**20- A 52-year-old man was admitted with an altered mental status, paraesthesia and severe hypertension. For the last 3-months, he was suffering from fatigue, intermittent paraesthesia of all limbs, polyuria, weight gain, and irritability. The patient worked as an accountant with a 15 pack- year smoking history and would occasionally drink alcohol. He lived a sedentary life, and was obese from childhood, being unable to lose weight through his diet.**
**A venous blood gas was performed on admission:**

| | | |
|---|---|---|
| pH | 7.55 | (7.35-7.45) |
| Na+ | 145 mmol/L | (133-146) |
| K+ | 3 mmol/L | (3.5-5.5) |
| HCO3- | 40 mmol/L | (22-26) |

**What is the most likely diagnosis in this case?**

A- Addison's disease
B- Cushing's syndrome
C- Nelson's syndrome
D- Pheochromocytoma
E- Pyloric stenosis

**The correct answer is B**

Cushing's syndrome - hypokalaemic metabolic alkalosis

Hypokalaemia and metabolic alkalosis are more common in Cushing's syndrome caused by ectopic adrenocorticotropic hormone (ACTH) production (90%) than in other causes of Cushing's syndrome due to the enhanced mineralocorticoid effect. Given this patient's significant smoking history, a diagnosis of small-cell lung cancer with ectopic ACTH syndrome.

# Adrenal pastest

1. **You are called to a psychiatric unit to see an 18-year-old woman with anorexia nervosa. She has been admitted for refeeding. She has a BMI of 13.4kg/m2. She has not had a period in 1 year. What would you expect to see in the results of her biochemical investigations?**
   A. Raised Levels of luteinis1ng hormone (LH) and follicle-stimulating hormone (FSH)
   B. Elevated circulating cortisol
   C. Low resting growth hormone Levels
   D. Increased levels of gonadotropin-releasing hormone (GnRH)
   E. Normal oestrogen levels

**The correct answer is B**

These have been shown to be elevated in anorexia. They can also be normal.

**2. A 42-year-old woman is diagnosed with phaeochromocytoma. Screening with pentagastrin testing suggests that she has medullary thyroid carcinoma, and you plan a thyroidectomy. What antihypertensive medication should be started before surgery for a patient with phaeochro1mocytoma?**

A. Phenoxybenzamine

B. Atenolol

C. Labetalol

D. Ramipril

E. Doxazosin

**The correct answer is A**

Phenoxybenzamine is a more potent a-blocker than doxazosin and is the recommended choice for initial antihypertensive medication in phaeochromocytoma where surgery is contemplated.

It should be given in divided doses, at 20 mg initially, increasing to 80 mg. Patients should then be considered for additional 113- blockade with propranolol, again in divided doses up to 240 mg/day.

Always start with a-blockade first. as initial use offs-blockers can worsen hypertension. Labetalol is not recommended.

An experienced surgeon and anaesthetist are crucial for this operation.

3. **A 35-year-old man is diagnosed with phaeochromocytoma after being admitted to the Emergency department with severe headaches and worsening blood pressure control. On examination his IBP is 185/95 mmHg, despite taking Ramipril 10mg daily. Creatinine is recorded at 135 micromol/l.**
   **He is Listed for surgery.**
   **Which of the following is the most appropriate intervention with respect to achieving blood pressure control?**

   A. Amlodipine
   B. Atenolol
   C. Doxazosin
   D. Hydrochlorothiazide
   E. Phenoxybenzamine

**The correct answer is E**

Full alpha blockade is crucial before surgery to remove a phaeochromocytoma is attempted. Phenoxybenzamine is the agent of choice and should be started at least 7-10 days before surgery.

4. **A 32-year-old woman presents to her GP with extreme lethargy 6 weeks after the birth of her third child. Her pregnancy was uneventful, but she has a history of hypothyroidism and post-partum depression. She complains of fatigue, nausea and dizziness, along with symptoms of a urinary tract infection (UTI). The GP prescribes antibiotics: however, 3 days later she is brought to the Emergency Department via ambulance after collapsing at home. She is found to have a blood pressure of 80/52 mmHg, a Na+ concentration of 127 mmol/l, a K+ concentration of 5.9 mmol/l and a urea of 12 mmol/l. You note increased skin pigmentation.**
   **What is the likely diagnosis?**
   A. Sheehan syndrome
   B. Prolactinoma
   C. Addison's disease
   D. Postnatal depression
   E. Thyrotoxicosis

**The correct answer is C**

She has evidence of primary hypoadrenalism. Her hypotension, hyponatremia and hyperkalemia are suggestive of both glucocorticoid and mineralocorticoid deficiency.

Secondary adrenal insufficiency from a central cause (ie in Sheehan syndrome) would not cause hyperkalemia as aldosterone production is intact.

Other clues to the diagnosis are the intercurrent illness (UTI), which has caused the Addisonian crisis, and her history of autoimmune hypothyroidism.

5. **A 45-year-old pharmacist presents with episodes of redness and lethargy. Her blood pressure is 115/75 mmHg. Her bloods reveal hypokalemia and a raised serum bicarbonate level. Urine collection reveals hypercalciuria. Otherwise, the findings are unremarkable.**
   **What's the Likely diagnosis?**

   A. Bartter syndrome
   B. Gitelman syndrome
   C. Furosemide abuse
   D. Conn syndrome
   E. Liddle syndrome

**The correct answer is C**

This patient's occupation as a pharmacist is the clue, which makes medication abuse more Likely. Loop diuretics, such as furosemide. inhibit the Na-lK-2Cl cotransporter of the thick ascending loop of Henle, resulting in sodium and chloride diuresis.

With the inhibition of the Na-K-2Cl cotransporter, the trans-membrane potential difference is not created and therefore calcium and magnesium resorption is inhibited. This enhances urinary calcium and magnesium.

6. **A 45-year-old woman is due to undergo a hysterectomy. She has a history of hypertension, headaches and panic attacks over the past few years. She currently takes ramipril for her blood pressure. Preoperative examination revealed a blood pressure of 150/BS mmHg. normal renal function and calcium concentration. An electrocardiogram showed mild left ventricular hypertrophy {LVH).During the operation, as the surgeon attempts to mobilize her uterus, her blood pressure rises to 210/110 mm Hg, her pulse rises to 130 bpm and she suffers an acute myocardial infarction.**
   **What is the most likely cause of her intraoperative hypertension and myocardial infarction?**

   A. Essential hypertension
   B. Occult coronary artery disease
   C. Undiagnosed phaeochromocytoma
   D. Multiple endocrine neoplasia type 1 (MEN 1)
   E. Renal artery stenosis

**The correct answer is C**

Given her history, she is likely to have been suffering paroxysms of catecholamine release (headaches. panic attacks'). Mobilization of the uterus is Likely to have precipitated an acute release of large amounts of catecholamines, causing her catastrophic rise in blood pressure and intraoperative myocardial infarction.

7. **A 48-year-old man has experienced a weight increase of 4 kg over the past two months. He also has poor controlled blood pressure desp1te tak1ng three oral agents. and has recently been diagnosed with impaired glucose tolerance. On examination his IBP is 165/92 mm Hg, his pulse is 72 beats per min and regular and his BMI is 31. He has abdominal striae on examination of the abdomen.**
**Which of the following is the best initial investigation to establish the diagnosis?**

   A. High dose dexamethasone suppression test
   B. Metyrapone test
   C. Short Synacthen test
   D. Serum ACTH
   E. 24 h urinary free cortisol

**The correct answer is E**

Twenty-four-hour urinary free cortisol may be elevated in cases of alcohol abuse, although it is considered the initial screening test of choice because it can be instigated at the first outpatient appointment.

8. **A 39-year-old man with uncontrolled hypertension is found to have a plasma potassium concentration of 2.B mmol. His blood pressure is persistently 150/95 mmHg, despite taking three blood pressure-lowering agents. His physical examination is unremarkable. Further testing, after supplementing his potassium, reveals a suppressed plasma renin activity and a high aldosterone.**
   **Which is the next most appropriate investigation?**

   A. Saline suppression test.
   B. MR renal arteries.
   C. Plasma catecholamines.
   D. Overnight dexamethasone suppression test.
   E. Urinary catecholamines.

**The correct answer is A**

This would provide secondary confirmation of hyperaldosteronism. HOWEVER, the 2016 Endocrine Society guidelines suggest that in the setting of spontaneous hypokalemia, plasma renin below detection levels plus plasma aldosterone concentration of 550 pmol/l, there may be no need for further confirmatory testing. This statement is debated heavily by endocrinologists.

**9. An 18-year-old woman comes to the endocrine clinic for review. She complains of excessive hairiness, acne and irregular, heavy periods once every 2 months. She takes no regular medication. Examination reveals a BP of 122/82 mmHg, pulse is 74 beats/min and regular. Her body mass index {IBIMI) is 23. You confirm facial and upper chest acne with increased hair growth affecting the beard line and around the nipples.**

**Investigations:**

| Investigations | Result | Normal Value |
|---|---|---|
| Hb | 130.1 g/l | 115-155 g/l |
| WCC | 5.9 X 109/l | 4-11 x109/L |
| Platelets | 203 X 109/l | 150 - 400 x 109/l |
| Na+ | 140 mmol/l | 135-145 mmol/l |
| K+ | 4.9 mmol/l | 3.5-5.0 mmol/l |
| Creatinine | 100 µmol/l | 50-120 µmol/l |
| 17 -0 H progesterone | 2800 nmol/L(H) | 60.6 -1212 nmol/l |
| Testosterone | 5.8 nmol/l (H) | 0.52 - 2.43 nmol/l |

**Which of the following is the most likely diagnosis?**

A. Adrenal tumor.

B. 5-alpha reductase deficiency.

C. Classical congenital adrenal hyperplasia (CAH).

D. Non-classical congenital adrenal hyperplasia (CAH).

E. Polycystic ovarian syndrome (PCOS).

**The correct answer is D**

The presentation later in life with symptoms of hyperandrogenism. coupled with elevated testosterone and 17- 0H progesterone is consistent with a diagnosis of non-classical CAH.

Although corticosteroid replacement does reduce hyperandrogenism in this situation, the dose has to be balanced against the potential risks of long-term steroid use.

**10. A 17-year-old boy who is 155 cm tall is worried that he might have stopped growing.**
**Which hormone is chiefly responsible for epiphyseal fusion and cessation of growth?**

A. Growth hormone
B. Testosterone
C. Somatostatin
D. Oestrogen
E. Thyroxine.

**The correct answer is D**

The growth spurt at puberty is brought about by the secretion of androgens in the male and oestrogens in the female. However, it is oestrogens that ultimately terminate growth by causing the epiphyses in the long bones to fuse.

Oestrogens rather than androgens are therefore responsible for skeletal maturation, epiphyseal fusion and cessation of growth in males and females.

**11. A 54-year old woman is seen for the first time in the Diabetes Clinic. She is obese, plethoric and has marked bruising on her Limbs and fresh striae over her abdomen. She has developed a dorsal kyphosis following a vertebral collapse earlier in the year.**

**Which of the following results will help to pinpoint the diagnosis if you suspect Cushing syndro1me secondary to adrenal adenoma?**

A. Normal 0900-h serum cortisol level
B. Serum potassium of 2.2 mmoL/l
C. 0900-h serum cortisol of 200 nmol/L after an overnight dexamethasone test
D. Raised urine cortisol: creatinine ratio
E. Undetectable serum adrenocorticotropic hormone (ACTH) Level

**The correct answer is E**

Functioning adrenal adenomas produce excessive Levels of cortisol, which suppresses the ACTH production from the pituitary gland by negative feedback.

**12. A 42-year-old woman presents with d1fficult-to-treat hypertension; she is taking ramipril, atenolol and bendroflumethiazide. but her blood pressure in the clinic is still 150/100 mmHg: her serum potassium concentration in the clinic was 2.9 mmoL. Her atenolol is stopped, her potassium is normalized with oral supplementation and then she undergoes further testing, which reveals a low plasma renin and an elevated aldosterone to renin ratio.**
**Which of the following diagnoses is most likely to fit with this clinical picture?**

A. Adrenal Cushing's
B. Conn syndrome
C. Glucocorticoid-suppressible hyperaldosteronism
D. Aldosterone-producing carcinoma
E. Adrenal incidentaloma

**The correct answer is B**

As this woman has secondary hypertension: the combination of hypokalemia, suppressed renin and elevated aldosterone to renin ratio, is indicative of hyperaldosteronism.

She should undergo secondary testing with saline suppression followed by adrenal venous sampling to localize the disease.

**13. 50-year-old woman with resistant hypertension is investigated for an underlying secondary cause. She has found to have hypercortisolaem1a. after testing reveals a high 24-hour urinary cortisol excretion and failed dexamethasone suppression test. Which one of the following clinical findings would suggest most strongly that ectopic secretion of adrenocorticotropic hormone (ACTH) is the cause of the condition?**

A. Hyperglycaemia
B. Worsening hypertension
C. Hypokalemia
D. Muscle wasting
E. Weight loss

**The correct answer is E**

Ectopic Cushing's syndrome is associated with underlying malignancy. For this reason it is recognized to occur in conjunction with weight loss.

Other features such has muscle wasting and hyperglycaemia are also seen.

**14. A 50-year-old man presents with a history of panic attacks, palpitations, sweating, headache and flushing, On examination his pulse rate is 120 bpm and his blood pressure is 190/110** mmHg**. Urinary catecholamines are elevated over a 24-h period, with noradrenaline most elevated. Initial ultrasound scan of the abdomen reveals no masses. A CT scan of the abdomen does not show an adrenal mass.**
**Which of the following tests would be most useful in establishing the diagnosis?**

A. Repeat ultrasound scan after interval
B. Genetic testing for RET proto-oncogene mutation
C. Magnetic resonance imaging
D. Renal arteriography
E. [$13^{11}$], metaiodobenzylguanidine (MlBG) scan

**The correct answer is E**

This patient most probably has phaeochromocytoma. The presence of a raised noradrenaline usually indicates an extra-adrenal tumor.

Scanning with [1311] metaiodobenzylguanidine (MIBG) demonstrates specific uptake in sites of sympathetic activity with about 90% success.

This scan is particularly useful with extra-adrenal tumours when CT or IMRI of adrenal glands is negative.

**15. A 25-year-old woman presents to the Reproductive Endocrinology Clinic with a history of being unable to conceive after two years of using no contraception. It is thought that she might have polycystic ovarian syndrome.**
**Which one of the following is most likely to be associated with this condition?**

A. A 28-day menstrual cycle
B. Hirsutism and virilization
C. Low sex hormone binding globulin (SHBG) and raised free androgen index
D. Low Levels of circulating insulin
E. Normal BMI (body mass index)

**The correct answer is C**

Polycystic ovary syndrome (PCOS) is the most common endocrinopathy in women of reproductive age. Joint European Society of human reproduction and Embryology and American Society of Reproductive Medicine consensus on the diagnostic criteria (Rotterdam criteria) require at least 2 out of 3 of the following: hyperandrogenism (clinical and biochemical), oligomenorrhoea, polycystic ovaries on ultrasound and exclusion of other disorders.

**16. A 38-year-old woman comes to you for a repeat prescription. She has had hypertension since her last pregnancy at the age 30 and has been maintained on clonidine 0.2 mg twice a day. She gets headaches, dyspnoea on exertion; swelling of her feet and orthopnoea. but denies chest pain. Her father is also being treated for hypertension. She does not smoke.**
**She is five foot seven inches tall and weighs 15 stone. Her blood pressure is 180/110 mm Hg, pulse is 92 bpm. The rest of her examination is remarkable for hypertensive retinopathy, bibasilar rales and 1+ pitting oedema bilaterally. Initial lab results were normal except for a serum potassium of 3.0 mmol/l (normal range 3.5-5.0 mmol/l) and serum bicarbonate of 33 mmol/l (22-28 mmol/l).**
**You correct the hypokalemia and obtain a random serum aldosterone level of 25 ng/dl (5-30 ng/dl) with a plasma renin activity of 0.5 ng/ml/h (1.6-7.4 ng/ml/h) while the patient is on a normal diet.**
**What additional tests might be appropriate?**

A. Adrenal computed tomography
B. Adrenal vein sampling
C. 18-Hydroxycorticosterone
D. Saline loading test
E. Adrenal computed tomography, adrenal vein sampling and 18-hydroxycorticosterone testing

**The correct answer is E**

Primary aldosteronism, a disorder characterised by hypertension, hypokalemia, suppressed plasma renin activity and increased aldosterone secretion, affects 0.05-2% of the hypertensive population.

This disorder should be suspected in hypertensive patients in whom spontaneous or easily provoked hypokalemia develops that is slow to correct after discontinuation of diuretics.

As important as recognizing the presence of primary aldosteronism is the differentiation of Lesions that are surgically curable (60-70% of the cases in some series) from those that are best treated medically.

In this patient, the presence of hypertension, hypokalemia and alkalosis appropriately triggered screening for hyperaldosteronism, which led to the findings of an aldosterone-renin ratio of greater than 30, which constitutes a positive screening test. Aldosteronism can be confirmed by the finding of a 24-hour urine aldosterone secretion of 12 µg in the salt-replete state.

Adrenal imaging is the next step to differentiate adrenal adenoma from adrenal hyperplasia, although adenomas smaller than 1.5 cm can be missed and so mistaken for hyperplasia. In confusing cases, adrenal vein sampling for aldosterone measurements is used to localize adenoma {with 95°/2 accuracy).

The finding of a lateralizing 10 : 1 aldosterone ratio in the presence of a symmetrical adrenocorticotropic hormone {ACTH) induced cortisol rise diagnoses and localizes an adenoma.

Other features suggestive of adenoma include a plasma 18-hydroxycorticosterone of 100 ng/dl or more, spontaneous hypokalemia of less than 3 mmol/l and an anomalous postural decrease of plasma aldosterone concentration. Saline loading would be inappropriate in this patient because of her heart failure and hypertensive retinopathy.

**17. A 48-year-old alcoholic presents to the Endocrine Clinic with Loss of libido, erectile dysfunction and breast tenderness. On examination his BP is 110/70, pulse is 70 and regular. You confirm gynaecomastia and signs of chronic liver disease and his BMII is elevated at 30. Elevated oestrodiol and Liver function tests consistent with cirrhosis are noted on laboratory testing.**

**Which of the following is a direct precursor to oestradiol?**

A. Testosterone

B. Dihydrotestosterone

C. Cortisol

D. Progesterone

E. Oestriol

**The correct answer is A**

Testosterone is derived from cholesterol and is converted to oestradiol by aromatase. Alcohol excess and obesity are known to increase aromatase activity and may therefore account for feminisation in obese patients or those with alcoholism.

**18. Antinuclear antibodies were positive. She notes that a similar episode occurred a few years previously when she took a specific antibiotic for a urinary tract infection.**
**Which of the following is the most likely diagnosis?**

A. Polycystic ovarian syndrome
B. Stevens-Johnson syndrome
C. Toxic epidermal necrolysis (TEN)
D. Porphyria cutanea tarda
E. Systemic lupus erythematosus (SLE)

**The correct answer is D**

This patient's clinical picture is very typical of porphyria cutanea tarda. Antinuclear antibodies are frequently seen in patients with this condition. Oestrogens can precipitate development of the condition, hence her presentation shortly after commencing the oral contraceptive pill.

A history of a similar episode in response to an antibiotic is also suspicious for porphyria cutanea tarda.

Urinary porphyrins are raised in porphyria cutanea tarda; the cause is congenital deficiency of uroporphyrinogen decarboxylase (UROD).

Assay of red blood cells for UROD activity is now available in many hospital laboratories. She should be encouraged to find another form of contraception.

**19. An obese 38-year-old man presents with rapid weight gain and the development of extensive abdominal striae, and his midnight cortisol is found to be elevated. He has hypertension with a BP of 155/82 mmHg, type 2 diabetes currently treated with metformin. and has recently suffered a left Calles' fracture.**
**Which of the following would best differentiate between a pituitary adenoma and ectopic ACTH 1production as a cause of hypercortisolism?**

A. Low-dose dexamethasone suppression test
B. Synacthen® test
C. 24-hour Urinary cortisol collection
D. High-dose dexamethasone suppression test
E. Basal adrenocorticotropic hormone levels

**The correct answer is D**

The high-dose dexamethasone suppression test involves the administration of 2 mg dexamethasone 6-hourly for a 48-hour period. In patients with Cushing's disease.

The cortisol falls by more than 50% of the basal value, though it should be noted that 10% of patients with Cushing's disease fail to suppress.

A reduction of more than 90% in basal urinary free cortisol levels confirms Cushing's disease due to a pituitary adenoma as the underlying cause. Where cortisol levels fail to reduce. ectopic ACTH production is suggested.

**20. A 25-year-old woman is being investigated for suspected multiple endocrine neoplasia (MEN) type 2B. after a first degree relative was diagnosed with the syndrome. She is noted to have marfanoid features on clinical examination.**
**What will be the most likely finding if this patient has MEN 28?**

A. Elevated serum calcium.
B. Elevated metanephrines.
C. Elevated thyroxine.
D. Decreased parathyroid hormone.
E. Elevated glucagon.

**The correct answer is B**

Multiple endocrine neoplasia type 2B {MEN2B) with a marfanoid phenotype is associated with phaeochromocytoma and medullary carcinoma of the thyroid. Parathyroid hyperplasia is not well described in association with MEN2B.

Out of the options given, elevated metanephrines are most likely to be found.

**21. A 34-year-old alcoholic man has been admitted to the Intensive Therapy Unit after having been found collapsed in the street. [Initial CT brain scan excluded any intracranial lesion. On admission he had signs of a left basal pneumonia. confirmed on chest X-ray and Low sodium concentration of 118 mmol/l. You are asked to see him as, although he is now conscious, extubated and able to communicate by blinking, he appears to be unable to move or speak. On examination he has a quadriparesis and bilateral extensor plantar responses. His eye movements appear normal, as is facial sensation, but he has no gag reflex and is unable to swallow or speak.**
**What diagnosis do you consider most likely when planning how best to investigate his problem?**

A. Basilar artery dissection
B. Basilar artery thrombosis
C. Central pontine myelinolysis
D. Guillain-Barre syndrome
E. Miller-Fisher syndrome

**The correct answer is C**

Central pontine myelinolysis classically occurs in the context of hyponatremia or rapid changes in sodium concentrations. The underlying pathology is that of a large, symmetrical demyelinating lesion of the central pons, which can give a “bat wing” appearance on MRII. This patient's history is fairly typical. with onset of an initially flaccid quadriplegia over several days, associated with an inability to speak or swallow.

Spasticity and increased tendon reflexes may subsequently develop. The eye movements may or may not be affected nystagmus and/or ophthalmoplegia may be present).

**22. A patient has a two-month history of intermittent flushing associated with tachycardia and wheezing. There have also been episodes of profuse watery diarrhoea. On examination the patient has facial plethora and is lushed. On examination IBP is 160/80, cardiovascular examination reveals a pansystolic murmur which is louder on inspiration in keeping with tricuspid regurgitation, and abdominal examination reveals a palpable liver edge.**
**Given the suspected diagnosis, what would be the most appropriate investigation?**

A. Dexamethasone suppression test
B. Urinary catecholamine collection
C. Urinary 5-hydroxyindoleacetic acid (5-HIAA) collection
D. Abdominal ultrasound
E. Fasting gastrin

**The correct answer is C**

The biologically active metabolite characteristically produced bv metastatic carcinoid tumours is 5- hydroxytryptamine (5-HT, serotonin), which is synthesized from the amino acid tryptophan.

5-HT plays a part in the pathogenesis of some of the symptoms of the carcinoid syndrome, particularly diarrhoea and bronchoconstriction.

It is metabolized to 5-hydroxyindoleacetic acid (5-HIIAA). which accounts for 959t6 of the urinary excretion of 5-HT.

**23. A 35-year-old man who drinks 70 units of alcohol per week comes to the GP surgery for review. He takes regular seretide for asthma and uses intermittent oral prednisolone for exacerbations. but has no other medical history of note. On examination his BP is 170/100 mmHg, with pulse 76 beats per min and regular.**
**His BMI is 33 and he has significant abdominal adiposity.**
**Investigations reveal:**

| Investigation | Result | Normal Value |
|---|---|---|
| Hb | 131 g/l | 135-175 ,gi/l |
| WCC | 7.0 X $10^9$/L | 4-11 x $10^9$/l |
| Platelets | 203 x $10^9$/l | 150-400 x $10^9$/l |
| Na+ | 137 mmol/l | 135-145 mmol/l |
| K+ | 4.2 mmol/l | 3.5-5.0 mmol/l |
| Creatinine | 103 µmol/l | 50-120 µmol/L |
| Glucose | 5.0 mmol/l | 3.5-5.5 mmol/l |

**Which of the following is the most likely explanation for the clinical findings?**

A. Cushing's syndrome
B. Hyperaldosteronism
C. Intermittent prednisolone use
D. Phaeochromocytoma
E. Pseudo-Cushing syndrome

**The correct answer is E**

Pseudo-Cushing's syndrome occurs in response to prolonged heavy alcohol consumption and obesity.

It is associated with an elevation in cortisol but not to the extent of that seen with Cushing's syndrome itself.

Management is with weight control and a reduction of alcohol consumption.

**24. A 18-year-old girl presents to the Emergency Department with episodes of shortness of breath on exercise. Her parents have always been reluctant to use medical services for themselves and their children. and therefore this patient has never been registered with a general practitioner. On examination her BP is 155/88; pulse is 82 and regular. She has a systolic murmur. You also note that she is of short stature with webbing of the knee . She tells you that she has never had a menstrual period.**
**Which hormone is it most important to replace in this patient?**

A. Growth hormone
B. Progesterone
C. Oestrogen
D. Pulsatile GnRH
E. Luteinizing hormone

**The correct answer is C**

The clinical picture here is consistent with a diagnosis of Turner syndrome. Oestrogen replacement is required to develop secondary sexual characteristics and to reduce the risk of Long-term osteoporotic fracture.

**25. A 22-year-old woman comes to the clinic complaining of hirsutism, particularly around her jaw Line and around her upper chest and Lower abdomen. In addition she has particular problems with acne.**

**Apparently she has intermittent, heavy periods. which have a tendency to only occur every 3-4 months.**

**On examination her BP is 148/84 mmHg, pulse is 70/min and regular and her BMI is 33. You confirm the pattern of excess hair over her jaw line, upper chest and abdomen.**

**Investigations:**

| Investigation | Result | Normal Value |
|---|---|---|
| Hb | 128 g/l | 115-155 g/l |
| WCC | 7.5 X $10^9$/l | 4-11 X 109/l |
| Platelets | 214 X $10^9$/l | 150-400 x 109/l |
| Na+ | 138 mmol/L | 135-145 mmol/l |
| K+ | 4.3 mmol/L | 3.5-5.0 mmol/l |
| Creatinine | 100 µ1mol/L | 50-120 µmol/L |
| LH | 17 U/l | 1-70 U/l |
| FSH | 5 U/l | 1-25 U/l |
| Prolactin | 750 mU/l | < 400 mU/l |
| Testosterone | 3.9 nmol/l | 0.52 - 2.43 nmol |

**Which of the following is the most likely diagnosis?**

A. Androgen secreting tumor.

B. Hypothyroidism.

C. Microprolactinoma.

D. Polycystic ovarian syndrome.

E. Simple obesity.

**The correct answer is D**

The LH/FSH ratio is elevated in the presence of a mildly elevated testosterone, along with obesity. Hirsutism and acne, making PCOS the most likely diagnosis. Mild elevations in prolactin may be seen in up to 30% of patients with PCOS.

Transvaginal ultrasound has a 90% or greater sensitivity for confirming the diagnosis in the hands of an experienced operator. Given that her BMI is significantly elevated at 33, weight loss is the initial treatment of choice.

**26. A 22-year**-old man is referred with severe hypertension. Despite taking maximal dose ACIE inhibitor and a calcium-channel antagonist, his BP is still elevated at 160/100 mmHg. He also has a history of generalized muscle weakness and lethargy, which makes it difficult for him to carry out his job as a sales rep. On examination in the clinic, his BP is 155/95 mmHg, with pulse 75 beats per min and regular. Respiratory and abdominal examination is unremarkable. Investigations reveal:

| Investigation | Result | Normal Value |
|---|---|---|
| Hb | 130 g/l | 135-175 g/L |
| WCC | 6.7 X $10^9$/l | 4-11 X $10^9$/l |
| Platelets | 198 x $10^9$/l | 150-400 x $10^9$/l |
| Na+ | 142 mmol/l | 135-145 mmol/l |
| K+ | 3.1 mmol/l | 3.5-5.0 mmol/l |
| Bicarbonate (HCO3) | 33 mmol/l | 24-30 mmol/l |
| Creatinine | 122 µmol/l | 50-120 µmol/l |
| Renin and aldosterone | both suppressed | |

**Which of the following is the most likely diagnosis?**

A. Bartter syndrome

B. Conn syndrome

C. Gitelman syndrome

D. Hypokalaemic periodic paralysis

E. Liddle syndrome

**The correct answer is E**

Liddle syndrome is caused by a mutation in the epithelial sodium channel. It results in profound hypertension associated with hypokalemia, alkalosis and suppressed renin and aldosterone.

Hypertension associated with Liddle syndrome is very sensitive to diuretics that target the epithelial sodium channel namely amiloride and triamterene.

A number of mutations that Lead to Liddle's have now been identified. and genetic screening for these is available.

**27. An 18-year-old woman presents with a 2-month history of vague ill health, dizziness and abdominal pain: she has some abnormal skin pigmentation. Random cortisol is Low (38 nmol). Which of the following investigations would best demonstrate that this woman had Addison's disease?**

A. High cortisol level after a short synacthen test and low measured adrenocorticotropic hormone (ACTH) Level

B. High early-morning cortisol, low ACTH and positive anti-2l-hydroxylase antibodies

C. Low 24-hour urinary cortisol excretion

D. Positive overnight dexamethasone suppression test

E. Low cortisol level after a short synacthen test, high ACTH and positive anti-21-hydroxytase antibodies

**The correct answer is E**

In Addison's, or autoimmune adrenal failure, the adrenal glands do not produce cortisol, so you see a low cortisol Level after short synacthen test.

The pituitary is functioning normal, and so produces more ACTH in response to the low cortisol.

21-hydroxylase antibodies, also known as anti-adrenal antibodies, are seen in Addison's, but are not always positive when measured.

**28. A 17-year-old girl with Addison's disease is intolerant of her hydrocortisone treatment, which she takes at a dose of 20 mg in the morning and 5 mg in the evening.**
**Which of the following doses of prednisolone would provide an approximately equivalent daily dose to her hydrocortisone?**

A. 1 mg

B. 6.5 mg

C. 10 mg

D. 12.5 mg

E. 15 mg

**The correct answer is B**

Equivalent dose of prednisolone vs hydrocortisone therapy is usually about 25% of the hydrocortisone dose. Adequacy of steroid replacement is normally assessed by clinical wellbeing and restoration of normal (not excessive) weight.

Cortisol levels during the day are only a useful assessment if the patient is on hydrocortisone.

Patients normally require therapy with mineralocorticoids as well as glucocorticoid therapy. Standard therapy is with fludrocortisone 50-300 micrograms/day, and effectiveness is assessed by serum electrolytes. postural change in blood pressure and suppression of plasma renin activity to normal levels.

**29. A 25-year-old woman presents to the endocrine clinic with a rapidly enlarging left thyroid nodule. Histology of this lesion suggests that it is a medullary thyroid carcinoma. Her blood pressure is also elevated at 155/90.**
**Which of the following would you consider as the most like y cause of her hypertension?**

A. Coarctation of the aorta
B. Hyporeninemic hyperaldosteronism
C. Liddle's syndrome
D. Phaeochromocytoma
E. Renal artery stenosis

**The correct answer is D**

The presence of medullary thyroid carcinoma raises the possibility of multiple endocrine neoplasia type 2A.

MEN2A is associated with hyperparathyroidism, medullary thyroid carcinoma and phaeochromocytoma.

**30. A 17-year-old gymnast presents to the endocrine clinic with lethargy and amenorrhoea. She admits to Limiting her calorie intake to maintain a Low weigh. On examination her BP is 100/60 mmHg. pulse is 70/min and she has fine downy hair over her arms. Her BMI is 18; otherwise there are no other findings.**

| Investigation | Result | Normal Value |
|---|---|---|
| Hb | 115 g/l | 115-155 g/L |
| WCC | 7.2 x $10^9$/l | 4-11 X 109/L |
| Platelets | 207 X $10^9$/l | 150-400 x 109/L |
| Na+ | 137 mmoL/l | 135-145 mmol/l |
| K+ | 3.7 mmoL/L | 3.5-5.0 mmol/l |
| Creatinine | 87 µ1mol/L | 50-120 µmol/l |
| FSH | 3.1 µU/L | 0.17-3.2 µU/L |

**Which of the following findings would you also anticipate on laboratory testing?**

A. Decreased FSH

B. Decreased prolactin

C. Raised LH

D. Raised FSH

E. Raised testosterone

**The correct answer is A**

Low body mass index, as seen here. leads to a fall-off in production of gonadotrophins and subsequent secondary ovarian failure.

Gaining weight to normal BMI leads to a restoration of menses.

Of significant concern in this patient is under-oestrogenisation and potential risk of osteoporosis.

**31. A** previously fit 30-year-old man presents with a 2-month history of weight loss, tiredness, and nausea. He has no past medical history of note. Examination reveals a blood pressure of 110/70 mmHg. pulse is 78 beats/1m1n and regular. There is a postural blood pressure drop **of 20 mmHg on standing.**

| Investigation | Result | Normal Value |
|---|---|---|
| Hb | 133 g/l | 135-175 g/l |
| MCV | 88 fl | 76-98 fl |
| WCC | 6.0 X $10^9$/l | 4-11 X $10^9$/l |
| Platelets | 450 X $10^9$/l | 150-400 x $10^9$/l |
| Na+ | 130 mmol/l | 135-145 mmol/l |
| K+ | 5.7 mmol/l | 3.5-5.0 mmol/l |
| Urea | 3.0 mmol/l | 2.5-6.5 mmol/l |
| Creatinine | 78 µmol/l | 50-120 µmol/l |
| Total tetra-'iodothyronine | 11 pmol/l | 11-22 pmol/L |
| TSH | 8 µU/l | 0.17-3.2 µU/l |

**Which of the following would be the most useful diagnostic investigation?**

A. Anti-thyroid peroxidase antibody titre

B. Insulin tolerance test

C. Free thyroxine concentration

D. Short Synacthen ® test

E. Thyroid-releasing hormone test

**The correct answer is D**

The clues here include the nausea, tiredness, weight loss over the past few months. coupled with hyponatremia and hyperkalemia, and the postural hypotension.

These features are all strong pointers towards a diagnosis of Addison's disease, and a short Synacthen test, where a rise in cortisol indicating normal adrenal function rules out the diagnosis.

**32. A 35-year-old woman is referred by her GP to the hospital because of recurrent episodic headaches. which tend to come on at times of stress or exercise; she also complains of intermittent anxiety, palpitations and problems with sweating. He has tried her on a course of antidepressants, which only seemed to make her symptoms worse. Her 24-hour urinary catecholamines show markedly raised normetanephrine and metanephrine; CT imaging reveals a mass in the right adrenal medulla her blood pressure in the clinic is 145/95 mmHg. What is the best definitive 1management plan for this woman's condition?**

A. Urgent Ɓ blockade, then unilateral adrenalectomy
B. Urgent adrenalectomy
C. Urgent ƌ blockade. then fs blockade, if required, and unilateral adrenalectomy
D. Urgent Ɓ blockade, then a -blockade, if required, and unilateral adrenalectomy
E. Urgent ƌ blockade, then fs blockade, if required, and bilateral adrenalectomy

**The correct answer is C**

This woman has a phaeochromocytoma of the right adrenal medulla.

**33. A 42-year-old man is referred to the Hypertension Clinic for advice. He is currently taking atenolol, bendroflumethiazide and ramipril and his blood pressure is currently 165/105 mm Hg. His potassium is 3.0 mmol/l, with a serum bicarbonate concentration of 31 mmol/l. His BMI is 24. with a normal hip:waist ratio.**

**What is the best next 1management step?**

A. Measure the ratio of aldosterone to renin

B. Wash out as many of his antihypertensive agents as possible for a period of 2 weeks, then review

C. Measure his 24-hour blood pressure

D. Arrange 24-hour urinary free cortisol collection

E. Add in a further agent and review in 12 months

**The correct answer is A**

The suspicion here - with hypokalemia, metabolic alkalosis and resistant hypertension despite being on 3 agents - is that he has primary hyperaldosteronism.

Conn syndrome is primary hyperaldosteronism due to an aldosterone-secreting adenoma. Recent guidelines suggest taking a baseline random renin and aldosterone to calculate ratio is a worthwhile initial screen even in the presence of interfering medications.

If the aldosterone- renin ratio is <800 (using units of pmol/ml/hr for renin and pmol/L for aldosterone) then Conn syndrome is extremely unlikely and the patient should be investigated for other causes of secondary hypertension and hypokalemia. An aldosterone-renin ratio of >800 should prompt medication review and formal evaluation.

Angiotensin-converting enzyme (ACE) inhibitors, angiotensin II-receptor blockers and spironolactone/eplerenone need to be stopped for at least 4 weeks before re-testing. Beta-blockers and other diuretics need to be stopped 2 weeks before testing.

Patients may need to start alternative agents to maintain safe BP control. This requires careful involvement of the GIP and patient in arranging safe IBP and serum potassium monitoring before planning investigations.

**34. A 35-year-old woman presented with a 2 day history of vomiting and abdominal pain. She had a background of anorexia nervosa with diuretic abuse , though she was currently engaging well in a treatment programme.**
**On examination, her pulse rate was 86 bpm and blood pressure 102/76 mmHg. She weighed 55kg.**
**Investigations:**

| Investigation | Result | Normal Value |
|---|---|---|
| Na+ | 132 g/l | 135-175 g/l |
| K+ | 5.5 mmol/l | 3.5-5.0 mmol/l |
| Urea | 9.8 mmol/l | 2.5-6.5 mmol/l |
| Creatinine | 92 µmol/L | 50-120 µmol/l |

**What is the most likely cause for her hyperkalemia?**

A. Addison's disease
B. Bartter syndrome
C. Conn's syndrome
D. Diuretic abuse
E. Renal tubular acidosis type 1

**The correct answer is A**

This patient has a mild hyponatremia and mild hyperkalemia which is typical for Addison's disease.

Combined with her presenting symptoms and age, this is highly suggestive of Addison's disease.

**35. A 19-year-old student is brought to the Emergency Department by his flatmates. He had been playing squash ha afternoon. and while out for an Italian meal he complained of generalized weakness: he was unable to stand and had to be carried in by his friends. His potassium level was noted to be 2.6 mmol/l; urine screens for diabetes and laxative abuse were negative. Apparently, there is a family history of such events; he has had multiple previous episodes since childhood. The symptoms were aborted by potassium chloride.**
**Which of the following types of mutation is most likely to be responsible?**

A. Mutation in a muscle voltage-gated chloride channel
B. Mutation in a muscle voltage-gated potassium channel
C. Mutation in a renal potassium channel
D. Mutation in a renal chloride channel
E. Mutation in a muscle voltage-gated calcium channel

**The correct answer is E**

The diagnosis here is hypokalaemic periodic paralysis, which is related to muscle calcium-channel mutation

{CACLN1A3). There are two types based on the causative gene, CACNA1 (calcium channel) and SCN4A (a-subunit of the sodium channel).

**36. A 22-year-old woman presented with abdominal pain, nausea and vomiting of 24 h duration. She had no past medical history. On examination, her blood pressure was 108/72mmHg, heart rate was 88bpm, and she was afebrile.**

| Investigation | Result | | Normal Value |
|---|---|---|---|
| Arterial blood gases, breathing air | PO2 | 11.7 kPa | 135-175 g/l |
| | PCO2 | 4.2 kPa | 3.5-5.0 mmol/l |
| | PH | 7.30 | 2.5-6.5 mmol/l |
| | HCO3- | 11.7 kPa | 50-120 µmol/l |
| Anion gap | 16 mmol/l | | 12-16 mmol/L |

**What is the likely cause for the patient's sy1mptoms and blood gas results?**

A. Addison's disease

B. Conn's syndrome

C. Cushing's syndrome

D. Diabetic ketoacidosis

E. Persistent vomiting

**The correct answer is A**

This patient is a young woman with abdominal pain, nausea and vomiting, with a low-normal blood pressure. She has a mild metabolic acidosis with a normal anion gap.

This would be a typical presentation of Addison's disease; it causes a metabolic acidosis due to the increased excretion of sodium and increased retention of hydrogen secondary to the relative lack of aldosterone.

This is more likely than diabetic ketoacidosis (the only other option in the list to cause these symptoms with a metabolic acidosis) because DIKA would cause a metabolic acidosis with a raised anion gap.

**37. A 19-year-old woman comes to the clinic for review. She complains of problems with facial and upper chest hair and severe acne. She only has a menstrual period approximately every 3-4 months and when these do occur they are heavv1. She takes no regular medications and does not currently have a sexual partner.**

**On examination her BP is 152/90 mmHg, pulse is 78/min and regular. Respiratory examination is unremarkable. Her abdomen is soft and non-tender, BMI is elevated at 31. She has facial hair, hair over her upper body, and acne affecting her face and upper chest.**

| Investigation | Result | Normal Value |
|---|---|---|
| Hb | 132 g/l | 115-155 g/l |
| WCC | 8.1 X $10^9$/l | 4-11 X $10^9$/L |
| Platelets | 201 X $10^9$/l | 150-400 x $10^9$/l |
| Na+ | 138 mmol/l | 135-145 mmol/l |
| K+ | 4.3 mmol/l | 3.5-5.0 mmol/l |
| Creatinine | 95 µmol/l | 50-120 µmol/l |
| Glucose | 6.5 mmol/l | 3.5-5.5 mmol/l* |
| LIH:FSH ratio | 2.2 | |
| Testosterone | 5.1 nmol/l | |
| Her main complaint is of hirsutism and acne. | | |

**Which of the following is the most appropriate initial intervention?**

A. Clomifene
B. Combined OCP
C. Co-cyprindiol (cyproterone acetate and ethinylestradiol)
D. Metformin
E. Pioglitazone.

**The correct answer is C**

The diagnosis here is polycystic ovarian syndrome (PCOS). Co-cyprindiol (cyproterone acetate and ethinylestradiol; brand name Dianette) blocks androgen receptors (via the cyproterone component), and reduces androgen production via negative feedback because of the presence of ethinylestradiol.

It is particularly effective in reducing androgenic acne and is therefore the Logical choice here. Weight loss is extremely important in the management of PCOS and the patient should also be encouraged to follow intensive life style and diet intervention.

**38. An 18-year-old student is admitted to the Emergency Department having fainted for the third time in the past six months while at work. She tells you that she always feels tired. and often suffers from muscle cramps.**
**There is no history of significant past medical illness, and she takes no regular medication. On examination her**
**BP is 110/70 mmHg, pulse is 67 beats/min and regular. Her chest is clear, abdomen is soft and non-tender and her body mass index (BMII) is 22.**
**Investigations:**

| Investigation | Result | Normal Value |
|---|---|---|
| Hb | 124 g/l | 115-155 g/l |
| WCC | 7.0 X $10^9$/l | 4-11 X $10^9$/l |
| Platelets | 201 X $10^9$/l | 150-400 x $10^9$/l |
| Sodium {Na+) | 139 mmo,1/l | 135-145 mmol/l |
| Potassium (K+) | 3.1 mmol/l | 3.5-5.0 mmol/l |
| Bicarbonate (HCO3 ) | 33 mmol/l | 24-30 mmol/l |
| Creatinine | 80 µmol/l | 50-120 µmol/l |
| Urinary calcium | reduced | |

**Which of the following is the most likely diagnosis?**

A. Bartter syndrome
B. Conn syndrome
C. Gitelman syndrome
D. Licorice poisoning
E. Liddle syndrome

**The correct answer is C**

Gitelman syndrome is characterised by hypokalaemic metabolic alkalosis in the presence of normal blood pressure.

It is differentiated from Bartter syndrome by Low calcium excretion, and is due to abnormal functioning of the thiazide sensitive sodium chloride co-transporter.

**39. A 34-year-old woman presents with a 4-month history of anorexia and weight loss, excess pigmentation and dizziness on standing. She has a previous history of autoimmune hypothyroidism that is managed with thyroxine. Examination reveals postural hypotension and skin discoloration. Initial investigations reveal hyponatremia {Na 119 (135-145 mEq/l) and hyperkalemia (K 5.5 (3.6-5.2).**
**Which of the following tests will be most useful to confirm the diagnosis?**

A. Erythrocyte sedimentation rate (ESR)
B. Thyroid function tests
C. Serum urea
D. Short Synacthen ® test
E. Serum calcium

**The correct answer is D**

This woman has multiple signs and symptoms and abnormal biochemistry associated with adrenal failure.

**40. A 55-year-old-w·oman presents w·ith the clinical features of Cushing syndrome. She is on no medication. The results of routine biochemical investigations are normal. Her 0900-hours cortisol concentration is 800 nmol/l {normal 150-650) and ACTH 80 ng/ml {normal <50). Following a high dose dexamethasone the previous evening, a repeat 0900-hours cortisol concentration is 3B0 nmol/l.**
**Which of the following is the most likely diagnosis?**

A. Adrenal adenoma
B. Adrenal carcinoma
C. Cushing's disease
D. Depression
E. Ectopic ACTH secretion

**The correct answer is C**

In Cushing's syndrome secondary to an adrenal tumor. it would be expected that the high cortisol concentration would suppress the secretion of adrenocorticotrophic hormone (ACTH).

Given that ACTH is elevated. this makes Cushing's disease (due to a pituitary adenoma) the most likely diagnosis. This is usually suppressed by high dose exogenous glucocorticoids as evidenced in the stem.

**41. A 22-year-old man presents with episodes of headaches, tremor and sweating which can last for a considerable period of time. He has a history of epilepsy since childhood. for which he takes two different anti- epileptics. On examination his pulse is 135 bpm and his blood pressure is 160/110 mmHg. He has a Large port-wine naevus on one side of his face.**
**What is the most probable diagnosis?**

A. van Recklinghausen's disease
B. van Hippel-Lindau disease
C. Sturge-Weber syndrome
D. Ataxia telangiectasia
E. Hereditary hemorrhagic telangiectasia

**The correct answer is C**

Sturge-Weber syndrome is associated with an extensive port-wine naevus on one side of the face (usually in the distribution of a division of the Vth cranial nerve).

Phaeochromocytoma is associated with Sturge-Weber, although with a lower associated risk compared to other conditions Like multiple endocrine neoplasia type 2A syndrome {MEN 2A).

**42. A 56-year-old Lifelong smoker presents to his GP with a history of cough. breathlessness and weight loss. A chest X-ray is abnormal, with a mass at the right hilum.**
**Which of the following results is most likely to suggest the tumor is a small-cell lung tumor?**

A. Serum calcium of 3.3 mmol/l
B. Serum sodium of 123 mmol/l
C. Serum potassium of 5.5 mmol/l
D. Plasma osmolality of 335 mOsm/kg
E. Urine osmolality of 80 mOsm/kg

**The correct answer is B**

Paraneoplastic syndrome in small cell Lung cancer can secrete a number of hormones. including antidiuretic hormone (ADH, vasopressin) and adrenocorticotrophic hormone {ACTH).

Excess ADH causes SIADH syndrome of inappropriate ADH secretion). SIADH is characterised by hyponatremia.

Low plasma osmolality {normal range is 275-295 mOsm/kg) inappropriately high urinary osmolality (>100 mOsm/kg), high urinary sodium (> 30 mmol/L) in the face of clinical euvolemia.

**43. A 62-year-old man is brought to the Emergency Department with a grand mal seizure along with two days of fatigue and drowsiness. He recently underwent chemotherapy for small-cell carcinoma of the bronchus a few months ago.**
**On examination. he is alert with stimulation.**
**Neurological examination reveals no focal signs. Bloods on admission showed:**

| Investigation | Result | Normal Value |
|---|---|---|
| Na+ | 120 mmol/l | 135-145 mmol/ |
| K+ | 4.0 mmol/l | 3.5-5.0 mmol/l |
| Creatinine | 100 µmol/l | 50-120 µmol/l |
| Urea | 3.5 mmol/l | 2.5-6.5 mmol/l |
| Hb | 111 g/l | 135- 175 g/l |
| WCC | 4.5 X $10^9$/l | 4-11 X $10^9$/l |
| Platelets | 230 x $10^9$/l | 150-400$10^9$/L |

**Syndrome of inappropriate antidiuretic hormone secretion (SIADH) is diagnosed and, therefore. restrict their fluid intake. His sodium falls further to 119 mmol/l the following day. His drowsiness has increased. A computerized tomography (CT) head is arranged.**

**Which of the following represents the most appropriate management for him?**

A. Continue fluid restriction.
B. Start dexamethasone.
C. Give normal saline 0.9%.
D. Give demeclocycline.
E. Give hypertonic saline (3%).

**The correct answer is E**

The European guidelines for the management of severe symptomatic hyponatremia recommend the use of intravenous hypertonic saline (3'%) as an initial bolus of 300 ml with repeat serum sodium measurement every 20 minutes, ideally in a critical care unit with very close observation.

Intravenous bolusing of hypertonic saline should be continued at 20-minute intervals at a rate of 150 ml over 20 minutes until an increase of 5 mmol/l of serum sodium is achieved.

The serum sodium should not be increased faster than of 10 mmol/l during the first 24-hours and an additional 8-mmol/l during every 24-hours thereafter until the serum sodium concentration reaches 130 mmol/l.

**44. A 28-year-old man presents with hypertension that his GP is finding difficult to manage. There are a number of metabolic abnormalities found on investigation, and he is concerned about the possibility of Conn syndrome. The blood picture is one of metabolic acidosis, hyperkalemia and low renin and high aldosterone Levels.**

**What diagnosis fits with this clinical picture?**

A. Gordon syndrome

B. Bartter syndrome

C. Addison's disease

D. Conn syndrome

E. Gitelman syndrome

**The correct answer is A**

Also known as pseudo hypoaldosteronism. this is a condition that mimics hypoaldosteronism. The condition is due to a failure of response to aldosterone. and Levels of aldosterone are actually elevated due to a Lack of feedback inhibition.

This syndrome is characterised by short stature, intellectual impairment, dental abnormalities, muscle weakness, severe hypertension by the third decade of life, low fractional excretion of sodium, normal renal function, hyperchloremic metabolic acidosis and low renin and elevated aldosterone levels.

Hyperkalemia, another hallmark of this syndrome. may be a function of diminished sodium delivery to the cortical collecting tubules.

**45. A 34-year-old man presents with tiredness. He works night shifts in a factory and suffers from both asthma, for which he takes inhaled fluticasone and allergic rhinitis, for which he takes an over-the-counter nasal spray.**
**On examination, his blood pressure is 130/80 mmHg and this drops to 95/60 mmHg on standing. His pulse also increases from 65 to 92 bpm on standing. Otherwise, physical examination is unremarkable.**

| Investigation | Result | Normal Value |
|---|---|---|
| Hb | 129 g/l | 135-175 g/l |
| WCC | 7.8 X 109/l | 4-11 x 109/l |
| Platelets | 210 x 109/L | 150-400 x 109/l |
| Na+ | 133 mmol/l | 135-145 mmo/l |
| K+ | 5.3 mmol/l | 3.5-5.0 mmol/l |
| Creatinine | 53 mmol/l | 50-120 µmol/l |
| 09.00 cortisol | 180 nmol/l | 140-500 nmol/l |
| Cortisol level 30 min into a Synacthen test | | 570 nmol/l |

**Which of the following is the most likely diagnosis?**

A. Iatrogenic Cushing
B. Primary adrenal failure
C. Normal adrenal function
D. Corticosteroid-related adrenal suppression
E. Syndrome of inappropriate antidiuretic hormone secretion (SIADH)

**The correct answer is D**

It is Likely that he is using an over-the-counter inhaled nasal corticosteroid preparation. as well as his inhaled corticosteroids for asthma.

The combination is likely to have Led to a degree of adrenal suppression as evidenced by postural hypotension, mild hyponatremia coupled with a low baseline cortisol which returns to the normal range after administration of Synacthen®.

The treatment of choice is cessation of the inhaled nasal steroids, coupled with a strategy to reduce his asthma therapy corticosteroids. for instance by adding in a long- acting fs2-agonist and then stepping.

**46. A 45-year-old woman presents with significant weight gain of 4 stone over the past 18 months. She also has difficulty con rolling hypertension on 3 agents. Type 2 diabetes currently managed with Metformin. and problems with hirsutism and acne. ·On examination her BP is 155/90 mmHg, pulse is 75 bpm and regular. She has frontal male pattern hair loss, a beard line and acne. Her BMI is 35, and there are abdominal striae. Investigations reveal:**

| Investigation | Result | Normal Value |
|---|---|---|
| Hb | 131 g/L | 115-155 g/l |
| WCC | 7.4 X 109/l | 4-11 x 109/l |
| Platelets | 199 X 109/L | 150-400 x 109/l |
| Na+ | 141 mmol/U | 135-145 mmol/l |
| K+ | 3.5 mmol/l | 3.5-5.0 mmol/l |
| Bicarbonate | 29 mmol/l | 24-30 mmol/l |
| Creatinine | 110 µmol/l | 50-120 µmol/l |
| Glucose | 9.9 mmol/l | 3.5-5.5 mmol/l |

**Which of the following is the most useful next test?**

A. 24hr urinary free cortisol

B. High dose dexamethasone suppression test

C. LH/FSH ratio

D. Pituitary MRI

E. Transvaginal ultrasound scan

**The correct answer is A**

Urinary free cortisol is non-invasive and convenient, and therefore represents an ideal initial screening test for Cushing's syndrome.

Cushing's can be reliably diagnosed if 2 or more out of three collections of urine confirm that urinary cortisol excretion is greater than three times the upper limit of normal.

An alternative where patients find it difficult to comply with urine collection is the overnight low dose dexamethasone suppression test, in which Cushing1s is excluded by plasma cortisol< 60 nmol/l.

Virilization isn't invariably associated with Cushing's syndrome, and its presence is more likely to imply a malignant adrenal adenoma.

**47. An 18-year-old woman of Eastern European Jewish descent comes to the GP complaining of primary amenorrhoea. On examination she looks a little hirsute and has evidence of facial acne. She is within her predicted adult height range and has normal breast and external genitalia development, although there is excess hair over her lower abdomen and around her nipple area.**

| Investigation | Result | Normal Value |
|---|---|---|
| Hb | 131 g/L | 115-155 g/l |
| WCC | 8.6 X $10^9$/l | 4-11 x $10^9$/l |
| Platelets | 201 X $10^9$/L | 150-400 x $10^9$/l |
| Na+ | 139 mmol/l | 135-145 mmol/l |
| K+ | 4.5 mmol/l | 3.5-5.0 mmol/l |
| Creatinine | 110 µmol/l | 50-120 µmol/l |

**17-0H-progesterone is 1.4 times the upper limit of normal. Normal bilateral ovaries and uterus were visualized on pelvic ultrasound.**

**Which of the following is the most Unlikely diagnosis?**

A. Polycystic ovarian syndrome

B. Classic congenital adrenal hyperplasia

C. Non-classic congenital adrenal hyperplasia

D. Turner syndrome

E. Testicular feminization

**The correct answer is C**

Non-classical congenital adrenal hyperplasia is a cause of hyperandrogenism in up to 1 in 1000 females, particularly those of Hispanic, Yugoslavian or Eastern European Jewish descent.

The clinical picture can be confusing because patients might complain of no other symptoms apart from primary amenorrhoea.

Management involves glucocorticoid supplementation in juveniles.

**48. A 35-year-old man presents to the Emergency Department with palpitations. On further questioning he admits to progressively worsening headaches over the past 6-8 months, for which his GP has arranged an ultrasound and a urine test, the results of which he is awaiting. On examination he has a BP of 195/110 mmHg and a pulse of 140 beats per min. This reverts spontaneously while he is in the department.**
**Investigations reveal:**

| Investigation | Result | Normal Value |
|---|---|---|
| Hb | 131 g/l | 135-175 g/L |
| WCC) | 5.3 x $10^9$/L | 4-11 x $10^9$/L |
| Platelets | 202 X $10^9$/l | 150-400 x $10^9$/L |
| Na+ | 138 mmol/l | 135-145 mmol/l |
| K+ | 4.3 mmol/l | 3.5-5.0 mmol/l |
| Creatinine | 110 µmol/l | 50-120 µmol/l |
| Ultrasound | Left adrenal mass | |
| 12-Lead ECG during tachycardia | narrow complex tachycardia | |
| Urinary catecholamines | Raised | |

**How would you best manage him initially with respect to his phaeochromocytoma and episodes of supraventricular tachycardia (SVT)?**

A. Metoprolol.
B. Phenoxybenzamine.
C. Digoxin.
D. Amiodarone.
E. Verapamil.

**The correct answer is B**

The pharmacological options for treatment of this man's SVT are severely limited until he is adequately alpha blocked with phenoxybenzamine.

As such, phenoxybenzamine is the initial management of choice, with titration if possible to maximal dose.

It is likely once sympathetic outflow is reduced that episodes of SVT may well disappear anyway.

**49. A 26-year-old woman presents with increased hair growth on her arms. Legs and body. She describes a six- month history of weight gain, particularly in the abdominal region, and she has noted purple striae on her abdomen. Her menstrual pattern is normal. with a cycle every 30 days. There is no family history of type 2 diabetes and no one else in her family has suffered from hirsutism. Clinically there is no evidence of acanthosis nigricans, her BIMI is 29 and there is evidence of coarse black hair growth on her arms, legs, chin and upper lip. Pigmented purple striae are evident on her abdomen. and there is no evidence of virilization on examination of the female external genitalia. Which single investigation is most likely to establish the diagnosis?**

A. Serum adrenal androgen level
B. Serum oestrogen level
C. Karyotype
D. Serum prolactin level
E. Two 24 h urinary cortisol levels

**The correct answer is E**

Cushing syndrome commonly presents with hirsutism due to co-secretion of the adrenal androgen DHEA.

The clinical description in this case of weight gain and pigmented striae is very suggestive of excess cortisol.

The Endocrine Society guidelines recommend an initial screening test for Cushing syndrome with one of the following: a 1 mg overnight dexamethasone suppression test, two midnight salivary cortisol levels or two 24 h urinary free cortisol Levels..

**50. Exposure to darkness is found to increase melatonin secretion. You are considering recommending it for use in a 17-year-old man with severe autism who is awake for much of the night.**
**What is the most common mechanism by which melatonin is naturally synthesized?**

A. Decreased activity of suprachiasmatic nuclei
B. Increased serotonin N-acetyltransferase
C. Decreased hydroxy indole- O-methyltransferase activity
D. Blockade of noradrenaline release from sympathetic nerve terminals
E. Increased intracellular cAMP in the hypothalamus

**The correct answer is B**

Melatonin is synthesized and secreted by the pineal gland from serotonin: N-acetyltransferase + acetyl-CoA converts serotonin to N-acetyl serotonin, which is then converted by hydroxy indole-O-methyltransferase to melatonin. Exposure to darkness causes activation of the hypothalamus by the retinohypothalamic nerves.

This results in increased noradrenaline secretion by the postganglionic sympathetic nerves (nervi conarii) that innervate the pineal gland. Noradrenaline acts via a-adrenergic receptors in the pineal gland to increase the intracellular levels of cAMP, which then causes an increase in N-acetyltransferase activity.

**51. A 23-year-old woman is admitted to the Emergency Department from her office {for the third time in the space of 2 months) after having suffered a syncopal attack. On questioning, she admits to having felt very tired over the past few months. having intermittent abdominal pain and being dizzy on a number of occasions.**

**On examination she looks slim and tanned, her blood pressure is 110/70 mmHg on lying, but drops o B5/65 mmHg on standing. Her K+ is 5.4 mmol (NR 3-5-5.2), FT4 is 9 (NIR 10-22) and TSH is 0.8 (NR 0.5-3.5).**

**Which diagnosis fits best with the clinical picture?**

A. Hypothyroidism
B. Primary adrenal failure
C. Psychiatric symptoms
D. Hypovolemia
E. HIV positivity

**The correct answer is B**

The combination of tanned skin, postural hypotension and hyperkalemia are all suggestive of adrenal failure, likely from Addison's disease.

The mildly Low FT4 is likely related to systemic unwellness, and should be re- evaluated when she is treated for her adrenal failure

**52. A 25-year-old woman presents with recurrent episodes of headaches and sweating. Her mother had renal calculi and died of a tumor in her neck. On examination, A nodule is felt in the patient's neck in the region of the thyroid gland. Routine bloods are unremarkable: histology reveals small round cells which stain positively or calcitonin. A surgeon advises complete thyroidectomy.**
**What is the most important investigation the surgeon must undertake prior to surgery?**

A. Serum thyroxine
B. Serum calcium
C. 24-h urine test for 5-hydroxyindoleacetic acid (5-HIAA)
D. 24-h urinary metanephrines and catecholamines
E. Serum calcitonin

**The correct answer is D**

This patient probably has medullary carcinoma of the thyroid, which may be associated with phaeochromocytoma and hyperparathyroidism as part of the multiple endocrine neoplasia type 2A syndrome

{MEN 2A). Phaeochromocytoma must be excluded before surgery. If present, the effect of catecholamines must

be blocked prior to surgery using high-dose phenoxybenzamine +/- additiona-l blockade according to blood pressure control

**53. A 42-year-old woman is referred to the clinic with very difficult-to-manage hypertension. She is currently taking indapamide, ramipril, amlodipine and doxazosin, but her blood pressure is still 155/95 mmHg.**

**On examination, she has a body mass index {IBIMI) of 25 kg/m2. Ophthalmoscopy reveals evidence of chronic changes consistent with hypertension.**

**Blood tests reveal:**

| Investigation | Result | Normal Value |
|---|---|---|
| Hb | 140 g/l | 115-155 g/L |
| WCC | 5.8 X 109/l | 4-11 x $10^9$/L |
| Platelets | 190 x 109/l | 150-400 x $10^9$/L |
| Na+ | 139 mmol/l | 135-145 mmol/l |
| K+ | 3.0 mmol/l | 3.5-5.0 mmol/l |
| Creatinine | 100 µmol/l | 50-120 µmol/l |

**The patient is very compliant with medication. The past medical history is significant for hypokalemia, which was picked up two years ago on routine screening and left ventricular hypertrophy on a recent echocardiogram. You suspect Conn syndrome. Which of the following would be the first-Une investigation of choice to investigate pri1mary hyperaldosteronis1m?**

A. Computed tomography of the abdomen

B. Saline suppression test

C. Aldosterone : renin ratio

D. Urinary catecholamines

E. 24-hour urinary cortisol

**The correct answer is C**

An elevated aldosterone in the presence of a suppressed renin confirms the diagnosis of hyperaldosteronism or Conn syndrome.

However, certain antihypertensives can affect the interpretation of the result and ideally the test should be done following a period off medication, although the test may still be useful if only some of the antihypertensive medications can be discontinued, such as blockers which suppress renin and ACE inhibitors which cause a falsely low aldosterone reading.

**54. A 16-year-old adolescent is seen in the Endocrinology Clinic because he feels he is failing to enter puberty like his peers. On examination. pubic hair growth is minimal; facial hair growth is absent, and the external genitalia are small. Both testes a re normal in size and located in the scrotum.**
**Which of the following hormones most drives the development of secondary sexual characteristics?**

A. Testosterone
B. Androstenedione
C. Di hydrotestosterone
D. Dehydroepiandrosterone (DHEA)
E. Androsterone

**The correct answer is C**

The hormone has a two- to threefold higher level of affinity for the androgen receptor. and a fivefold higher propensity to activate the androgen receptor, compared to testosterone.

ln adults, it has a primary role in driving the growth of hair associated with secondary sexual characteristics.

Dihydrotestosterone is also important in the development and maintenance of the prostate gland and seminal vesicles.

**55. A 26-year-old woman attends her GP complaining of feeling tired all the time for the last few months. She describes 4 kg of unintentional weight loss. Her mother has autoimmune hypothyroidism, and her maternal uncle has type 1 diabetes. She has had no periods for six months and has been feeling dizzy first thing in the morning.**
**Which of the following clinical signs would the GP be most L1ikely to find if the diagnosis was thought to be adrenal failure?**

A. Buccal ulceration
B. Diminished body hair
C. Pallor
D. Postural hypotension
E. Optic atrophy

**The correct answer is D**

Postural hypotension occurs in adrenal failure due to mineralocorticoid and glucocorticoid deficiency and volume contraction.

Patients with adrenal failure require treatment with both hydrocortisone and fludrocortisone.

**56. A 54-year-old pub owner is referred by his GP for endocrine assessment. He is obese. with a body mass index {BMI) of 32 kg/m2, and has hypertension, which is poorly controlled on atenolol and Bendroflumethiazide; a recent fasting blood glucose test was 9.2 mmol/l. On examination he is cushingoid and his BMI is 32 kg/m2. You order a 24-hour urine-free cortisol (UFC). which comes back slightly above normal range; an overnight dexamethasone suppression test is 30 nmol/l. {NR < 50).**

**Which diagnosis fits best with this clinical picture?**

A. Cushing's disease
B. Pseudo-Cushing syndrome
C. Simple obesity
D. Cushing's syndrome
E. Primary aldosteronism

**The correct answer is B**

Obese patients who consume alcohol to excess over a prolonged period can acquire a cushingoid appearance: in this case. this man's occupation as a publican suggests that he will have easy access to alcohol.

His two screening tests for Cushing's disease (the dexamethasone suppression test and the 24-hour urine-free cortisol) are effectively normal, which effectively rules this out.

**57. A 45-year-old man comes to the clinic. He is concerned because he has gained threes ones in weight over the past six months. He also has hypertension which 1s poorly controlled, despite a combination of lisinopril, indapamide and amlodipine, and has been told by his GP that he has pre-diabetes. On examination in the clinic his BP is 158/90 mmHg, with pulse 85/min and regular. He is obese with abdominal striae, and a BMI estimated at 36.**

| Investigation | Result | Normal Value |
|---|---|---|
| Hb | 135 g/L | 135-175 g/l |
| WCC | 7.2 X $10^9$/l | 4-11 X $10^9$/l |
| Platelets | 198 x $10^9$/L | 150-400 x $10^9$/l |
| Na+ | 137 mmol/l | 135-145 mmol/l |
| K+ | 3.2 mmol/l | 3.5-5.0 mmol/l |
| Creatinine | 110 µmol/l | 50-120 µmol/l |
| Glucose | 8.1 mmol/l | 3.5-5.5 mmol/l |

**Which of the following tests would you do next?**

A. Abdominal USS

B. Glucose tolerance test

C. 24hr urinary free cortisol

D. Pituitary MRI

E. Renin/ aldosterone ratio

**The correct answer is C**

24 h urinary free cortisol is one of the investigations used in the diagnosis of Cushing syndrome. Other initial investigations include late night salivary cortisol levels and dexamethasone suppression tests.

The most important diagnosis to exclude is Cushing syndrome, given the presence of obesity, hypertension, dysglycaemia and hypokalemia.

Random cortisols are not particularly useful in confirming the diagnosis, due to diurnal variation in cortisol production. 24 h urinary free cortisol can be followed by Low-dose dexamethasone suppression test and imaging.

Conn syndrome is Less likely than Cushing given the presence of other features of the latter. such as obesity and dysglycaemia.

**58. A 40-year-old man is receiving lithium for a bipolar disorder. He now complains of increased urinary frequency and nocturia. He has taken the medication for some 7 years. he also takes risperidone and has gained 7 kg in weight over the past year. Post water deprivation test his plasma osmolality has risen to 320 and urine osmolality is 280.**
**What is the most likely cause form his symptoms?**

A. Deficiency of vasopressin
B. Reduced creatinine clearance
C. Onset of thyrotoxicosis
D. Development of resistance to vasopressin
E. Excessive water intake

**The correct answer is D**

This patient's water deprivation test is consistent with a diagnosis of nephrogenic diabetes insipidus, which is recognized as a Long-term consequence of therapy.

Often only partial reversal occurs with withdrawal of lithium therapy

**59. A 47-year-old woman is admitted via the Emergency Department. She has been suffering from increasing headaches over the past few months and has a IBP of 200/110 mmHg on review. Her GP has noted raised BP previously and has been monitoring it. Her BMII is elevated at 27. Fundoscopy reveals AV nipping and silver wiring.**

**Investigations:**

| Investigation | Result | Normal Value |
|---|---|---|
| Hb | 119 g/L | 115-155 g/l |
| WCC | 75.4 X $10^9$/l | 4-11 X $10^9$/l |
| Platelets | 192 x $10^9$/L | 150-400 x $10^9$/l |
| Na+ | 138 mmol/l | 135-145 mmol/l |
| K+ | 3.1 mmol/l | 3.5-5.0 mmol/l |
| Creatinine | 162 µmol/l | 50-120 µmol/l |
| Urine | Protein ++ | |
| Fasting Glucose | 7.2 mmol/l | < 7 mmol/l |

**Which of the following is the most likely diagnosis given the findings?**

A. Tension headache.

B. Essential hypertension.

C. Benign intracranial hypertension.

D. Phaeochromocytoma.

E. Diabetic retinopathy.

**The correct answer is D**

We have evidence of end-organ damage, with both retinal changes and proteinuria. Additionally, the degree of hypertension, hypokalemia and evidence of raised blood glucose also point to the possibility of phaeochromocytoma.

Increased epinephrine concentrations in the plasma secreted by pheochromocytoma induce hypokalemia through stimulation of beta 2 receptors causing activation of sodium potassium-ATPase in skeletal muscles and subsequent intracellular shift of potassium.

**60. A 30-year-old schoolteacher is on a combined oral contraceptive pill containing 20 µg of ethinylestradiol. She asks about its possible side-effects.**
**Which of the following side-effects is 1most Likely to occur with this dose of oestrogen in a combined pill?**

A. Deep vein thrombosis
B. Nausea
C. Increased ischaemic CV events
D. Breakthrough bleeding
E. Migraine

**The correct answer is D**

Dysmenorrhea, menorrhagia and pre-menstrual syndrome are seen very commonly(> 1 in 10) in women prescribed the combined oral contraceptive pill.

Other abnormalities associated with menstruation are also commonly seen (1 in 10 to 1 in 100).

**61. A 52-year-old man is referred to the clinic with rapid weight gain. increased acne and a recent diagnosis of Type 2 diabetes. There is a past history of hypertension, the control of which has worsened over the past few months. ·On examination his BP is 155/95 mmHg, pulse is 78/min and regular. There is evidence of acne, his BMI is 34 and abdominal striate are visible.**
**You suspect Cushing's disease.**
**Which of the following electrolyte abnormalities would you expect to see?**

A. Hypochloraemic metabolic acidosis
B. Hyperchloraemic metabolic acidosis
C. Hypochloraemic metabolic alkalosis
D. Hyperchloraemic metabolic alkalosis
E. Respiratory alkalosis

**The correct answer is C**

Cushing's disease is associated with glucocorticoid excess, and this excess leads to potassium depletion and sodium and water retention, at the expense of increased excretion of chloride.

The result is a hypochloremic metabolic alkalosis.

**62. A 38-year-old woman presents to her GP complaining of palpitations, sweating and weight loss of around 4 kg over the past six months. There is a family history of thyroid disease. On examination, she has a blood pressure of 145/85 mmHg and a pulse of 92 bpm.**
**Blood tests show:**

| Investigation | Result | Normal Value |
|---|---|---|
| TSH | < 0.05 µU/l | 0.17-3.2 µU/l |
| Free T 4 | 39 pmol/l | 11-22 pmol/l |
| Haemog1lobin | 134 g/l | 115-155 g/l |
| WCC | 5.6 X $10^9$/l | 4-11 X $10^9$/l |
| Platelets | 223 X $10^9$/l | 150-400 x $10^9$/l |
| Na+ | 140 mmol/l | 135-145 mmol/l |
| K+ | 4.0 mmol/l | 3.5-5.0 mmol/l |
| Creatinine | 100 µmol/l | 50-120 µmol/l |

**You suspect that she has thyrotoxicosis.**
**Which of the following fits best with the action/effects of excess thyroxine?**

A. Decreased oestrogenisation
B. Decreases myocardial oxygen demand
C. Increased prolactin release
D. Decreased heart rate
E. Leads to increased bone mass

**The correct answer is A**

Excess thyroxine can Lead to a cessation of menses (amenorrhoea), and as such is associated with decreased oestrogenisation and increased risk of osteoporosis.

**63. A 17-year-old girl is referred to the endocrine clinic with primary amenorrhoea. On clinical examination she has a BMI of 21 kg/m2, moderate hirsut1sm and clitoromegaly.**
**Blood tests reveal:**

| Investigation | Result | Normal Value |
|---|---|---|
| LH | 12 IU/l | 1-10 IU/l |
| FSH | 4 IU/l | 1 - 8 IU/l |
| Oestradiol | 400 pmol | > 200 pmol |
| Testosterone | 2 nmol/l | 0.2-1.0 nmoUL |

**A male cousin was seen in the clinic at the age of B years with precocious puberty. Which blood marker is most likely to be abnormal in this girl?**

A. Sodium
B. 17-hydroxyprogesterone
C. Potassium
D. Cortisol
E. Human chorionic gonadotropin

**The correct answer is B**

The Likely underlying diagnosis for this girl is non-classic congenital adrenal hyperplasia {CAH), because of her amenorrhoea, clinical hyperandrogenism, clitoromegaly and family history.

The accumulation of excess precursor hormones and, as such, the distinguishing characteristic of 21-hydroxylase deficiency is a high serum concentration of 17-hvdroxvprogesterone (usually > 1000 ng/dl).

**64. A 50-year-old man who is treated with metformin for his diabetes presents with malaise and loss of libido. He takes regular non-steroidal anti-inflammatories for osteoarthritis of both knees. He is tanned with multiple spider naevi across the upper chest and one finger breadth hepatomegaly.**

**Blood tests show:**

| Investigation | Result | Normal Value |
|---|---|---|
| Hb | 141 g/l | 135-175 g/L |
| Fasting glucose | 8 mmol/l | < 7 mmol/l |
| Serum iron | 45 µmol/l | 14-29 µmol/l |
| Serum ferritin | 420 000 µg/ | 20-250 µg/LI |

**What would be the most appropriate treat1ment for his Loss of libido?**

A. Testosterone replacement

B. Desferroxamine

C. Sildenafil

D. Insulin therapy

E. Liver transplant

**The correct answer is A**

This patient, with signs of liver disease, diabetes and joint pain most probably has a diagnosis of hereditary haemochromatosis. Iron overload causes endocrine dysfunction, particularly on the pituitary axis.

Hypogonadotropic hypogonadism is a classical complication of the condition.

Although venesection is the treatment of choice for hereditary haemochromatosis, this will not correct testicular atrophy or hypopituitarism, either or both of which can contribute to a Loss of libido. Testosterone replacement is often helpful in these patients.

**65. A 35-year-old woman with a strong family history of breast cancer visits you because she is keen to start on tamoxifen to reduce her risk of getting breast cancer.**
**Which of the following state1ments best describes the mode of action of tamoxifen?**

A. It is a progesterone-receptor agonist
B. It is a progesterone-receptor antagonist
C. It is an oestrogen-receptor agonist
D. It is an oestrogen-receptor antagonist
E. It is a mixed oestrogen-receptor antagonist and partial agonist.

**The correct answer is E**

While tamoxifen is commonly known as an anti-oestrogen, this is not an accurate description of its clinical activity.

In actual fact, tamoxifen has both oestrogenic and anti-estrogenic properties depending on the target tissue.

**66. An 18-year-old man comes to the Endocrine Clinic. He complains that his weight has increased very significantly over the last six months. He works hard as a computer operator and has a sedentary job but tells you that he at least tries to get out for a walk most Lunchtimes. He also describes recent difficulty rising up from his chair.**

**On examination, his blood pressure is 142/84 mmHg, his pulse is 75 bpm and regular and his body mass index {BMI) is 2B kg/m 2. He has abdominal striae.**

**Investigations show:**

| Investigation | Result | Normal Value |
|---|---|---|
| Hb | 128 g/l | 135-175 g/l |
| WCC | 6.1 X $10^9$/L | 4-11 X $10^9$/l |
| Platelets | 217 X $10^9$/l | 150-400 x $10^9$/l |
| Na+ | 141 mmol/U | 135-145 mmol/l |
| K+ | 3.2 mmol/l | 3.5-5.0 mmol/l |
| Creatinine | 110 µmol/L | 50-120 µmol/l |

**Given the suspected diagnosis, which of the following is the most appropriate next investigation?**

A. Aldosterone levels

B. Insulin tolerance test

C. Short Synacthen® test

D. High-dose dexamethasone suppression test

E. 2 x 24 h urinary free cortisol

**The correct answer is E**

The diagnosis to be excluded here is Cushing syndrome. An ideal initial test is 2 x 24 h urinary free cortisol because it can be done as an outpatient and is non-invasive.

The false-positive rate for the test is 1% and the false-negative rate is 5-10%. Because the false-negative rate approaches 10°;b, however. it is never used alone as a screening test for Cushing syndrome and should be followed by an overnight dexamethasone suppression test if clinical suspicion is high.

If both of these tests are normal, then Cushing syndrome can effectively be ruled out. Midnight salivary cortisol levels might be an additional useful test in some cases, to demonstrate the Loss of circadian rhythm of cortisol secretion.

**67. A 19-year-old female gymnast presents with complaints of headache and fatigue. She has had no significant previous medical history but has been amenorrhoeic for the past four months. She tens you that her menstrual cycle began aged 15 and was regular up until he past six months when she started more competitive gymnastic training.**
**On examination, her blood pressure is 110/70 mmHg and her pulse is 55 bpm. Her body mass index {BMI) is 16 kg/m2.**
**Investigations:**

| Investigation | Result | Normal Value |
|---|---|---|
| Hb | 115 g/l | 115 -155 g/l |
| WCC | 5.2 X $10^9$/L | 4-11 X $10^9$/l |
| Platelets | 156 x $10^9$/l | 150-400 x $10^9$/l |
| Na+ | 140 mmol/L | 135-145 mmol/l |
| K+ | 4.0 mmol/l | 3.5-5.0 mmol/l |
| Creatinine | 72 µmol/l | 50-120 µmol/l |

**The GP requests you to assess her hormone Levels.**
**Which of the following hormones do you most expect to be elevated?**

A. Cortisol
B. Oestrogen
C. Luteinizing hormone
D. Prolactin
E. Thyroid hormones

**The correct answer is A**

In weight restricted adults, cortisol levels are often high due to a permanent state of physical stress on the body related to starvation or catabolic state. In certain circumstances, cortisol may even fail to suppress on low dose overnight dexamethasone suppression test.

**68. A 28-year-old man presents to the Emergency Department with sudden Loss of vision in his right eye. His only past history of note is a previous cerebellar hemorrhage. On examination he has evidence of bilateral retinal angiomas, and a partial renal detachment in his right eye.**
**What is the most likely diagnosis?**

A. Simple traumatic retinal detachment
B. Clotting disorder
C. Bleeding due to hypertension
D. von Hippel-Lindau disease
E. McCune-Albright syndrome

**The correct answer is D**

**69. A 39-year-old woman is referred to the hypertension clinic for advice. She is a non-smoker who drinks no alcohol and exercises regularly at the gym. She is currently taking atenolol 100 mg, bendroflumethiazide 2.5 mg and ramipril 10 mg, and her blood pressure is measured at 165/105 mmHg. Her examination is otherwise unremarkable.**

| Investigation | Result | Normal Value |
|---|---|---|
| Body Mass Index (BMI) | 23 kg/m$^2$ | |
| Potassium (K+) | 3.0 mmol/l | 3.5 - 5.0 mmol/l |
| Serum bicarbonate concentration | 30 mmol/l | 24-30 mmol |
| Creatinine | 85 µmol/l | 50-120 µmol/l |
| Fasting glucose | 5.1 mmol/l | < 7 mmol/l/ |

**What is the screening test for the most likely underlying diagnosis in this case?**

A. Overnight dexamethasone suppression test

B. Ratio of aldosterone to plasma renin activity after holding medication

C. Renal magnetic resonance angiography

D. Urinary vanillylmandelic acid

E. Urinary catecholamines

**The correct answer is B**

The most likely diagnosis is Conn syndrome, which is the most common cause of secondary hypertension and causes an elevated ratio of aldosterone to plasma renin activity.

In addition, there is evidence of hypokalaemic metabolic alkalosis, and the woman does not appear cushingoid or acromegalic on examination.

Conn syndrome occurs in 5-15% of patients with hypertension and may occur in an even greater percentage of patients with treatment-resistant hypertension, which may be underdiagnosed.

Bilateral idiopathic adrenal hyperplasia is the most common cause. followed by adenoma.

**70. A 27-year-old woman who has suffered from type 1 diabetes for 23 years and more recently from coeliac disease comes to the clinic for review. She has had problems over the past few months with increasing redness and lethargy and has fainted at work. She is off her food due to increasing problems with nausea.**

**Only medication of note includes ramipril 5mg daily which she takes for microalbuminuria. On examination her BP is 100/70 mmHg, there are no other significant findings.**

| Investigation | Result | Normal Value |
|---|---|---|
| Hb | 110 g/l | 115 -155 g/l |
| WCC | 6.0 X $10^9$/l | 4-11 X $10^9$/l |
| Platelets | 171 x $10^9$/l | 150-400 x $10^9$/l |
| Na+ | 130 mmol/l | 135-145 mmol/l |
| K+ | 5.2 mmol/l | 3.5-5.0 mmol/l |
| Creatinine | 120 µmol/l | 50-120 µmol/l |
| HbA1c | 39.89 | <53 mmol/mol (<7.0%) |
| TSH | 7.2 µU/l | 0.17-3.2 µU/l |

**Which of the following is the optimal step in her management?**

A. Start thyroxine 50mcg.

B. Stop her ramipril.

C. Arrange a short Synacthen test.

D. Check her T3/T 4.

E. Reassure her that everything is ok.

**The correct answer is C**

This patient has adrenal insufficiency. There are a number of clues that point towards a diagnosis of adrenal insufficiency here, with the tiredness and Lethargy, hypotension, hyponatremia and hyperkalemia, and surprisingly good diabetes control for a person with 20 years+ diabetes.

Random cortisol levels should be taken in the acutely unwell patient in whom adrenal insufficiency is suspected immediately before emergency treatment commences. In the subacute patient, a Synacthen test should be performed before treatment starts.

**71. A 45-year-old woman is referred to the Endocrine Clinic complaining of a lump in the neck, which becomes particularly prominent when she swallows. On examination, there is a thyroid nodule at the base of the neck. Genetic screening of two other family members who had medullary thyroid carcinoma has revealed the RET proto-oncogene.**
**Which other endocrine condition will this patient require screening for if she is confirmed to have a mutation in the RET proto-oncogene?**

A. Hypoparathyroidism
B. Pancreatic neuroendocrine tumours
C. Pituitary adenomas
D. Phaeochromocytoma
E. Type 1 diabetes

**The correct answer is D**

The RET proto-oncogene encodes for a receptor tyrosine kinase. RET is associated with familial cases of medullary thyroid carcinoma and type 2 multiple endocrine neoplasia (MEN 2) syndrome.

MEN 2 syndrome is characterised by a predisposition to the development of medullary thyroid cancer. bilateral phaeochromocytoma and primary hyperparathyroidism.

Patients will require Lifelong follow-up and surveillance and management of these conditions, which can occur at any time over the Lifetime of the patient with this hereditary condition.

**72. A 26-year-old man is referred to the clinic for management of hypertension. His GP has measured successive very high blood pressures, the latest of which is 178/98 mmHg. On examination you notice a number of cafe au Lait spots and pedunculated lesions suggestive of neurofibromatosis.**
**Investigations:**

| Investigation | Result | Normal Value |
|---|---|---|
| Hb | 129 g/l | 135 -175 g/l |
| WCC | 9.1 X $10^9$/L | 4-11 X $10^9$/l |
| Platelets | 210 x $10^9$/l | 150-400 x $10^9$/l |
| Na+ | 137 mmol/L | 135-145 mmol/l |
| K+ | 4.2 mmol/l | 3.5-5.0 mmol/l |
| Creatinine | 105 µmol/L | 50-120 µmol/l |

**You suspect he may have a phaeochromocytoma. Which of the following is the initial investigation of choice?**

A. 24hr urinary catecholamines
B. CT abdomen
C. MIBG scan
D. Ultrasound abdomen
E. Selective venous sampling

**The correct answer is A**

Urine testing for catecholamines has both a high sensitivity and specificity for phaeochromocytoma, but it does not however localize the tumor.

It is the first investigation of choice both because it is noninvasive and because it reduces the chance of imaging detecting a lesion which may turn out to be an incidentaloma.

**73. A 35-year-old HIV-positive man is evaluated for weight loss and weakness and has been found to have disseminated tuberculosis. On examination he is hypotensive and has hyperpigmentation of the mucosa. elbows and skin creases. Which one of the following is likely to be found in this condition?**

A. Increased serum sodium

B. Increased serum chloride

C. Increased serum bicarbonate

D. Increased serum potassium

E. Decreased serum calcium

**The correct answer is D**

Hyperkalemia is caused by a combination of aldosterone deficiency. impaired glomerular filtration (due to hypotension) and acidosis. The most common endocrine gland affected in tuberculosis is the adrenal gland.

Tuberculosis causes adrenal insufficiency leading to hyperkalemia. Hyperpigmentation is associated with excessive adrenocorticotropic hormone (ACTH) production because melanin stimulating hormone is a by- product of ACTH synthesis by proopiomelanocortin (POMC) all of which is a result of negative feedback due to hypocortisolism.

**74. 55-year-old woman has a 6-month history of weight gain. She is otherwise well and takes no medication.**
**On examination her body mass index (BMI) is 28 kg/m 2• her blood pressure is 170/100 mmHg and she has a round, red face and slight atrophy of her arm muscles. Renal function tests and urinalysis are normal.**
**What is the next step in obtaining the diagnosis?**

A. A low-dose overnight dexamethasone suppression test
B. Urinary catecholamine collection
C. Urinary 5-hydroxyindoleacetic acid (5-HIAA) collection
D. Abdominal ultrasound
E. CT of the abdomen

**The correct answer is A**

This patient presents with clinical features suggestive of cortisol excess or Cushing syndrome. including a six- month history of weight gain, hypertension (170/100 mm Hg), proximal myopathy as suggested by atrophy of her arm muscles, facial plethora and a rounded face.

Other sensitive clinical features include hypokalemia due to the mineralocorticoid action associated with excess cortisol levels, pigmented abdominal striae and easy bruising.

Importantly the history notes that she is not taking any medications such as exogenous steroids that might have accounted for these clinical features.

If there is a clinical suspicion of Cushing syndrome, the Endocrine Society guidelines recommend an initial screening test using either a 1 mg overnight dexamethasone suppression test or two measurements of either late night salivary cortisol or 24 h urinary free cortisol.

A low-dose dexamethasone suppression test involves the administration of 1 mg of dexamethasone at midnight and a 9 am cortisol measurement the following day.

Exogenous dexamethasone should suppress the endogenous production of cortisol from the adrenal cortex. and a cut-off of <50 nmol/l is the gold standard for a normal test. In the setting of autonomous or excess cortisol secretion, exogenous dexamethasone will fail to suppress cortisol to <50 nmol/l, indicating a positive test.

**75. A 26-year-old woman, who is 20 weeks' pregnant with her first child, presents to the Emergency Department with an episode of severe hypoglycemia whilst shopping in the Local supermarket. This is the third episode over the past two weeks, and she admits to increased nausea and difficulty maintaining her we1ghtt Her type 1 diabetes has previously been well controlled using an insulin pump, and a most recent HbA1c was 45 mmol/mol (6.3%). On examination in the Emergency Department her BP is 110/60 mmHg, with pulse 95/min and regular. Her glucose is 9.1 mmol/dl after 10% dextrose administered by the ambulance crew.**

| Investigation | Result | Normal Value |
|---|---|---|
| Hb | 124 g/L | 135 -175 g/l |
| MCV | 104 fl | 76-98 fl |
| WCC | 8.3 X $10^9$/l | 4-11 X $10^9$/l |
| Platelets | 187 x $10^9$/L | 150-400 x $10^9$/l |
| Na+ | 132 mmol/l | 135-145 mmol/l |
| K+ | 5.5 mmol/l | 3.5-5.0 mmol/l |
| Creatinine | 104 µmol/L | 50-120 µmol/l |

**Which of the following is the most likely cause of her worsening glucose control?**

A. Adrenal insufficiency

B. Coeliac disease

C. Increased fetal insulin production

D. Increased insulin resistance

E. Folate deficiency

**The correct answer is A**

With her auto-immune history and Low sodium with high potassium, Addison's disease should certainly be considered. Adrenal insufficiency is associated with episodes of hypoglycemia; the sodium below the lower limit of normal, and the potassium at the upper end of the normal range, support the diagnosis as does the nausea over the past two weeks.

Onset of Addison's in pregnancy is relatively rare, although incidence is of course increased in patients with a background of other autoimmune pathology such as type 1 diabetes.

The raised MCV may represent concurrent 1812/folate deficiency, and raises the possibility of occult coeliac disease in addition.

**76. An 18-year-old man with meningococcal septicemia treated with high-dose ceftriaxone develops gangrene in four toes, which necessitates amputation. Post-operatively, he complains of flank pain and is now becoming drowsy and Lethargic. His blood pressure is 90/45 mmHg and his peripheries are cool Plasma creatinine is 96 µmol/l. urea is 9.6 mmol/l, K+ is 6.7 mmol/l, Na+ is 119 mmol/Land bicarbonate is 17 mmol/l; spot urine Na+ is 30 mlEq/L**
**Which one of the following is the most likely cause of his deterioration?**

A. Acute interstitial nephritis secondary to ceftriaxone
B. Acute tubular necrosis (ATN)
C. Adrenal insufficiency
D. Septic shock
E. Syndrome of inappropriate antidiuretic hormone (SIADH}

**The correct answer is C**

Bilateral adrenal hemorrhage may occur in the setting of severe sepsis and provide explanation for the electrolyte derangement. This was initially described in patients with meningococcemia with disseminated intravascular coagulation (DIC: Waterhouse-Friderichsen syndrome) although in a recent series, Pseudomonas infection was the most common cause.

The combination of hyperkalemia, hyponatremia and metabolic acidosis should always suggest hypoadrenalism. Adrenal insufficiency results in mineralocorticoid deficiency, potentially life-threatening salt-wasting and a failure to excrete potassium.

**77. A 66-year-old male patient with an extensive smoking history is being investigated for a suspected primary lung malignancy on a recent chest X-ray. He has been complaining of weakness in his leg and upper arm muscles. He describes difficulty standing up from a seated position, and 1n combing his hair. He reports weigh gain of B kg over the past four months and has noted that his skin appears darken and that his gums appear stained also. At present he is taking no regular medication but reports that he took a week-long course of steroids two months ago for an unresolving chest infection. Four years previously. this gentleman received radiotherapy for a head and neck cancer related to his smoking history. Routine investigations reveal a potassium of 2.9 mmol/l. AB mg dexamethasone suppression test has revealed an 8 am cortisol of 199 mmol. A paired 8 am ACTH was 430 nmol/l (< 350 nmol).**

**What is the most likely diagnosis?**

A. Adrenocortical tumor
B. Radiation side-effects
C. Ectopic adrenocorticotropic hormone (ACTH) secretion
D. Diabetes mellitus
E. Side-effects of steroids

**The correct answer is C**

The most common cause of ACTH-dependent Cushing syndrome is an ACTH-secreting pituitary adenoma. commonly referred to as Cushing disease. However, para neoplastic ACTH production can occur outside the pituitary in the setting of malignancy, with small cell lung cancer being the most common malignancy associated with ectopic ACTH production, accounting for 50-75% of cases. Ectopic ACTH production can also stimulate production of glucocorticoid or cortisol hormone from the zona fasciculata in the adrenal cortex.

ACTH is a cleavage product of the pro-hormone pro-opiomelanocortin (POMC), which also produces other hormones. including a-MSH that stimulates the production of melanin leading to skin hyperpigmentation as depicted in this case.

**78. A 51-year-old man presents to Emergency Department with altered consciousness. His blood pressure is B0/50 mmHg. his skin is pigmented and he has a past history of Hashimoto's thyroiditis. His family says that he has been red for several months, and has been Losing weight and complaining of abdominal pain.**
**Which of the following results is most likely to be found on investigation?**

A. Laboratory glucose level of 12.3 mmol/l
B. Serum sodium level of 116 mmol/l
C. Flattened T waves on electrocardiography
D. Serum potassium level of 2.4 mmol/L
E. Serum urea Level of 3.2 mmol/l

**The correct answer is B**

The clinical picture of an unwell patient with weight loss, abdominal pain. low blood pressure, mucocutaneous pigmentation and history of an autoimmune disease is highly suggestive of Addison's disease.

The classical biochemistry is hyponatremia, hyperkalemia, raised urea (due to dehydration) and hypoglycemia. Addison's disease may be associated with eosinophilia.

**79. A 26-year-old woman with non-classical congenital adrenal hyperplasia (CAH) due to 11 -hydroxylase attends the clinic with oligomenorrhoea and hirsutism. She asks you which hormone is responsible for excess coarse hair growth.**
**Which of the following hormones is responsible for hirsutism in non-classical CAH?**

A. Dehydroepiandrosterone (DHEA)
B. GnRH
C. Oestrogen
D. Cortisol
E. Prolactin

**The correct answer is A**

Non-classical CAH caused by a deficiency in the enzyme 11Ɓ hydroxylase results in the accumulation of adrenal sex steroids, most notably DHEA.

Because of the shared pathways of cortisol mineralocticoids and androgens, patients with CAH present with symptoms due to reduced production of cortisol and either over- or under-production of mineralocticoids and androgens, depending on the exact enzyme deficiency.

With 11Ɓ - hydroxylase deficiency there is overproduction of androgens.

**80. A 25-year-old woman has been prescribed emergency contraception (levonorgestrel 1.5 mg) following unprotected sexual intercourse. Her periods have been regular to date and her last period was 1 week ago.**
**What is the most probable mechanism of action of emergency contraception in preventing conception in this case?**

A. Thickening the cervical mucus.
B. Delay ovulation.
C. Decreasing tubal motility and ciliary activity.
D. Rendering the endometrium unfavorable for implantation.
E. Blocking the secretion of progesterone by the corpus luteum

**The correct answer is B**

Delay ovulation is correct. The main mode of action of Levonorgestrel 1.5 mg is to delay ovulation.

**81. 18-vear-old student presents with intermittent weakness and feelings of tiredness. Her GP requested some blood tests and found her to have a potassium Level of 2.B mmol/l and bicarbonate of 32 mmol/LI. Her blood pressure is 110/78. She is of short stature and tells you that she has always found sport and exercise difficult, with frequent admissions in childhood for dehydration/electrolyte abnormalities. You arrange renin and aldosterone Levels and both are elevated. Urinary calcium excretion is elevated. Urinary diuretic screen is negative. Which diagnosis fits best with this clinical picture?**

A. Diuretic abuse
B. Gitelman syndrome
C. Liddle syndrome
D. Barter syndrome
E. Conn syndrome

**The correct answer is D**

Bartter syndrome is characterised by increased urinary calcium excretion, hypokalemia, metabolic alkalosis and raised renin and aldosterone levels.

**82. 25-year-old woman presents with a renal calculus. She has recurrent episodes of headache and sweating. Physical examination reveals a thyroid nodule but no clinical signs of thyrotoxicosis.**
**Which one of the following investigations would be most useful in arriving at a diagnosis for the headaches?**

A. 24-h urine collection for 5-hydroxyindoleacetic acid excretion.
B. 24-h urine collection for metanephrines.
C. Serum alkaline phosphatase (ALP).
D. Serum calcium level.
E. Free triiodothyronine (T3), free thyroxine (T4) and thyroid-stimulating hormone (TSH) levels.

**The correct answer is B**

Multiple endocrine neoplasia (MEN) type 2 is associated with medullary carcinoma of the thyroid, hyperparathyroidism and phaeochromocytoma.

The most useful investigation would be a 24-h urine collection for metanephrines: plasma and urinary catecholamines can also be measured directly.

The hyperparathyroidism has Likely Led to elevated calcium levels leading to the renal stones.

**83. A 26-year-old man with Addison's disease presents with an acute onset of diarrhoea and vomiting over the past 6 hours. Apparently his two children have recently been ill with a 48-hour vomiting virus. He currently takes fludrocortisone and hydrocortisone steroid replacement.**
**What is the most appropriate management?**

A. Intravenous cyclizine
B. Intravenous ondansetron
C. Intravenous fluids and intravenous hydrocortisone
D. Increase fludrocortisone by 50%
E. Increase oral hydrocortisone by 50%

**The correct answer is C**

Patients receiving glucocorticoid replacement therapy should be advised to double the dose in the event of intercurrent febrile illness. accident or mental stress {eg an important examination).

If the patient is vomiting and cannot take anything by mouth, parenteral hydrocortisone must be given urgently, as indicated above.

For minor surgery. 50-100 mg of hydrocortisone hemisuccinate is given with the premedication. For major procedures, this is then followed by the same regimen as for acute adrenal insufficiency.

**84. A 38-year-old woman presents to the clinic with difficult-to-treat hyper ens1on. She takes ramipril 10 mg and amlodipine 10mg, and currently has a blood pressure of 155/95 mmHg. She has noted that her face has become more rounded over the years. and she is having increasing trouble with both acne and hirsutism.**

Fasting blood glucose is 6.6 mmol/l.

Renal function is normal.

K+ is 3.4 mmol/l.

**There has also been increasing problems with abdominal obesity, and she has noticed some purple stretch marks appearing around her abdomen.**

**What test is most likely to be abnormal in this case?**

A. Urinary vanillylmandelic acid

B. Plasma metanephrines

C. Plasma renin-to-aldosterone ratio

D. Overnight dexamethasone suppression test

E. Oral glucose tolerance test with growth hormone measurement

**The correct answer is D**

The diagnosis here is most Likely to be Cushing's syndrome, the screening test for which is an overnight low·- dose dexamethasone suppression test.

Cushing syndrome comprises a large group of signs and symptoms that reflect prolonged and inappropriate high exposure of tissue to glucocorticoids. Whereas the most common cause is iatrogenic from medically prescribed corticosteroids. endogenous Cushing's is an uncommon disorder: European population- based studies reported an incidence of two to three cases per 1 million inhabitants per year (4, 5).

Excess cortisol production. the biochemical hallmark of endogenous Cushing’s may be caused by either excess adrenocorticotropic hormone (ACTH) secretion {from a pituitary or other ectopic tumor) or independent adrenal overproduction of cortisol.

**85. A 17-year-old girl is admitted to the Emergency Department having collapsed at a rave: she is unconscious and her blood pressure is measured at 76134mmHg. She is found to have a card in her purse that indicates that she is on steroids for adrenal failure. Fingerprick glucose testing reveals blood glucose of 3.4 mmol/l: her blood gas reveals that her K+ is 5.5nmol/l (NIR 3.5-5.2) and Na+ is 130 mEq/l (NR 135-145). Which of the following should be given urgently to manage this woman's adrenal crisis?**

A. Intravenous glucose infusion
B. Intravenous hydrocortisone and hypertonic saline
C. Oral mineralocorticoid supplementation and IV insulin dextrose
D. Intravenous 0.9% saline and hydrocortisone
E. Intravenous 5% dextrose, 3% saline and hydrocortisone

**The correct answer is D**

The correct way for patients with suspected adrenal crisis to be treated is with an immediate parenteral injection of 100 mg hydrocortisone, followed by appropriate fluid resuscitation and 200 mg of hydrocortisone/24 hours {via continuous IV therapy or 6-hourly injection).

With this treatment, the other electrolyte abnormalities that occur secondary to mineralocorticoid and glucocorticoid deficiency will be corrected: hydrocortisone above a 30 mg dose have mineralocorticoid activity: once this woman is able to swallow, her mineralocorticoid should be given.

**86. A 45-year-old builder is admitted to the Emergency Department after falling off his ladder. Past history of note includes hypertension, which is managed with ramipril 10 mg daily. An emergency scan reveals a 3 cm, right- sided lipid rich adrenal adenoma. His blood pressure is 17 5/90 mmHg.**
**Blood tests show:**

| Investigation | Result | Normal Value |
|---|---|---|
| Hb | 121 g/L | 135 -175 g/l |
| WCC | 6.2 X $10^9$/l | 4-11 X $10^9$/l |
| Platelets | 232 x $10^9$/l | 150-400 x $10^9$/l |
| Na+ | 142 mmol/l | 135-145 mmol/l |
| K+ | 3.0 mmol/l | 3.5-5.0 mmol/l |
| Creatinine | 100 µmol/l | 50-120 µmol/l |

**Which of the following would the next step to reveal the underlying diagnosis?**

A. 24-hour urinary catecholamines
B. Plasma renin : aldosterone ratio post-BP medication washout
C. Metaiodobenzytguanidine (MIBG) scan
D. Magnetic resonance imaging of the adrenal glands
E. Saline suppression test

**The correct answer is B**

An elevated aldosterone in the presence of a suppressed renin confirms the diagnosis of hyperaldosteronism or Conn syndrome. However, certain antihypertensives can affect the interpretation of the result and ideally the test should be done following a period off medication.

The test may still be useful if only some of the antihypertensive medications can be discontinued such as beta-blockers. Beta-blockers suppress renin and can cause a false positive test and angiotensin-converting enzyme (ACE) inhibitors can suppress aldosterone and therefore ACIE inhibitors can cause falsely- low aldosterone reading.