



TIVA



&



Experience

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MD (Ane)



AUDIENCE **POLL**



TIVA

**g
?**

**2) What is your definition of
TIVA**

**3) What is your experience of
TIVA**

4) Will you give TIVA in your



Lecture Outlin



- **History**
 - **Definition**
- **Types of TIVA**
 - **Indications**
- **Advantages and Disadvantages**
 - **TIVA Drugs & Drug Mixtures**
- **Methods of giving TIVA**
 - **Syringe Infusion Pumps, Target Controlled Infusion(TCI) and Closed Loop Systems**
- **TIVA in Different Groups of Patient**
 - **Surgical Procedures**
- **TIVA Checklist & Monitoring**
 - **TIVA Updates & TIVA Apps**
- **My Experience & Future of TIVA**
 - **Take Home message**



TIVA



HISTORY

1656

IV injection of
opium
with alcohol into
a dog

in Oxford in
leading to
1865
anaesthesia

Sigismund

Elsholtz

first attempted
intravenous
anaesthesia
by injecting a
solution

of opiate in

1872

Ore, Myer, and
to obtain
insensibility
Witzel

experimented with
IV

chloral hydrate in
animals

Ketamine 1959

Propofol 1977

Remifentanyl 1997

Dexmedetomidine 2010

1905

Real Intravenous
anaesthesia
started about
when Fedorow at
St.

Petersburg,
reported his
results on 530
cases in which he
used 0.75 per cent

1921
Hedonal in a
normal saline
solution

Advance in
intravenous
anaesthesia began
with

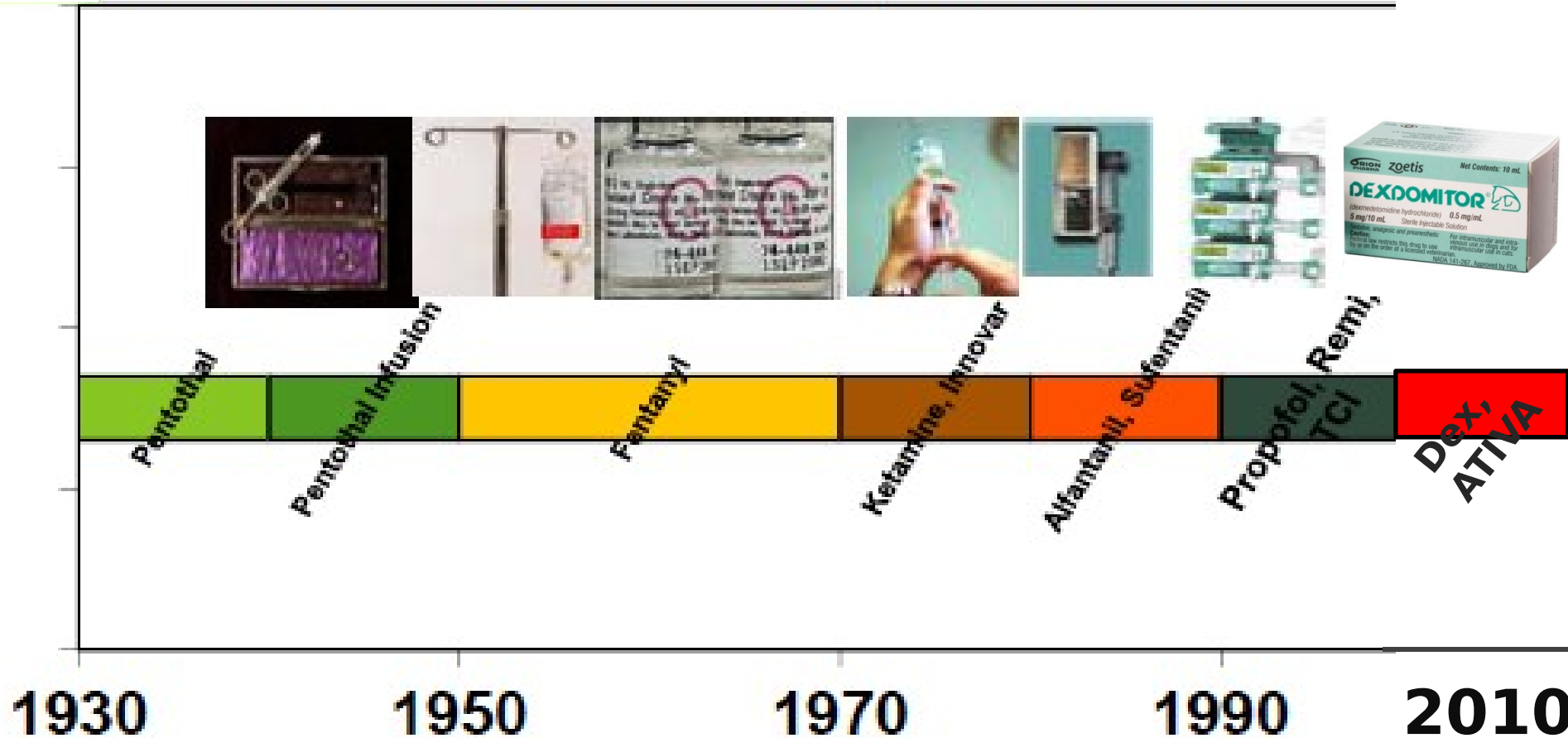
Daniel and Gabriel
Bardet

1936
Pentothal changed
the

IV anesthesia
practice
of TIVA



IV Anesthesia History Timeline



Definition



It is a technique of general anesthesia

Anesthesia via intravenous agents only

**No Gas (Even Nitrous Oxide)
or Volatile agents
are used**

Totally through Intravenous Lines

**Given by IV boluses,
in drips, by syringes
or by infusion pumps**

Total intravenous anaesthesia (TIVA)

It is a technique of general anaesthesia which uses a combination of agents given exclusively by the intravenous route without the use of inhalation agents (Gas Anaesthesia) including Nitrous Oxide, but oxygen, compressed air or



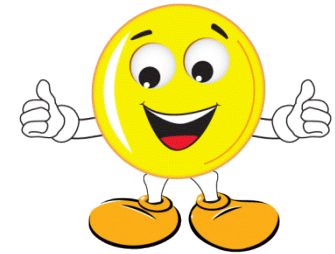
WHY TIVA ?



TIVA is Becoming Popular

because

GAS?



Gives

Always

Side
effects



Types of TIVA



Types of TIVA

Top

Types



With Endo Tracheal Tubes **Without Endo Tracheal Tube**



With Supra Glottic Airways **Without Supra Glottic Airway**



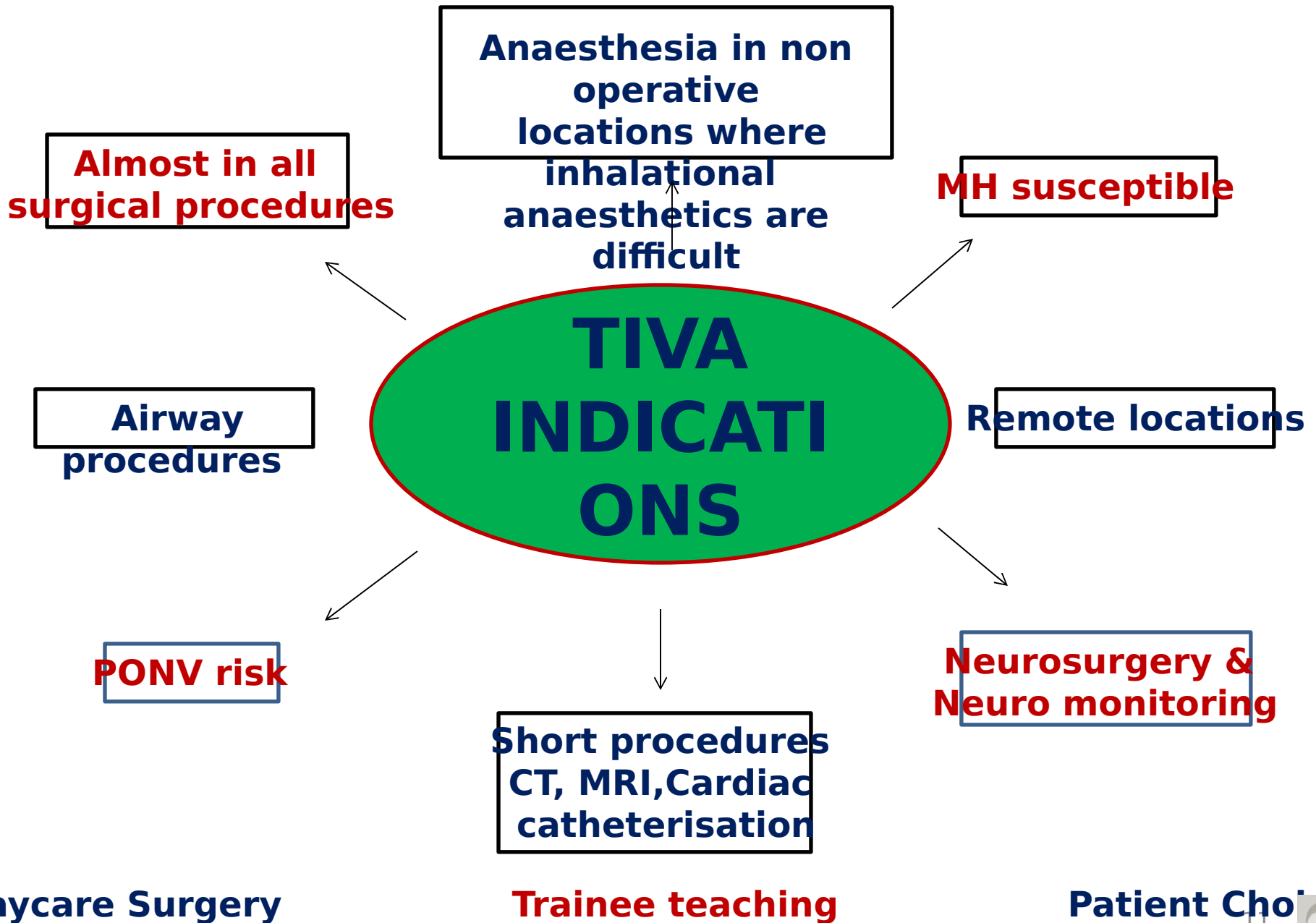
With Nasal Airways

With Oral Airways



Without ETT/SGD/Nasal/Oral Airways





**Avoid distension
air**

**filled spaces in the
patient's body- so
better operating**

**Better preservation
of cerebral auto
regulation**

**Except for a
slight prick in
the arm, the
patient is
unaware of
having an
anaesthetic**
**No mask over
the face**

Reduced stress response

**No sudden
concentration
of gas or vapour**

**Patients wake up as it
from natural sleep**

No risk of MH

Less PONV

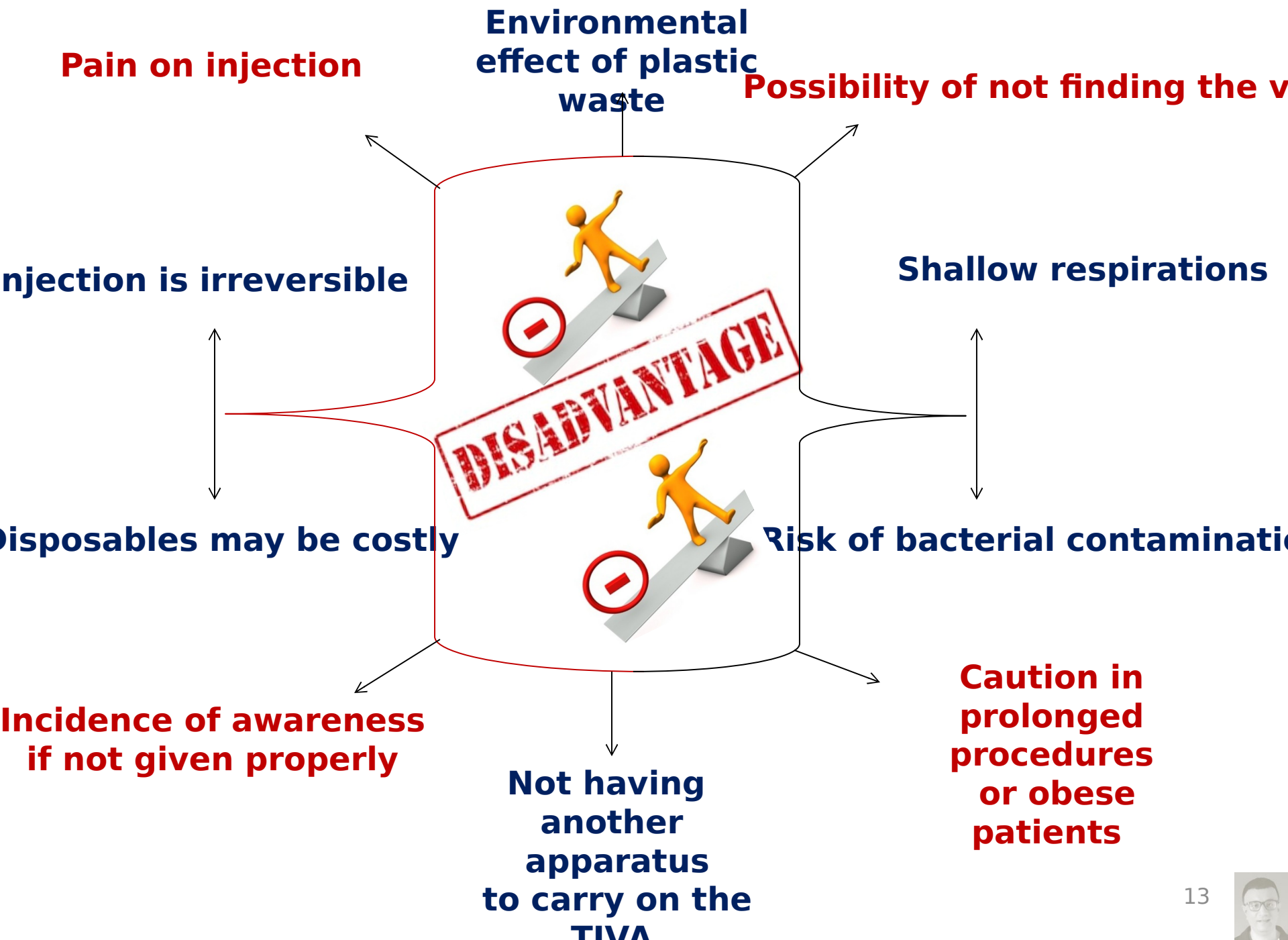
**Very low incidence of
post operative delirium**

**Less chances of
emergence phenomena**

**Less operating room
pollution**

**There should be no
smell
of volatile agents
at all in
the room, and the
patient
is usually most**





TIVA Drugs



Dexamethasone



Magnesium Sulphate

**All
Benzodiazep
ines**



Propofol

Ketamine



**All
Narcotics**



**All
Dexmedetomidine**



**All
Muscle
Relaxants**



IDEAL

TIVA
DRUG

Rapid onset of action



No perivascular sloughing if extravasated



Rapid and predictable recovery



Not absorbed by plastics



Potent and lipid-soluble



Does not promote bacterial growth



Water-soluble to



minimize toxicity associated with the solvent



Most important it can be mixed with other anesthetic agents without any complication



Devoid of adverse side effects



Stable in solution



Low cost



IV Anesthetic Drugs



Ketamine in TIVA

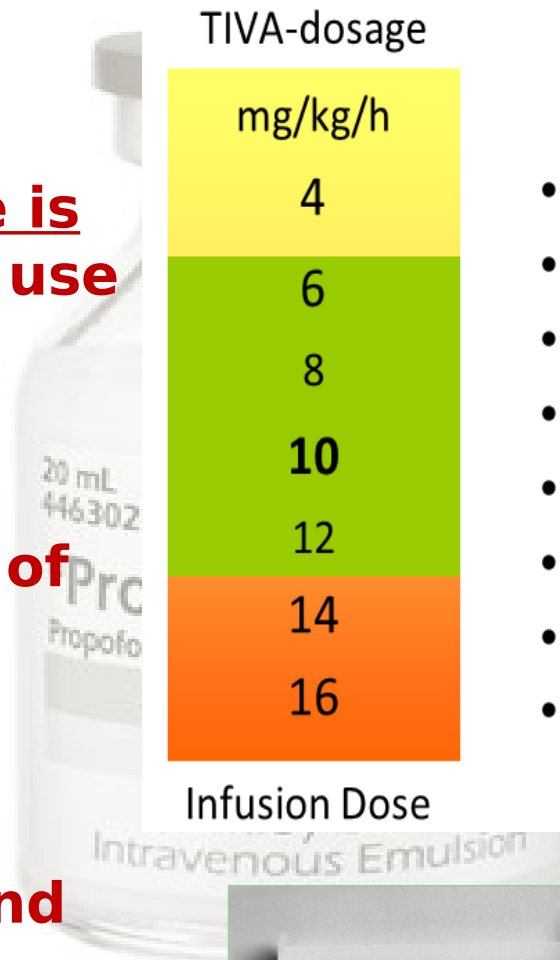
- Only intravenous anaesthetic with hypnotic, analgesic and amnesic properties
- Produces rapid hypnosis with profound analgesia and amnesia after intravenous administration of 0.5-2.0 mg/kg
- It can be mixed with all types of anaesthetic and narcotic agents in single syringe
- Ketamine with Medazolam (Ketomed), Ketamine with Propofol (Ketofol) and ketamine with Dex (Ketodex) are established TIVA mixtures
- One of established drug for TIVA mixture



Propofol In TIVA

Maintenance

- **Prime drug in all TIVA combination**
- **Initially TIVA dose is 2-2.5 mg/kg IV (if use alone)**
- **In TIVA mixture 1 mg/kg IV**
- **Co-administration of Propofol and Remifentanyl by target-controlled infusion (TCI) is highly effective and constitutes ideal total i.v. anaesthesia**



TIVA-dosage

mg/kg/h

4

6

8

10

12

14

16

Infusion Dose

Intravenous Emulsion

Anesthesia depth

- Sedation
- Light pain
- Laryngeal mask
- Moderate pain
- Surgical anesthesia
- Intubation
- Strong pain
- Deep anesthesia

TCI-dosage

µg/ml

1.5

2.0

3.0

3.5

4.0

5.0

6.0

Target Concentration



Etomidate

- **Excellent Cardio stable drug**
- **Use mainly in Hemodynamically compromise patient as TIVA induction agent**
- **For Sedation : 0.1 mg/kg up to three doses**
- **For TIVA : 0.3 to 0.4 mg/kg IV over 30-60 seconds**
- **In ICU : As continuous infusion 0.04 to 0.05 mg/kg/hr with continuous monitoring**
- **In Cushing Syndrome or low Cortisol level patient 0.2 mg/kg**
- **In Geriatric patients : 0.2 mg/kg**



Dexmedetomidine - in TIVA

- **Highly selective α_2 agonist**
- **Anxiolytic, sedative, analgesic and sympatholytic properties and less respiratory depression make Dexmedetomidine a much preferred drug in TIVA anaesthesia**
- **Advisable to combine another drugs with dex for TIVA**
- **Dose ranges from 0.5 to 1 mcg per kg according to patient status and surgery needs**
- **Maintenance infusion is generally initiated at 0.6 μ /kg/hour and titrated to achieve desired anaesthesia effects**
- **In pediatric TIVA dex with ketamine (Ketodex) combination is mostly preferred for Endoscopic and Radiological procedures**



Opioids



Fentanyl in TIVA

- Bolus 3 $\mu\text{g/kg}$ over 30 sec
- Followed by 2 $\mu\text{g/kg/hr}$ for 30 min
- 1.5 $\mu\text{g/kg/hr}$ from 31-150 min
- 1 $\mu\text{g/kg/hr}$ until 30 min before skin closure

Remifentanyl in TIVA

- * 1mg/vial, 2mg/vial, 5mg/vial
- * Initial dose of 1 mcg/kg
- * TIVA Maintenance 0.25-0.5 mcg/kg/min IV
- * Post-Op Period 0.025-0.2



Adjuvant TIVA Drugs

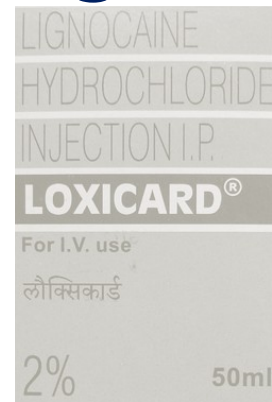
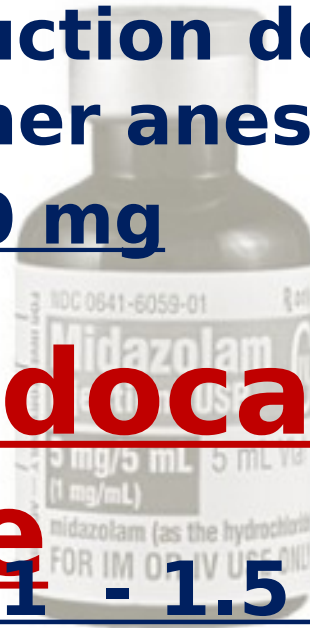


Midazolam

- 0.05 mg/kg
- Co-administration of midazolam in TIVA reduce the induction dose and the total dose of any other anesthetic drug
- Total dose: < 10 mg

Lidocaine

- * Bolus dose is 1 - 1.5 mg/kg
- * Infusion as 1.5 mg/kg/hr as adjuvant in TIVA
- * Reduce the TIVA dose of other anesthetic agents by 10 to 20 %



Magnesium Sulphate

- As an analgesic adjunct
 - Useful in patients receiving total intravenous analgesia (TIVA)
 - Reduce propofol, dex, atracurium and postoperative narcotic consumption
 - Improves the quality of postoperative analgesia during TIVA
 - Bolus dose is 30-50 mg/kg with other anesthetic agents and maintenance dose is 6-10 mg/kg/hr as continuous infusion
 - Very cost effective for TIVA
- Available as 2 ml amp with 500 mg/ml and total 1



Dexamethasone

- **Dexamethasone is used widely in TIVA as an adjuvant**
- **As anti-inflammatory agent, prevents and treats post-operative nausea and vomiting (PONV), suppress inflammation, good analgesic agent**
- **Provides a sense of well-being**
- **Good quality of recovery and early discharge in patients from TIVA anaesthesia**
- **Single prophylactic dose of dexamethasone 8 mg can be given irrespective of sex, disease or ASA risk**



TIVA Drug Combinations



Different Mixture COMBINATIONS A

- PDF TIVA (Propofol, Dexmedetomidine and Fentanyl)
- MDF TIVA (Midazolam, Dexmedetomidine and Fentanyl)
- KPD TIVA (Ketamine, Propofol and Dexmedetomidine)
- KETOFOL TIVA (Ketamine and Propofol)
- KETODEX TIVA (Ketamine and Dexmedetomidine)
- KETOMED TIVA (Ketamine and Midazolam)
- RP TIVA (Remefentanyl and Propofol)

Any Drug Mixture shake well and use within 4 to



Multiple Drugs Mixtures

Propofol, fentanyl, vecuronium mixtures – emulsion stability, zeta potential, microbial growth studied and concluded to be compatible and stable immediately after mixing and during Y-site injections

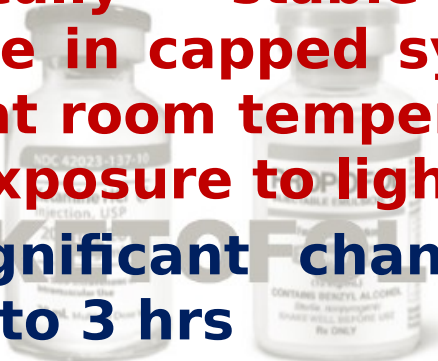
Isert PR1, Lee D, Naidoo D, Carasso ML, Kennedy RA .Compatibility of propofol, fentanyl, and vecuronium mixtures designed for potential use in anesthesia and patient transport. J Clin Anesth. 1996 Jun;8(4):329-36.

Trissel LA, Gilbert DL, Martinez JF. Compatibility of Propofol injectable emulsion with selected drugs during simulated Y-site administration. Am J



Ketofol

- First established TIVA combination
- **Physically compatible** • **chemically stable 1:1 mixture in capped syringe 3 hrs at room temperature with exposure to light**
- **No significant change in pH up to 3 hrs**
- **No separation, cracking, color change, gas formation**
- Widely used by all anesthesiologist across globe



Ketodex

Ketamine 1mg/kg and Dex 1 mcg /kg

Useful in Pediatric patients

Ketomed

- **Ketamine 1mg/kg and Midazolam 0.1 mcg /kg**
- **Useful in outside OT procedures**



KPD TIVA (Ketamine, Propofol and Dex)

Mixture in 1:1:1 Dose for TIVA

Combination of all these drugs permit lower dose of each individual agent for TIVA and reducing their adverse hemodynamic and respiratory effects which is very safe and important for patient and anesthesiologist



The advantage is low dose of each agent as compared to full dose

Excellent analgesia

and anesthesia

↓ dose of individual

Stable haemodynamics



↓ airway complications

Rapid recovery



KPD Journal Articles

[Indian J Anaesth](#). 2014 Mar-Apr; 58(2): 138-142.

doi: [10.4103/0019-5049.130813](#)

PMCID: PMC4050928

PMID: [24963176](#)

Dexmedetomidine decreases the requirement of ketamine and propofol during burns debridement and dressings

[Prabhavathi Ravipati](#), [Pothula Narasimha Reddy](#), [Chaithanya Kumar](#), [P](#)

[Pradeep](#), [Rama Mohan Pathapati](#),¹ and [Sujith Tumkur Rajasheka](#)
Indian Journal of Anaesthesia, Vol. 58, No. 3, May-June, 2014, pp. 275-280

Clinical Investigation

Ketofol-Dexmedetomidine combination in ECT

Ragaa El-Masry¹, Tarek Shams²

¹ Department of Public Health, College of Medicine, Mansoura University,
Mansoura, Egypt

² Department of Anesthesia and ICU, College of Medicine, Mansoura
University, Mansoura, Egypt

[Pediatr Cardiol](#). 2012 Jun;33(5):770-4. doi: 10.1007/s00246-012-0211-1. Epub
2012 Feb 16.

Is the addition of dexmedetomidine to a ketamine-propofol combination in pediatric cardiac



PROPOFOL & FENTANYL



Combination of Propofol (1% & 2%) with Fentanyl (10 & 50 mcg/mL) showed no significant degradation of emulsion within 20 hrs



Propofol dose reduction by 50%



RP TIVA (Remifentanyl and Propofol)

Can be mixed in polypropylene syringes and used for up to 36 hours- remifentanyl concentration is 50 mcg/ml (1mg in 20 ml propofol)

Color and clarity good with pH stable at 3.9 - 4

Very short acting

Adequate analgesia, satisfactory hemodynamic, rapid recovery, shorter PACU stay, excellent patient acceptance

Ideal agents for TCI model

Synergism- Propofol dose reduction by 50%

Most widely used TIVA combination with TCI in the world



Jubilee Technique Doses in TIVA

Recommended induction and maintenance doses of the commonly used IV agents used in TIVA.

	Induction	Maintenance /m	Maintenance /hr
PROPOFOL (anaesthesia)	1-2.5 mg/kg	0.10-0.2 mg/kg/m	6-12 mg/kg/hr
REMIFENTANIL (anaesthesia)	0.5-1 mcg/kg	0.25-0.5mcg/kg/m	15-30mcg/kg/hr
(conscious analgesia)	0.5-1 mcg/kg	0.05-0.2mcg/kg/m	3- 12mcg/kg/hr
FENTANYL (analgesia)	1-2mcg/kg bolus		1-2mcg/kg/hr.
DEXMEDETOMIDINE (sedation)	1mcg/kg		0.2-1.4 mcg/kg/hr.

Ketamine

mg/kg/m

5 mg/kg/hr

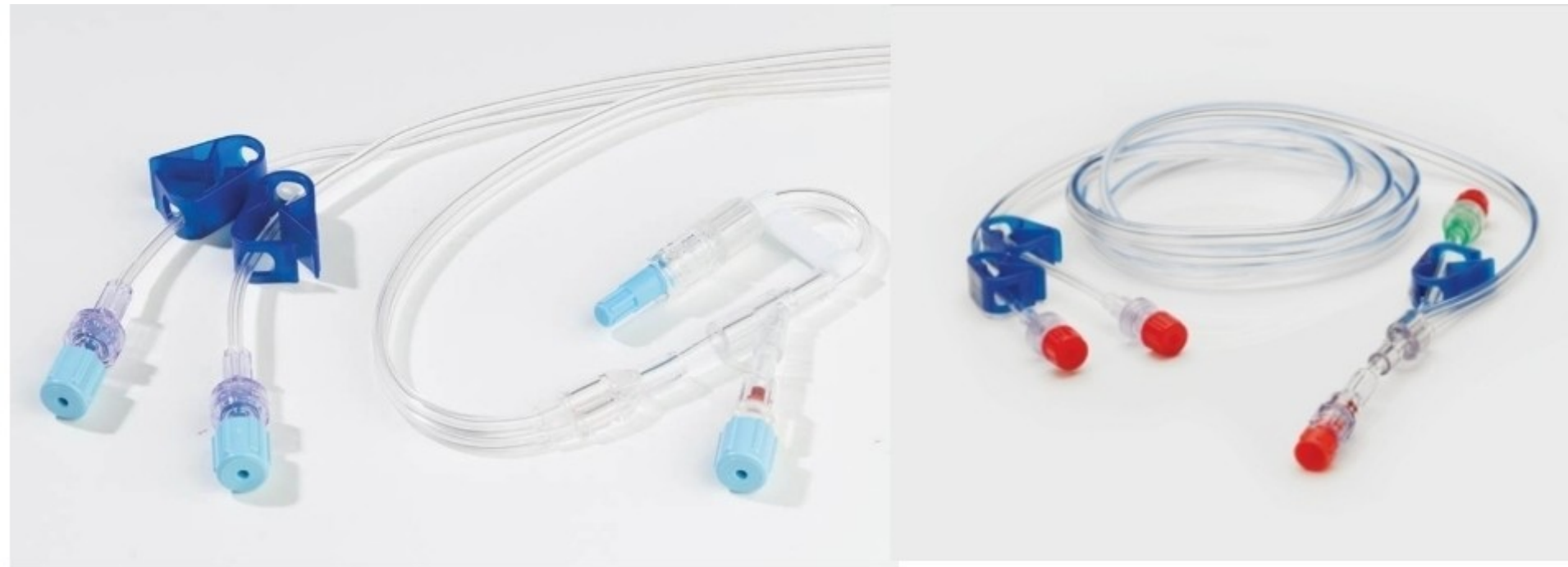
1 to1.5 mg/kg

0.1-0.2

Onset and duration of action of the agents used.

	Onset of action IV	Biological half life	Duration of action
<u>Midazolam</u>	5 minutes	1.5-2.5hrs.	1-6 hours.
<u>Fentanyl</u>	5 minutes	6 minutes	30- 60 minutes
<u>Remifentanyl</u>	2 minutes	3 minutes	5-10 minutes
<u>Dexmedetomidine</u>	5-10 minutes	2 hours	60 minutes.
Propofol	15-30 seconds	1.5-3hrs	5-10 minutes



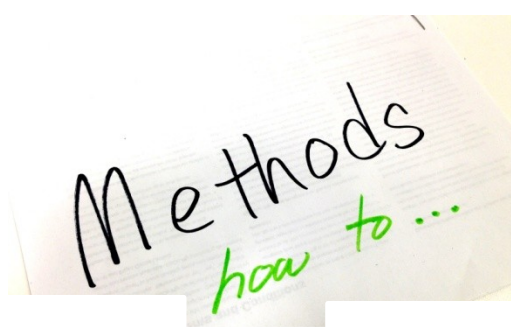


Total Intravenous Anaesthesia Sets



Methods





give TIVA

- Either with a single drug or with a combination of drugs
- By Single Syringe Technique with mixture of drugs or with only one drug
- Continuous IV infusion through drips
- With Syringe infusion pumps
- With TCI (Target Controlled Infusions) machines
- Automated drug delivery through Closed Loop Systems



Single Syringe TIVA (SS TIVA)

Explores the feasibility and conduct of combining intravenous agents in a single syringe technique to provide balanced anesthesia

1) No additional investment for TCI or Closed Loop Systems and no need for expertise in it.

2) Simple syringe or pump can be made use of.

3) Only one syringe is used, with the

advantage of dose titration at a

single level & fixed dose mixtures

4) Short procedures can be managed with intermittent



Manually Controlled Infusion (MCI)

Manual dosing of anaesthetic agents during TIVA

With fixed infusion rate

With syringes or with



Target Controlled Infusion (TCI)

A target controlled infusion is an infusion controlled to achieve a pre set drug concentration in the plasma or the effect



Key components of a TCI infusion

User interface to enter details and target blood concentration

Software with pharmacokinetic model, validated for specific drug to control infusion rate

Communication between (control unit) and pump





Single Syringe TCI



Double Syringe TCI



Three Syringe TCI



John Baird Iain Glen

He is
Father
of Modern TIVA Technique

has developed first established
TCI system 'Diprifusor'
for Propofol TIVA
First time in 1996



Clinical benefits of TCI (>2000 publications)

- * More predictable onset of anaesthetic effect
- * Higher stability during maintenance
- * More predictable offset of anaesthetic effect
- * Short time to recovery
- * Low incidence of PONV
- * Short time to discharge

Economic benefits

- * Saves nursing time in the recovery room



TCI Models Overview

Drug	Model	Age	Height	Weight	Blood Concentration	
Propofol 1%- 10mg/ml 2%- 20mg/ml	Marsh (Diprifusor)	↑ 16yr Tested: 16-150yrs		30-150kg	Max: 15µ/ml	Weight based only - age limits the use Age will not affect doses Avoid use on children Plasma targeting
Propofol	Schnider	↑ 16yr 16 - 94yrs	100-220cm	30-240kg	Max: 15µ/ml	Effect Site target only Plasma target gives too small dose Use LBM in calculation Adjusted on Weight, Height, Age and Gender Remember: Ideal weight has restrictions Invalid pt parameters: Adult: ↑ 40yrs if ↓ 35kg or ↓ 130cm
Propofol 1%- 10mg/ml 2%- 20mg/ml	Paedfusor	↑ 1yr Not yet tested Validation study: 1-15yrs		↑ 5kg Not yet tested Validation study: 5-53kg	Max: 15µ/ml	No effect site available only Plasma site Not yet tested Validation study: Mix of boys & girls
Propofol 1%- 10mg/ml 2%- 20mg/ml	Kataria	↑ 3yr 3 - 25yrs		↑ 15kg 11-149kg	Max: 15µ/ml	No effect site available Weigh & age No Effect Site trend is displayed
Remifentanyl	Minto	↑ 12yr			20 - 50µg/ml	Use LBM in calculation Both plasma & effect site Invalid parameter: ↑ 210cm if ↓ 15yrs ↓ 45kg if ↑ 75yrs
Alfentanyl 500µg/ml	Maitre	Tested: 3-119yrs Limit on pump: 18-95yrs		15-200kg	Max: 500ng/ml	Weight, Age and Gender Only Plasma targeting Max rate: 300µg/kg/min
Sufentanyl 0.2-5µg/ml	Gepts	Tested: 12-150yrs		No limits	Max: 2ng/ml	Not for children Plasma & Effect site targeting



Closed Loop Anaesthesia Delivery Systems

or

Automated Total Intravenous Analgesia/Anesthesia (ATIVA/CLADS)

A closed loop system is
the ideal means of
automated drug delivery

- The Input - Drug delivery (etc. Propofol, Opioids)
- The Output - Evoked Potential, Bispectral Index (BIS), Blood Pressure, Pulse Rate.

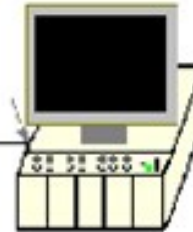


Output

Anaesthetic depth monitor



Vital sign monitor



Closed loop Automated anaesthesia delivery system IAADS

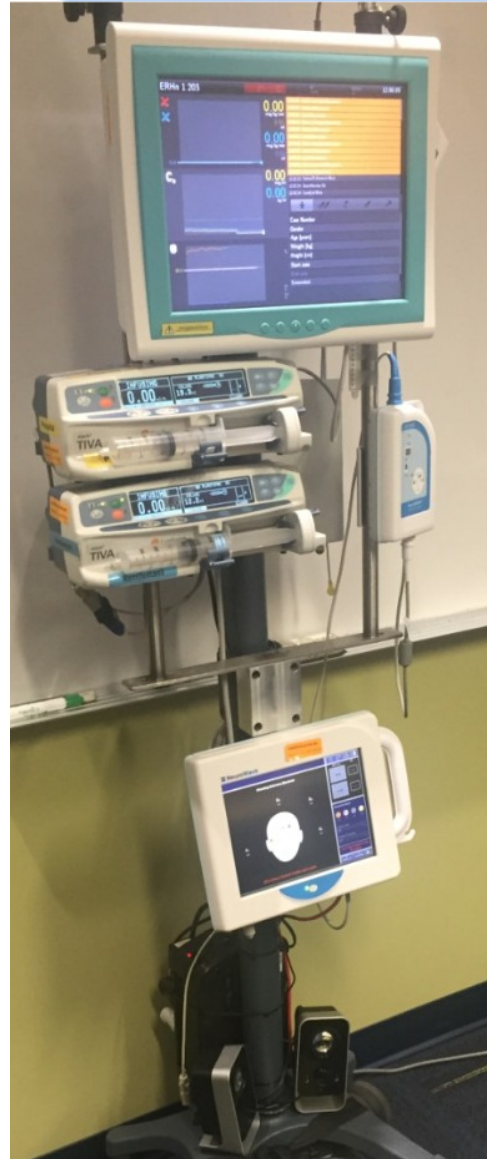


Syringe pumps containing different anaesthetic drugs

Input



Closed Loop Anaesthesia Models



Clinical Benefits of Closed Loop Anesthesia

- Automatic delivery of anaesthetic drugs to the patient at the time of induction of anaesthesia using IV anaesthetic agents depending upon the patient's condition or choice of anaesthetist.
- Frees the anaesthetist from the repetitive task of looking at the anaesthetic depth and altering the drug delivery manually.
- Frees anaesthetists hands to allow him/her for other activities while keeping a watch on the monitor.
- Anaesthetist is warned of
- Fine-tuning of the drug delivery according to the requirement of the patient as well as the surgical stimulus requirement.
- Safety of patient by cutting off anaesthetic drug delivery in case of severe drop in blood pressure or heart rate.
- The anaesthetist to define the safety limits of blood pressure as well as heart rate and blood gas levels for not only warning the anaesthetist but also stopping delivery of the anaesthetic agents.
- The anaesthetist to



iControl-RP (Remifentanyl-Propofol)

iControl-RPR (Remifentanyl-Propofol-Relaxant)

- **Auto Robotic TIVA CLADS**
- **US FDA approved**
- **Developed in Vancouver at University of British Columbia in 2015**
- **By Team of Dr. Ansermino(Pediatric Anesthesiologist) & Dr. Dumont(Professor of electrical**

TIVA in Different Groups of Patient



TIVA in Pediatric Patients

- Paediatric total IV anaesthesia (TIVA) can facilitate surgery, reduce airway responsiveness, and minimize complications such as postoperative nausea and vomiting and emergence agitation
- **Manual infusions remain an important option in clinical practice due to variability of dose regime**
- Kataria and Paedfusor TCI models are used. The Kataria model used in children aged 3-16 yr and weighing 15-61 kg, and the Paedfusor in children aged 1-16 yr and weighing 5-61 kg
- Propofol, Ketamine, Remifentanyl and dexmedetomidine play important role in TIVA
- For obese children use the total body weight (TBW) to calculate the dose needed for infusion

TOTAL INTRAVENOUS
ANAESTHESIA FOR
PAEDIATRICS



As far as avoid TIVA in
Neonates



TIVA in Geriatric Patients

- Compared with inhalation anaesthesia, TIVA is more suitable as it has less observable effects on cognitive function in elderly patients after surgery
- Comparing with TIVA, inhalational anaesthetics may augment complications related with reduced lung blood flow and circulatory depression. Inhalational anaesthetic agents may further reduce cardiac output and cause potentially lethal increase in alveolar concentration
- Always start with a low concentration/infusion rate and slowly work upwards. Go Low, Go Slow and Always Follow
- Most important is to avoid hypotension. Consider intravenous fluids and vasopressors when appropriate
- Multi Para monitoring and Oxygen is must during TIVA in geriatric patients



TIVA in Obese Patients

- TIVA is an excellent method of administering general anaesthesia to obese patients
- The recommended drug dose in obese patients always lower than non-obese patients, the actual blood concentration is higher than the calculated target dose of drugs.
- The “no-relaxant” technique (for intubation) is not advisable for obese patients and Suxamethonium for intubation in TIVA is ideal choice
- In Obese patient always secure airway to avoid respiratory depression with nasal or oral airways
- Multi Para monitoring and Oxygen is must during TIVA in Obese patients



TIVA in ASA III Patients

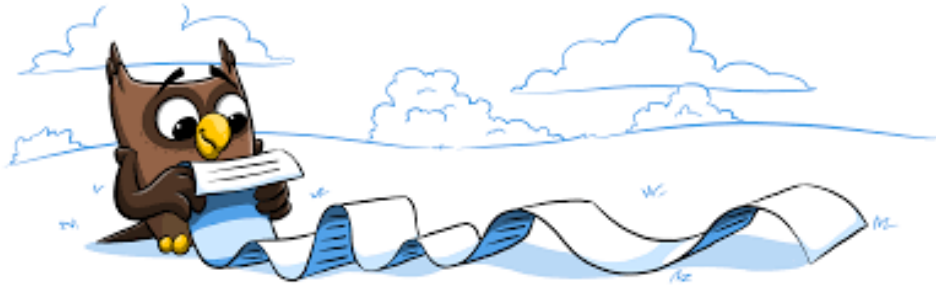
- TIVA can be given to seriously ill patients in whom their systemic disease is not a threat to their life (ASA III)
- There are no specific protocols for TIVA in ASA III patients but dose of TIVA of elderly patients can be adopted, require a lower concentration to produce anaesthesia
- Multi Para monitoring and Oxygen is must during TIVA in these patients
- Choose the most appropriate TIVA drugs according to the patient's physical condition:-
 - # Whether the patient is elderly or young
 - # Whether the patient is obese or non-obese



Surgical Procedures **under TIVA**

- **From OT to Outside OT**
- **From Pediatric to Geriatric**
- **From any Surgical to Medical Specialty**





- All anesthesia drugs, Airway Equipments, Oxygen and Multipara Monitor are must before giving TIVA
- **Ensure no leakages from cannula and patient's IV cannula is always visible during the surgery (if possible)**
- **Syringes should be labelled with the drug name, date and concentration**
- **Infusion lines should be checked every 15 minutes during surgery**
- The infusion set through which TIVA is delivered **should have a Luer-lock connector at each end**
- **If BIS is used, check placement before and after surgical draping**
- At end of case, ensure all tubing/IV cannulae which had TIVA drugs by any method are flushed to prevent inadvertent boluses in the ward



TIVA Monitoring

Visual

- Anesthesiologist
- Loss of response to shaking and shouting
- Loss of hemodynamic response or limb movement with vigorous jaw thrusting
- Absence of tachycardia or even bradycardia with laryngoscopy and intubation

Machine

- Multiparameter monitoring
- Bispectral Index Monitor
 - Evoked Potentials
 - pEEG monitor is recommended when a neuromuscular blocking drug is used with TIVA





TIVA has become more Popular, Practical and Possible due to two main reasons -

First

The advance knowledge of pharmacokinetic and pharmacodynamic properties of drugs such as Propofol, Ketamine, Dexmedetomidine and newer short-acting opioids, making them suitable for intravenous administration

Second

New concepts in pharmacokinetic modeling coupled with advances in the technology of infusion pumps which allow the use of algorithms such as Syringe Infusion Pumps, Target Controlled Infusion (TCI) & Closed Loop System

Propofol with Remifentanyl seems to be the dominating TIVA technique all over world, delivered either by conventional pumps or by target control systems or by close loop systems



TIVA APPS





iTIVA plus Anaesthesia

RamirezMD Medical

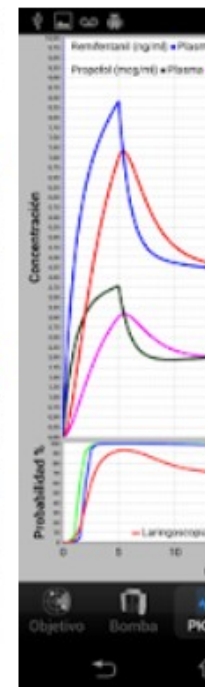
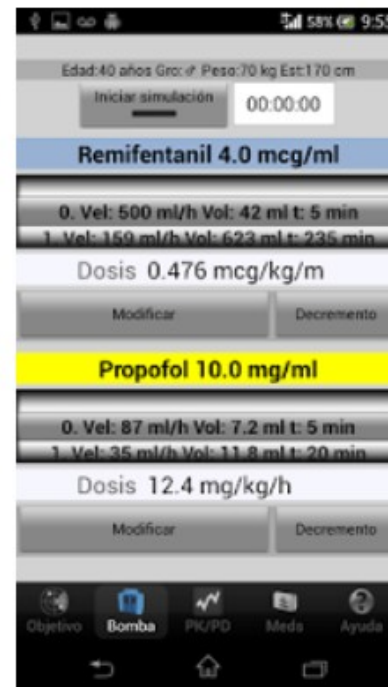
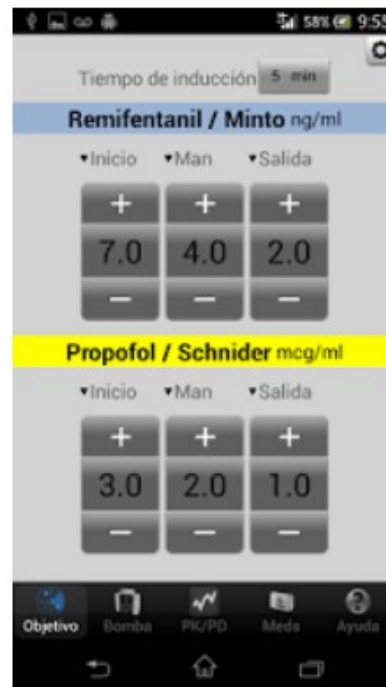
★★★★★ 35

3+

Offers in-app purchases

Add to wishlist

Install



Do TIVA with your Smartphone and volumetric pumps,





Anesthesia Infusion Calculator

Crystal Clear Solutions

Medical

**The easiest and
best drug infusion
calculator for
anaesthesia or
anywhere else**

Universal Infusion Calculator

Amount in ml

☐ Grams ☒ Milligrams

Kgs	Rate
69	24
70	25 .00
71	26 .01

mg/kg/min mcg/kg/min ng/kg/min

Run infusion at 10.50 ml/hr

Universal Infusion Calculator

Amount in ml

☐ Grams ☒ Milligrams

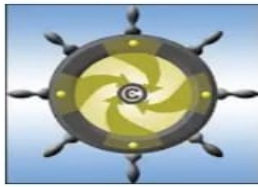
Kgs	Rate
69	24
70	25 .00
71	26 .01

1 2 3

4 5 6 Done

7 8 9





TIVAManager

ANAESTHESIA SOFTWARE

Medical



**Calculator of plasma concentration
of anesthetics based on PK/PD
models.**





© 2017

Total Intravenous Anesthesia and Target Controlled Infusions

A Comprehensive Global Anthology

Editors: **Absalom**, Anthony R., **Mason**, Keira P. (Eds.)

First definitive text of total intravenous anesthesia and target controlled infusion

Internationally renowned editors and contributors provide comprehensive, expert coverage

Addresses history of TIVA and of TCI, neuropharmacology of TIVA, and pharmacological modeling basics

In-depth profiles of drugs used in TIVA and of up-and-coming new drugs

Drug interactions

Case studies of adult and pediatric patients, with accompanying video

TIVA Textbook

Kindle Edition

₹ 16,065.00

Paperback

₹ 19,466.00



My Experience

- In my practice of general anesthesia, almost 70 % cases I do under TIVA
- MY Preferred combination is KPD mixture which I am giving since 5 years in all my cases of TIVA
- If required then, I give 25% of original dose as sedation of KPD TIVA in regional Anesthesia , and 50% of original dose in RAGA/GARA anesthesia
- I always give 3 to 5 liter of oxygen in my TIVA cases where Airway, Intubation or SGD are not required



My Technique for giving any drug combination in TIVA by any method

- Start with 1 mg or 1 mcg per kg with combination of any TIVA drugs as mixture
- Maintain with 0.5 mg or 0.5 mcg per kg every 10 minutes according to surgical time
- Multipara monitoring and Oxygen are must
- Stop the TIVA mixture before 10 minutes of surgical time
- By observation patient will fully conscious within 30 minutes post operation
- Through this technique I maintain TIVA maximum up to 4 hours of by any methods



So TIVA in fact

- Patient Friendly
- Surgeon Friendly
- Anaesthesiologist Friendly
- Economically Friendly
- Environmentally Friendly
- Productivity Friendly



This is how it is
used



Future

**Auto TIVA through Artificial Intelligence(AI) with help of TCI
and BIS**

**Dexmedetomidine TCI model
Hannivoort and Dyck
Will be launched in 2019**

**Like Vaporizers, the Syringe Pumps
and TCI systems will be integrated
into the Anesthesia Work Station**



ALL-IN-ONE TCI and CLA

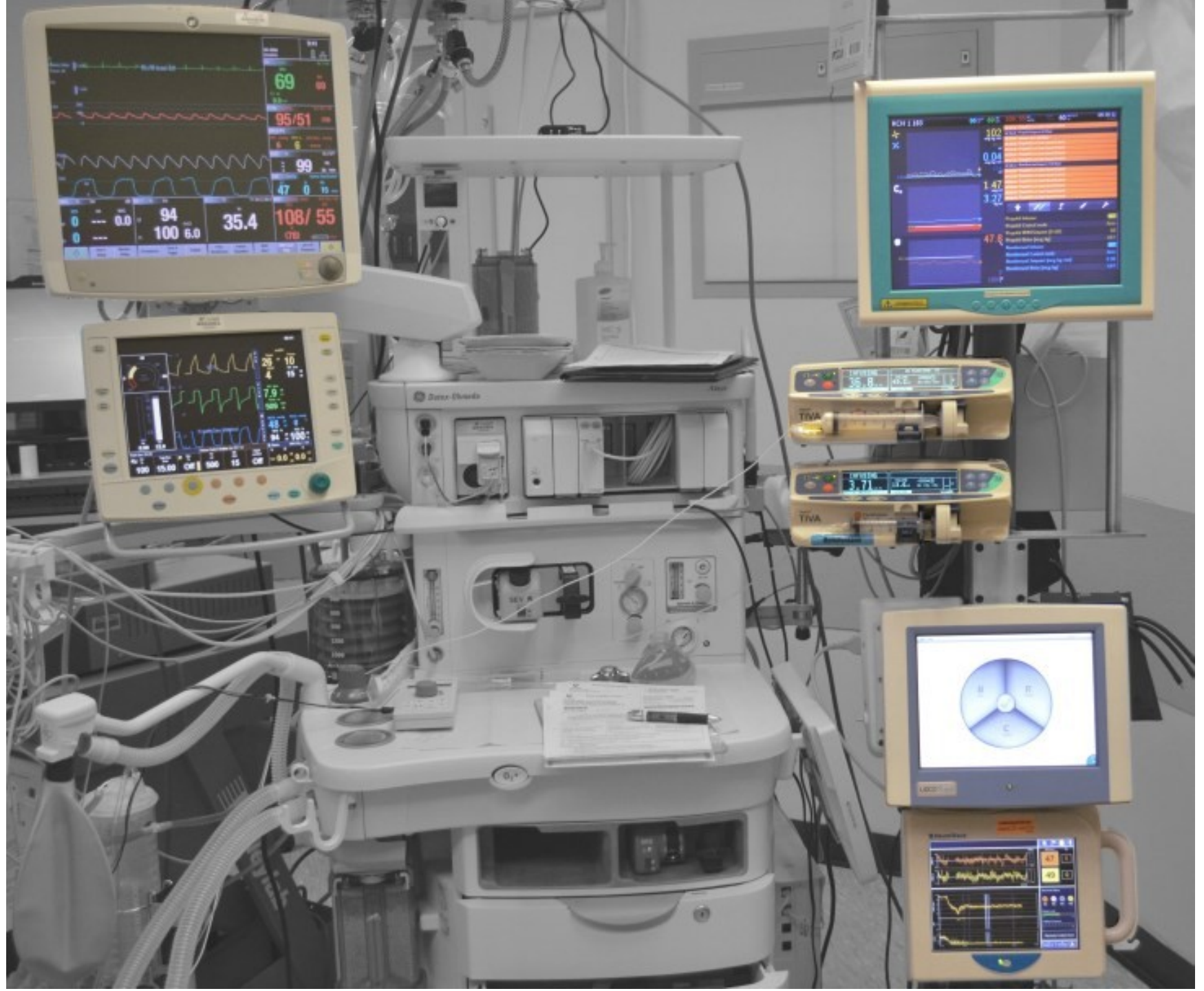


Secret Project for long TCI TIVA

Asena P&P

The Asena[®] Pump & Play





Future Auto Anesthesia

Work Station

This machine will have in built different drug tanks and different vaporizer and all type of monitoring system and only one channel will connect human body. And machine itself will decide dose, time, depth of anaesthesia according to patient vitals and pre operative data in relation with operation and disease. So anaesthetist will just start the button of asleep and at the end will stop the button to awake. And of course in between you can have coffee from that machine only. This machine will work with concept of Augmented Reality with Artificial Intelligence. And it will have in built internet, Wi-Fi, NFC & Bluetooth. So anaesthetist can also monitor remotely in his Smartphone.



Newer Drugs in near future in TIVA

- **Hyptiva** (Anesthetic + Narcotic)
- **Duzitol** (Anesthetic + Narcotic + Muscle Relaxant)
- **Remimizolam** (Narcotic + Benzodiazepine)
- **Suggamdex** (Reversal Agent)



Take Home Message

Total
Intravenous
anaesthesia is
viable and
safe
alternative to
the Inhalation
Anaesthesia
now, with lots
of advantages
over the latter



&

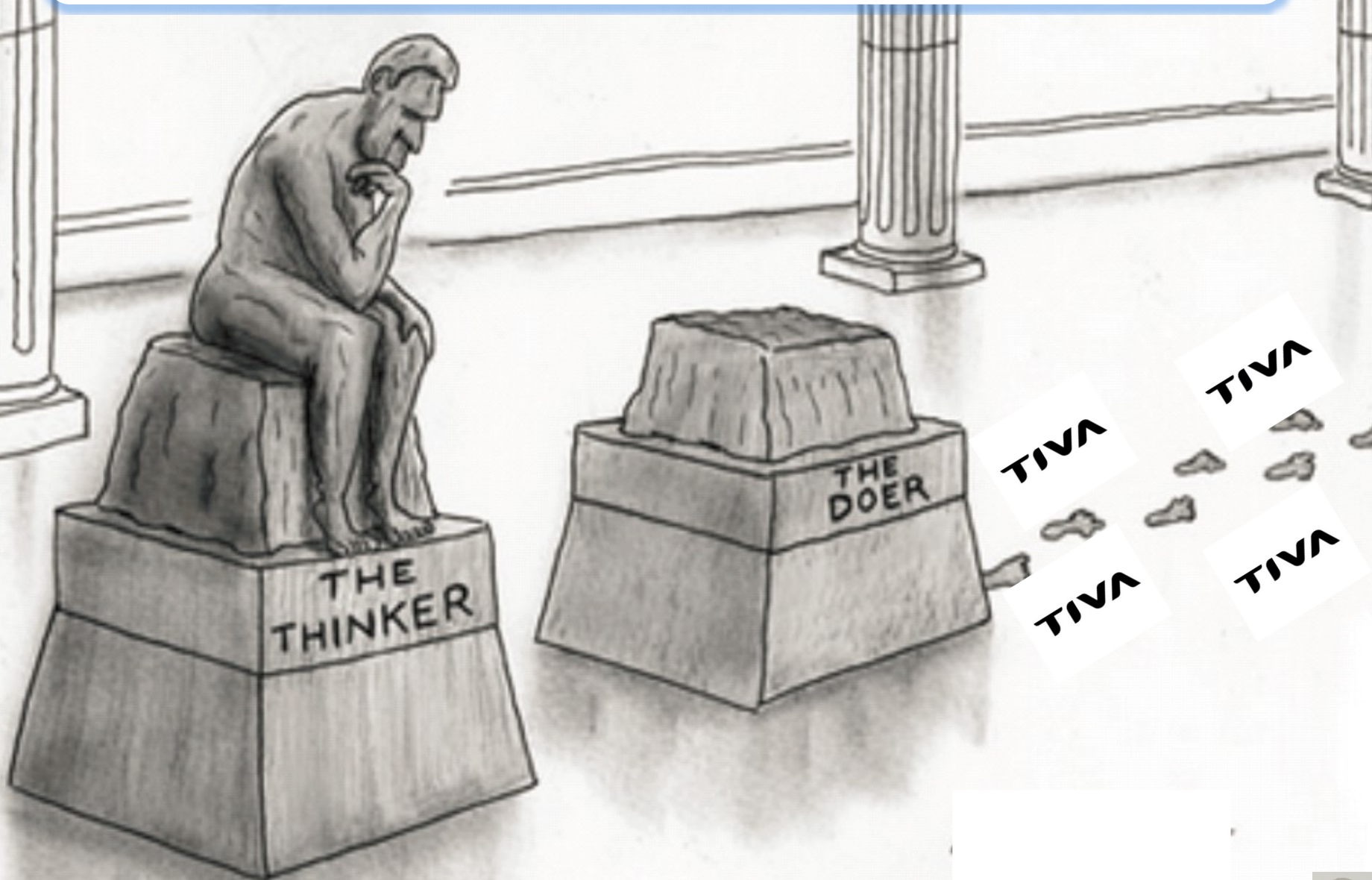
TCI pumps
and advance
monitors
make
administratio
n of TIVA easy
and precise



Manual
Controlled
Infusions using
regular syringe
pump can
be used to
deliver pre-
calculated doses
The newer
intravenous
hypnotics and
analgesic agents
with
favourable
pharmacokinetic
properties
have made TIVA
feasible in a wide
array
of varying clinical

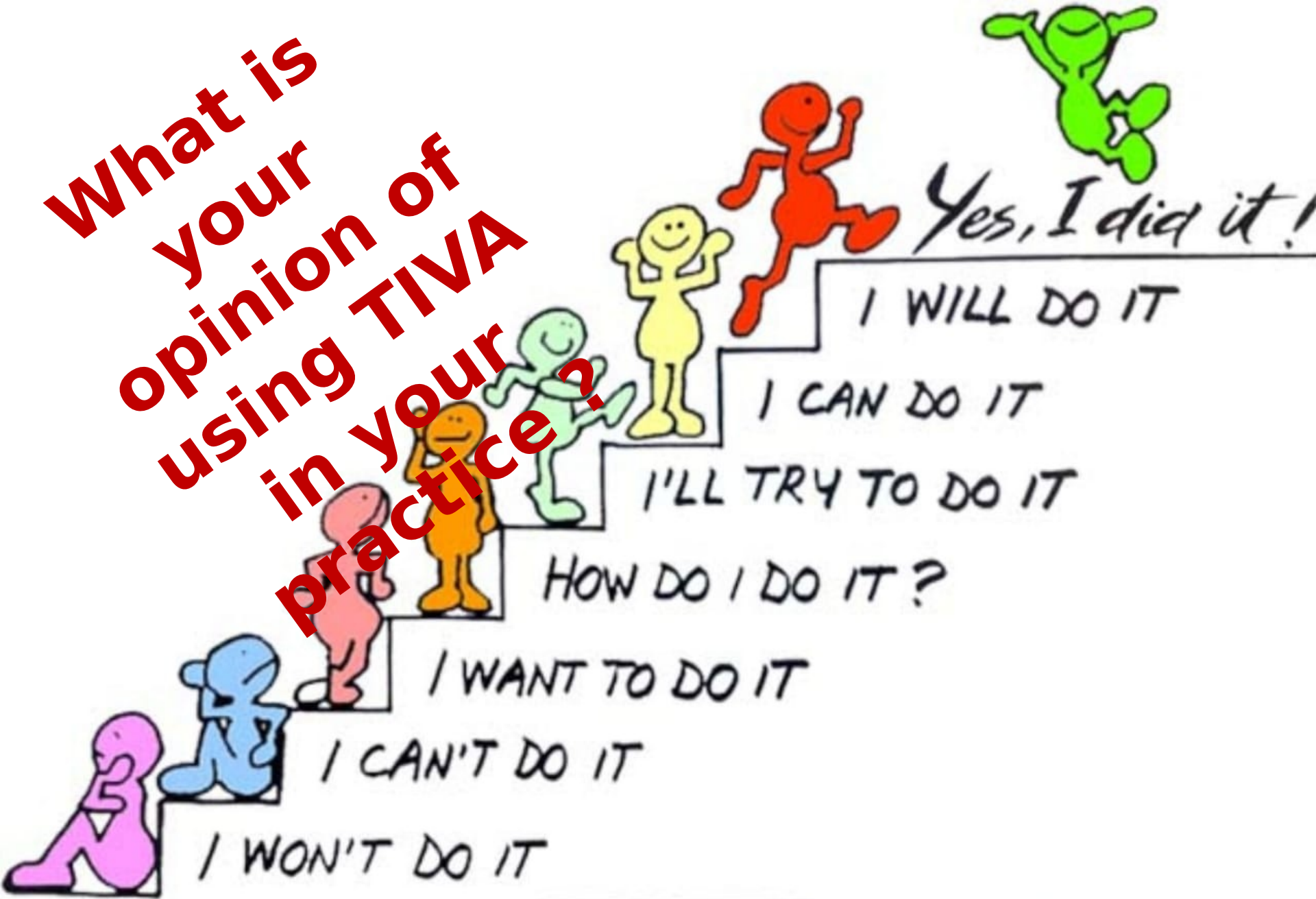


Patient wants more than Gas Anesthesia





What is
your
opinion of
using TIVA
in your
practice?



WHICH STEP HAVE YOU REACHED TODAY?





facebook



GROUP



Different TIVA Societies

www.eurosiva.eu

www.worldsiva.org

<https://siva.ac.uk>



Thank You

