Endocrine Pathology Final Review

Appreciation for Maan Alherbish for all the hard work, dedication and for putting so much effort into making this file. Thank you!

Done by :

Maan Alherbish
Abdullah Almousa
Majed Altulian
Mohammed Alnafisah
Aisha Alraddadi
Badour Alsalman
Ebtesam Alateeg
Reem Almassoud

Team Leaders : Abdullah Alatar & Ghaida Alawaji

(Hypo/Hyper) Thyroidism and Hashimoto's Thyroiditis

- The Thyroid gland is formed of 2 large lobes connected by isthmus, it's regulated by Hypothalamus-Pituitary-Thyroid axis.
- Hypothyroidism:
    - Caused by any structural or functional damage, leading to dropped levels of secreted hormones. Can be primary (Thyroidal disease) or Secondary (e.g. TSH deficiency)
    - Incidence is 0.1%, Affect women ten folds more than men.

  Primary causes include:

  1. Developmental (Acquired mutations, e.g. PAX8, FOXE1, TSH receptor mutations).
  2. Surgery and Radioiodine therapy (Postablative)
  3. Iodine deficiency (Most common cause of congenital hypothyroidism).
  4. Autoimmune (e.g. Hashimoto's Thyroiditis) Most common cause of hypothyroidism in iodine-rich countries.
  5. Congenital defects (e.g. Dyshormonogenetic goiter) less common cause of congenital hypothyroidism.

Manifestations differ according to the age affected:

- Cretinism: Due to congenital hypothyroidism, patients come with severe mental retardation and short stature.
- Myxedema: slowing of physical and mental activity, mental sluggishness and overweight.

- Thyrotoxicosis: Hypermetabolic state caused by elevated circulating levels of free T3 and T4.

Causes	Explanation	Examples
Associated with Hyperthyroidism	More common, hyperfunction of the thyroid gland.	Graves's disease/Adenoma/ Multinodular goiter/Pituitary adenoma
Not Associated with Hyperthyroidism	Any other cause leads to high levels of the thyroid hormones.	Thyroiditis / Struma ovarii / Exogenous hormonal intake

- Graves' disease: Autoimmune disorder characterized by presence of Immunoglobulins against TSH-Receptor that mimic the action of TSH.

- Other antibodies against Peroxisome and Thyroglobulin may also be a finding.

- Thyroiditis: Inflammation of the thyroid gland.

Can be:

- Painful with Acute illness (Infectious, Subacute granulomatous thyroiditis*).

Thought to be caused infectiously (Coxsackie, Mumps viruses) More common in women (40-50)

- Painless with little inflammation (Subacute lymphocytic and fibrous Thyroiditis).

- Hashimoto's Thyroiditis: Gradual thyroid failure by autoimmune destruction of the thyroid gland (Against many thyroidal autoantigens e.g. Peroxidase enzyme and Thyroglobulin).

- Patients come with diffusely symmetrically enlarged gland with Lymphocytic infiltration (Struma Lymphomatosa).

- Female predominance of 10:1 to 20:1. Age 45-65.

- Morphology:

1. Gross features: Diffusely enlarged gland with pale, yellow-tan and firm cut-surface.

2. Microscopic features: extensive infiltration of the parenchyma by a mononuclear inflammatory infiltrate containing small lymphocytes, plasma cells, and well-developed germinal centers.

- Presence of what is called (Hürthle cells) with eosinophilic granular cytoplasm containing numerous mitochondria.

Thyroid nodules and Neoplasms

- Thyroid Neoplasm could be Follicular-Adenoma (Benign) or Carcinoma (Malignant)

- The major subtypes of thyroid carcinoma are:
  - Papillary carcinoma (> 85% of cases)
  - Follicular carcinoma
  - Medullary carcinoma
  - Anaplastic carcinoma

- Follicular Adenoma and all subtypes of thyroid carcinoma arise from follicular cells EXCEPT Medullary carcinoma from parafollicular (c-cells).

- Benign neoplasms outnumber thyroid carcinomas by a ratio of nearly 10:1.
  - Solitary nodules, in younger male patient → neoplastic
  - Nodules that highly uptake radioactive iodine (hot nodules) → benign

- Careful evaluation of the integrity of the capsule is critical in distinguishing follicular adenomas from follicular carcinomas, which demonstrate capsular and/or vascular invasion.
  - Follicular adenomas: encapsulated mass lesion.
  - Follicular carcinomas: invasion of capsule or blood vessels.

- Follicular adenomas are the most common benign neoplasms, while papillary carcinoma is the most common malignancy.

Carcinomas

- Genetics:

Follicular → RAS	Medullary → MEN-2, RET
Papillary → RET, NTRK1 or BRAF	Anaplastic → P53

1. **Papillary Thyroid Carcinoma:**

- The major risk factor is exposure to ionizing radiation.
- Between the ages of 25 and 50
- The first manifestation may be a mass in a cervical lymph node
- Have an excellent prognosis
- Papillary carcinomas are recognized based on nuclear features
- Morphology: Papillary structures, Orphan Annie nuclei and Psammoma bodies.

2. **Follicular Carcinomas:**

- Between 40 and 60 years and More common in women (3 : 1)

3. **Medullary Carcinomas:**

- Neuroendocrine neoplasms derived from C cells.
- Measurement of *Calcitonin* plays an important role in the diagnosis and postoperative follow-up of patients.
- About 70% of tumors arise sporadically and the remainder occurs in the setting of MEN syndrome 2A or 2B
- Morphology: polygonal to spindle cells and **Amyloid deposition**. (Detected by Congo red stain)

4. **Anaplastic Carcinomas**

- Undifferentiated tumors of the thyroid follicular epithelium.
- Lethal (100%).
- Older age group > 65 year.
- Morphology: composed of highly anaplastic cells → giant cells, spindle cells and small cells.

Pathology of Adrenal gland

- The main pathological disorders of adrenal cortex are either hyperfunction or hypofunction while in the adrenal medulla the main are thought to be neoplastic conditions.

  -Three distinctive hyperadrenal syndromes:

(1) Cushing syndrome (characterized by increased cortisol)

(2) Hyperaldosteronism

(3) Adrenogenital syndrome, caused by excess levels of androgens (Male sex hormones)

-Hypercortisolism is divided into: 1-Endogenous 2-Exogenous

-The vast majority of cases in Cushing syndrome are the result of the administration of exogenous glucocorticoids ("iatrogenic" Cushing syndrome)

-The most common cause of endogenous Hypercortisolism (Cushing's syndrome) is pituitary adenoma (Cushing disease)

- ❖ The endogenous causes can be furtherly divided into:

  1-ACTH dependent

  2-ACTH independent

- ❖ primary Hyperaldosteronism usually leads to suppression of Renin angiotensin system (RAS)

  While secondary Hyperaldosteronism is due to a response of activated (RAS).

  (e.g. Renal artery stenosis)

  -Patients presents with hypertension. With an estimated prevalence rate of 5% to 10% among non-selected hypertensive patients. Also (Hypernatremia , Hypokalemia)

-Aldosterone-producing adenomas:

(They are solitary, small, bright, yellow in cut surface and well circumscribed).

- adrenocortical insufficiency (Hypofunction):

-Three patterns:

(1) Primary acute adrenocortical insufficiency (adrenal crisis)

(2) Primary chronic adrenocortical insufficiency (**Addison disease**)

(3) Secondary adrenocortical insufficiency

- Pheochromocytoma is an uncommon neoplasm of adrenal medulla composed of chromaffin cells, which synthesize and release Catecholamines.

(Characterized by hypertension), (Can be a component of MEN syndrome 2A and 2B)

-Microscopic morphology:

Zellballen nests (Nests of spindle shape chromaffin cells + sustentacular small cells).

Diabetes Mellitus Type1/2

- ❖ Diabetes is diagnosed by any one of **three** criteria:

1/a random glucose concentration > 200 mg/dl

2/a fasting glucose concentration > 126 mg/dl on more than one occasion.

3/an abnormal oral glucose tolerance test (OGTT)

-Abnormal when glucose concentration > 200 mg/dl

- Down's, Kleinfelter, Turner and Prader-Willi syndromes* are some Genetic syndromes associated with diabetes.

*loss of satiety

-Diabetes can occur secondary to other endocrine conditions or drug therapy (e.g. Cushing's syndrome or glucocorticoid therapy).

- ❖ Type I DM (insulin-dependent):

-Can develop at any age, the peak age of onset coincides with puberty.

-Caused by autoimmune destruction of the insulin-producing B-cells in the pancreatic islets of Langerhans.

-Characterized by frequent oxidation of fat leading to overproduction of ketone bodies, which are released into the blood from the liver resulting in **metabolic ketoacidosis**.

-The most important gene that it is associated with is the HLA locus on chromosome 6p21.

Cell-mediated immune mechanisms are fundamental to the pathogenesis, CD8+T lymphocytes pre-dominate.

- ❖ Type 2 DM:

-It is known as **non–insulin-dependent** or maturity-onset diabetes, in most of the cases it's associated with obesity.

-results from:

1. Resistance to the metabolic action of insulin in its target tissues.

2. Inadequate secretion of insulin from B-cells of the pancreas (Beta cell dysfunction)

-it has a high genetic association. However, there's no association with (MHC).

-B-cell function is affected in type2 diabetics due to chronically elevated plasma levels of free fatty acids that occur in obese persons.

- ❖ Histopathology:

No reduction in number of B-cells, Amyloid deposition and late-onset fibrosis.

-Insulin levels in type 2 diabetes always normal or elevated.

- ❖ Complications:

1/Diabetic Microvascular Disease (renal failure, blindness)

- Pathophysiology behind them: Arteriolosclerosis and capillary basement membrane thickening.

-Diabetic Nephropathy

(Kimmelstiel-Wilson disease or nodular glomerulosclerosis)

-Diabetic Retinopathy (Microaneurysms due to chronic hypertension → hemorrhage exudate retinopathy).

-Diabetic Neuropathy (**most common complication** of diabetes, may result in foot ulcers)

Also plays a role in the painless destructive joint disease (Neuropathic arthropathy).

-Infections (e.g. Mucormycosis, it usually affect young diabetics and begins suddenly).

- ❖ Gestational diabetes

Develops in a few percent of pregnant women, owing to the insulin resistance of pregnancy combined with a B-cell defect, but almost always abates following parturition.

MCQs for midterm

1-A 46-year-old woman complains of increasing fatigue and muscle weakness over the past 6 months. She reports an inability to concentrate at work and speaks with a husky voice. The patient denies drug or alcohol abuse. Physical examination reveals cold and clammy skin, coarse and brittle hair, boggy face with puffy eyelids, and peripheral edema. There is no evidence of goiter or exophthalmos. Laboratory studies show reduced serum levels of T3 and T4. Which of the following is the most likely underlying cause of these signs and symptoms?
A. Amyloidosis of the thyroid
B. Hypothyroidism
C. Thyroid follicular adenoma
D. Multinodular goiter

2-A patient presents with signs of hyperthyroidism (thyrotoxicosis). To investigate the matter, you measure the levels of T4 and TSH. If the patient has a benign thyroid adenoma ("toxic nodule"), you can expect the following results?
A. T4 elevated, TSH reduced
B. T4 reduced, TSH reduced
C. T4 elevates, TSH elevated
D. T4 reduced, TSH elevated

3-A patient presents with signs of hypothyroidism. To investigate the matter, you measure the levels of T4 and TSH. If the patient suffers from iodine deficiency, you can expect the following results?
A. T4 reduced, TSH reduced
B. T4 elevated, TSH reduced
C. T4 elevates, TSH elevated
D. T4 reduced, TSH elevated

4-The Exact cause of Hashimoto's thyroiditis is?
A. therapeutic radiation
B. thyroid resection
C. hypopituitarism
D. autoimmune destruction

5-In Grave's disease, enlargement of the thyroid gland is caused by?
A. constitutive activation of the Gs-protein as a result of a somatic mutation
B. an antibody that stimulates TSH receptors
C. abnormally elevated TSH levels
D. a transport defect for iodine in the membrane of the follicular cell

6-A 40-year-old woman complains of chronic constipation and anovulatory menstrual cycles for the last 8 months. Her vital signs are normal. Physical examination reveals peripheral edema and a firm, diffusely enlarged thyroid gland. Serum levels of T3 and T4 are abnormally low. A thyroid biopsy is shown in the image. What is the appropriate diagnosis?
A. Graves' disease
B. Hashimoto's thyroiditis
C. Lymphadenoid thyroiditis
D. Subacute (de Quervain) thyroiditis

7-A 43-year-old woman complains of low-grade fever and has a 3-day history of pain in her neck. Physical examinations reveals a slightly enlarged thyroid. A CBC is normal. A biopsy of the thyroid reveals granulomatous inflammation and the presence of giant cells. What is the appropriate diagnosis?
A. Graves' disease
B. Hashimoto's thyroiditis
C. Lymphadenoid thyroiditis
D. Subacute (de Quervain) thyroiditis

8-Patient has symptoms of hyperthyroidism. Which of the following best summarizes the clinical symptoms expected in this patient?
A. Tremor, tachycardia, weight loss
B. Hyperpigmentation, weakness, hypotension
C. Nervousness, irritability, paresthesia, tetany
D. Dry skin, hypogonadism, fatigability

9-Which one of the following is the most susceptible group to be affected by Hashimoto's Thyroiditis?
A. 20 Years old, male
B. 80 Years old, male
C. 50 Years old, female
D. 35 Years old, female

10-The appropriate reason behind the appearance of hypothyroid manifestations between the episodes of hyperthyroidism in some patients with Graves' disease is?
A. Presence of immunoglobulins that are directed to antigens other than TSH receptor
B. Coexistence of TSH-receptor stimulating and inhibiting autoantibodies
C. Excessive levels of plasma TSI
D. None of these

11-The most common type of thyroid carcinoma is?
A. Papillary carcinoma
B. Follicular carcinoma
C. Medullary carcinoma
D. Anaplastic carcinoma

12-Young male came to the hospital with solitary nodule of the thyroid .On examination with radioactive iodine, the nodule appear to be cold. What is the most likely diagnosis?
A. Non neoplastic nodule
B. Neoplastic nodule, malignant nodule
C. Neoplastic benign nodule

13-The definitive diagnosis of thyroid adenoma by?
A. Gross examination
B. Careful histological examination
C. Radiological examination

14-Ionising radiation is the major risk factor for papillary carcinoma?
A. True
B. False

15-A 35 years old female comes to the hospital with cervical lymph node enlargement, Microscopic examination shows finely deposit chromatin (Orphan Annie eye) and pseudoinclusion, what is the most likely diagnosis?
A. Papillary carcinoma
B. Follicular carcinoma
C. Anaplastic carcinoma
D. Medullary carcinoma

16-papillary carcinoma usually metastasize through lymphatics?
A. True
B. False

17-A 56 male have past history of well-differentiated thyroid carcinoma, presents with swelling in his neck, biopsy was done and showed poor differentiated pleomorphic giant cells. What is the most likely diagnosis?
A. Follicular carcinoma
B. Papillary carcinoma
C. Anaplastic carcinoma
C. Medullary carcinoma

18-In the patient described in Q7, what other microscopic fetters you will observe?
A. Well-defined, intact capsule
B. Spindle cell with a sarcomatous appearance
C. Psammoma bodies
D. Orphan Annie eye

19-A 50 years old woman come to the hospital with sever goiter then appear to have iodine deficiency .Histological examination of the thyroid shows follicular cells invading the blood vessels. What is the most likely diagnosis?
A. Papillary carcinoma
B. follicular carcinoma
C. Anaplastic carcinoma

D. Medullary carcinoma

20-In follicular thyroid carcinomas there is mutation in?
A. In the PI-3K/AKT signaling pathway
B. RET gene
C. P53 tumor suppressor gene

21-Medullary carcinoma derived from follicular epithelium?
A. True
B. False

22-A 36-year-old woman presents with swelling in her neck. Physical examination reveals a non-tender nodule in the left lobe of the thyroid. The thyroid nodule is found to be “cold” by radioiodine test. And a section stained with Congo red reveals birefringent amyloid stroma. What is the most likely the diagnosis?
A. Follicular carcinoma
B. Medullary carcinoma
C. Anaplastic carcinoma
D. Papillary carcinoma

MCQs for final

23-A 30 year-old female presented with truncal obesity and moon-like face, she also mentioned that she had menstrual irregularities. She informed that she doesn't have any history of medication.
What's the most likely the cause of her presentation?
A. Small cell carcinoma
B. Aldosterone Adenoma
C. ACTH pituitary Adenoma
D. Iatrogenic Cushing syndrome

24-A 53 female subjected to renal transplantation 3 years ago .After the surgery she started glucocorticoids therapy to prevent the rejection of transplantation. She came to the hospital for screening and the adrenal biopsy was done. What's the most likely finding that can be observed?
A. Diffuse hyperplasia
B. Cortical atrophy
C. Macronodular hyperplasia
D. Dysplasia

25-A 65 year old male came to ER with sustained hypertension (140\90), flank pain and noticed tachycardia. On the clinical examination the patient was depressed and having Wight loss. The CT scan was done and show adrenal mass.
What's the most likely underlying cause of his manifestations?
A. Aldosterone-producing adenoma
B. Small cell carcinoma
C. Pheochromocytoma
D. Renal cell carcinoma

26-based on the question above, what's the histopathological finding that can be found in the case?
A. Vaculated cytoplasm
B. Atypia
C. Nests of neuroendocrine cells
D. Zellballen nests

27-Primary Hyperaldosteronism is characterized by?
A. Hypoglycemia
B. Hypokalemia
C. Hyperkalemia
D. Hyponatremia

28-Which of the following is ACTH-independent condition that may cause endogenous Cushing syndrome?
A. McCune-Albright syndrome
B. Paraneoplastic syndrome
C. Ectopic corticotropin syndrome
D. Cushing disease

29-Which of the following is a sign of exogenous Cushing syndrome?
A. Micronodular hyperplasia
B. Cortical atrophy
C. Diffuse hyperplasia
D. Macronodular hyperplasia

30-A 34-year-old woman is seen because of unexplained weight gain, selectively over the trunk, upper back, and back of the neck; irregular menstrual periods; and increasing obesity. She is especially concerned about the changing contour of her face, which has become rounder, creating a “moon-faced” appearance. She has also developed purple-colored streaking resembling stretch marks over the abdomen and flanks, as well as increased hair growth in a male distribution pattern. Blood pressure is elevated to 190/100 mm Hg. Blood sugar is elevated. Computed tomography reveals a smooth, homogeneous lesion in the left adrenal gland. Surgery is performed. The clinical findings and the change in the adrenal gland are most likely related to which of the following?
A. Adrenal (glucocorticoid) steroid therapy
B. Ectopic production of ACTH.
C. Hyperproduction of adrenal glucocorticoids
D. Hyperproduction of hypothalamic corticotropin-releasing factor

31-The most common cause of Primary Hyperaldosteronism?
A. Adrenocortical Adenoma
B. Idiopathic Hyperaldosteronism
C. Adrenocortical carcinoma
D. Pregnancy

32-A 34-year-old man is referred for evaluation of hypertension and persistent hypokalemia in spite of taking oral potassium supplements. Blood pressure is 180/110 mm Hg. Serum sodium is 149 mEq/L (normal 140 to 148 mEq/L); potassium, 3.3 mEq/L (normal 3.6 to 5.2 mEq/L). Computed tomography demonstrates a 3cm mass in the right adrenal gland. The most likely diagnosis is?
A. Addison disease.
B. Cushing syndrome.
C. Sipple syndrome.
D. Conn syndrome

33-A 44-year-old woman has become increasingly listless and weak and has had chronic diarrhea and a 5-kg weight loss over the past 7 months. She also notices that her skin seems darker, although she rarely goes outside because she is too tired for outdoor activities. On physical examination, she is afebrile, and her blood pressure is 85/50 mm Hg. A chest radiograph shows no abnormal findings. Which of the following is most likely to account for these findings?
A. Adenohypophyseal adenoma
B. Autoimmune destruction of the adrenals
C. Pancreatic neuroendocrine tumor
D. Metastatic carcinoma with lung primary

34-A 26-year-old woman has episodic hypertension with headache, diaphoresis, and palpitation. Which of the following diagnostic procedures would be most useful in evaluating the possibility that a Pheochromocytoma might be the cause of these findings?
A. Serum C-peptide
B. Urinary vanillylmandelic acid
C. Serum hemoglobin A1C (glycosylated hemoglobin)
D. Urinary aldosterone

35-Which one of the following hyperglycemic conditions have a relatively young age of onset?
A. DM type 2
B. MODY
C. Metabolic syndrome
D. All the above

36-MODY 5 is caused by mutation in?
A. Glucokinase
B. Hepatocyte nuclear factor 1α (HNF1A)
C. Transcription factor 2
D. Pancreatic and duodenal homeobox1 (PDX1)

37-Which one of the following statements is true about DM TYPE1?
A. Insulin injections may be required
B. Associated with variety gene defects (including Glucokinase)
C. Associated with overproduction of ketone bodies
D. CD4+ predominate along the course of the disease

38-A 55-year-old male known to have type 1 diabetes since he was 15. A pancreatic biopsy of this patient would exhibit which one of the following?
A. Scattered areas of necrosis and hemorrhagic nodules
B. Diffuse fibrosis of the islets of Langerhans with reserved secretory capacity of Beta cells
C. Amyloid deposition in the islets of Langerhans
D. Diffuse interlobular and interacinar fibrosis with Acinar atrophy

39-Which one of the following is NOT TRUE regarding DM Type2
A. Show reduced number and many pathological lesions of Beta cells histologically
B. worsening obesity and lack of exercise contribute to the development of the disease.
C. Not associated with genes of the major histocompatibility complex
D. Beta cells fail to meet the demand for insulin in the body

40-Which one of the following is NOT correct about diabetic nephropathy?
A. Increases risk for cardiovascular disease
B. Associated with normal urinary albumin secretion
C. Associated with retinopathy
D. None of the above

41-Which type of immunity is severely affected in DM
A. Humoral immunity
B. Cell-mediated immunity
C. Both of them

42-The most common contributory factor for diabetic foot ulcers is?
A. Edema
B. Peripheral Neuropathy
C. Blindness
D. Nephropathy

43-A 45-year-old lady with chronic DM was diagnosed to have UTI.
Suddenly she suffered from a massive renal pain, urine sample showed significant hematuria. What is the most likely diagnosis?
A. Kimmelstiel-Wilson disease
B. Hydonephrosis
C. Necrotizing papillitis
D. Kidney stones

44-A Young patient presented with sudden onset of black nasal discharge, right eye swelling with retrobulbar headache and weakening of the visual acuity on the right eye, he also showed high fever and general malaise. The young patient was known to be diabetic. Blood cell count and swab culture of the nasal discharge as well as the skull x-ray didn't lead to a definite diagnosis.
-What is the most likely diagnosis?
-What is the most reliable test to find the diagnosis?
A. Right ophthalmic vein thrombosis – Nasal biopsy
B. Acute streptococcal sinusitis – Blood culture
C. Thyrotoxicosis – Head MRI
D. Mucormycosis – Nasal biopsy

45-A 35 year old patient comes to your clinic with newly diagnosed diabetes. Lab tests reveal no C-peptide in her blood. She has lost a lot of weight recently, despite the fact that she has been eating a lot. This patient has?
A. Type 1 Diabetes mellitus
B. Type 2 Diabetes mellitus
C. MODY
D. Gestational Diabetes

46-Which of the following is a long-term complication of diabetes?
A. End stage renal disease
B. Acute renal failure
C. Nephrotic syndrome
D. Primary renal disease

47-Factors that seem to play a role in the development of type 2 diabetes include?
A. Weight and heredity
B. Liver disease
C. Enzyme deficiencies
D. Childhood illness

48-What are the cardinal signs of DM2?
A. Polyuria, polydipsia and polyphagia
B. Weight loss, polyphagia and proteinuria
C. Dizziness, kidney failure and fatigue
D. Polyuria, pyuria and polydipsia

49-Diabetics are prone to infections because?
A. bacteria thrive in high-glucose environments
B. insulin has anti-infective property
C. high blood glucose level raise body temperature

50-Injury to pancreatic islet cells in patients with T1DM is most likely mediated by which of the following mechanisms?
A. Antibody-mediated islet cell destruction
B. Cell-mediated immunity
C. Direct viral cytopathic effects

51-Which of the followings is not a complication of DM?
A. Renal failure
B. Amputation
C. Gangrene
D. Stroke

52-A 50-year-old man with diabetes mellitus develops swelling in his lower extremities. Urinalysis shows 3+ proteinuria and 3+ glycosuria. Serum albumin is 3 g/dl and serum cholesterol is 350 mg/ dl. A kidney biopsy is done. Which of the following glomerular changes is evident in this biopsy specimen?
A. Amyloidosis
B. Deposition of basement membrane like material
C. Endothelial cell hyperplasia
D. Mesangial hyperplasia

Question	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
Answer	**B**	**A**	**D**	**D**	**B**	**B**	**D**	**A**	**C**	**B**	**A**	**B**	**B**	**A**	**A**	**A**	**C**	**B**	**B**	**A**	**B**	**B**
Question	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**
Answer	**C**	**B**	**C**	**D**	**B**	**A**	**B**	**C**	**B**	**D**	**B**	**B**	**B**	**C**	**C**	**D**	**A**	**B**	**B**	**B**	**C**	**D**
Question	**45**	**46**	**47**	**48**	**49**	**50**	**51**	**52**														
Answer	**A**	**A**	**A**	**A**	**A**	**B**	**B**	**B**														

Thank You