The following was taken from the Performance report for the 2005 Exam for cardiac pacing for the associated professional ...

Fundamentals of electrophphysiology (5 questions)

Applied Science and Technology (48 questions)
key words - Algorithms, Anodal Stimulation, ATP, atrial fibrillation, Charge, Chronaxie and rehobase definitions, evoked response, Far Field R wave, Inappropriate shocks, Lead impedance, Lead/electrode, Mode switch, Sensing of atrial output, Sinus bradycardia, Stimulation threshold, Upper rate, VDD pacing.

Pharmacology (3 questions)
Key words - Torsades de pointes and complete heart block

Electrocardiography (11 questions)
Key words - atrial over sensing, ECG interpretation, Outflow tract pacing, paced 12 lead ECG

Clinical assessment (3 questions)
Mobitz I, Pericarditis, Vagal AV block

Pre and Perioperative Practice (34 questions)
Key words - Congenital Heart disease, Indications, Indications for pacing, Sick sinus syndrome and syncopy, Surgical technique, Tamponade, Upper rate limit.

Safety (8 questions)
Key words - Cardioversion, EMI/Extracardiac signals, radiation safety

Device / Patient follow up (67 questions)
atrial capture, atrial pacing preference, atrial R over sensing, Atrial sensitivity programming, atrial tachycardia, charge time, ECG interpretation; Sinus beat undersensing, Far field R wave sensing, Histograms, ICD sensitivity, Lead noise, mode switching, pacemaker reprogramming, pacemaker syndrome, programming, sudden brady response, surveillance:security system interaction, Timing intervals, ventricular high rate, T wave over sensing, Ventricular auto capture, ventricular output, Wedensky effect.

Clinical trials (3 questions)
Key words - Clinical trials, Randomized trials

Radiology (4 questions)
Key words - Coronary Sinus structures, Pacing lead connection

Cardiac Life support (4 questions)
Guaranteed to Pass
ExAM Tidbits in easy to digest, bite sized morsels

Volume 1: Number 28

I’ve compiled (from a couple of sources) a breakdown of question topics from the 2005 Pacing ExAM. Over the next couple of months, I will attempt to create a GtP for as many as possible. It’s not very likely that I will be able to cover all the topics, but at least you now have an idea of what to expect.

**Fundamentals of electrophysiology (5 questions)**
- Applied Science and Technology (48 questions)
  - Algorithms
  - Anodal Stimulation
  - ATP
  - Atrial fibrillation
  - Charge
  - Chronaxie and rehobase definitions
  - Evoked response
  - Far Field R wave
  - Inappropriate shocks
  - Lead impedance
  - Lead/electrode
  - Mode switch
  - Refractory Periods
  - Sensing of atrial output
  - Sinus bradycardia
  - Stimulation threshold
  - Upper rate
  - VDD pacing.

**Pharmacology (3 questions)**
- Drug effects
- Torsades de pointes
- complete heart block

**Electrocardiography (11 questions)**
- Atrial oversensing
- ECG interpretation
- Outflow tract pacing
- Paced 12 lead ECG

**Clinical assessment (3 questions)**
- Mobitz I
- Pericarditis
- Vagal AV block

**Pre and Perioperative Practice (34 questions)**
- Congenital Heart disease
- ICD Complications
- Indications
- Indications for pacing
- LV Lead
- Lyme disease
- RV Apex Lead Placement
- Sick sinus syndrome and syncopy
- Surgical technique
- Tamponade
- Upper rate limit.

**Safety (8 questions)**
- Cardioversion
- Device EMI interaction
- EMI/Extracardiac signals
- ICD therapy
- Radiation safety

**Device / Patient follow up (67 questions)**
- Atrial capture
- Atrial pacing preference
- Atrial R oversensing
- Atrial sensitivity programming
- Atrial tachycardia
- Auto capture in a non-dependent patient
- Charge time
- ECG interpretation:
  - Sinus beat undersening
  - Retrograde Conduction
- Electrocardiography of AAI mode
- Far field R wave sensing
- Histograms
- ICD sensitivity
- Inappropriate shock
- Lead noise
- Mode switching
- Pacemaker reprogramming
- Pacemaker syndrome
- Pacing lead complications
- Programming
- Sudden brady response

**Surveillance: security system interaction**
- SVT
- Timing intervals
- Ventricular high rate
- T wave oversensing
- Ventricular auto capture
- Ventricular output
- Ventricular sensing
- Wedensky effect.
- Wedensky, ventricular refractory
- Clinical trials (3 questions)
- Clinical trials
- Outcomes
- Randomized trials

**Radiology (4 questions)**
- Coronary Sinus structures
- Pacing lead connection
- Persistent left SVC

**Cardiac Life support (4 questions)**
- Transcutaneous pacemaker

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1If you believe that, you’ll believe anything. The real purpose of these newsletters is to STIMULATE thought and self-help research. Your comments and suggestions are welcomed.
Questions from NASPExAM 2005

1. Calculate Wenckebach interval, 2:1 block
2. Given Upper Rate, SAV, PAV, PVARP, etc., plus SAV decreases by 25ms when the rate is over 100 bpm, what happens when the rate is close to TARP? Two questions like this with different values.
3. Ventricular safety pacing
4. Why have rate below lower rate in DDD mode
5. PVARP is extended until finally the device delivers AP. Why?
7. Find the proportion of energy difference given two thresholds (each with a different Amp and PW)
8. Most efficient amp/pw values
10. Given 2 points on threshold curve, asked about points in between
11. AS-VR markers consistently – what is it?
12. 1 question where the patient’s device had VRS feature on.
13. Difference between IS-1 and 3.2mm connectors
14. What kind of lead for beat-to-beat VCM
15. Ventricular based timing question
16. Fallback
17. Wedensky effect and how to counteract it?
18. DC device with single lead question
19. 12-lead ECG: LV vs. BiV vs. RV capture, A & V capture (several questions)
20. ECG axis – LAD vs. RAD deviation (?)
21. Where are the atrial and ventricular leads (epicardial/endocardial, RA/LA/RV/LV) in a patient having had the Mustard procedure?
22. Persistent superior left vena cava
23. Where do you put the pacemaker pocket (under epidermis, under fat, under muscle)?
24. X-rays:
   a. set screw not fully inserted (Choose from the following answers: a) Atrial impedance high, b) Atrial threshold high, c) V impedance high, d) V threshold high
   b. 1 X-ray set was labeled AP/Lateral and also RAO/LAO. Know basics of RAO/LAO views.
   c. lead dislodgment (?)
   d. lead looking like it could be in the outflow tract.
   e. coil in left subclavian vein.
   f. Xray with lead tunneled under the arm and around to the back.
25. What is the first drug you give for pulseless VT/VF in the ER (?)
26. What is the chance of survival if a person goes into cardiac arrest 4 minutes before being defibrillated?
27. What do you do if 3-4 shocks from the AED don’t work? Continue shocks, perform CPR and wait for the EMT, etc.?
28. Where put external defib paddles?
29. What to do with a pacemaker patient who needs a knee MRI? Don’t do it; Do it if the manufacturer says it’s ok; Do it if the knee doesn’t enter the MRI machine
30. There were a few specific indications questions, but mainly they were wrapped into a clinical scenario.
31. Clinical trial info was wrapped into clinical scenario (e.g. describing a person with MADIT inclusion criteria)
32. Ashman’s – short-long pattern with wide QRS
33. How treat a person with AV block after walking in the woods (Lyme disease)?
34. Risk of SCD post MI, low EF (?)
35. What is the main instigator of AF in the atrium (ectopic beats, depolarization, and other choices).
36. Brugada syndrome
37. Relationship between pacer voltage and ICD voltage?
38. Integrated bipolar lead that questioned where pacing takes place.
39. What to do as a patient nears ERI? Patient has appropriate shocks every 4 months, 16 shocks since last followup, charge time = 21s (repeated). Possible answers: program cap formation to 1 month, increase followup frequency, etc.
40. Identify a vein leading from the coronary sinus.
41. Identify where the Bi-V lead is from the 12-lead ECG.
42. Best position for an LV lead
43. Most common complication with LV leads in the posterolateral/lateral position – phrenic nerve stimulation, dislodgement, etc.
44. Bigeminy or trigeminy question
45. What are farads, coulombs associated with? Capacitance, charge
46. A question with numerous graphs, one with number of mode switch episodes and durations, another with Atrial high rate number of episodes and duration, another with Ventricular high rate number of episodes and duration, and another with % of Apace/Asense/Vpace/Vsense. Cannot remember what the question was about.
47. Infection types (staphylococcus aureus & epidermis) – which causes fever?
48. Implant scenario: The V lead is in, have already tried four different sites for the A lead; present site has capture issues and P-wave of 1.5 mV; what to do next?
49. Atrial lead oversensing T wave – what do next
50. Patient with a cough – caused phrenic nerve stim?
51. LV using RV anode. Impedances are out of range for certain RV and LV unipolar and bipolar measurements – what is the issue?
52. Airport metal detector question – interaction with device
53. Implanted device caused popping sound and discoloration on the can. What happened? What do next? Possible answers – pacing and coil leads reversed, device defect, etc.
54. Graph showing lead impedance high for one month after implant and then settles into normal. What to do next?
55. ICD with V sensing causing double counting – what do next?
56. FFRW oversensing – what do next?
57. Patient has frequent shocks, episodes show intermittent double counting. What do next?
58. What is statistical power in a clinical trial?
59. Sensitivity vs. specificity
60. Radiation question, what to do and “move device to other side” was not one of the choices.
61. Adenosine – converts SVT
62. 2 questions: drug that raises defib threshold, drug that decreases stimulation threshold. One of these also asked which drug minimally changed the refractory period (cycle length) of the arrhythmia. One choice for decreasing stimulation threshold was exercise.
63. Diagram with frequency on the x axis and voltage on the y axis. Circles on the graph showed the ranges for P waves, R waves, T waves, muscle stimulation.
64. Auto capture daily max/min graph with extreme values, what to do next (turn off auto capture, change amplitude, or what)?
65. Episode where 3 ½ squares represents 2 minutes.
66. Determine the arrhythmia type in an episode: SVT, VT, AF, AFLutter, VF

**General:**
Main point is that most of the questions were “what to do next” type questions rather than just identifying a feature loss of capture.

Indications and trials and drugs were mainly tested via the “what to do next” format. Short term upon arrival to emergency what drug to give, longer term what to do given a list of patient data (give a medication, observe, schedule for an EP study, schedule for a permanent pacemaker/ICD). For example, one question had answers of “give a pacemaker”, “give a bi-v pacemaker”, “give and ICD” or “give a bi-v ICD”?

Practice speed; About ½ of the questions are diagrams with one question, the other ½ are plain questions without a related diagram; Long list of details and data to read on each patient (whether a diagram there or not);

All questions have 5 answers (A-E) so good to be ready to scan through 5 choices.

Many 12-lead ECGs, not only with Bi-V pacing questions but also for your basic Atrial capture/sensing, Ventricular capture/sensing, what is going on, what to do next questions.