Challenging Cases in Endocrinology

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Question 1

• A 64 year old male comes to see you in your office for an initial visit. He has had type 2 diabetes for 10 years, hypertension and hyperlipidemia. He is taking metformin, a GLP-1 receptor agonist and sulfonylurea, a statin, ACEI and thiazide. His BP is 135/80, BMI 30 kg/m², and he has no clinical evidence of end organ complications of diabetes.

• Relevant biochemical data is as follows:
  • HbA1c 7.8%
  • Urine albumin/creatinine 130 mg/g (normal less than 30)
  • eGFR 50 ml/min; LFTs normal
Which of the following statements is correct?

1. Lowering the HbA1c to less than 7.0% will lower the risk of a cardiovascular event over the next 3 years
2. Lowering the HbA1c to less than 7.0% will reduce the risk for progression of nephropathy
3. Lowering BP to less than 130/80 will NOT reduce the risk for progression of nephropathy
4. Lowering the HbA1c to less than 7.0% will increase mortality
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3. Lowering BP to less than 130/80 will NOT reduce the risk for progression of nephropathy

4. Lowering the HbA1c to less than 7.0% will increase mortality
A 58 year old female is seen for her routine physical examination. She has mild hypertension controlled on an ACEI, and mild hyperlipidemia controlled on a statin.

She weighs 170 lb (77 kg) and her height is 66 inches (165 cm) (BMI 28).

Her fasting glucose is 105 mg/dL (5.8 mmol/l) and her A1c is 6.0%.
Which of the following statements is correct?

1. Weight loss of about 12 lbs (5.5 kg) with regular exercise will reduce the risk of her developing diabetes by almost 60%
2. Metformin will reduce the risk of her developing diabetes by about 30%
3. Rosiglitazone therapy will reduce the risk of progression to diabetes by 60%
4. Acarbose use will reduce the risk of developing diabetes by 25%
5. All of the above are correct
Question 2

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A 55 year old female is seen in your office complaining of increase in weight, easy bruising and facial hirsutism. Clinical evaluation reveals an overweight female with centripetal distribution of fat, pigmented striae and supraclavicular fat pads. BP is 140/100 and fasting glucose is 140 mg/dL (7.7 mmol/l).
What is the most appropriate next test to do?

1. Overnight (1 mg) dexamethasone suppression test
2. Measure 9:00 am plasma cortisol
3. High dose (8mg) dexamethasone suppression test?
4. MRI of adrenal gland
Question 3

1. Overnight (1 mg) dexamethasone suppression test
2. Measure 9:00 am plasma cortisol
3. High dose (8mg) dexamethasone suppression test?
4. MRI of adrenal gland
Cushing’s Syndrome

- **ACTH Dependent**
  - Pituitary
    - Adenoma
  - Ectopic
    - Carcinoid tumors
    - Carcinoma

- **ACTH Independent**
  - Adrenal
    - Adenoma
    - Carcinoma
    - Bilateral hyperplasia
      - Micronodular
      - Macronodular
Adrenocortical Adenoma

Usually < 3 cm
Usually unilateral
Shape--round to oval
with smooth margins
MR imaging--isointense to liver on
T2-weighted image
Presence of necrosis, hemorrhage, or
calcifications - rare
Growth--usually stable or
very slow growth

Young WF. Endocrinol and Metab Clin N Amer. 2000;29:159
Cushings plus virilization = adrenocortical cancer until proved otherwise
Adrenocortical Carcinoma

Large, typically >4 cm
Shape--irregular with unclear margins
Laterality--usually solitary and unilateral
Contrast media enhancement--usually vascular, marked enhancement
MR imaging--hyperintense compared with liver on T2-weighted image
Presence of necrosis, hemorrhage, or calcifications--common
Growth--usually rapid

Young WF. Endocrinol and Metab Clin N Amer. 2000;29:159
Cushing’s Syndrome
Pituitary Dependent Cushing’s Disease

ACTH and Cortisol Response to CRH

![Graph showing ACTH and Cortisol response to CRH](image-url)
A Case of Ectopic Cushing’s Syndrome

Bronchial Carcinoid
Question 4

A 75 year old female is seen for evaluation of an episode of diaphoresis and confusion which occurred at the end of a 24 hour fast. She added that she had occasionally experienced similar symptoms when she skipped breakfast on previous occasions. She is found to have a random glucose of 40 mg/dL in your office (2.2 mmol/l) 6 hours after her last meal.

All of the following tests would be indicated at the time of the visit, except:
Question 4

1. Serum insulin
2. Serum growth hormone
3. Serum cortisol
4. C-Peptide
5. Urine screen for sulfonylureas
Question 4

1. Serum insulin
2. Serum growth hormone
3. Serum cortisol
4. C-Peptide
5. Urine screen for sulfonylureas
# Causes of hypoglycemia

<table>
<thead>
<tr>
<th>Increased utilization of glucose</th>
<th>Decreased production of glucose</th>
</tr>
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<tbody>
<tr>
<td>Excess insulin</td>
<td>Alcohol</td>
</tr>
<tr>
<td>Exogenous</td>
<td>Cortisol deficiency</td>
</tr>
<tr>
<td><strong>Endogenous:</strong></td>
<td>Renal, hepatic, cardiac failure</td>
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<tr>
<td>- Drugs, e.g. insulin secretagogues</td>
<td>Severe sepsis</td>
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<tr>
<td>- Insulinoma</td>
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<td>- Nesidioblastosis</td>
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<tr>
<td>- Post gastric bypass</td>
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<tr>
<td>Insulin-like factors</td>
<td></td>
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<tr>
<td>- IGF-2</td>
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<tr>
<td>Autoimmune</td>
<td></td>
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<tr>
<td>- Insulin antibodies</td>
<td></td>
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<tr>
<td>- Insulin receptor antibodies</td>
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A 49 year old female is seen for a routine check up and is found to have a serum calcium (corrected) of 11.2 mg/dL (2.8 mmol/l) (normal 9 – 10.5 or 2.2 – 2.7 mmol/l). The PTH is < 10 pmol/L (normal 10 – 60). She is asymptomatic. Her BMI is 23 kg/m². BP is 125/75. Neck examination is normal. Thyroid examination is normal. Remainder of the examination is unremarkable.
Question 5

Which of the following tests are least appropriate:

1. Small parts ultrasound of the neck
2. Chest X Ray
3. 24 hour urine calcium
4. Serum vitamin D and 1,25 (OH)$_2$ concentrations
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# Hypercalcemia: Differential Diagnosis

<table>
<thead>
<tr>
<th></th>
<th>Ca</th>
<th>PTH</th>
<th>uCa</th>
<th>1,25 (OH)₂ vitamin D</th>
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<tbody>
<tr>
<td><strong>Primary Hyperparathyroidism</strong></td>
<td>Increased</td>
<td>N – Increased</td>
<td>N – Increased</td>
<td>N</td>
</tr>
<tr>
<td><strong>FHH</strong></td>
<td>Increased</td>
<td>Normal</td>
<td>Decreased</td>
<td>N</td>
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<tr>
<td><strong>Malignancy</strong></td>
<td>Increased</td>
<td>Decreased</td>
<td>Normal</td>
<td>N or Decreased</td>
</tr>
<tr>
<td><strong>Sarcoidosis</strong></td>
<td>Increased</td>
<td>Decreased</td>
<td>Increased</td>
<td>Increased</td>
</tr>
<tr>
<td><strong>Thyrotoxicosis</strong></td>
<td>Increased</td>
<td>Decreased</td>
<td>Normal - Increased</td>
<td>Normal</td>
</tr>
</tbody>
</table>
A 66 year old male with type 2 diabetes of 3 years duration is seen for evaluation of erectile dysfunction. His diabetes is well controlled on diet, exercise and metformin (HbA1c of 6.5%). He takes no other medications. On examination he has no end organ complications of diabetes, has normal secondary sexual characteristics.

Relevant laboratory data shows the following:
Serum testosterone 140 mg/dL (normal 270 – 870)
LH 2.2 mIU/ml (normal 1.3 – 13)
FSH 1.6 mIU/mL (normal 0.9 – 15)
Question 6

1. Start treatment with testosterone
2. Prescribe a phosphodiesterase-5 inhibitor
3. Measure serum prolactin
4. Obtain a penile doppler study
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1. Start treatment with testosterone
2. Prescribe a phosphodiesterase-5 inhibitor
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3 months post treatment with dopaminergic agonist
A 23 year old female is seen in your office complaining of secondary amenorrhea. Menarche occurred at the age of 14, but menses were never been regular. At the age of 18 she started taking an oral contraceptive, but stopped this (even though menses became regular) 2 years ago. She has had amenorrhea since. A pregnancy test is negative.
On examination she has a BMI of 24 kg/m². There is mild facial and abdominal hirsutism, and darkening of the skin at the back of her neck and in the axillae:
Which of the following tests is most likely to be abnormal?

1. Serum total and free testosterone
2. DHEA-S
3. FSH
4. Prolactin
5. TSH
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1. Serum total and free testosterone
2. DHEA-S
3. FSH
4. Prolactin
5. TSH
A 48 year old female with longstanding stable type 1 diabetes and hypothyroidism is seen for routine follow up. She is taking levothyroxine 112 mcg daily. As part of her evaluation you check thyroid function tests, which reveal the following:

- TSH 18 uU/ml (normal 0.35 – 5)
- Free T4 0.8 ng/dL (normal 0.9 -1.8)

You review her previous thyroid function tests and note that her TSH has been stable and within the normal range for the past 4 years on the current dose of levothyroxine.
Question 8

Which of the following might explain the increase in TSH?

1. She is taking an iron supplements together with her levothyroxine
2. She is taking a multivitamin with her levothyroxine
3. She is taking a calcium supplement with her levothyroxine
4. She has developed celiac disease
5. All of the above
Question 8

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