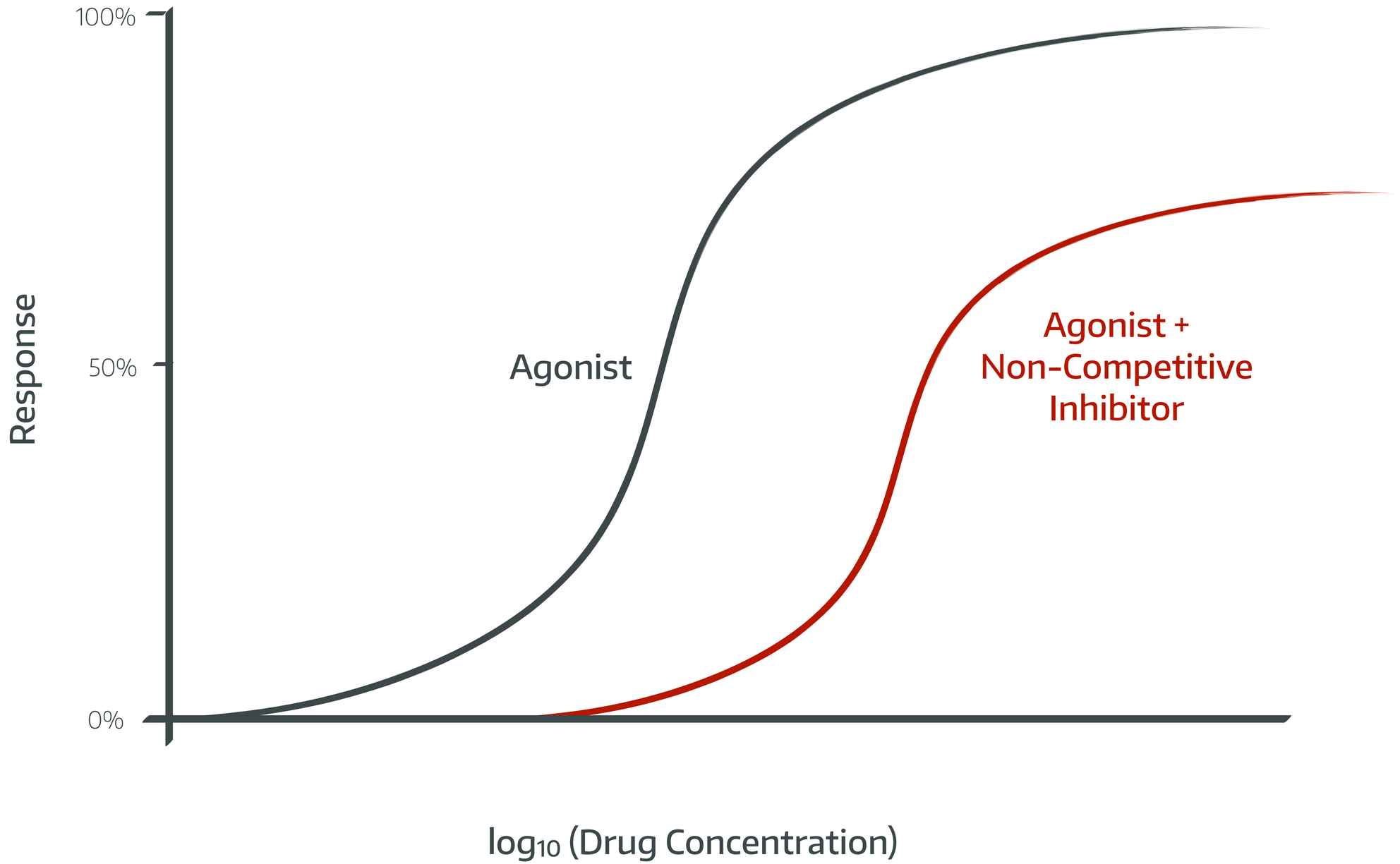
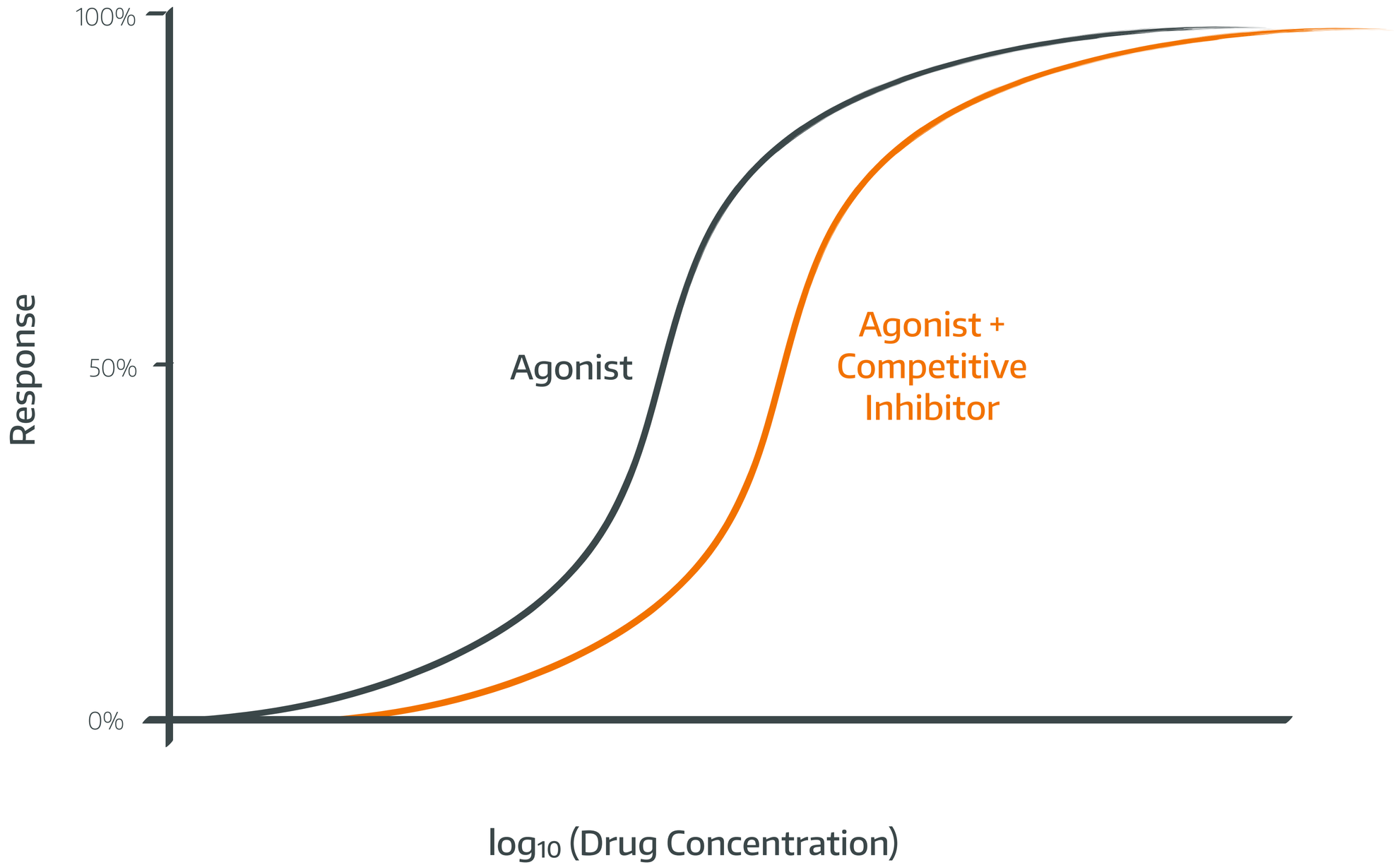


PHARMACODYNAMICS



Drugs across the placenta

Liopophilicity
Size
Polarity
pKa

Protein-Binding
Potency
Cardiac Output
pKa

Diffusion Constant | **Surface Area** | **Concentration Gradient**

$$Q = \frac{K A (C_{in} - C_{out})}{D}$$

Q: Flux

D: Distance

Local Anaesthetics

Foetal Toxicity only occurs if mother toxic
Bupivicaine can ion-trap

Anaesthetic Agents

Thiopentone crosses (no harm).
Inhaled agents cross but excreted rapidly.

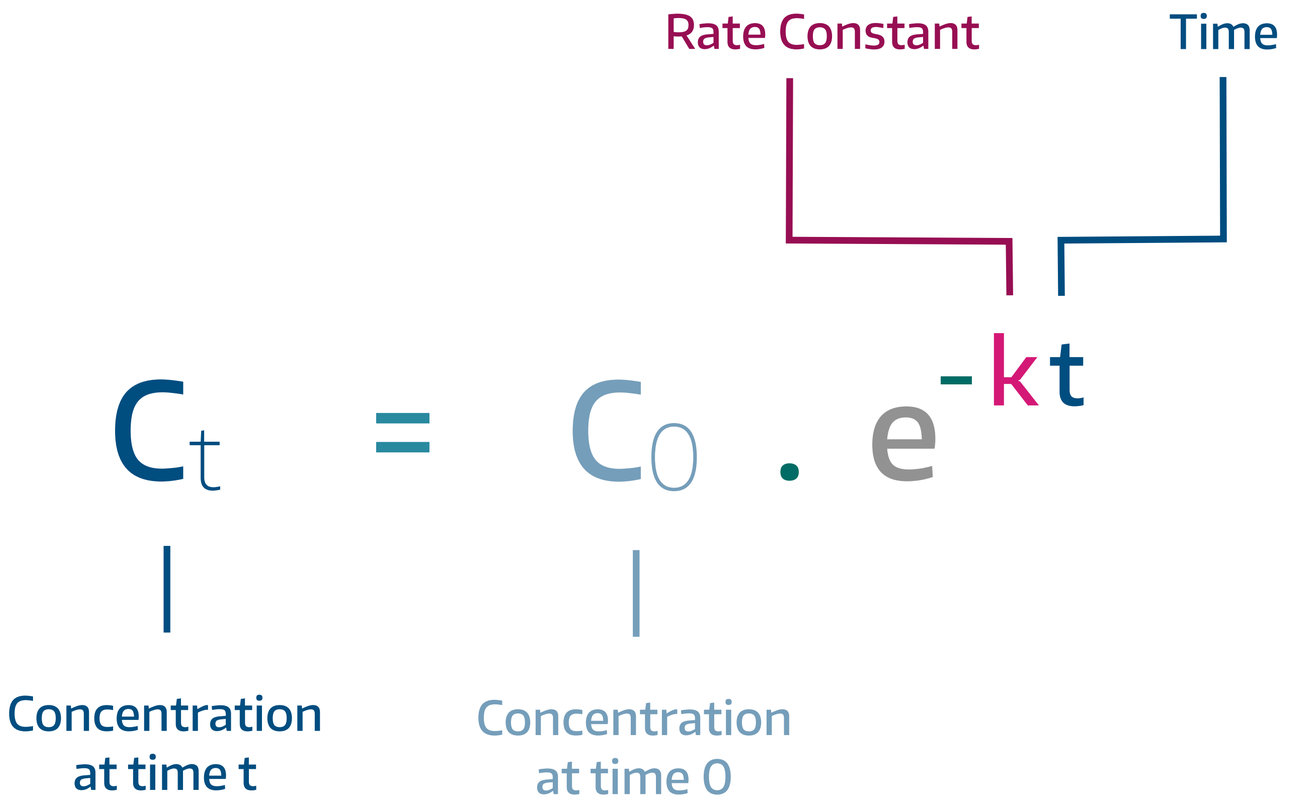
Muscle Relaxants

Suxamethonium crosses in very small quantities.
NDMRs do not cross.

Opioids

Beware that Pethidine (and active metabolite Norpethidine) cross and can ion-trap in foetus.

Drug Elimination



Drug Elimination

$$C_t = C_0 \cdot e^{-kt}$$

$t_{1/2}$ = time taken for C_0 to drop by 50%

$\therefore$ substitute 1 for C_0

$$\frac{1}{2} = 1 \cdot e^{-kt_{1/2}}$$

$$\ln\left(\frac{1}{2}\right) = \ln(1) + -kt_{1/2}$$

$$\ln\left(\frac{1}{2}\right) = 0 - kt_{1/2}$$

$$kt_{1/2} = \ln(2)$$

$$t_{1/2} = \frac{\ln(2)}{k}$$

Drug Elimination

Clearance

Volume of Distribution

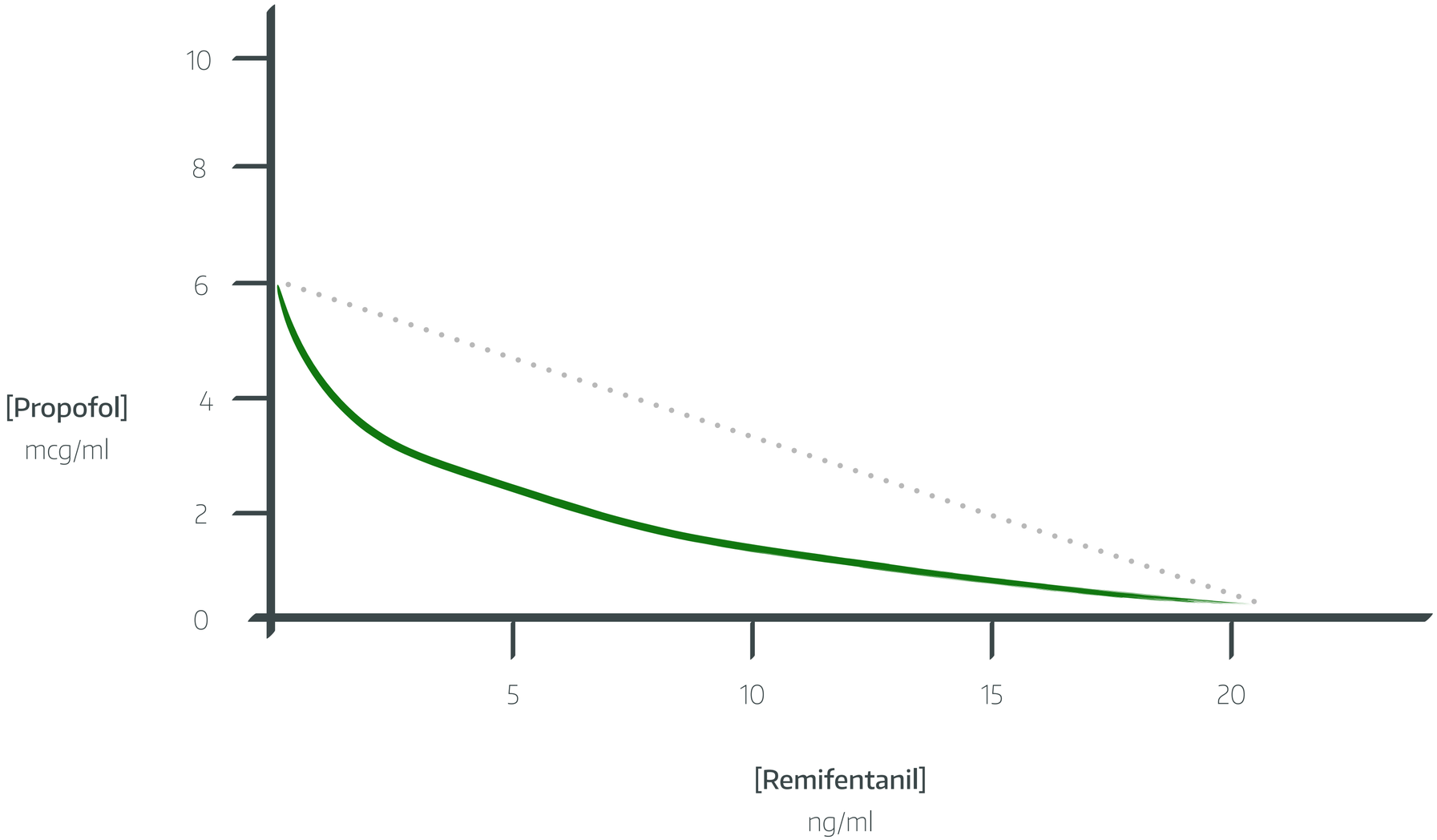
Elimination Rate Constant

$$Cl = V_D \cdot k$$

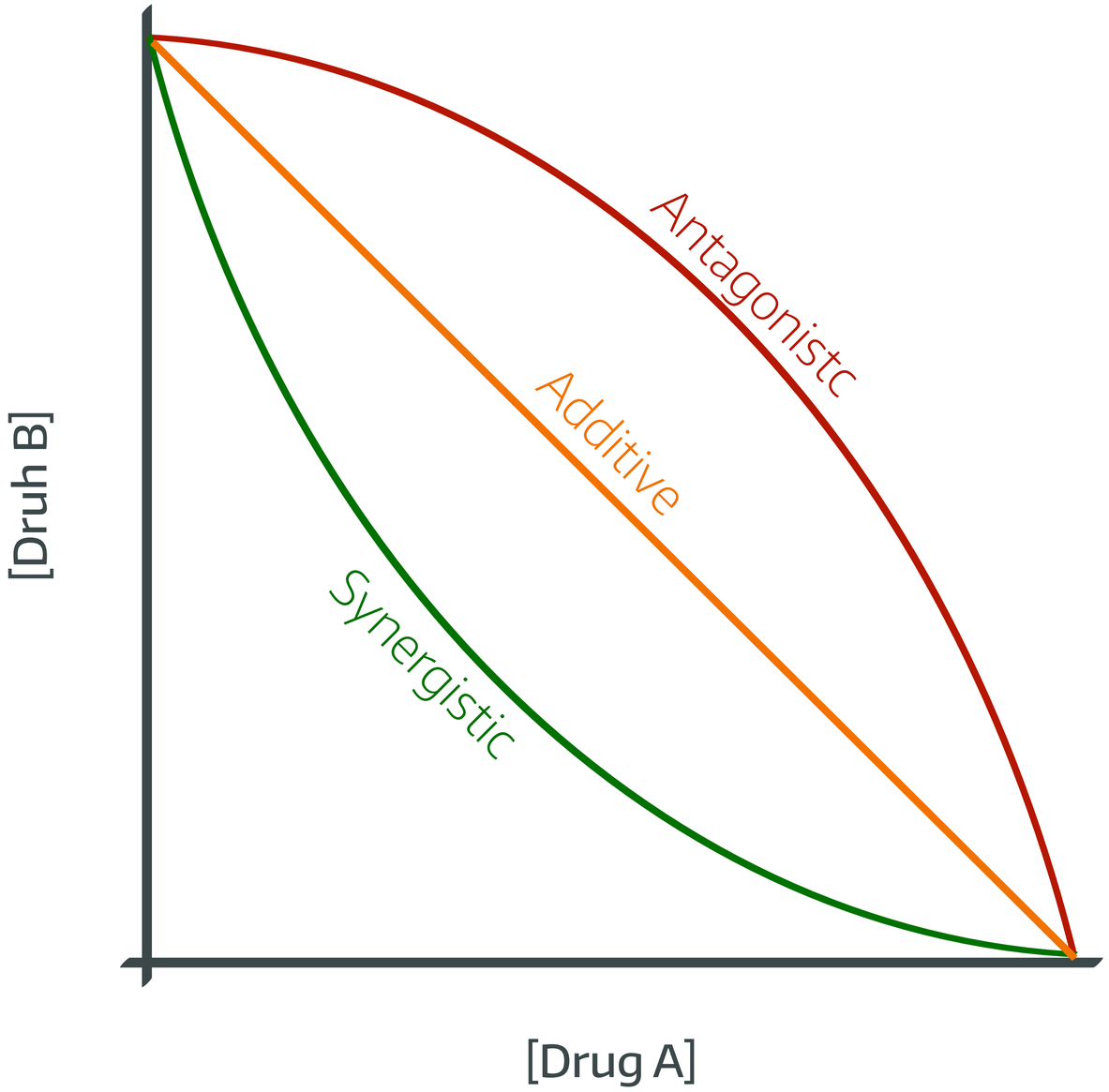
$$ml.min^{-1} = ml \cdot min^{-1}$$

PHARMACOKINETICS

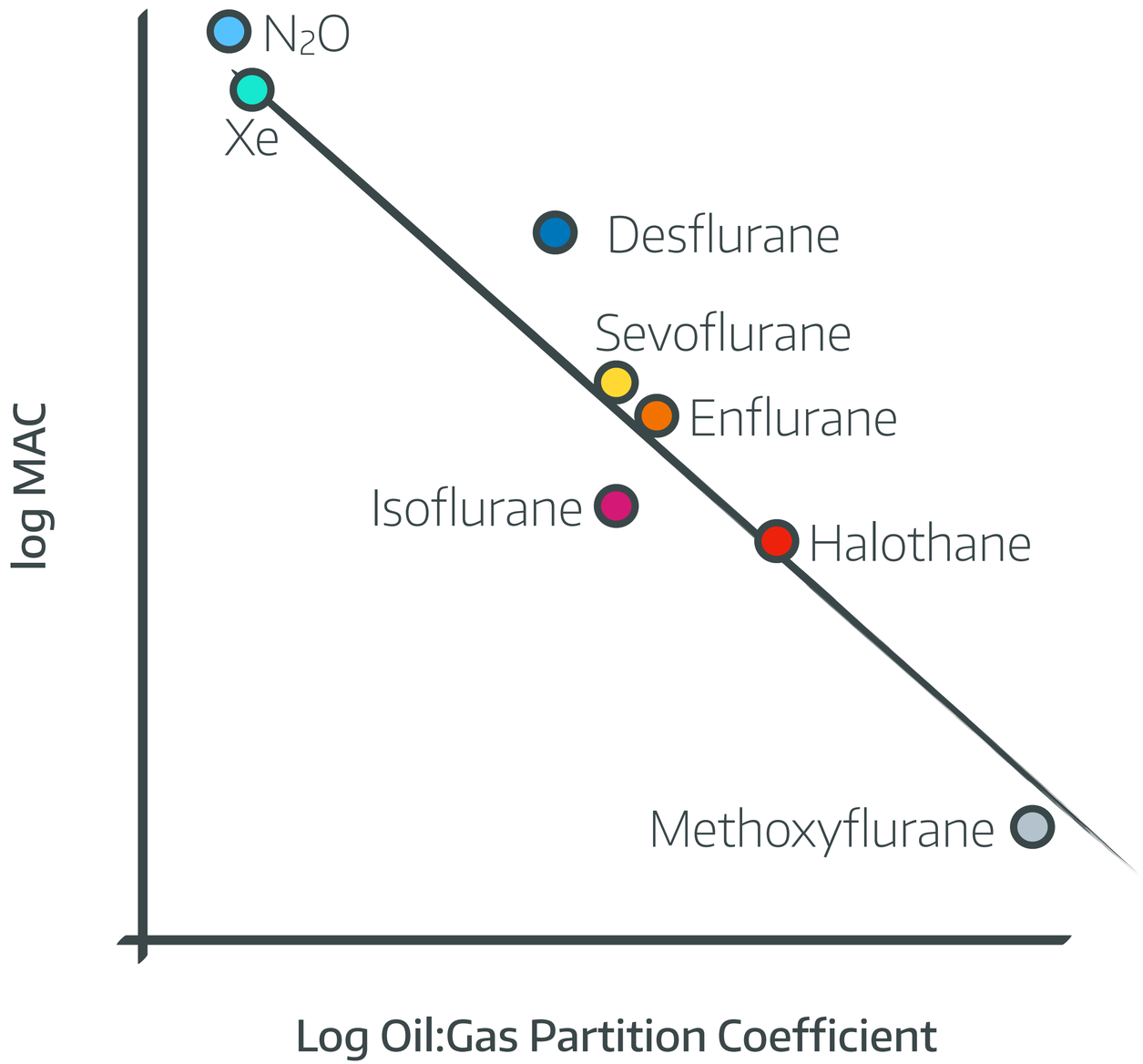
PROPOFOL VS REMIFENTANIL ISOBOLOGRAM



Isobologram



Meyer-Overton



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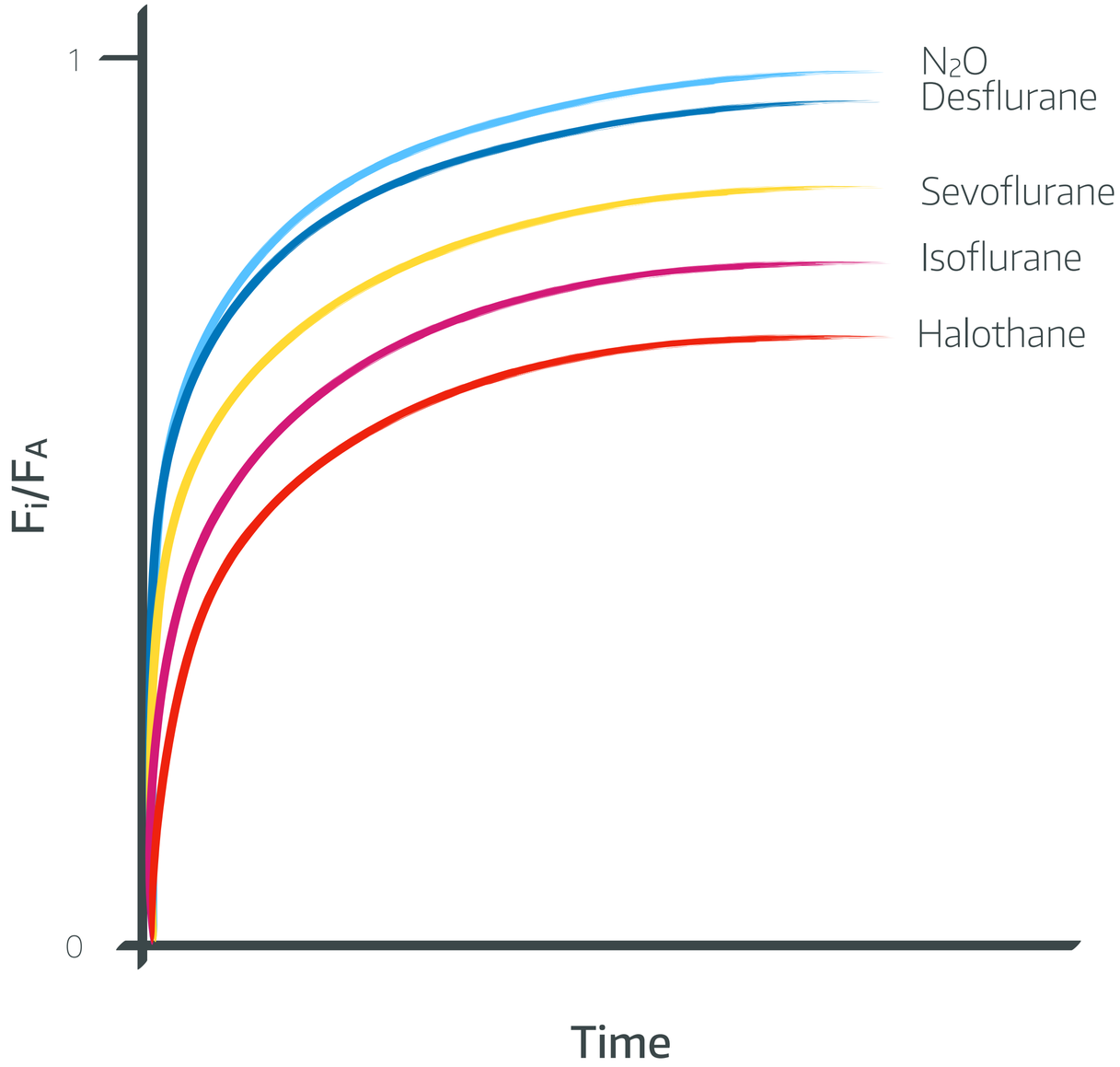

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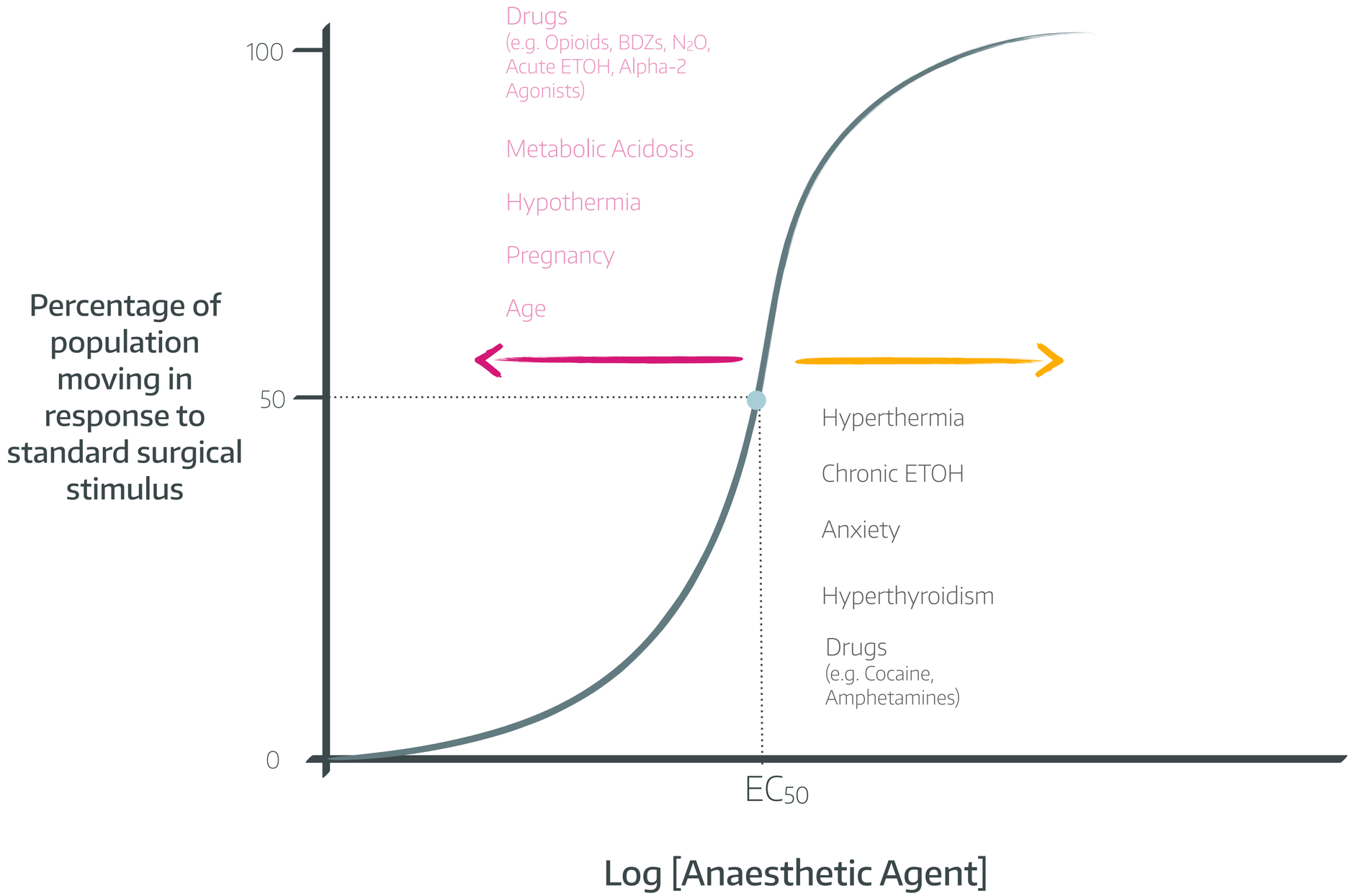
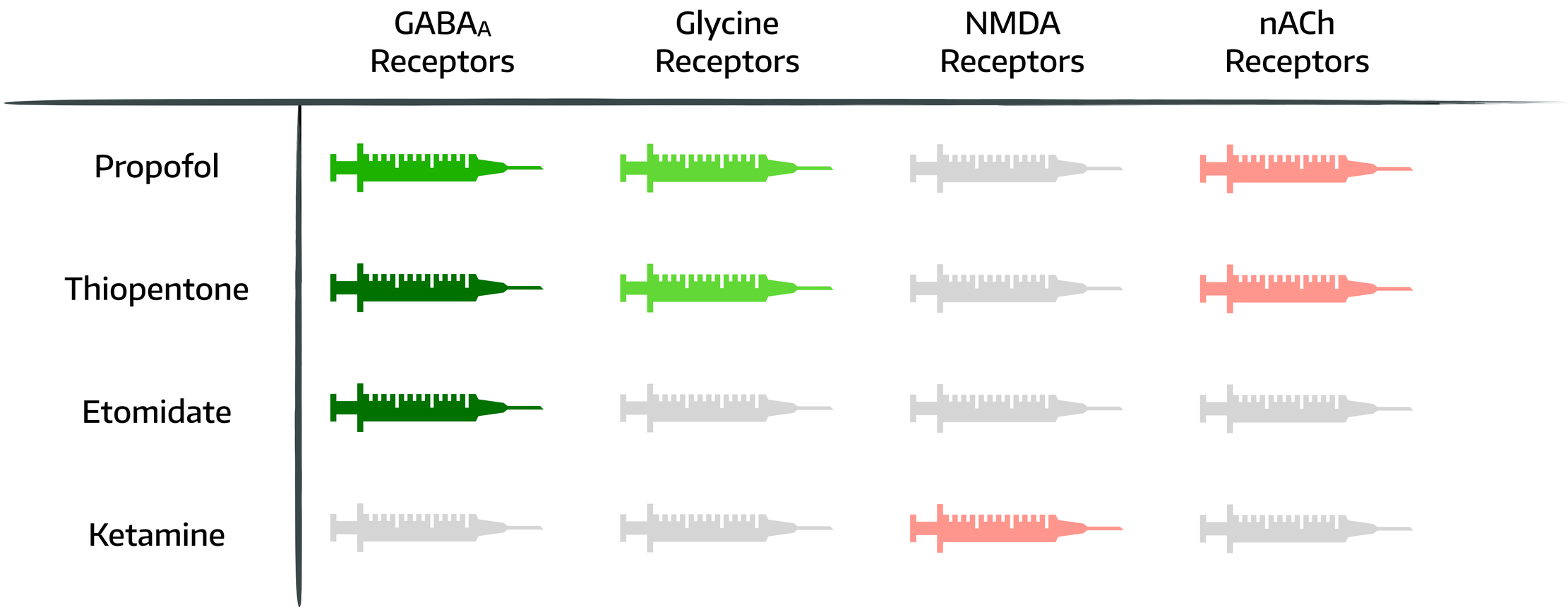
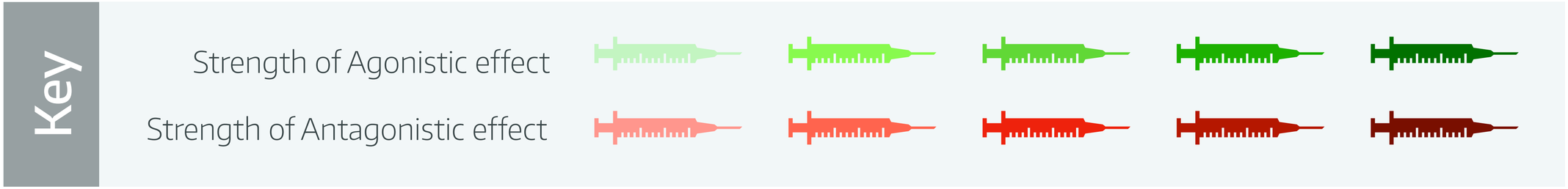


Hyponotic Agents

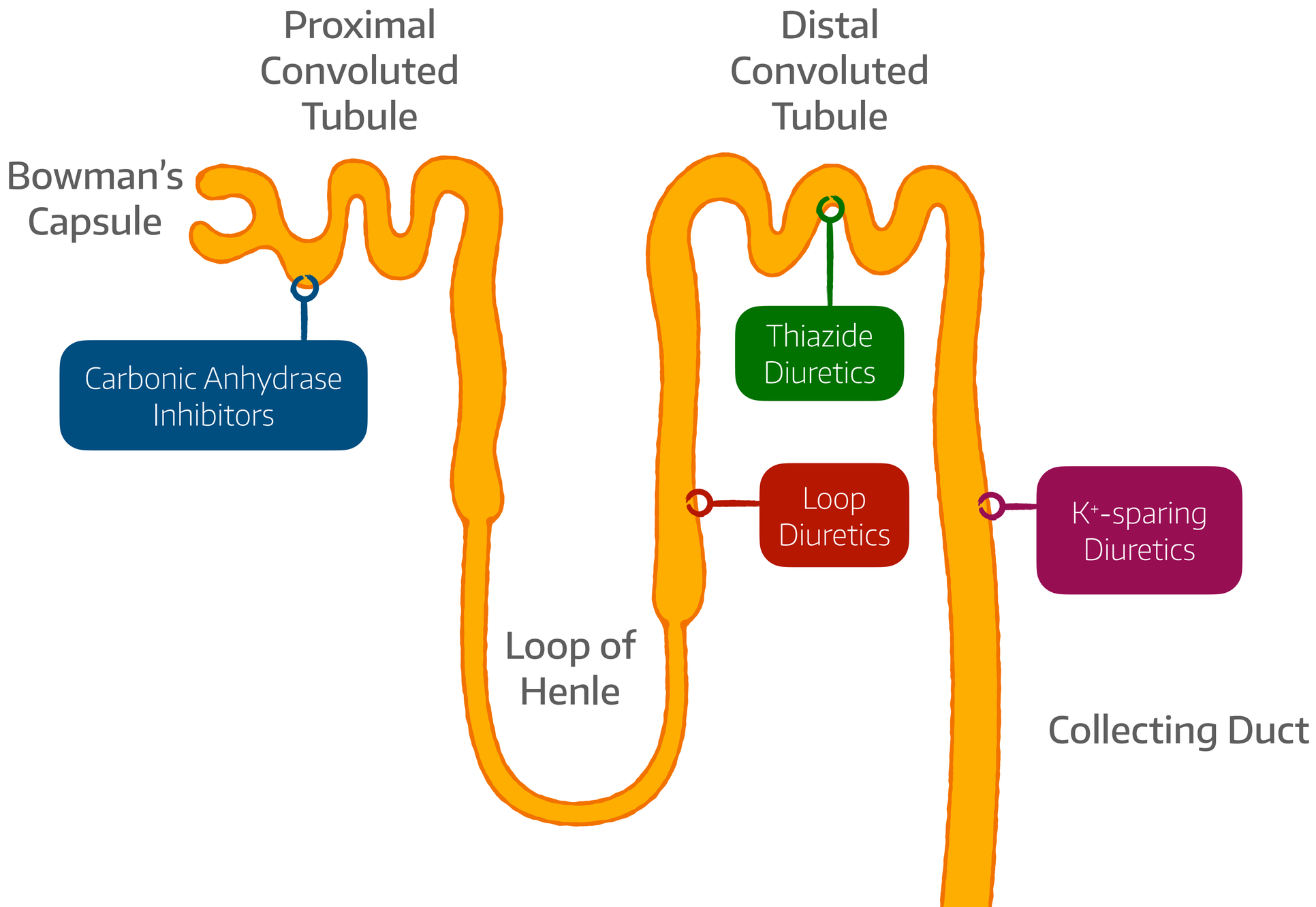




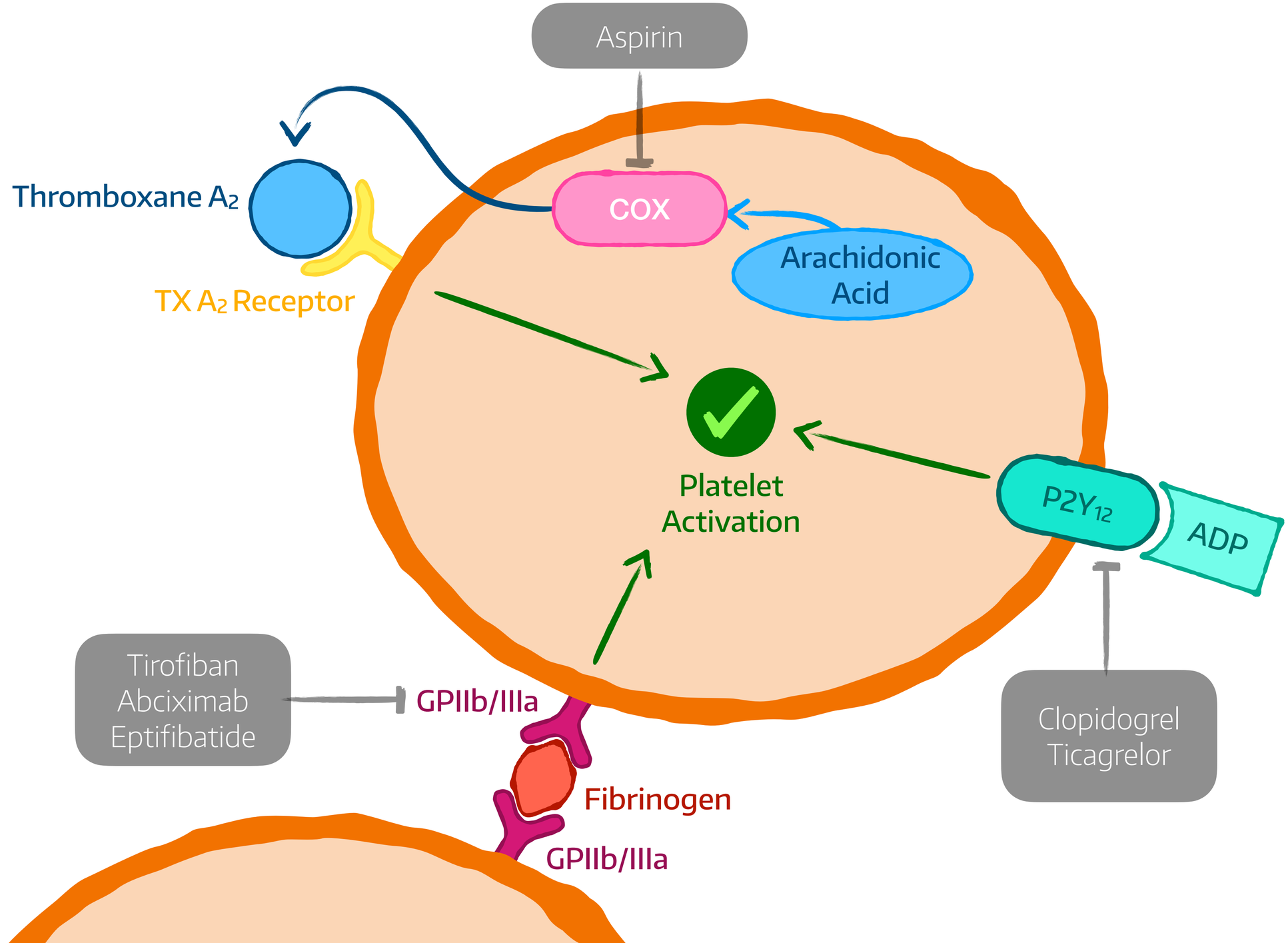
Benzodiazepines

	Equipotent Dose (mg)	Onset (Mins)	Half-life (Hours)	Duration of Effect (Mins)
Chlordiazepoxide	25	60 PO		
Diazepam	10	1 IV 15-30 PO		
Lorazepam	1	2 IV 30-60 PO		
Midazolam	2.5	2-5 IV		

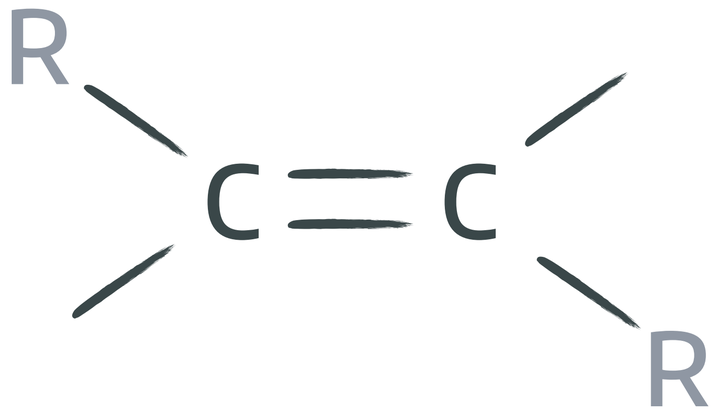
Diuretics


Proximal Convoluted Tubule
Distal Convoluted Tubule
Bowman's Capsule
Carbonic Anhydrase Inhibitors
Thiazide Diuretics
Loop Diuretics
K+-sparing Diuretics
Loop of Henle
Collecting Duct

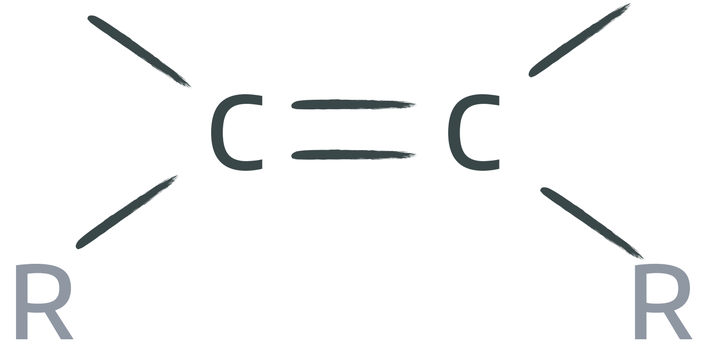
Antiplatelet Agents



Geometric Isomerism

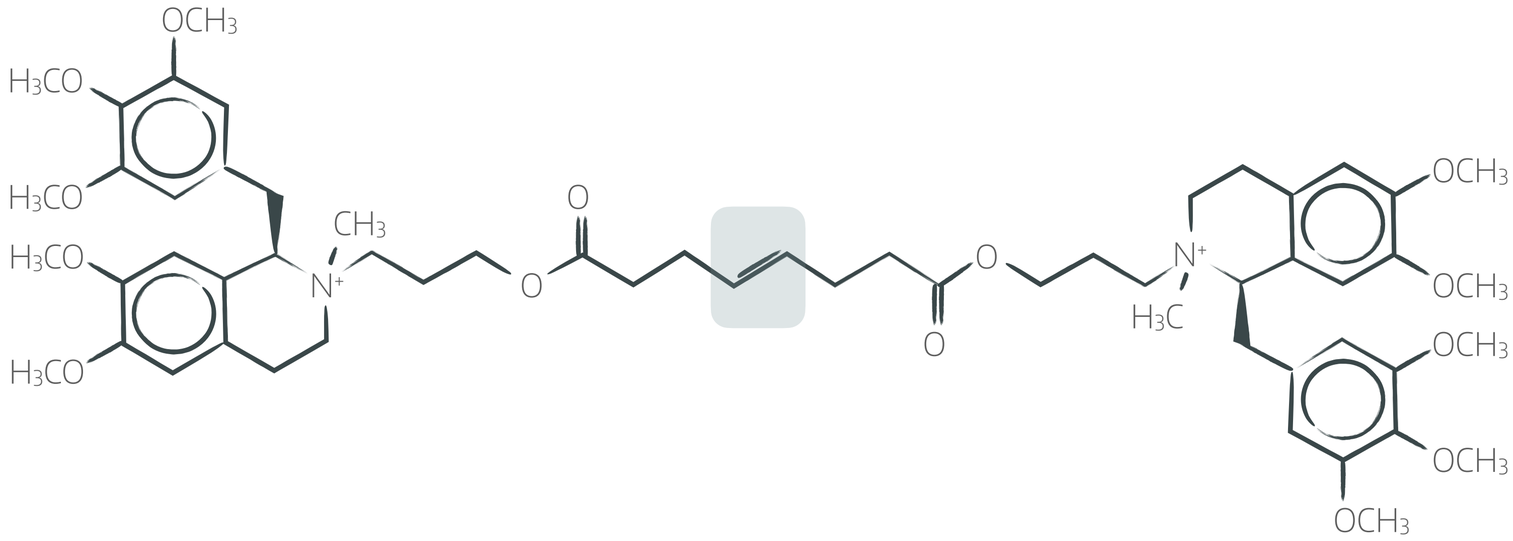


Trans



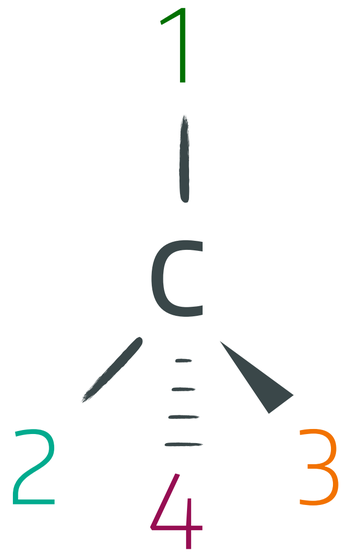
Cis

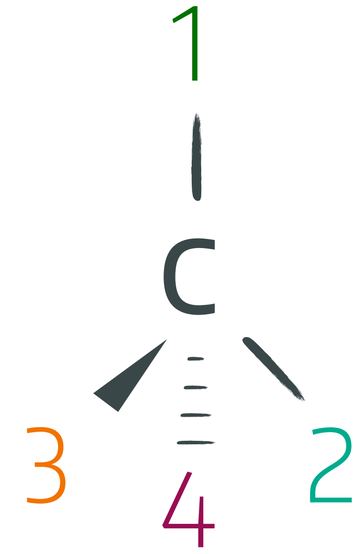
Geometric Isomerism



Mivacurium

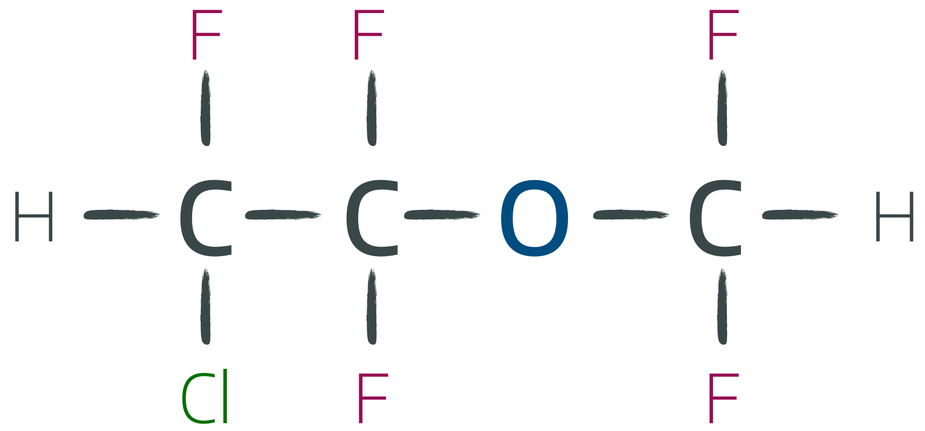
Optical Isomerism





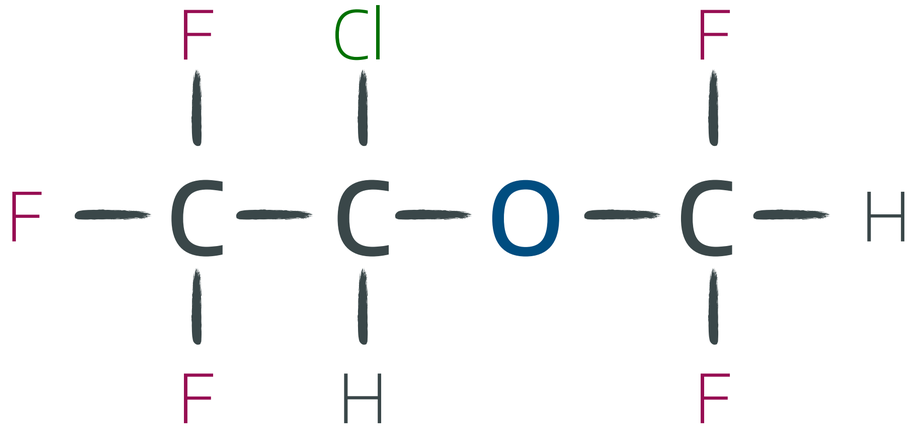
STRUCTURAL ISOMERS

Enflurane



MAC	BP	SVP	B:G
1.68	56	23.1	1.9

Isoflurane

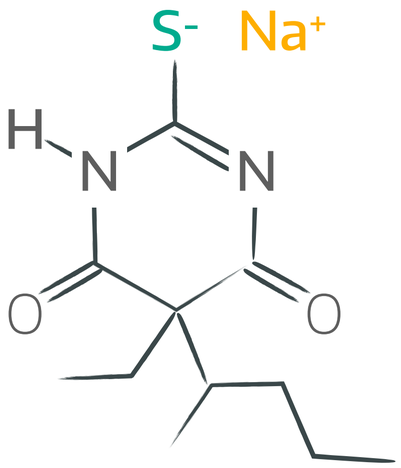


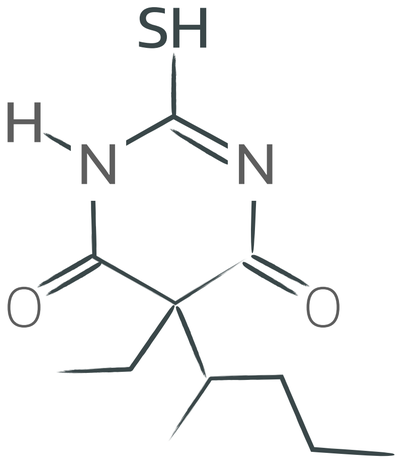
MAC	BP	SVP	B:G
1.15	48	31.5	1.4

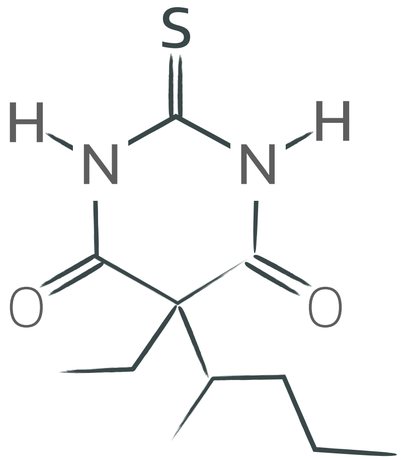
TAUTOMERISM

THIOPENTONE

Ionised	Unionised

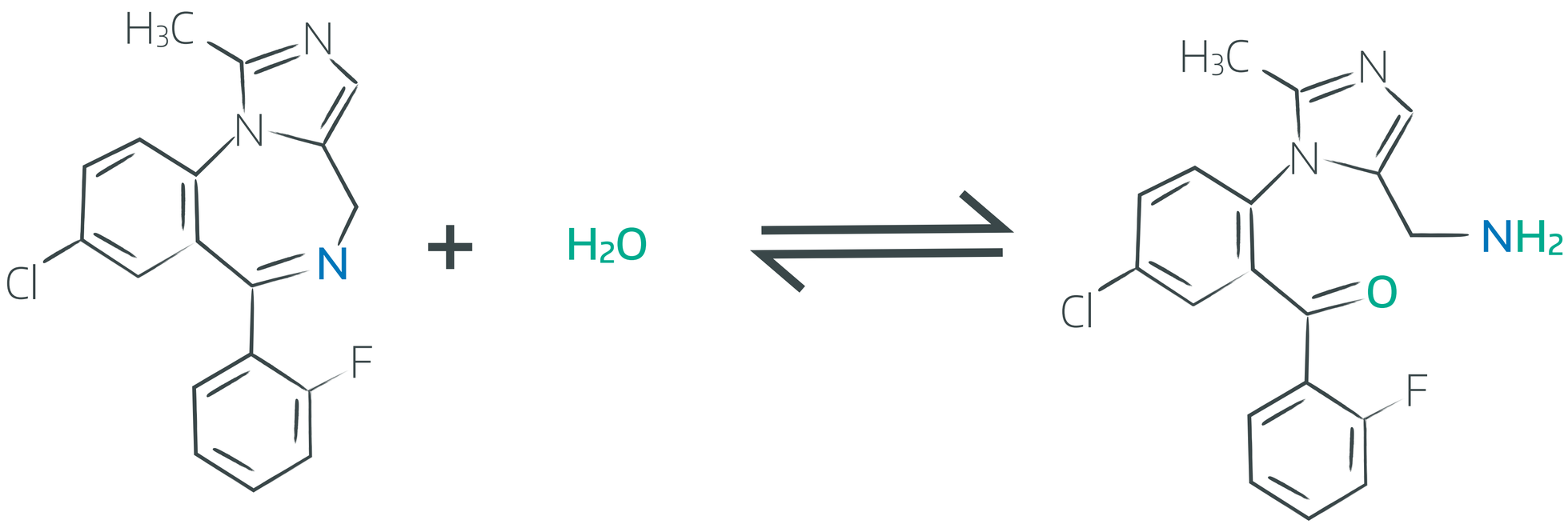




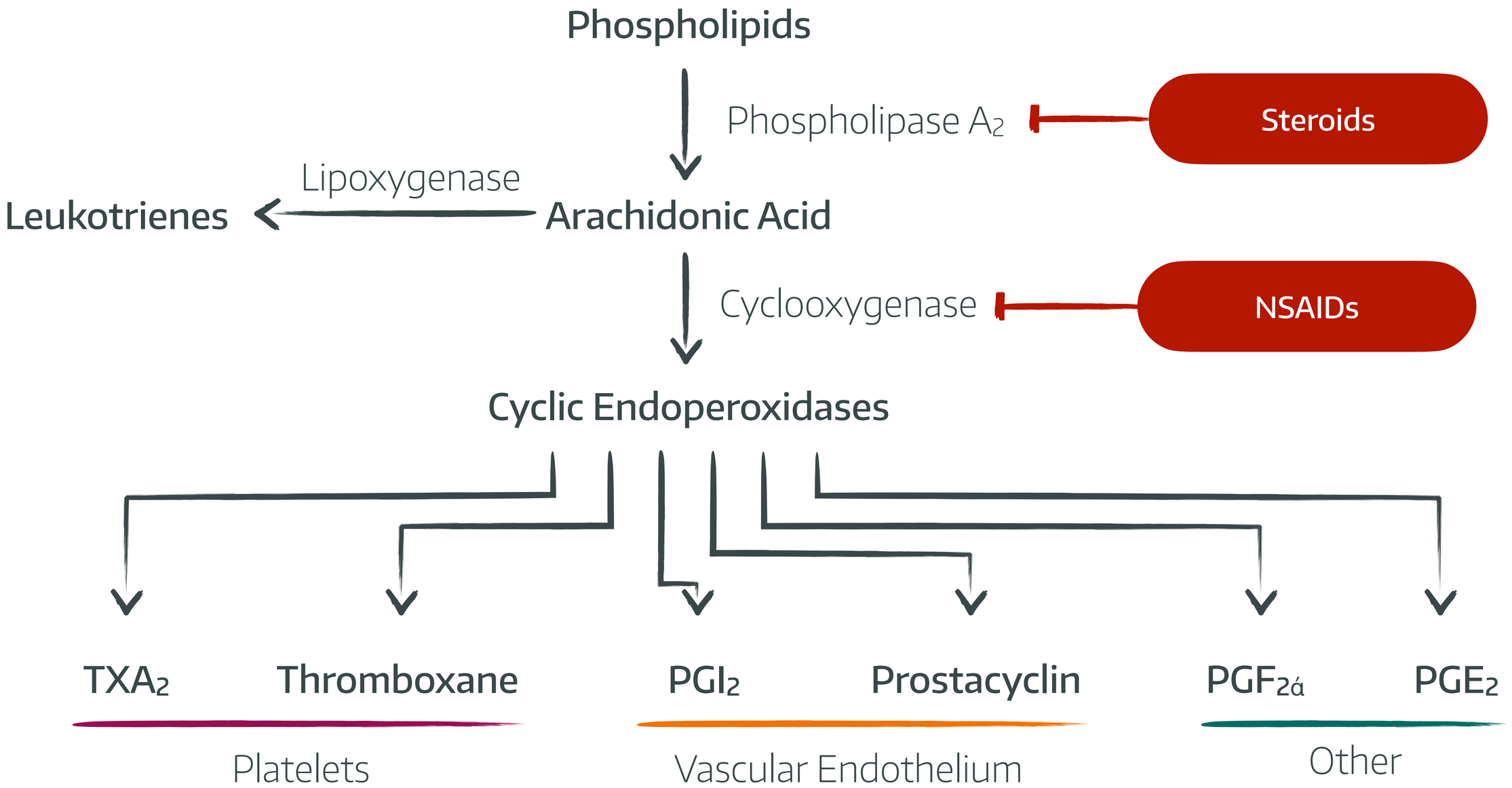


Tautomerism

Midazolam

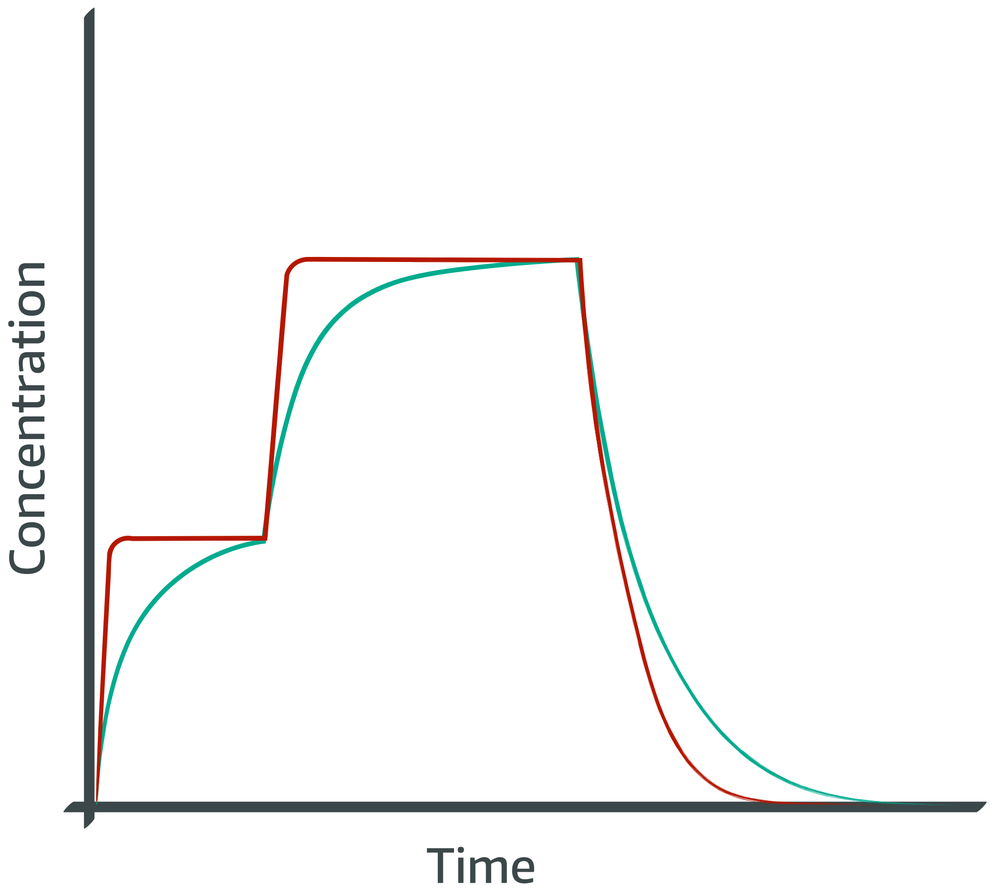


Arachidonic Acid Cascade

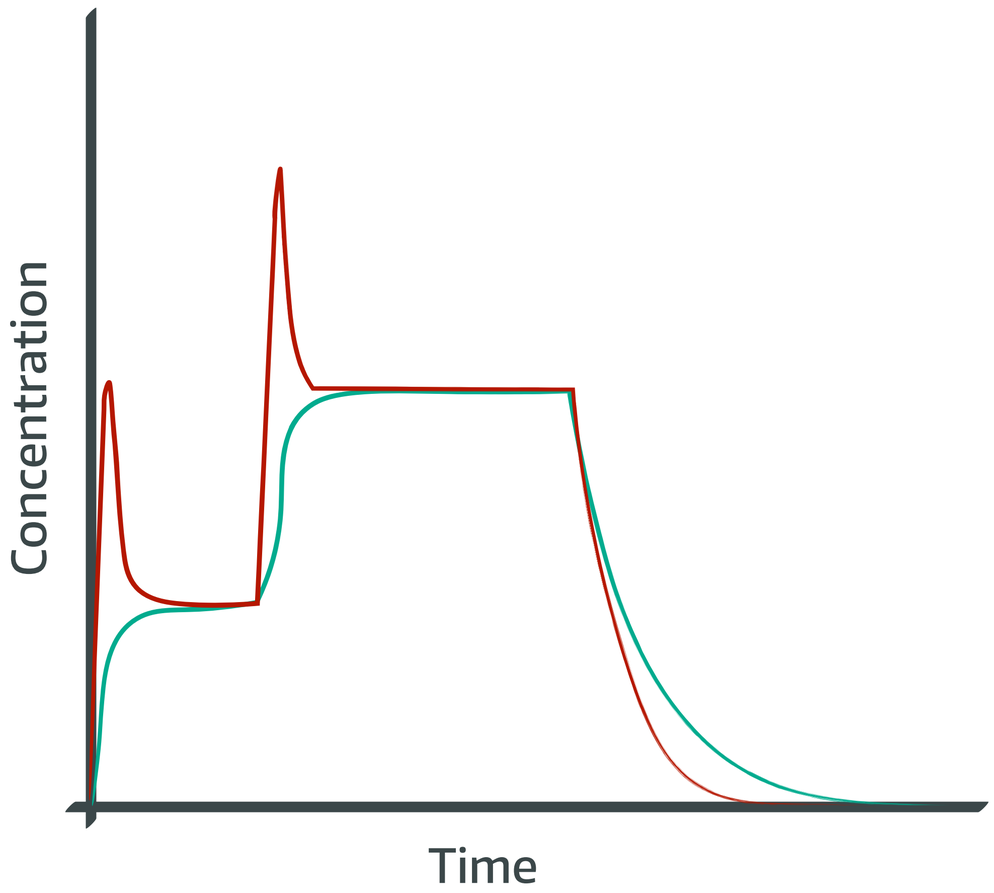


Target-Controlled Infusions

Plasma Control



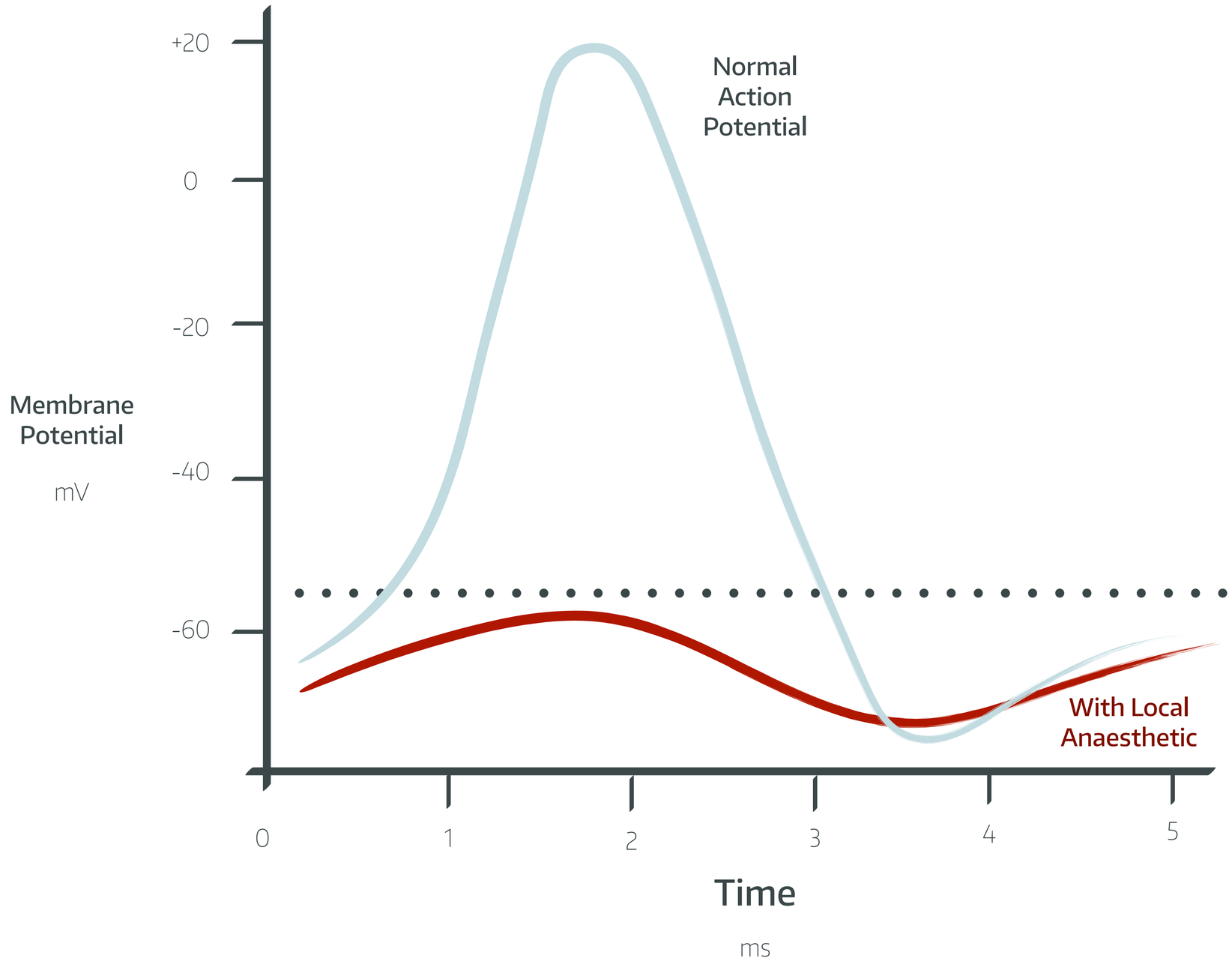
Effect Site Control



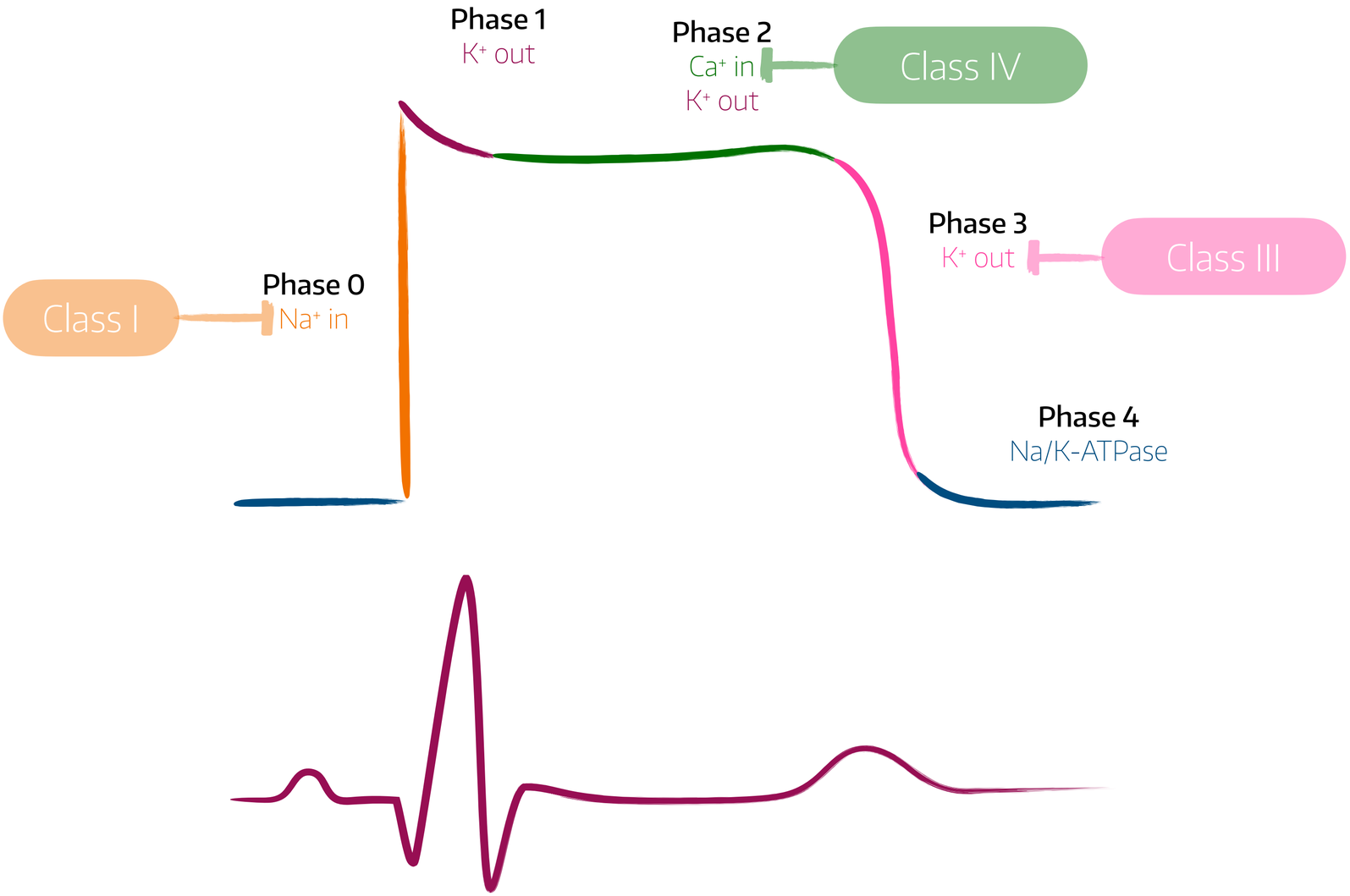
Effect Site

Plasma

LOCAL ANAESTHETICS



ANTIARRHYTHMICS



Indications for Beta-Blockade

Cardiovascular	Endocrine	Neurological
Angina	Thyrotoxicosis	Migraine Prophylaxis
Arrhythmia		Anxiety
Hypertension		Glaucoma (topical)
Heart Failure		
Myocardial Infarction		

Antiarrhythmics

Beta-Blockers

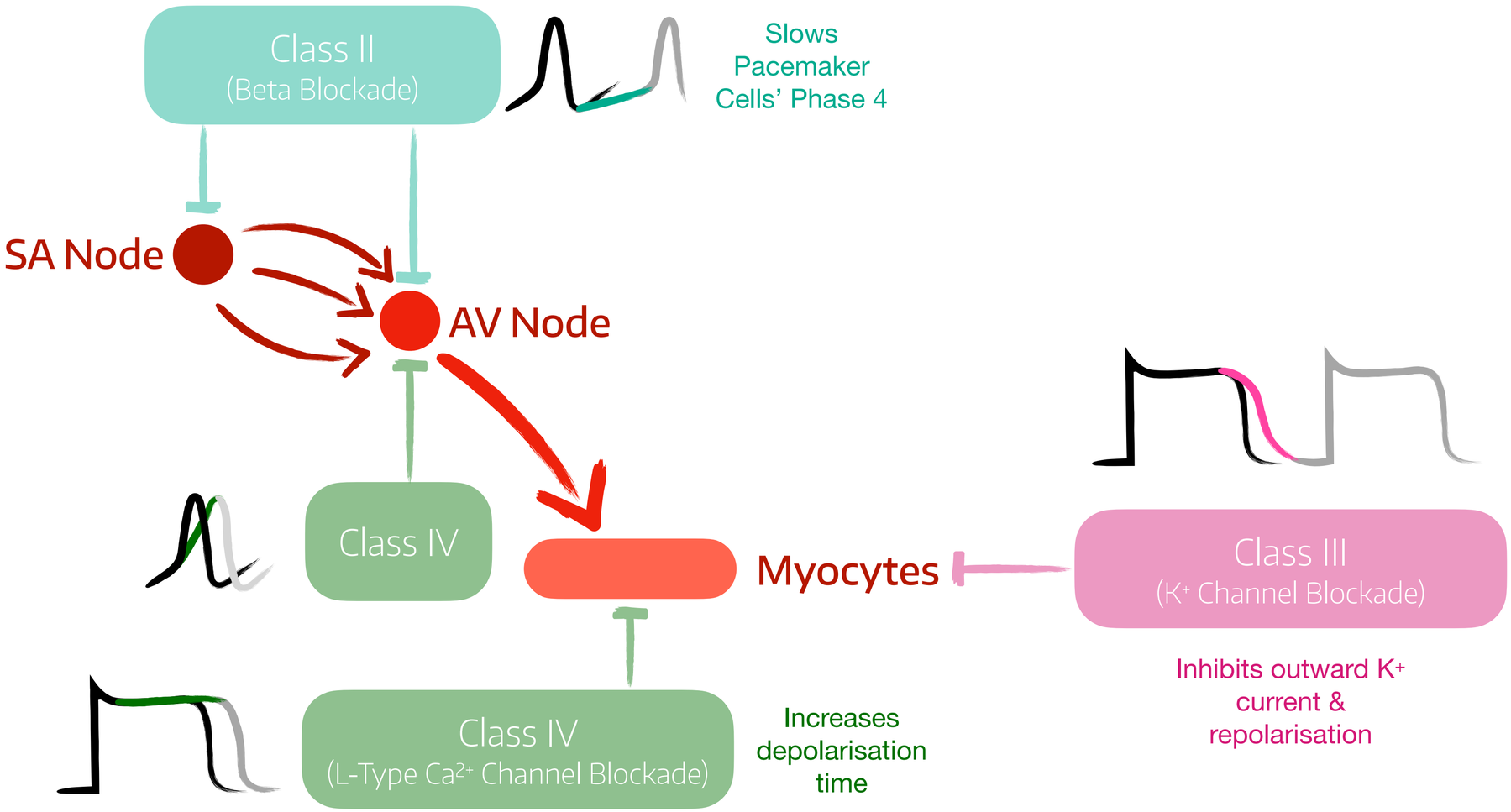
Competitive Antagonists

Selective β_1	Non-Selective	
	α & β	β_1 & β_2
Bisoprolol	Labetalol	Timolol
Esmolol	Carvedilol	Sotalol
Atenolol		Propranolol
Metoprolol		

Drug Additives

Buffers	Solvents	Preservatives	Antioxidants
Hydroxide	Water	Benzyl Acohol	Sulphites
	Propylene Glycol		
	Mannitol		
	Soy Bean Oil		

Actions of Amiodarone



Bariatric Drug Dosing

(Society for Obesity & Bariatric Anaesthesia)

Total Body Weight
kg

Suxamethonium

..... mg/ml

LMWHs

..... mg/ml

Lean Body Weight
Boer / James / Hume Formulae

Propofol (Induction)

..... mg/ml

Thiopentone

..... mg/ml

(Al)Fentanyl

..... mg/ml

Morphine

..... mg/ml

Non-Depolarising NMBDs

..... mg/ml

Local Anaesthetics

..... mg/ml

Adjusted Body Weight
= 1.4 × IBW

Propofol (Infusion)

..... mg/ml

Neostigmine

..... mg/ml

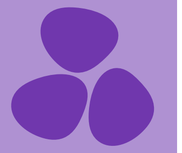
Sugammadex

..... mg/ml

Antibiotics

..... mg/ml

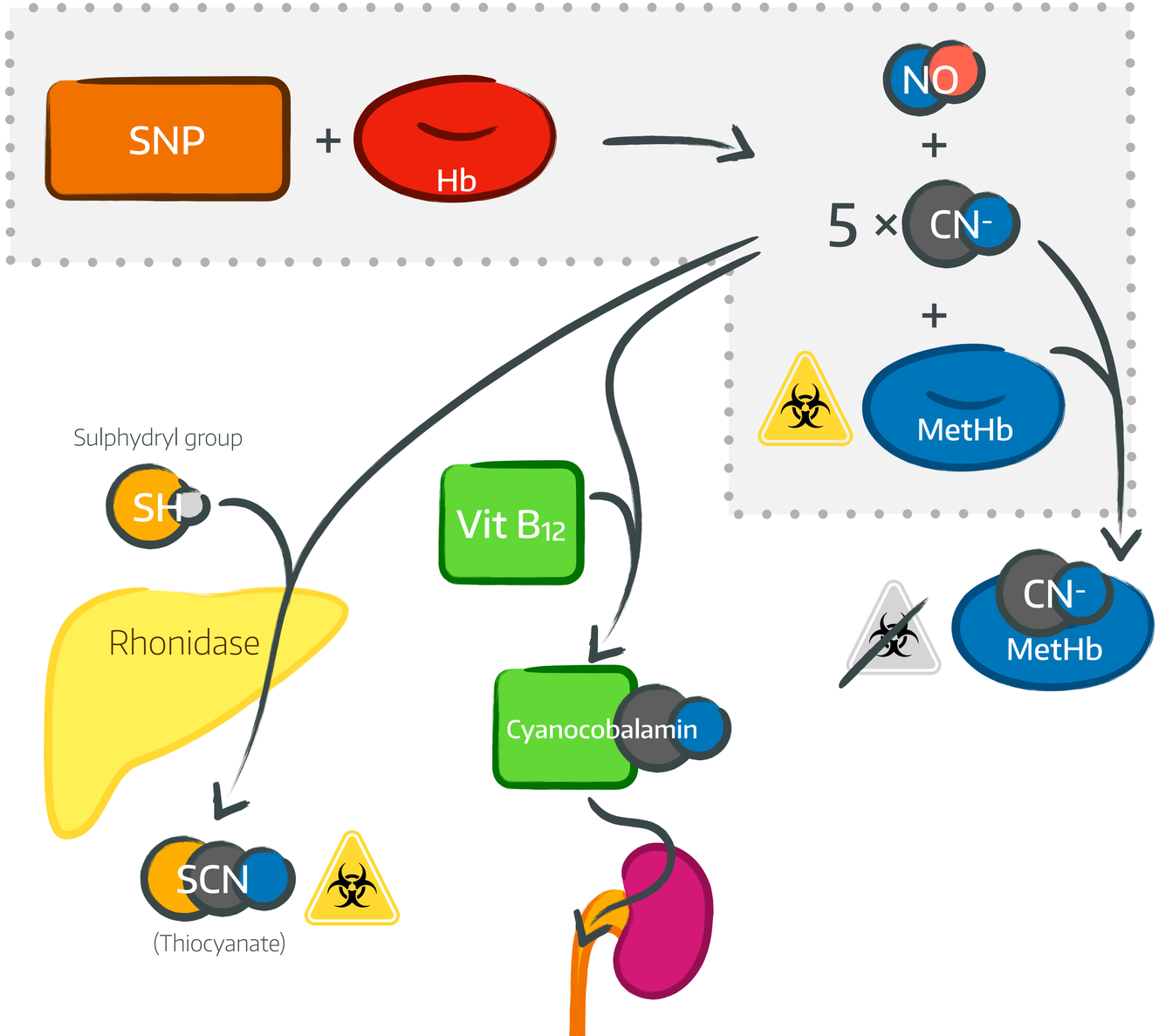
Classification of Bacteria

	Gram Positive		Gram Negative	
	Cocci 	Bacilli 	Cocci 	Bacilli 
Aerobic	Staphylococci Streptococci Enterococci	Bacillus	Neisseria Moraxella	Haemophilus Klebsiella Pseudomonas Enterobacter Mycobacteria Campylobacter Legionella Proteus
Anaerobic	Streptococcus viridans	Actinomyces Clostridium Lactobacillus Listeria		Escherichia

This is not a comprehensive classification of all bacteria, but is a useful table to bear in mind when considering antibiotic therapies.

Sodium Nitroprusside

Metabolism



Toxicity

Cyanide

CN-

Binds cytochrome oxidase
Impairs aerobic respiration
8micrograms/ml = toxic level

Thiocyanide

SCN

100 × less toxic

Treatment

1. Stop SNP
2. Dicobalt Edetate
3. Sodium Thiosulphate (provides sulphydryl groups)
4. Nitrates (converts oxyhaem to methaem which has higher affinity for CN^- than cytochrome oxidase)