

Sedation (Oh No Not Again!)

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MEETINGS

NONE OF US IS AS DUMB AS ALL OF US.

Outline

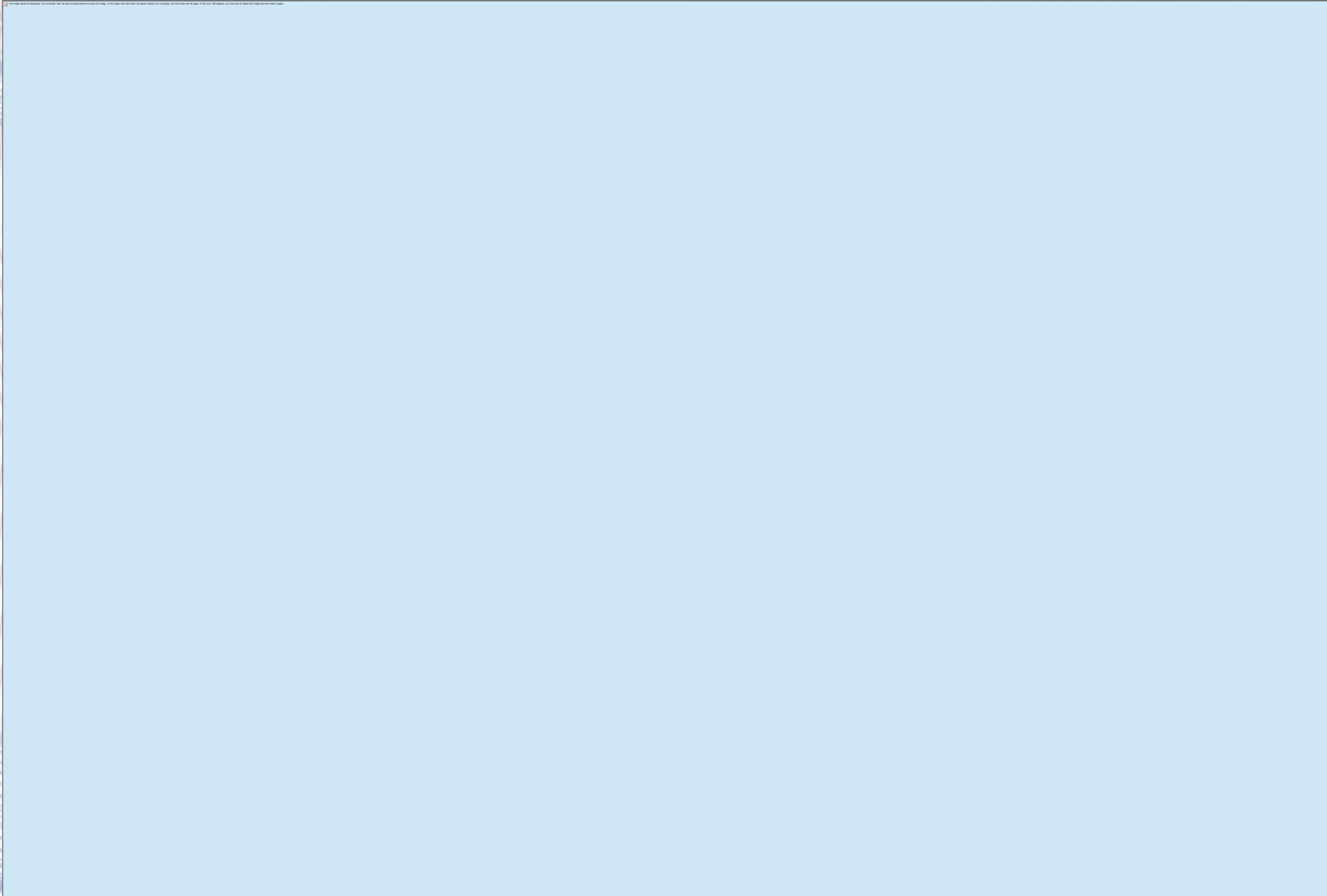
- Sedatives
 - Ideal
 - Propofol
 - Midazolam
 - Fentanyl
- Monitors
 - Ideal
 - ECG
 - Pulse Ox
 - Capnography

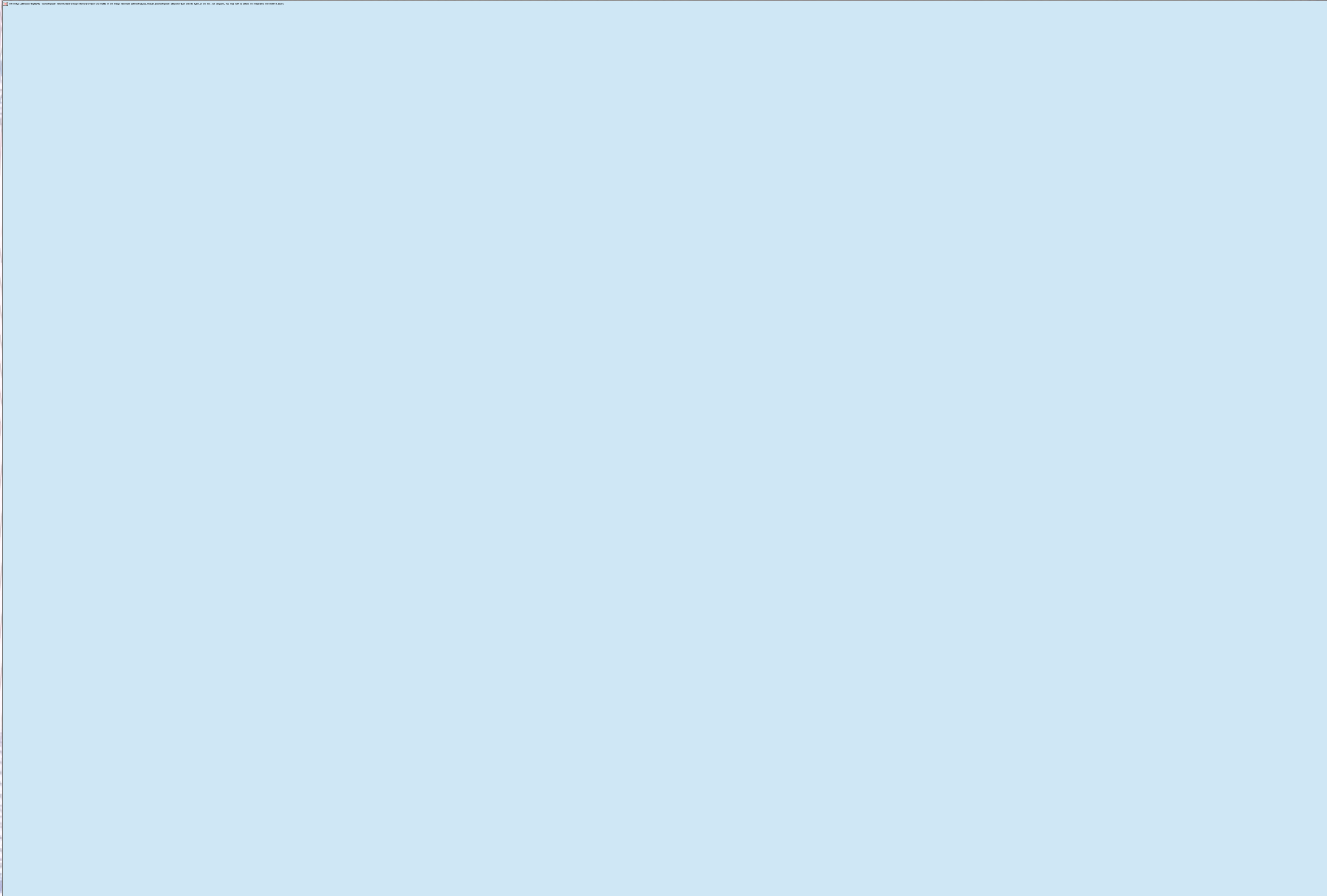
Desirable sedative properties

- Sedation / hypnosis
 - Amnesia
 - Anxiolysis
 - Sleepiness
- Pain relief
- Rapid effect & controllable (short) duration & reversible
- Reproducible across populations
- Forgiving dose response

Undesirable properties

- Respiratory depression
- Cardiovascular effects (hypotension, bradycardia)
- Nausea
- Dysphoria, disinhibition
- Hangover

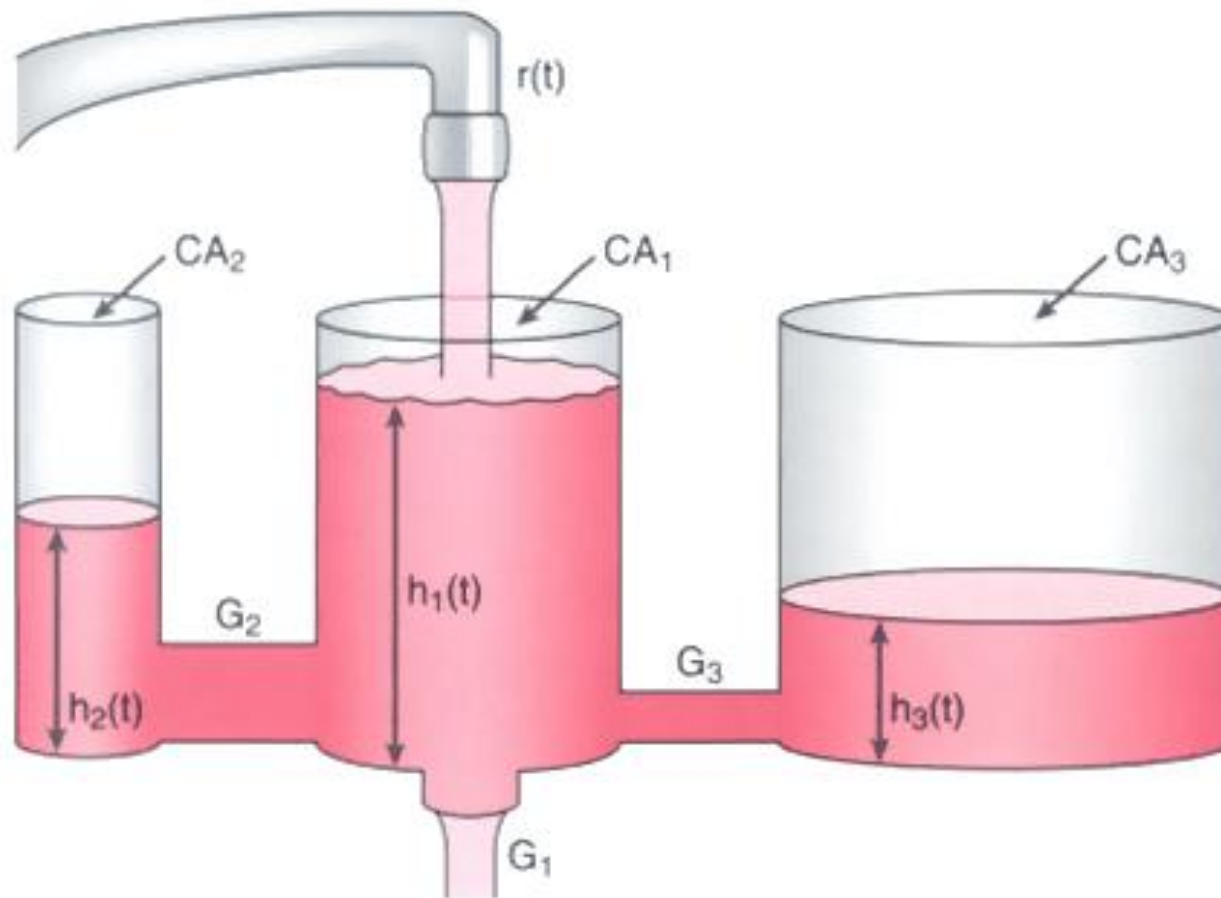




Fentanyl

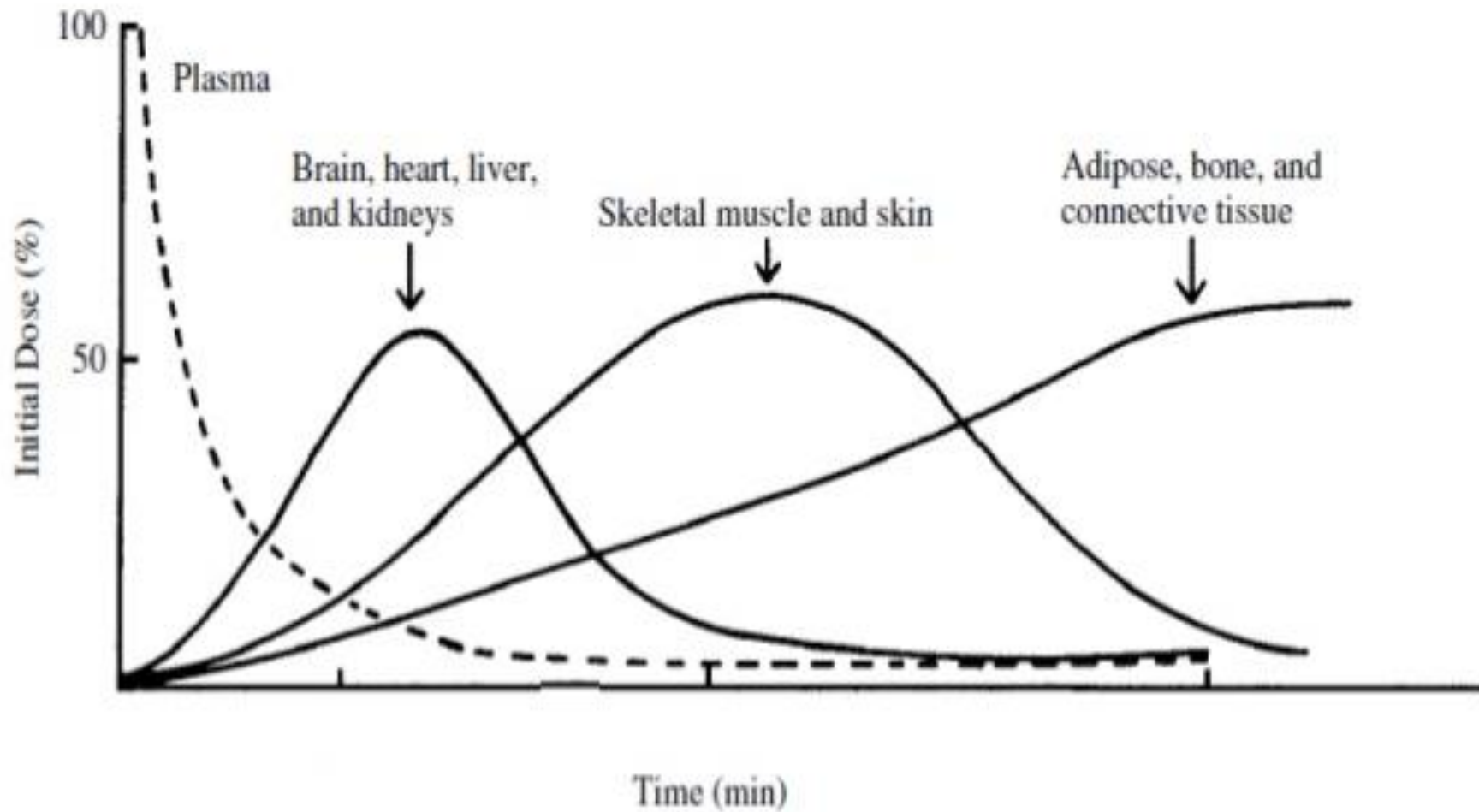
- Very fast acting (lipid soluble)
- Long elimination half life
- Effect ended by redistribution with small doses (less than about 500 mcg)
- Excellent pain relief
- Profound respiratory depression
- Dizziness and nausea post procedure

Redistribution

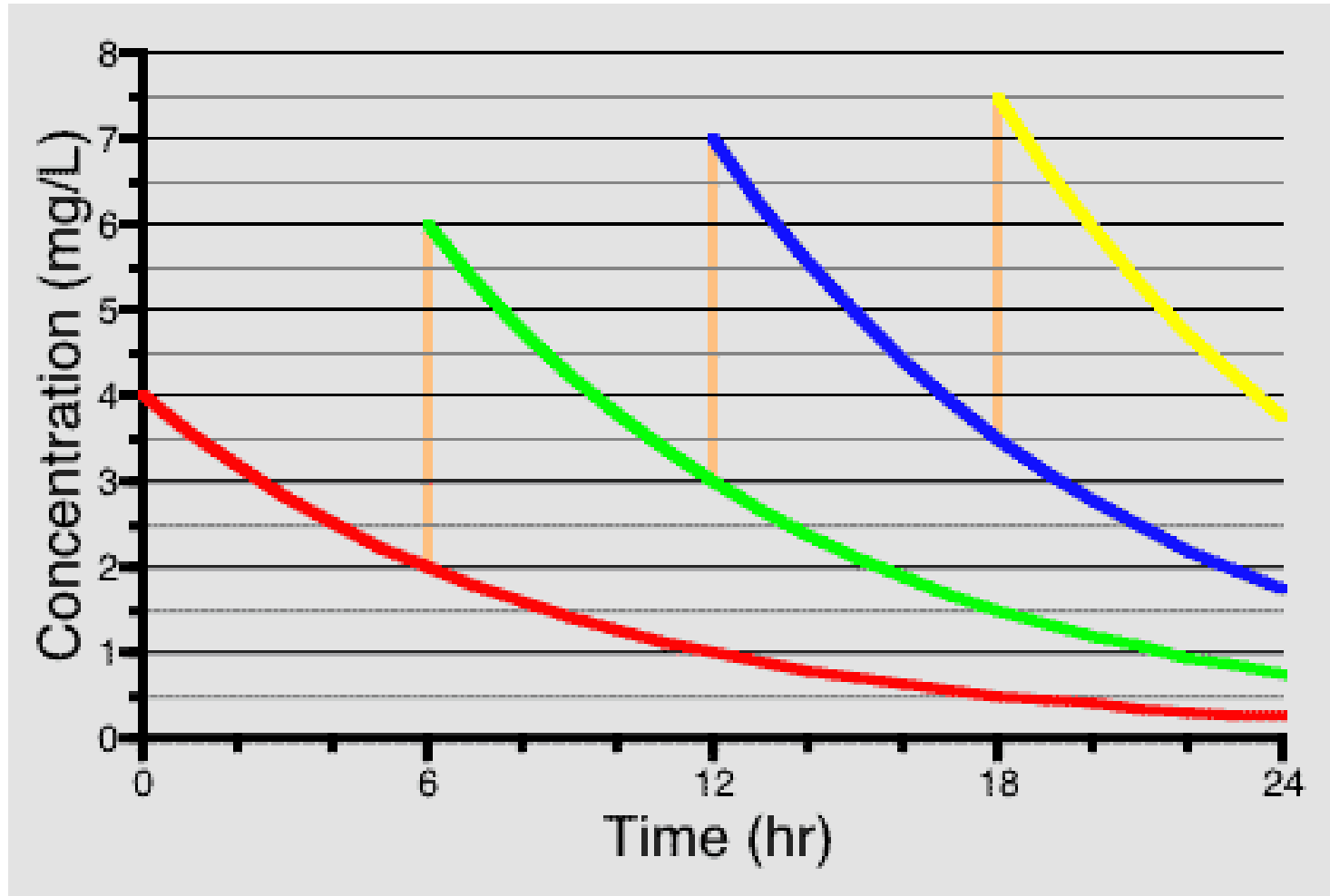


- From Hughes MA, Glass PS, Jacobs JR: Context-sensitive half-time in multicompartment pharmacokinetic models for intravenous anesthetic drugs. *Anesthesiology* 76:334-341, 1992.

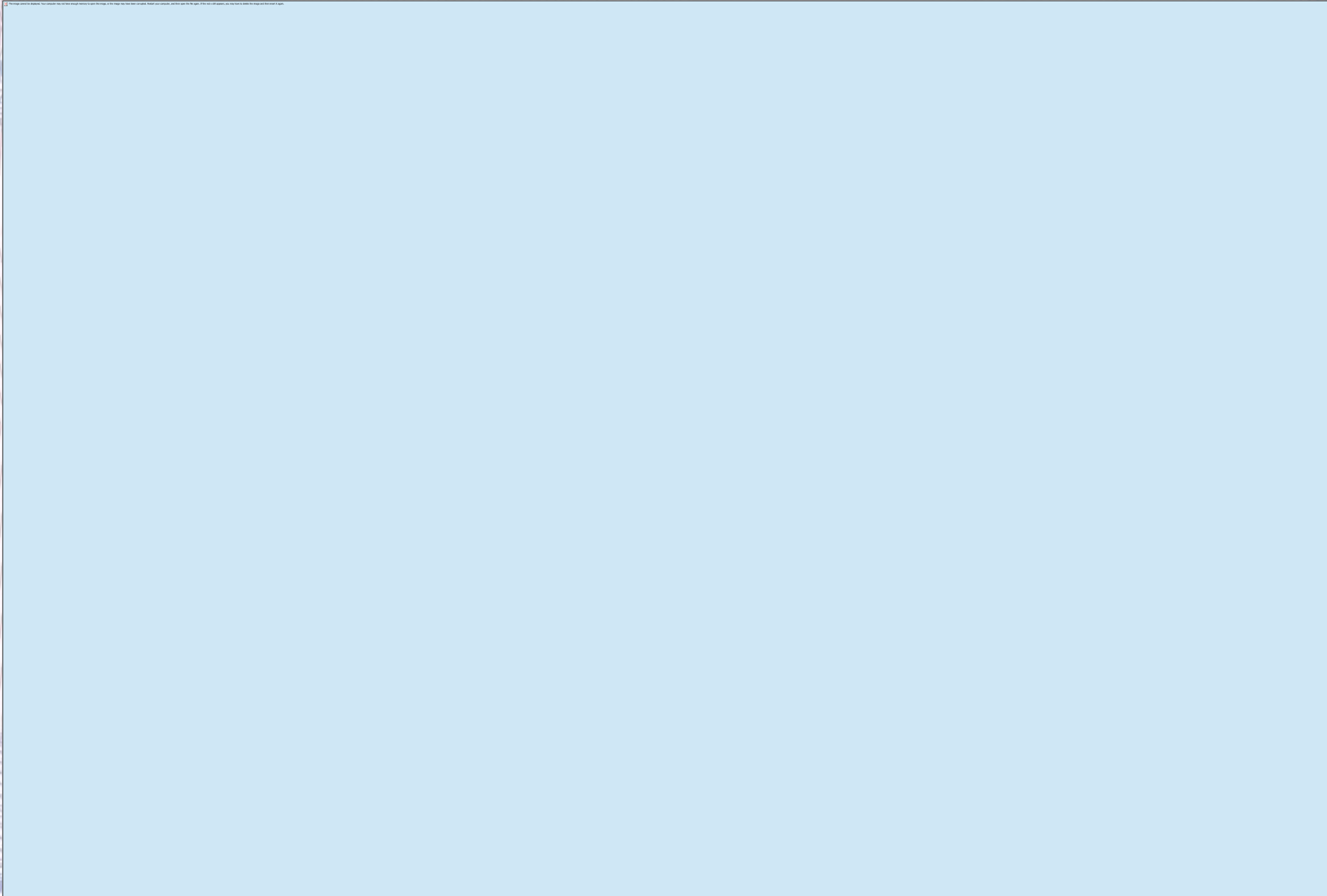
Redistribution



Redistribution



- From <http://www.boomer.org/c/p3/c25/c2504.html>



Propofol

- Very fast acting (very lipid soluble)
- Long elimination half life – hours to days
- Effect ended quickly by redistribution even with large doses (very large volume of distribution 60 L/Kg)
- Possible antiemetic
- Euphoric

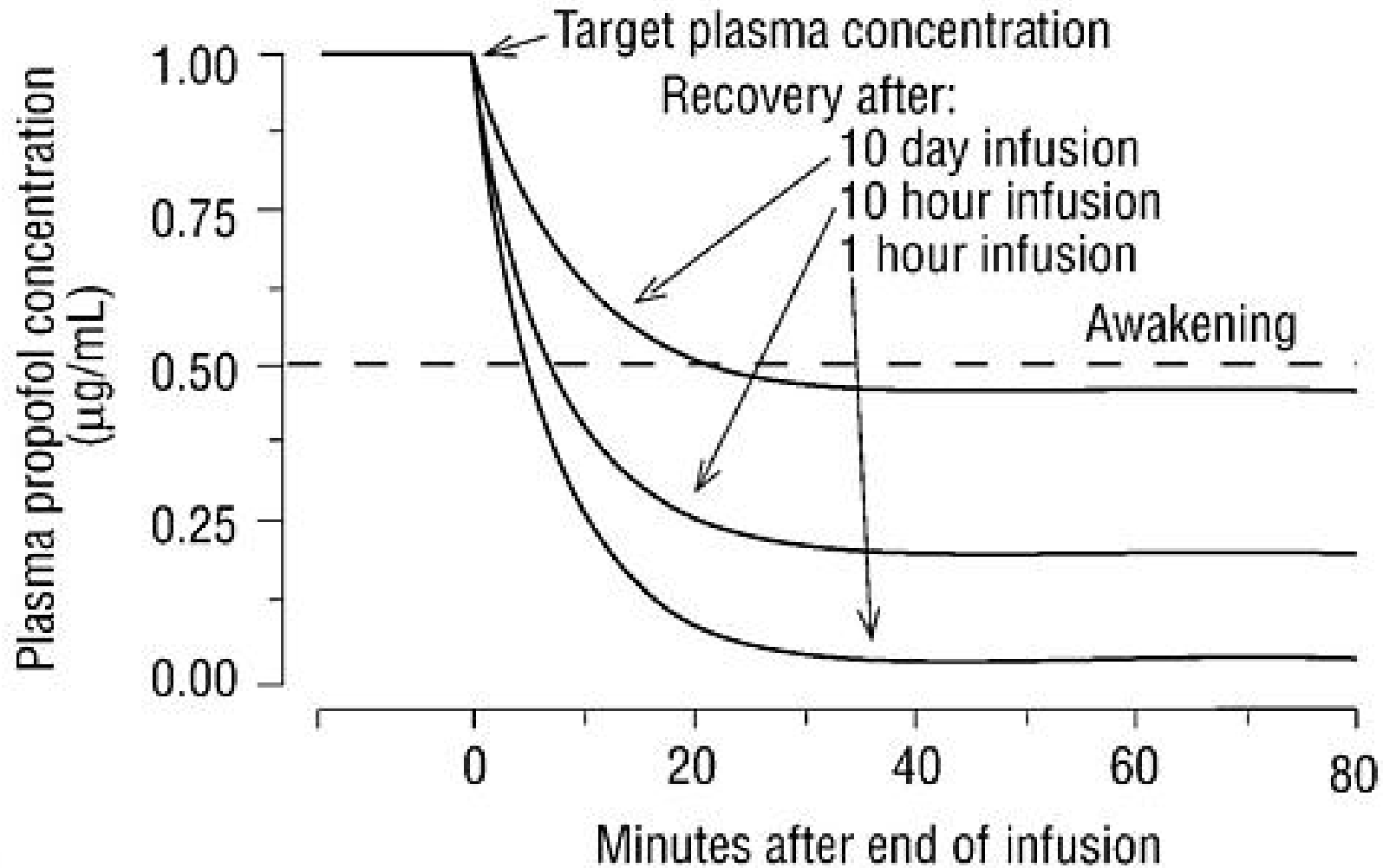
Propofol

- Strong vasodilator – hypotension in hypovolemic patients
- Respiratory depression at just above sedative doses
- Pain on injection
- Vivid dreams – sexual arousal
- Tonic movements
- Supports bacterial growth

Propofol

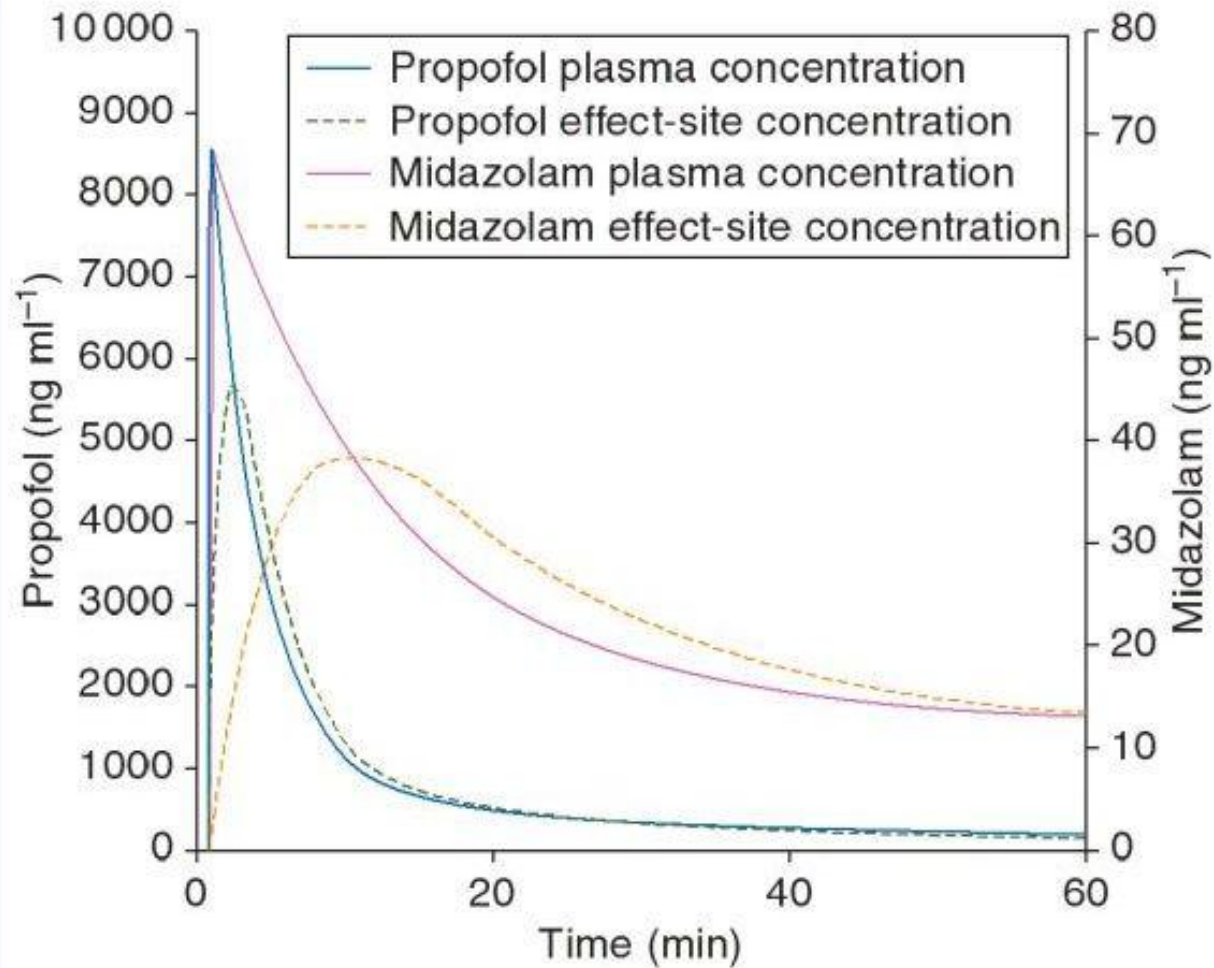
- Not reversible
- No analgesia
- Contains soy bean oil and egg lecithin

Propofol Accumulation



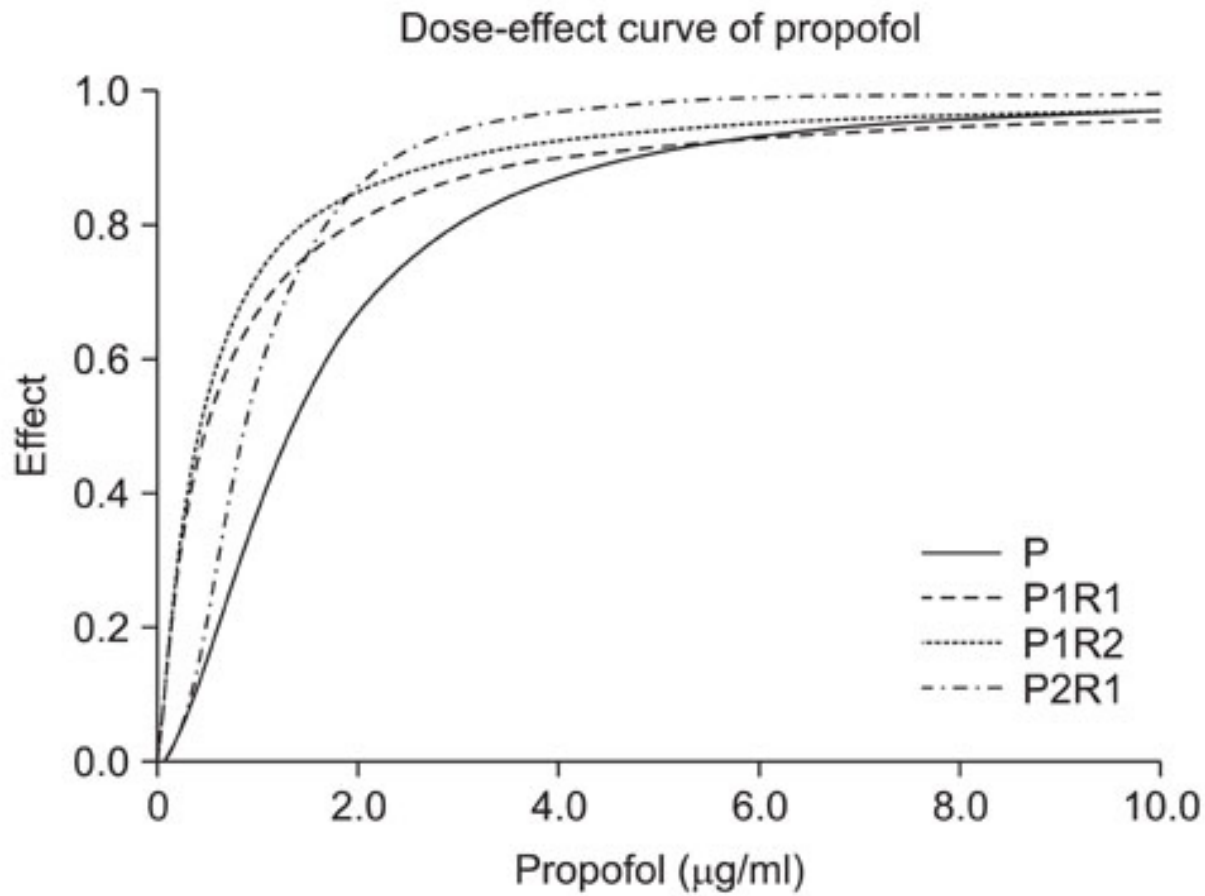
Propofol

Medscape



Source: Br J Anaesth © 2010 Oxford University Press

Propofol Dose Response



From Won Ho Kim, et al, "Interactions of propofol and remifentaniol on bispectral index under 66% N2O: analysis by dose-effect curve, isobologram, and comb

Propofol Resp Depression

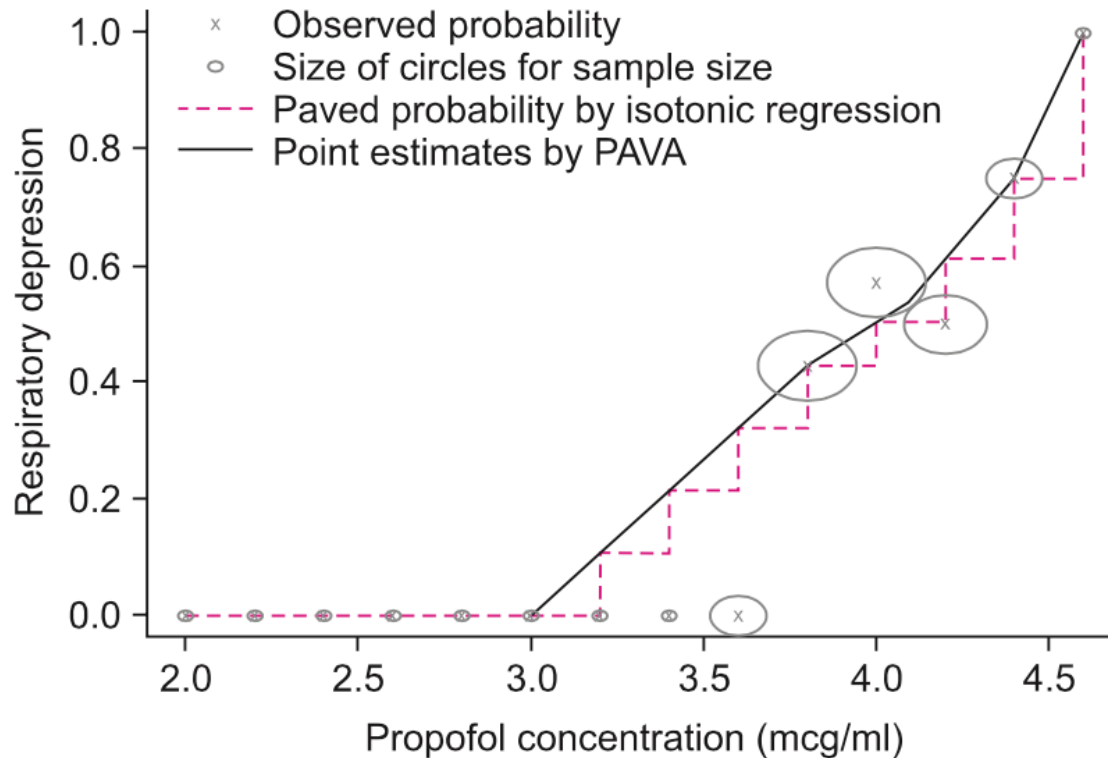
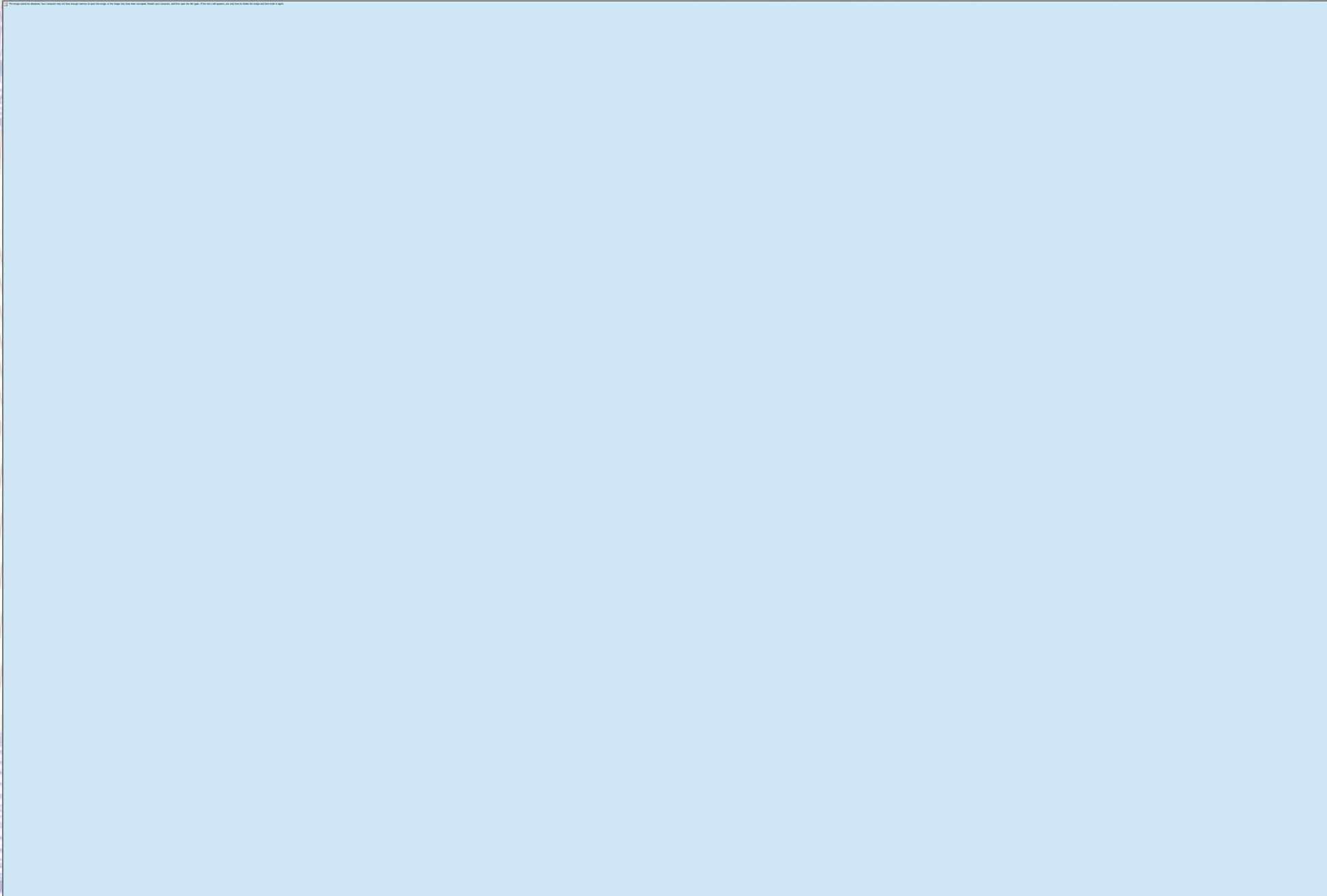


Fig. 2. Relationship between respiratory depression and the effect site concentration of propofol. EC_5 value was 3.09 mcg/ml and EC_{50} value was 3.99 mcg/ml.

From: Mi Hyeon Lee, et al, "The effect-site concentration of propofol producing respiratory depression during spinal anesthesia"
Korean J Anesthesiol 2011 August 61(2): 122-126





Desirable Monitor Properties

- Measures an important parameter
- Accurate & reproducible
- Robust, tolerant of “noise”
- Few false alarms
- Cheap and easy to use
- Provides information to guide therapy
- Gives early warning of danger
- Predicts the future



DARWIN AWARDS

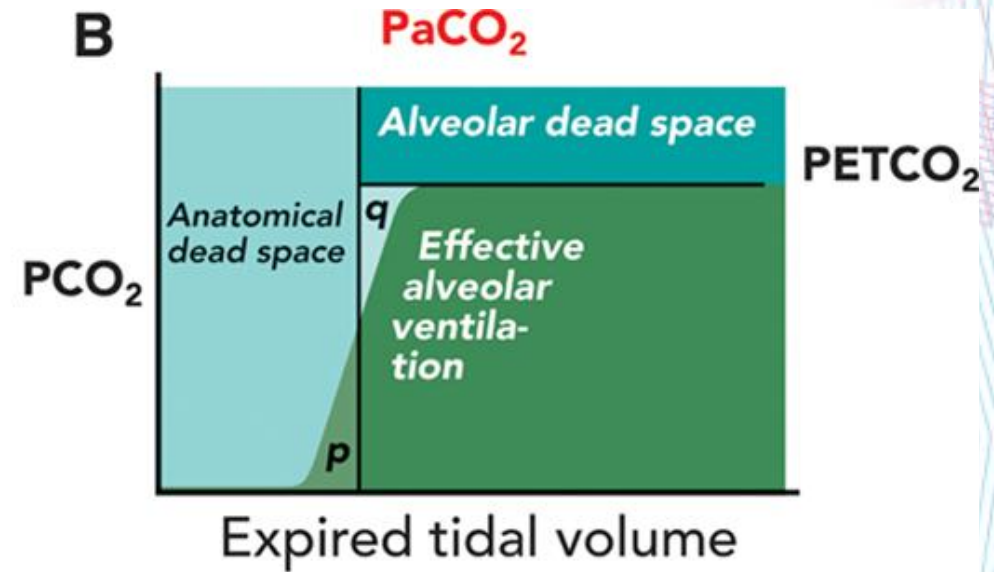
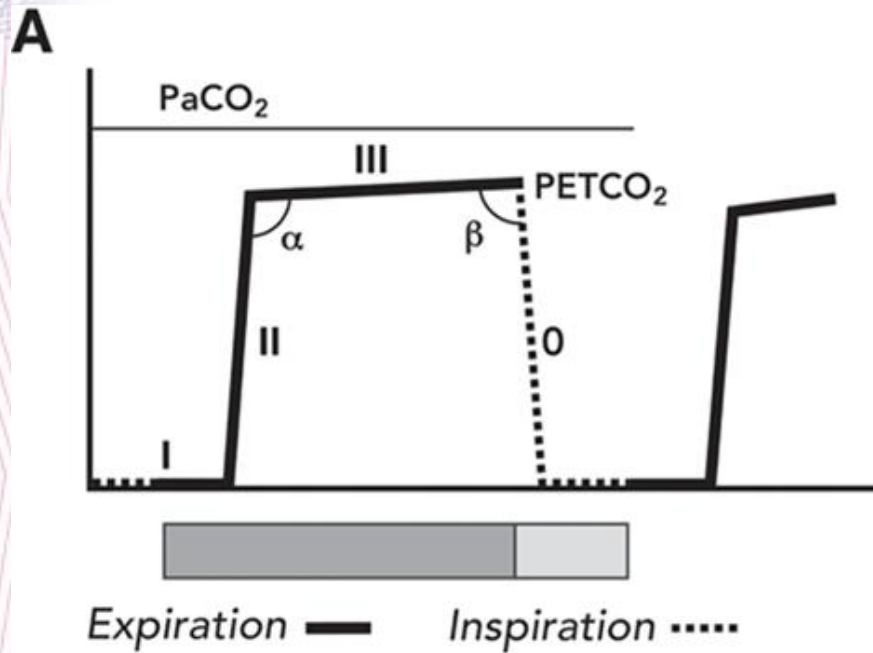
Sometimes you just see it coming.



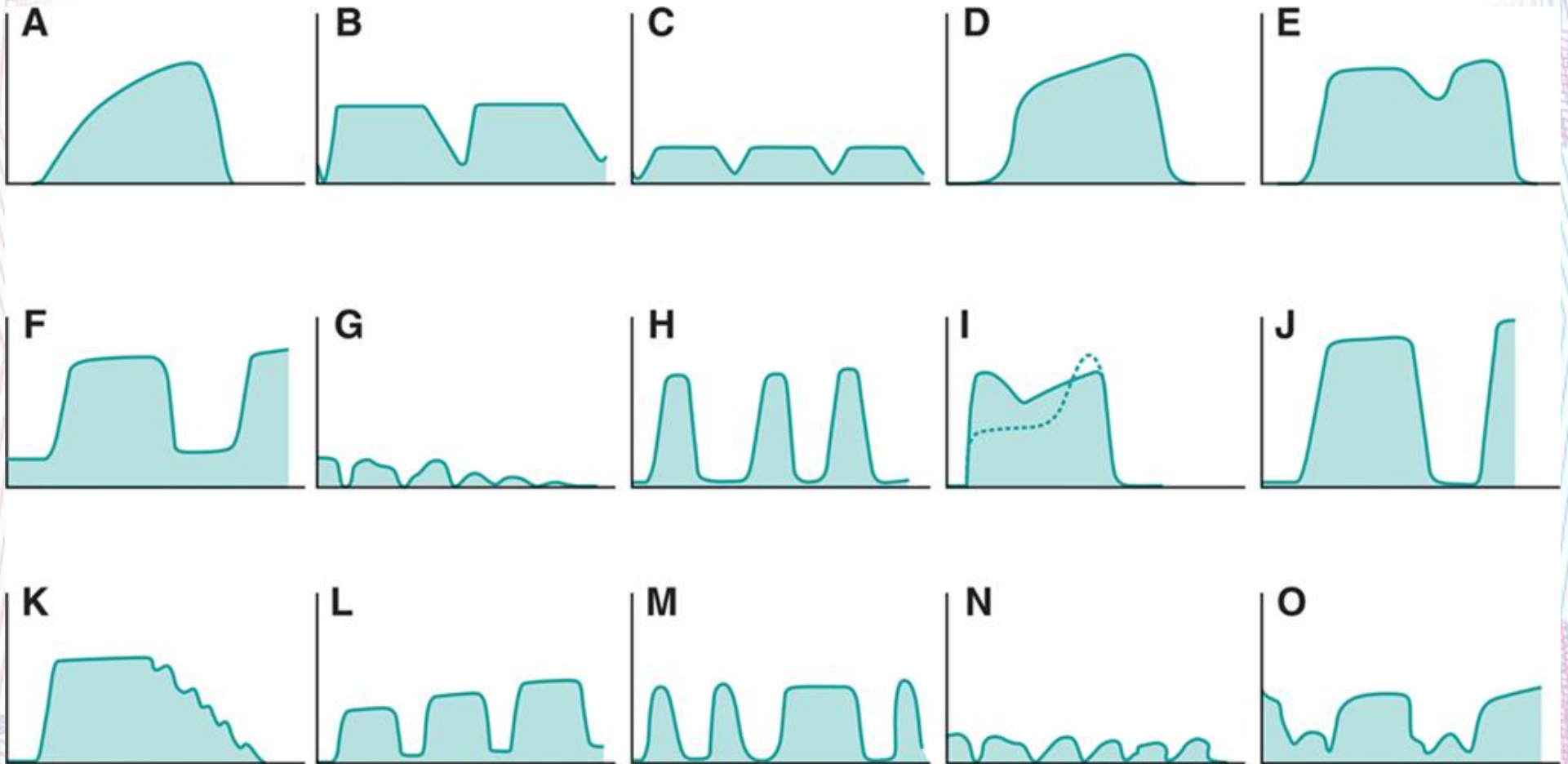
Capnography

- Measurement of CO₂ at the airway requires
 - Metabolism at the tissue level
 - Blood flow to tissue
 - Blood flow to lungs
 - Respiratory effort
 - Open airway
- Provides early warning of apnea
- Requires end tidal sampling for full information BUT is useful without perfect sampling

Perfect Capnograph

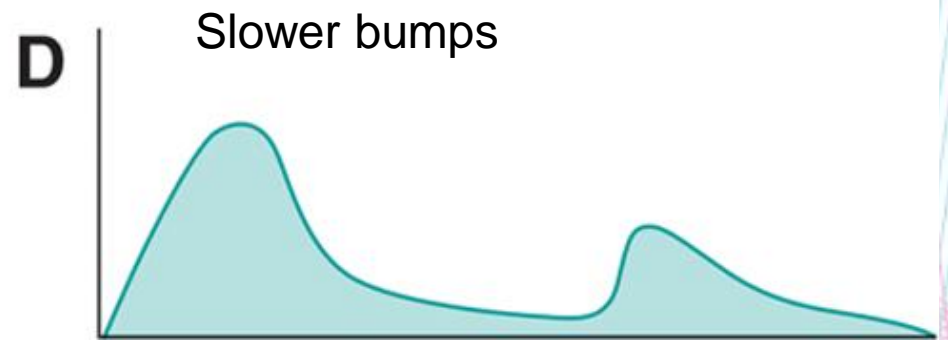
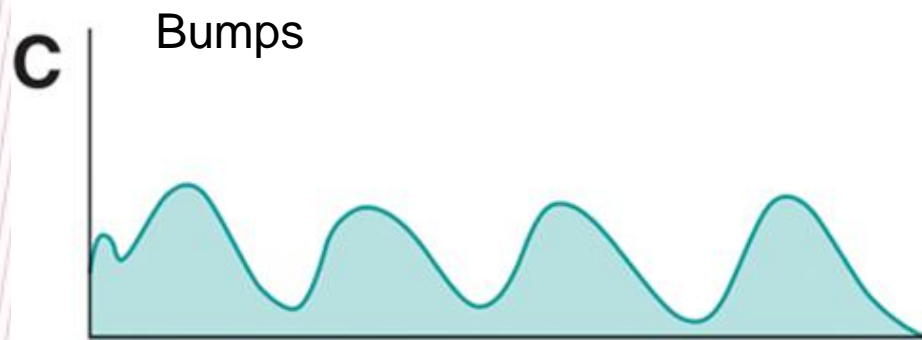
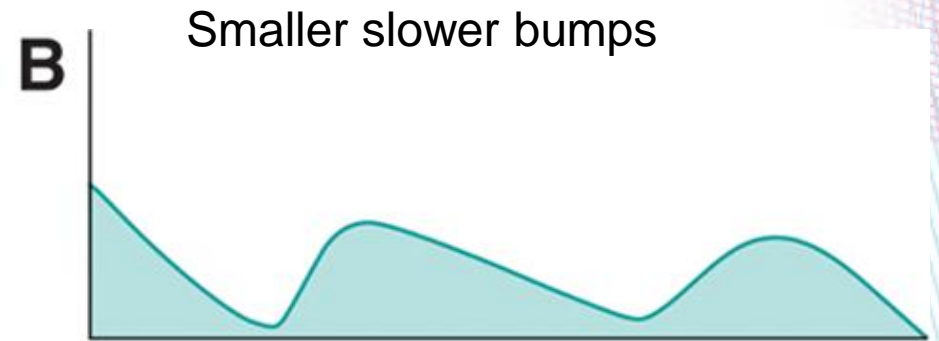
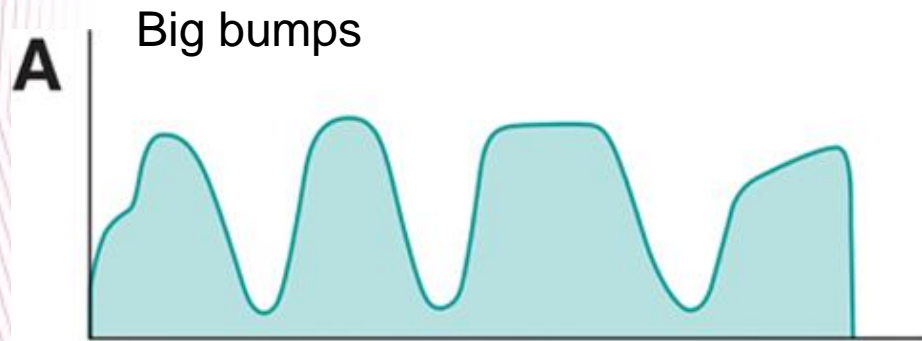


Too Much Information



From: Bhavani Shankar Kodali, M.D. "Capnography Outside the Operating Rooms" *Anesthesiology*. 2013; 118(1):192-201

What You Need To Know



From: Bhavani Shankar Kodali, M.D. "Capnography Outside the Operating Rooms" Anesthesiology. 2013; 118(1):192-201

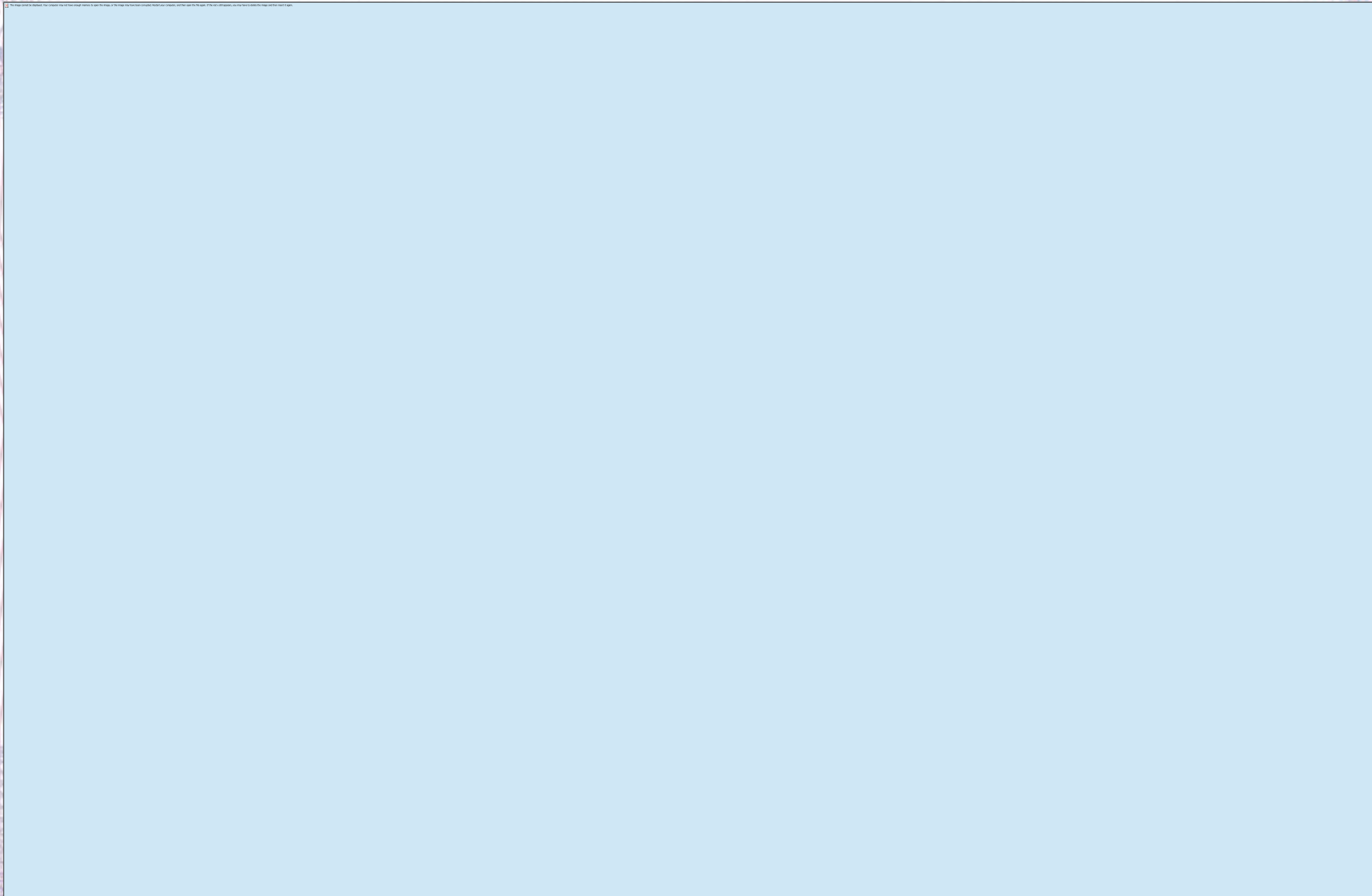


Is Capnography Needed?

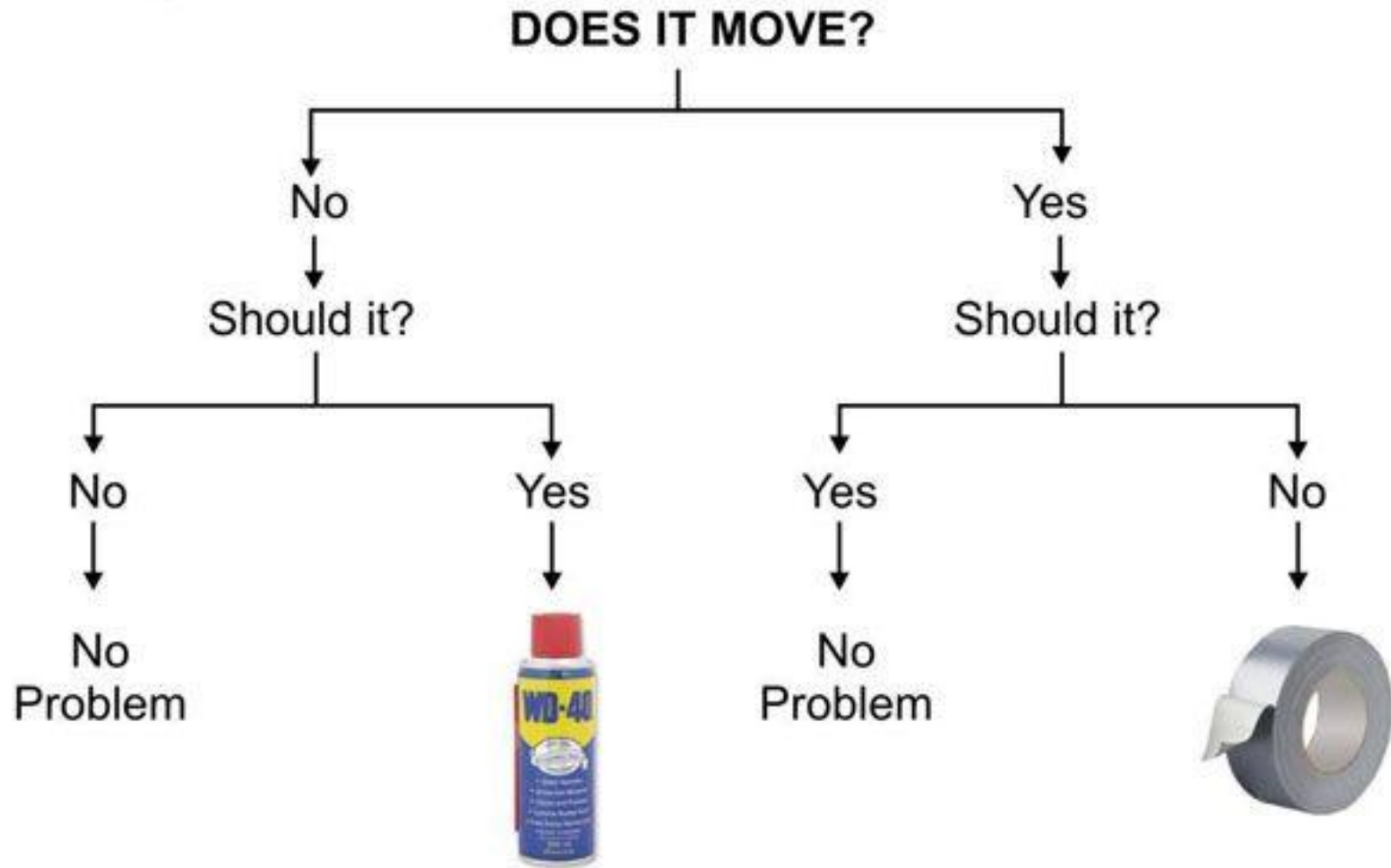
- Standard of care for anesthetic sedation
- Studies beginning to show decrease in apneic episodes and earlier identification of apnea
- Useful tool for managing propofol/fentanyl sedation
- Increases cost of sedation
- New alarms to acknowledge
- New charting overhead

CAUTION
THIS MACHINE
HAS NO BRAIN
USE YOUR OWN



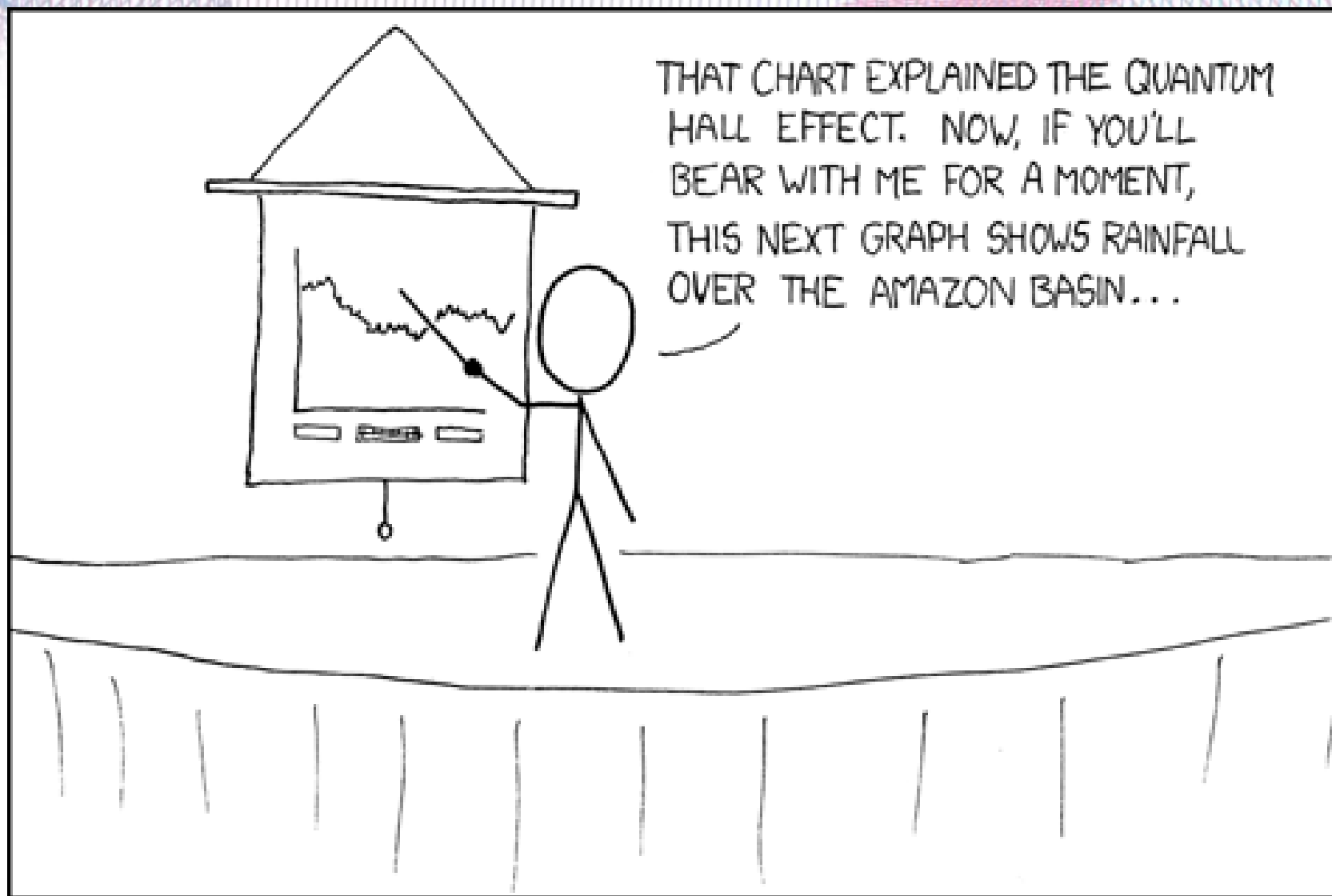


Putting it into Practice



Typical Sedation

- Just accept the inevitable and use ECG, BP, Pulse OX, and CO2
- Use fentanyl for pain relief and dose according to the respiratory rate. Aim for 10 to 12 breaths/min
- Midazolam for anxiolysis and sedation
- If using propofol decrease midazolam dose and use an infusion (10 – 75 mcg/kg*min) and small boluses (10 – 30 mg)



THAT CHART EXPLAINED THE QUANTUM HALL EFFECT. NOW, IF YOU'LL BEAR WITH ME FOR A MOMENT, THIS NEXT GRAPH SHOWS RAINFALL OVER THE AMAZON BASIN...

IF YOU KEEP SAYING "BEAR WITH ME FOR A MOMENT", PEOPLE TAKE A WHILE TO FIGURE OUT THAT YOU'RE JUST SHOWING THEM RANDOM SLIDES.