

Syllabus	POM_IS_04
Topic	Coronary stents and pacemakers

Dai Thomas attends your pre-assessment clinic. He is a 70 year-old man listed for a right hemicolectomy in 2 weeks time. He has a history of ischaemic heart disease with an implanted pacemaker and Drug-Eluting Stents (DES). His regular medication includes aspirin and clopidogrel.

a)
Fill in the box below (6 marks)

Drug	Mechanism of action
Aspirin
Clopidogrel
Tirofiban

b)
How does a drug eluting stent (DES) work? (2 marks)

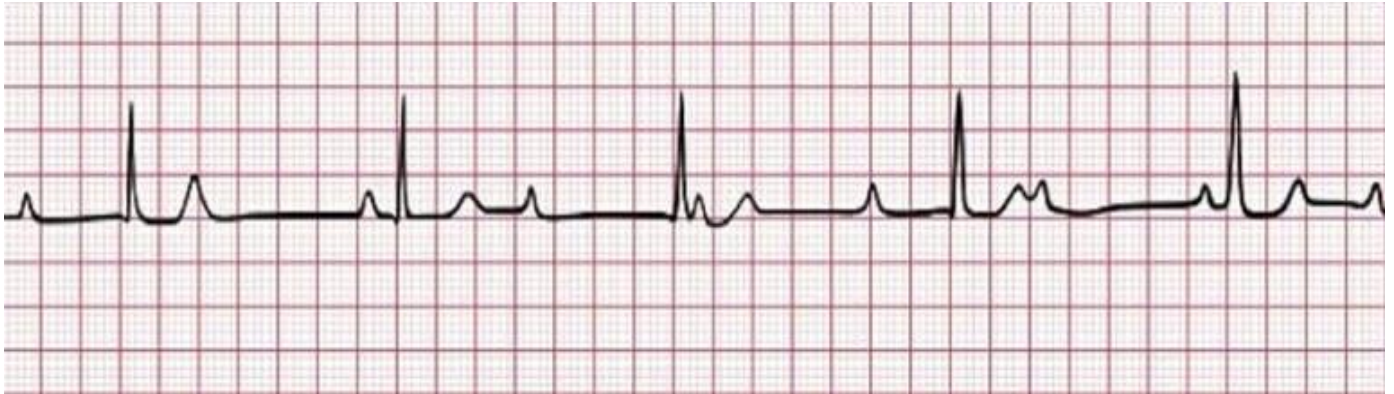
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c)
Why are drug eluting stents preferred to bare metal stents (1 mark)

.....
.....

d)

Dai had an ECG taken in pre-assessment clinic and a rhythm strip from it is shown below:



What does the ECG show? (1 mark)

.....
.....

e)

List 3 symptoms Dai may have with this ECG pattern (3 marks)

1.
2.
3.

f)

List 3 indications for a pacemaker (3 marks)

1.
2.
3.

g)

What does the each position of the pacemaker code represent? (5 marks)

Pacemaker code position	Function
Position 1
Position 2
Position 3
Position 4
Position 5

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Q	Answer	Mark	Guidance
a)	<p><u>Aspirin:</u></p> <ul style="list-style-type: none"> • (Salicylate) • Irreversible non selective cox inhibitor • Inhibits platelets ability to produce thromboxane a2 (prothrombotic eicosanoid) • Endothelial cells instead synthesize the anti-thrombotic PGI2 which favours balance towards reduced platelet activation <p><u>Clopidogrel:</u></p> <ul style="list-style-type: none"> • (Thienopyridine) • Prevents ADP-mediated platelet activation • irreversible inhibition P2Y12 subtype of ADP receptor • Pro-drug activated in liver by CYP3A4 <p><u>Tirofiban:</u></p> <ul style="list-style-type: none"> • GPIIb/IIIa inhibitor • Reversible platelet inhibition in a dose- and concentration-dependent manner 	4	<p>For full marks need to mention aspirin and clopidogrel are irreversible inhibitors whereas tirofiban is a reversible inhibitor</p> <p>Extra knowledge: The reversibility of tirofiban allows for shorter duration of action when stopped. That is why tirofiban could be used as a bridging infusion for a high risk patient on clopidogrel needing urgent surgery.</p>
b)	<ul style="list-style-type: none"> • Metal mesh coated with a polymer • Polymer contains anti-proliferative drug slowly released into vessel wall over weeks • Inhibit smooth muscle cell proliferation and migration of cells of vessel media • Prevent formation of neointima 	2	<p>Score full marks for a basic overview (aim to inhibit neointima formation).</p> <p>Extra knowledge: Taxus stents – paclitaxel – anti-tumour drug that inhibits microtubule formation during cell division Cypher stent – sirolimus (rapamycin) – macrolide antibiotic that blocks progression from G1 to S phase of cell cycle</p>
c)	<ul style="list-style-type: none"> • Re-stenosis rates of drug eluting stents <2% vs ~15% for bare metal stents 	2	<p>Extra Knowledge: Balloon angioplasty has re-stenosis rate of 30-40%</p>

d)	<ul style="list-style-type: none"> • Complete/Third degree heart block 	1	
e)	<ul style="list-style-type: none"> • Light-headedness • Dizziness • Fatigue • Palpitations • Chest pain/Angina • Shortness of breath • Fainting/Syncope 	Any 3	
f)	<ul style="list-style-type: none"> • Sick sinus syndrome • Symptomatic bradycardia • Tachy-Brady syndrome • AF with sinus-node dysfunction • Complete/Third-degree block • Chronotropic incompetence • Prolonged QT syndrome • Cardiac resynchronization therapy with biventricular pacing 	Any 3	
g)	<ol style="list-style-type: none"> 1. Chamber paced 2. Chamber sensed 3. Response to sensing 4. Rate modulation/Programmability 5. Anti-tachycardia function 	5	

References:

Stents:

1) DeVile MPJ, Foex P. Antiplatelet drugs, coronary stents and non-cardiac surgery. CEACCP (2010) 10(6)187-191 <https://academic.oup.com/bjaed/article/10/6/187/299624>

2) Barash P, Akhtar S. Coronary stents: factors contributing to perioperative major adverse cardiovascular events. (2010) BJA 105(Suppl. 1)i3-i15
https://academic.oup.com/bja/article/105/suppl_1/i3/236299

Pacemakers:

1) Salhukhe TV, Dob D, Sutton R. Pacemakers and defibrillators: anaesthetic implications. (2004) BJA 93(1)95-104 <https://academic.oup.com/bja/article/93/1/95/265745>

2) Bryant HC, Roberts PR, Diprose P. Perioperative management of patients with cardiac implantable electronic devices. BJA education (2016) 16(11)388-396
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