September 2014 VIVA Topics

Viva Sample

What tests are there to assess liver function?
What are the specific blood tests?
Tell me about albumin
What are its functions?
What other proteins carry drugs?
What are the effects of protein binding on PK?
What drug interactions can occur in regards to protein binding?
What is Vd?
What is clearance?
What are the differences between thio and propofol clearance and why?

Viva Sample

What is normal RR?
What is RR times TV?
What is dead space?
Which airways involved, what generations?
What is the structure of currently used volatiles?
What effect do the halogens infer?
What is the effect of different halogens? ie fluoride vs bromide
What is blood gas partition coefficient?
What is oil gas portion coefficient? What does it infer?
What do you mean by equilibrium?
Shown wash in curve of commonly used anaesthetic gases - why is nitrous oxide at the top?

Viva Sample

What area of the brain is responsible for nausea? What are the inputs involved?
What other inputs? - kept asking same question What is the mechanism of higher cortex inputs? What is the best target?
What is the natural ligand for NK1?
What else is substance p involved in?
Name an NK1 antagonist?
Will it relieve pain?
Do you know any IV NK1 antagonists?
Do you know any other NK receptors?
How do steroids work in nausea?

Viva Sample

Patient with AF, what are the treatment options?
I choose to use amiodarone, how is it given?
Why is a loading dose given given?
How do you calculate loading dose?
Would you use that equation for amiodarone?
What other equation could you use?
What are the pharmacodynamic effects of amiodarone? What about the heart?

Draw an action potential - how does amiodarone effect this? What about phase 4? What about phase 0?

Viva Sample

How do you classify IV induction agents?
What is the induction dose of propofol?
In what circumstances would you alter that dose?
- patient factors - what about age?
- clinical state
- anaesthetic factors - premedication
Anything else?
Draw a concentration time curve for propofol?
Does it start working straight away?
What is the delay?
Draw the effect site curve on your concentration time curve What is clearance?
Where else is the drug distributed?
At what stage would the patient wake up?

Viva Sample

What different routes of administration do you know for morphine? What is the epidural dose of morphine?
How does it exert its effect?
What would you ensure when giving epidural morphine?
What monitoring would you like afterwards?
Why?
Why is drowsiness/sedation important to monitor?
What is the mechanism of sedation?
How is ventilation controlled?
What are the peripheral and central sensors?

Viva Sample

Draw me a grade 1 view of the larynx
Asked to identify parts I hadn't labelled - vallecula, piriform fossa What is the difference between the true and false cords?
What nerves would you need to block to anaesthetise the larynx? How do you classify nerve fibres?
Do you know a classification system? ABC fibres
What are their different functions?
Draw me a peripheral nerve action potential
What it happening at each stage?
Why can the action potential propagate backwards?
What is the advantage of myelination?
What is saltatory conduction?

Viva Sample

What are platelets?
Where are they produced?
What size are they?
What do they contain? Anything other than granules?

What is their function?
How do they aggregate?
How does thromboxane A2 work?
What is the platelet lifespan? How are they broken down?
How is platelet level maintained?
What is the effect of aspirin?
What is the effect of clopidogrel?
How are platelets stored for infusion?
What are they stored in?
What is the bag made out of?
What is the problem with them being stored at room temperature?

Viva Sample

You are managing a patient under spinal anaesthesia for LUSCS, what dose of oxytocin do you give her? What influences your dosage?
Shown a dose response curve
Explain the curve
Is it quantal or graded?
What is the difference between quantal and graded?
What would happened to the curve for a patient with tachyphylaxis?
How is oxytocin presented?
How do you give it?
Can you give it by any other routes?
What are the adverse effects of oxytocin?

Viva Sample

How do we measure cardiac output? Tell me about thermodilution
What equipment is required?
Where is the cold injectate injected? Where is the thermistor located? Shown a temperature time curve How is cardiac output calculated? Where is the area under the curve?
What would happen to the shape of the curve if - room temperature injectate used?
- smaller volume of cold injectate used?
- patient on an adrenalin infusion?
- patient given a beta blocker?

Viva Sample

What is pressure?
What is blood pressure?
Where is it measured on the arterial tree?
Why is that important?
What is hydrostatic pressure?
What are the determinants of flow?
What about laminar flow?
How do we alter parameters in the equation?
How do we increase MAP clinically?
How does increasing resistance with vasopressors increase MAP

Viva Sample

How do local anaesthetics work?
Where on the ion channel do they bind?
In what channel states to they bind best?
Are there any other mechanisms by which they work?
What factors affect latency of local anaesthetics?
What is pKa?
What is the effect of lipid solubility?
Does it affect latency?
Cocaine is highly lipid soluble with pka of 8.6, we give it mucousally, what about cocaine makes it useful for this purpose? What percentage is ionised at physiological pH?
Is this an advantage or disadvantage in terms of systemic absorption?
How do we give it to improve absorption across mucosal membrane?
- they wanted high concentration gradient I think

Other VIVA Topics

ETT Placement
Anatomy of Larynx (trachea)
Gastric Physiology:
- Acidity - pH, pharmacology of suppressing acid - control - cephalic/gastric/intestinal
Haemorrhage - barorecptors, valsalva Plasmalyte - what's in it
Blood transfusions
LASERS and safety
Venturi & Bernolli principle

Altitude
Pharmacological Rx of MI Haemostasis
Clopidogrel pharmacology LAs
α1 antagonists Buprenorphine

N2O :
- entonox
- storage
- Poynting effect
- toxic effects Pain transmission

ICP:
- volatiles - CPP
- propofol - CO2

Morphine:
- routes of administration
- epidural - effects of spread - site of action
- safety precautions
- control of resp

Catecholamines & adrenaline
- structure activity relationship
- receptor structure
- effect on vascular smooth mm - isoprenaline/dobutamine

VIVAS FROM OTHER PEOPLE (MONDAY AND TUESDAY)

What does of oxytocin would you administer?
Adverse effects
Kinetics of oxytocin
Bioavailability

Cardiac output monitoring
Thermal dilution

Autonomonic nervous system
Changes in the elder
Compliance
ACH effects

P02 and co2 on ventilation
Drugs affecting this

Vomiting centre antiemetics
Aprepitent nk-inhibitor
Indocyanine green
Liver function tests
Clearance

Bronchial arteries
Pulmonary artery
Pulmonary hypertension and medication
Compare to systemic

Thermoregulation
Neonates
Temp in theatre
Temp measurement

Capnography
Ventilation

Anatomy and nerve supply of larynx
Local anaesthetic

WEDNESDAY VIVAS 2014

ROUND ONE

Catherine:
First examiner

1. You are about to anaesthetize a two day old baby for a laparotomy. Compare and contrast the similarities and differences between the neonatal and adult respiratory systems? Talked through anatomy, lung volumes, lung mechanics, respiratory control. They didn't interrupt so I just kept going til I'd covered all of them.
2. You talked about compliance. What is compliance?
3. What types of compliance are there?
4. What makes up total compliance?
5. Tell us more about chest wall compliance?
6. What is different about the chest wall compliance of a neonate and how does this affect your anaesthetic (I talked about the neonate having a higher alveolar ventilation rate to minimize work of breathing, "yes, what else?" and their closing capacity exceeding their FRC so needing PEEP to minimize dead space
7. Tell us more about closing capacity? what is CV? How does neonatal CC differ from adult CC? I started to draw them the graph but they hurried me along so I just described it
8. Tell us about the side effects of sux
9. Which ones of these happen more in a neonate (I said brady, phase 2 block)
10. How does sux work? Talk us through nerve transmission (wanted excitation contraction coupling too)
11. What is a phase 2 block, how does it differ from a normal depolarizing block
12. How does it happen? I told them the theories behind it but they wanted to know how much they had to give, I said repeated dosing but I wasn't sure quantitatively, he said, could I give 100mg then give 10mg without it happening? I said I didn't know. He said "could I give 100mg then give 80mg? I said I wasn't sure but would put a twitcher on and carefully monitor for development of a phase 2. He said does it matter if you get a phase 2? I said no, you can use neostigmine, he frowned, the bell went.

Second examiner

1. Tell me about the functions of the liver
2. You mentioned synthesis, what does the liver synthesise
3. Tell us about liver function tests
4. Here is a set of LFTs from a patient you are about to anaesthetize, tell us what each test represents and what the result means (bili up, albumin normal, GGT and ALP up, AST ALT normal) – talked through what each component meant then said it was an obstructive picture
5. Why is the albumin normal? I said b/c its an acute picture. What's the half life of albumin?
6. What would happen to these LFTs if this problem were more chronic?
7. What colour will this patient's urine be (I said tea coloured and pale feces)
8. Why is this? I said bilirubin is excreted in the urine because the biliary tree was obstructed so it couldn't be excreted in the feces (not sure this was right because he frowned a bit then asked the questions below and I got the feeling he was trying to help me understand something)
9. Whats bilirubin
10. What's it metabolized to, where is it metabolized, what is it conjugated to, what is conjugation and why is it important, what is it bound to in the serum, what is the significance of this then he came back to the LFTs and said so why does this person have dark urine? I can't remember what I said but he gave up and moved on…
11. What are the symptoms of hyperbilirubinaemia? I said itch, confusion
12. What would you think if these LFTs were from a neonate and not an adult? I said they might have more symptoms because they have less albumin to bind it to??
13. So lets pretend I just gave the neonate a bolus of metoprolol. Whats the IV dose of metoprolol? I said I only knew the adult dose of tartrate, he didn't mind and told me the mg/kg dose.

14. How is it metabolized
15. How will the metabolism differ in the neonate (I said immature Cyp450 so longer half life)
16. What's special about metoprolol (I said it's cardioselective, not sure if that's what he wanted)
17. What does cardioselective mean?
18. Thermoregulation – can't remember the transition question. Something like "why do patients get cold in OT"
19. Draw a graph to help you explain it
20. What are the causes for each phase
21. What is the most important mechanism of loss (I said radiation) what is radiation?
22. What does a bair hugger do? What mechanisms of heat loss does it prevent?
23. What would be the most efficient way to prevent a patient getting cold? I said crank the room up to their core temp. Why don't we do this? I said because it would be intolerable for everyone else in OT, he seemed satisfied with that
24. What are the consequences of hypothermia
25. You mentioned cogulopathy, why does this happen (bell rang)

Other people from my group

- Shown a picture of norad, asked what it was, explain the structure-activity relationship and exactly what each part of the molecule means
- What's tachyphylaxis? What are the mechanisms? What's tolerance?
- Define hypothermia
- How does it happen in theatre
- What are the consequences of hypothermia
- Describe the anatomy of the respiratory tree
- What are the functions of the lower respiratory airways
- How do you treat bronchospasm
- Tell us more about B2 agonists and exactly how they work, effects etc
- What are the physiological consequences of losing 750mL of blood
- Tell us about the Valsalva maneuver, draw a diagram and explain
- What does MAC mean
- Discussion of principles of volatiles, draw wash-in graph, why is N2O at the top
- Tell me about the immune system (acquired, innate)
- You mentioned complement, whats that
- What are the functions of complement
- Acid base stuff – shown an easy metabolic acidosis and asked to explain what she thought the problem might be, talked about anion gap non anion gap, I can't remember what she said the underlying problem was
- Local anaesthetics – how they work
- EMLA – what is it, how is it made, whats a eutectic mixture
- What influences skin absorption
- Classify antibiotics
- Draw CVP trace
- Explain anatomy of IJV
- Functions of FRC
- Shock
- Physiological responses to shock, cellular mechanisms (wanted discussion about hypoperfusion causing lactic acid formation) then discussion re lactate metabolism
- Glucose handling by the kidney, draw a graph

ROUND TWO

Catherine

First examiner and second examiner (they've mixed into one in my head)

1. You are about to conduct a GA caesarean on a woman who is 40 weeks pregnant. Why will she desaturate more quickly than a non pregnant woman? I started by talking about O_2 demand and supply.
2. Ah, O_2 supply. Tell us more about this. I said anatomical and physiological reduction in O_2 stores, mainly due to reduction in FRC

3. Define FRC
4. What is the function of FRC
5. How much is it reduced in a pregnant woman
6. How bout once shes anaesthetized
7. How bout once shes lying down
8. What are the anatomical changes that cause the reduction in FRC (I said predominantly the diaphragmatic displacement)
9. What are the other anatomical changes (bronchodilation, blood vessel engorgement, chest cage changes, oedema etc)
10. You said bronchodilation, what are the physiological consequences of this (I said reduced airways resistance but increased dead space)
11. Wanted exact numbers for changes in MV, TV, RR, FRC, CC (doesn't change)
12. What sort of values would you expect to find if you did an ABG on a normal pregnant woman
13. What are the cardiovascular changes in pregnancy
14. What are the cardiovascular changes in labour (wanted exact numbers for increases in CO in each stage of labour)
15. Whats dead space?
16. What's shunt
17. What's VQ mismatch
18. Whats venous admixture
19. Whats the shunt eqn
20. Here's an ABG (PaO2 was 22mmHg) – whats this? I said hypoxaemia
21. Whats hypoxaemia
22. Whats hypoxia
23. What are the causes of hypoxaemia (I said any disruption to any step of the O_2 cascade)
24. Draw the O_2 cascade? list the causes of hypoxaemia next to it, explain what each step means
25. How does low FiO2 cause hypoxaemia – I wrote out the alveolar gas equation, said something about reduced O_2 delivery to the alveolus and rising CO_2 in the alveolus dilutes the O_2, not sure that was right
26. The $PACO_2$ you have here – does this make more of a contribution or does the low FiO2? I said CO_2 is tightly controlled so they will hyperventilate
27. What controls this
28. You mentioned central chemoreceptors, how do they work
29. Something about other central receptors, I said the chemoreceptor trigger zone, they said ok tell us about the vomiting reflex – drew the afferent and efferent pathways
30. Explain the actual process of vomiting
31. What receptors are there in each of these pathways you've drawn
32. Which antiemetics work where
33. Whats an antiemetic which doesn't act at the receptors you've drawn (I said propofol at GABA and NK-1 antagonists and as soon as I said NK-1 they said stop)
34. Whats the NK-1 receptor? I said I knew very little except that its agonist is substance P
35. What else does substance P do? I said pain mediation.
36. Name an NK-1 antagonist, I said fosapripitant, they said whats that, I said the prodrug for apripitant
37. Whats a prodrug
38. What other prodrugs do you know of? I said cilazapril enalopril parecoxib dabigatran codeine then the bell rang

Other people in my group

- Resp changes at altitude
- Alveolar gas equation
- What is barometric pressure
- Lasers – how do they work, different types, what are the advantages and disadvantages of using lasers, what safety precautions have to be taken
- Opiate log dose/response curves – efficacy, potency, affinity
- What is buprenorphine, lots of Qs about its PK and PD
- Morphine PK and PD
- Describe the blood supply to the heart (anatomy)
- What happens during the cardiac cycle (draw the coronary perfusion graph)
- How would this graph look different if we gave the patient beta blockers? How about adrenaline?
- What are the SEs of sux

- Tell me about anaphylaxis (wanted the physiology of an IgE mediated reaction – exposure then memory) whats a plasma cell, whats an antibody, what are cytokines
- Define pressure (he said force per unit area). Ok whats blood pressure? He said force per unit area within the circulatory system, they seemed happy with that
- Why do we monitor BP? They wanted (to monitor tissue perfusion)
- Inhalationals
- Tell us about N2O.
- What happens if you give it to a person with a pneumothorax? He said expands it, they said how?
- What are the metabolic effects of N2O
- Tell us about cerebral blood flow
- What is cerebral perfusion pressure
- Draw a graph which illustrates what you're talking about with the Monroe kellie doctrine (volume vs ICP)
- Draw a graph of what happens with CPP and hypoxia? Hypercarbia?
- What does "critical temperature" mean? How does it apply to our use of N2O
- What safety mechanisms are there to ensure you do not deliver 100% N2O to a patient? He talked about everything from the wall connectors to the back of the machine to the cylinders to the dials on the anaesthetic machine to the alarms on the monitor etc etc
- What about the pin index system? What's that? Asked him if he could draw it

ROUND THREE

I was totally dead by this stage so I didn't cover much in the way of content and can't recall much of it now

1. Draw a graph showing plasma concentration of propofol after you give a 3mg/kg bolus to a healthy 70kg male. I thought we were going down the distribution/elimination route so I drew a multiexponential decay curve and logged it. They said it was right but could I please draw a non-logged curve for the purposes of the discussion so I drew a normal exponential decay
2. Superimpose the effect site concentration
3. Why are the two curves not the same
4. When will this person go to sleep (I put some numbers on the y axis – 8 mcg/ml at the top and 4 in the middle and said for this person their effect site MIC is 4 so they'll be asleep at 4)
5. When will they wake up (I said 4 and he said I was wrong, Tim has since looked this up and apparently it's more like 1-1.2)
6. What do you use in your PCAs? I said morphine or fentanyl to start then I can add other things
7. What PK factors determine which one you chose? I started saying A,D,M,E, he hurried me on and said I only want the salient points, I said something about Vd, then PB, then ionization but he kept saying no, I said metabolism and that if the person had impaired renal function I'd chose fent, he said that's pharmacodynamic I want pharmacokinetic, I said well the elimination half life varies for each one once you reach steady state
8. Whats elimination half life, I wrote him the equation ($T1/2B = 0.693 \times Vd/Cl$) he said what specifically in this eqn is different for morph/fent I said Cl and Vd
9. Whats clearance
10. Write an equation (I wrote vol plasma cleared/time) he said no (it was all going very badly)
11. Whats important for onset and offset of the two drugs? I said depends if it's a bolus or an infusion as to whether distribution or elimination is more important, he kept shaking his head, I kept asking him to repeat the question, I still have no idea what was going on.
12. Whats a loading dose? How do you calculate it?
13. How do we measure renal function?
14. How does your lab calculate eGFR (I said Cockroft Gault, this is definitely wrong)
15. Whats the Cockroft Gault
16. Is there an alternative to this (I said the MDRD eqn)
17. What variables does this take into account
18. What else can you measure for renal function (I said Inulin clearance, 24 hr CrCl, cystatin C)
19. Why did you say 24h CrCl? (I had given up by this stage) because it's another option
20. Does it have to be 24h?

21. What about urea, do you use that? I said no because it is influenced by many external factors. Like what? Muscle mass, age, gender, pathological reasons for raised/low urea
22. How does Cr conc change with GFR
23. How much does GFR have to fall to cause a change in Cr?