ROYAL COLLEGE
OF PHYSICIANS AND SURGEONS OF CANADA
COLLÈGE ROYAL
DES MÉDECINS ET CHIRURGIENS DU CANADA

Sample Written Exam – Endocrinology and Metabolism

Question 1

A 22-year-old woman is referred to you for evaluation and treatment of hyperglycemia. Her random plasma glucose level is 16 mmol/L. Two days ago, her random plasma glucose level was 18 mmol/L. She is on no medications.

a. List **EIGHT** features of her history or physical examination that would support the diagnosis of type 2 diabetes as opposed to type 1 diabetes.

   MODEL ANSWER (0.5 marks each, 4 marks total)

   - Ethnic origin (high-risk populations)
   - Family history of type 2 diabetes
   - Personal history of glucose intolerance or impaired fasting glucose
   - Gestational diabetes or infant with macrosomia
   - Exposure to diabetes in fetal life
   - Overweight, obesity or central obesity
   - Diseases such as schizophrenia, dyslipidemia, hypertension, vascular disease, polycystic ovary disease, acanthosis nigricans
   - Presence of diabetic complication
   - Personal history of metabolic syndrome

b. Identify **TWO** findings from laboratory investigations that would favour the diagnosis of type 2 diabetes as opposed to type 1 diabetes for this patient.

   MODEL ANSWER (1 mark each, 2 marks total)

   - Absence of ketoacidosis/ketosis
   - Absence of auto-antibodies (anti-glutamic acid decarboxylase [anti-GAD], anti-islet, anti-insulin, etc.)
   - Persistent increased insulin and C-peptide levels
   - Absence of high-risk human leukocyte antigen (HLA) genotype

Question 2

You are asked to see an 18-year-old woman with significant diarrhea and anorexia who has been hospitalized for a flare of her Crohn disease. She developed carpopedal spasm, and was found to have a total serum calcium level of 1.55 mmol/L with an albumin level of 30 g/L. At the moment, she is receiving nothing by mouth (NPO) for bowel rest.

a. List **THREE** KEY components of the acute management of her calcium levels.

   MODEL ANSWER (1 mark each, 3 marks total, dose not required)

   - 10 cc of 10% calcium gluconate solution followed by calcium gluconate infusion
   - Monitor calcium levels
   - Cardiac monitor

   DO NOT ACCEPT INTUBATION OR ABCs

b. Despite your treatment, her albumin corrected calcium and ionized calcium levels remain low. Name **TWO** other laboratory tests that should be ordered to help in understanding her hypocalcemia.

   MODEL ANSWER (1 mark each, 2 marks total)

   - Magnesium
   - Parathyroid hormone (PTH)
   - 25-OH vitamin D

c. Two days later, she is able to tolerate oral feeding. What oral treatment should be recommended for her calcium disorder?

   MODEL ANSWER (1 mark each, 2 marks total, dose not required)

   - Oral calcium carbonate/gluconate/citrate 1000-1500 mg elemental calcium
   - High-dose vitamin D (high dose: 1000 or more units once daily)
     OR potent vitamin D (calcitriol, 1-alpha-hydroxy-vitamin D3)

Question 3

You are asked to assess a 25-year-old woman with secondary amenorrhea. She is on no medications.

a. What is the MOST important condition that should be ruled out first?

MODEL ANSWER (1 mark)

- Pregnancy

b. Results of basic investigations show that she has normal thyroid function and a normal prolactin level. Her LH and FSH levels are both in the lower end of the normal range. List **SIX** causes that could explain these findings.

MODEL ANSWER (0.5 marks each, 3 marks total)

- Functional hypothalamic amenorrhea (or accept idiopathic functional/hypothalamic; or accept two of stress, weight loss, severe illness)
- Polycystic ovary syndrome (PCOS)
- Hyperandrogenism (or accept ovarian tumour)
- Non-classic congenital adrenal hyperplasia (CAH)
- Idiopathic hyperandrogenism
- Pituitary tumour/sellar mass
- Hypopituitarism
- Asherman syndrome/uterine scarring
- Cushing syndrome

DO NOT ACCEPT pregnancy, premature ovarian failure, or abnormal karyotype.

c. If her LH and FSH levels were markedly elevated, state the MOST important test to perform next.

MODEL ANSWER (1 mark)

- Karyotype

Question 4

Note: This question is for Adult Endocrinology candidates only

You are asked to see a 65-year-old woman who is 6 months post pituitary surgery for a growth hormone-secreting tumour of the pituitary. Growth hormone and IGF-1 levels have remained high postoperatively. Repeat MRI shows residual tumour.

a. List **FIVE** options that could be recommended for treatment of her acromegaly at this time. Indicate **ONE** potential adverse effect of EACH treatment.

   MODEL ANSWER (0.5 marks for each treatment, 0.5 marks for each adverse effect, 5 marks total)

   - Repeat surgery: Hypopituitarism, death, hemorrhage, CSF leak, meningitis, sodium/water imbalance
   - Radiotherapy including gamma knife (stereotaxic radiation): Hypopituitarism, damage to surrounding tissues such as radionecrosis, cranial nerve damage, cognitive changes and secondary tumours
   - Somatostatin analogues: Increased gall stone formation, nausea, abdominal cramps, diarrhea, hair loss, injection site reactions
   - Pegvisomant (Somavert®): Increased liver enzymes, tumour progression, injection site reactions
   - Dopamine agonists/cabergoline: Nasal stuffiness, nausea, postural hypotension, fatigue, headache

b. Name **TWO** cardiovascular complications of acromegaly.

   MODEL ANSWER (1 mark each, 2 marks total)

   - Hypertension
   - Cardiomyopathy
   - Left ventricular hypertrophy

Question 5

Note: This question is for Pediatric Endocrinology candidates only

You make a diagnosis of growth hormone deficiency based on 2 growth hormone stimulation tests in a 3-year-old boy who has short stature and low growth velocity.

a. List **EIGHT** physical examination features that are associated with Growth Hormone deficiency.

   MODEL ANSWER (0.5 marks each, 4 marks total)

   - Cleft lip/palate
   - Single central incisor
   - Increased weight for height
   - Delayed tooth eruption
   - Microphallus
   - Frontal bossing
   - High-pitched voice
   - "Cherubic" features
   - Choanal atresia
   - Fine thin hair
   - Central fat

b. List the **TWO** MOST important next steps in investigation.

   MODEL ANSWER (1 mark each, 2 marks total)

   - Neuroimaging with MRI
   - Assessment of other pituitary hormones for deficiency of TSH, ACTH, etc.