Syllabus	CT_IK_12, PC_IK_08
Topic	Point of care coagulation testing/Anticoagulation in cardiac surgery

a)

What dose of heparin is used to achieve full anticoagulation for cardiopulmonary bypass? (1 mark)

....

b)

What is the mode of action of unfractionated heparin (UFH)? (2 marks)

....

....

c)

Fill in the table with the laboratory and 'point of care' tests used to determine the effectiveness of heparin anticoagulation in patients under cardiopulmonary bypass. Give one advantage and one disadvantage of each of the tests. (9 marks)

Test	Advantage	Disadvantage
1.		
2.		
3.		

d)

List 4 causes of inadequate anticoagulation in a patient whom it is believed has already received heparin? (4 marks)

1. ....

2. ....

3. ....

4. ....

e)
List 4 possible adverse effects of protamine. (4 marks)

1. ……

2. ……

3. ……

4. ……

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Q	Answer	Mark	Guidance
a)	• 300-400 iu/kg	1	
b)	• UFH augments the activity of antithrombin (AT) • Heparin-AT complex inhibit thrombin (factor IIa) and factor Xa	1 1	See CEACCP article – 'Anticlotting mechanisms 2: pharmacology and clinical implications' (June 2013)

c)	• Test: <u>APTT, lab test</u>
	  o Advantages: cheap
	  o Disadvantages: slow turnaround time and so less well-directed management, result affected by under-filled collection tubes
	• Test: <u>Anti-Xa assay, lab test</u>
	  o Advantages: 'gold standard', less susceptible to interference by clotting factor deficiencies and those factors that result from acute phase reactions
	  o Disadvantages: more expensive vs other lab tests i.e. APTT, poor inter-laboratory correlation i.e. with therapeutic ranges and different assays used in labs
	• Test: <u>ACT, point of care test</u>
	  o Advantages: fast turnaround vs lab tests, cheap, familiar, easy to use
	  o Disadvantages: also prolonged by other factors (thrombocytopenia, antiplatelet drugs, hypothermia, haemodilution), ACT has poor correlation with clinical anti-Xa activity
		9	1 mark for each test and a mark for an advantage and disadvantage of each

d)	• Errors – wrong drug administered, drug not given, CVC not patent, CVC not flushed after dose given • Pharmacokinetic factors – acutely ill patient, malignancy, peri- or post-partum	4	Any 4

	• Lack of anti thrombin – recent heparin use, DIC, sepsis, dilution from CPB, liver cirrhosis, familial		
e)	• Arterial hypotension • Reduced CO • Pulmonary vasoconstriction • Anaphylaxis • Excessive dose promotes bleeding (unbound protamine inhibits platelet reactivity + aggregation)	4	

References:

1) See similar question in 'The Final FRCA Short Answer Questions' by Elizabeth Combeer, also was in March 2015 SAQ exam

2) Srivastava A, Kelleher A. Point-of-care coagulation testing. CEACCP (2013) 13(1)12-16
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3) Machin D, Allsager C. Principles of cardiopulmonary bypass. CEACCP (2006) 6(5)176-181
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4) Adanma Ezihe-Ejiofor J, Hutchinson N. Anticlotting mechanisms 1: physiology and pathology. CEACCP (2013) 13(3)87-92
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