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DM Entrance Examination



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MCQs in Endocrinology for DM Entrance Examination

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CHAPTER

3

Laboratory Techniques for Recognition of Endocrine Disorders

QUESTIONS

1. **Radioisotope used in immunoassay:**
   a. C-14 b. I-125
   c. U d. Cobalt
2. **Pooled serum is not used in:**
   a. PRL b. Cortisol
   c. FSH/LH d. GH
3. **Which of the following is not used for immunoassays?**
   a. Radio-isotope b. Enzyme
   c. mRNA d. Chemiluminescent substance
4. **Which subunit of peptide hormones interact with immunoassays?**
   a. Alfa subunit b. Beta
   c. Gamma d. Delta
5. **RIA uses:**
   a. I-123 b. I-125
   c. I-127 d. I-131
6. **Antibody labeling instead of Ag labeling:**
   a. ELISA b. Radioimmunoassay
   c. Gel filtration d. None of the above
7. **Monoclonal antibodies are used in:**
   a. RIA b. HPCL
   c. Mass spectrometry d. Chemiluminescence
8. **Final endpoint in ELISA is assessed by:**
   a. Beta counter b. Gamma counter
   c. Fluorimeter d. Spectrophotometer/colorimeter
9. **High dose Hook effect usually occurs with:**
   a. RIA b. Immunometric assay
   c. Bioassay d. ELISA

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ANSWERS

1. Ans. (b) I-125
[Williams 13th ed pg 79, 80, 568; Chemistry and Applications of Iodine]

There are 37 known isotopes of iodine, but only one, 127-I, is stable. The following isotopes are used as tracers and therapeutic agents in medicine:

- *Iodine-127:* Nonradioactive. It is used in potassium iodide.
- *Iodine-125 (half-life 59 days):* It is used as a gamma-emitting tag for proteins in biological assays.
- *Iodine-123 (half-life 13 hours):* It is the isotope of choice for nuclear medicine imaging of the thyroid gland. Also used in MIBG scintigraphy.
- *Iodine-131 (half-life 8 days):* It is a beta-emitting isotope. It is used to treat Graves' disease and thyroid cancers. It is also used as to kill tissues such as cancers that take up artificially iodinated molecules (example, MIBG).

2. Ans. (d) GH
[Endocrine Abstracts (2013) 32 P888; Principles and Practice of Endocrinology and Metabolism pg 1118; J Clin Epidemiol. 1996 Mar;49(3):345-50; Send to Scand J Clin Lab Invest. 2008;68(6):508-12]

3. Ans. (c) mRNA
[Williams 13th ed pg 80; Pediatric Endocrinology 4th ed pg 93]

Immunoassays use radioactive, chemiluminescent, colorimetric (in ELISA), or fluorescent signals.

4. Ans. (a) Alfa subunit
[Williams 13th ed pg 209, 212]

The α-subunit is common to TSH, LH, FSH, and hCG, whereas the β-subunit is unique and confers specificity of action. Because of the high homology of the glycoprotein hormones, development of highly specific assays, especially those distinguishing free α-subunit from intact hormones, has been challenging.

5. Ans. (b) I-125
[Williams 13th ed pg 79, 80]

Although both I-125 and I-131 have been used to label the antigen in RIA. Option (b) is more appropriate than option (d).

See discussion of Chapter 3, Question 1.

6. Ans. (a) ELISA
[Williams 13th ed pg 80; Pediatric Endocrinology 4th ed pg 92, 93]

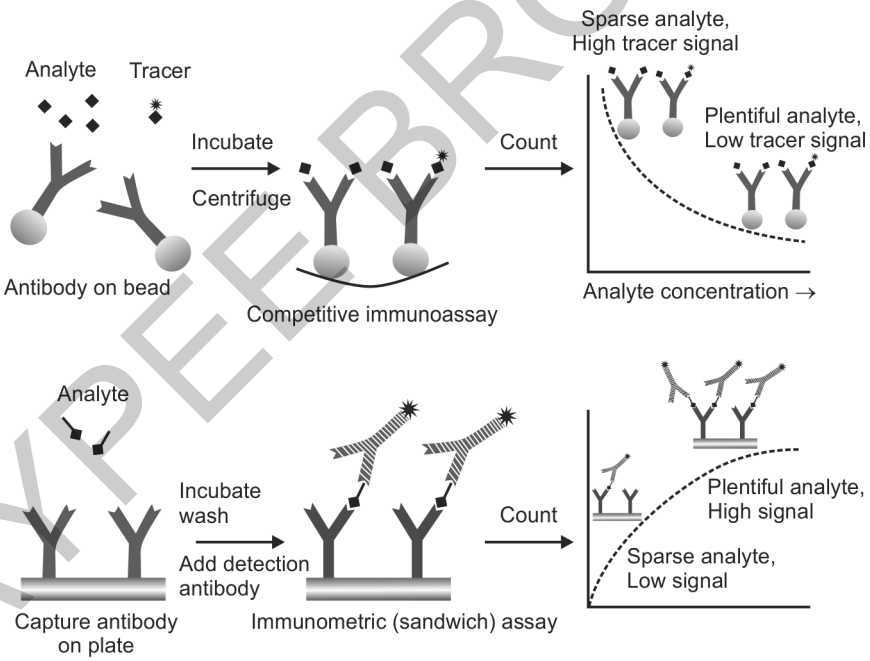
There are two main immunoassay formats

1. Competitive immunoassay
   - A primary antibody against the substance ("analyte") of interest is added to the patient's sample, together with a radiolabeled version

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of the analyte ("tracer") that competes with the endogenous analyte for binding to the primary antibody.
- Any unbound tracer or analyte is washed away, and the amount of tracer in the precipitate is then quantified.
- The amount of signal detected decreases as the analyte in the patient's sample increases.
- *Example:* Radioimmunoassay (RIA); Nonisotopic signaling systems use colorimetric, fluorometric or chemiluminescent signals.

2. Immunometric (sandwich) assay
   - An antibody attached to a solid support is used to capture the analyte of interest, followed by the addition of a second, labeled antibody that binds to a different site on the analyte, creating an antibody-analyte-antibody sandwich.
   - After unbound detection antibody is washed away, that which remains generates a radioactive (immunoradiometric [IRMA]), chemiluminescent (immunochemiluminometric [ICMA]), colorimetric (enzyme-linked immunosorbent assay [ELISA]), or fluorescent (immunofluorescence assay [IFMA]) signal, depending on the label chosen.



7. Ans. (a) RIA and (d) Chemiluminescence
[Pediatric Endocrinology 4th ed pg 90, 93]

8. Ans. (d) Spectrophotometer/colorimeter
[Pediatric Endocrinology 4th ed pg 93]

See discussion of Chapter 3, Question 6.

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9. Ans. (b) Immunometric assay

[Pediatric Endocrinology 4th ed pg 93]

Sandwich immunometric assays are vulnerable to the "hook" or "prozone" effect that can lead to falsely normal or low values in the presence of large amounts of the analyte. Generally, as analyte concentration increases, more antibody-analyte-antibody sandwiches are formed, leading to more signal detected. At extremely high analyte concentrations, however, it is possible for both capture and detection antibodies to be saturated with analyte prior to formation of a sandwich complex, leading to the detection antibody being washed away and the low signal being misinterpreted as a low concentration of analyte.

This phenomenon is not seen with competitive immunoassays.

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As per the directives from Ministry of Health and Family Welfare, Government of India, the National Board of Examinations (NBE) would be conducting a computer-based multiple choice questions (MCQs) examination. Candidates appearing for DM (Endocrinology) Entrance Examinations would be expected to answer 40% questions from the feeder specialty and 60% questions would be in Endocrinology. This book is aimed to give students an idea of the kind of questions that they might expect/anticipate in the examinations.

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She is holding and has held many prestigious posts of National Societies across India. She is an Editor-in-Chief, ESI Manual of Endocrinology (1st and 2nd edition) and the member of Editorial Committee of several peer-reviewed journals. She has been invited as Faculty at both national and international forum. Honors have bestowed upon her in the scientific and public field for her enormous contribution to the medical fraternity and society in endocrine education and awareness.

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