

Appendix

Appendix 1: Selected Genetic Mutations and Their Corresponding Endocrine States

Table A.1 Pituitary gland

Gene(s)	Endocrine condition
AIP	Familial isolated pituitary adenoma (FIPA) syndrome
KAL1, FGFR1	Kallmann syndrome
PROP1, POUF1F1	Combined pituitary hormone deficiency
Menin	Multiple endocrine neoplasia type 1
PRKAR1A	Carney complex
GnRH-1, KISS 1	Normosmic idiopathic hypogonadotropic hypogonadism (IHH)
DAX1	Normosmic IHH and adrenal insufficiency
LEP	Normosmic IHH and obesity

Table A.2 Thyroid gland

Gene(s)	Endocrine condition
SCN4A	Hypokalemic periodic paralysis
SLC26A4	Pendred's syndrome
PAX8, TSHR	Congenital hypothyroidism
THRB, THRA	Thyroid hormone resistance

Table A.3 Adrenal gland

Gene(s)	Endocrine condition
ALADIN	Triple A syndrome (primary adrenal insufficiency, alacrima, and achalasia)
RET	Multiple endocrine neoplasia types 2A and 2B
TSC1, TSC2	Tuberous sclerosis complex
VHL	Von Hippel-Lindau syndrome
ABCD1	X-linked adrenoleukodystrophy
MC2R	Familial glucocorticoid deficiency
SDHx	Hereditary pheochromocytoma-paranganglioma syndromes
TP53	Adrenocortical carcinoma
KCNJ5	Familial hyperaldosteronism

SDHx refers to SDHA, SDHB, SDHB, and SDHAF2

Table A.4 Pancreatic gland

Gene(s)	Endocrine condition
GCK	Monogenic diabetes (uncomplicated course)
HNF1A	Monogenic diabetes (sulfonylurea responsive)
WFS1	Wolfram syndrome (DIDMOAD)
KCNJ11	Neonatal diabetes
ABCC8, KCNJ11	Congenital hyperinsulinism

Table A.5 Parathyroid gland, calcium, and bone metabolism

Gene(s)	Endocrine condition
CASR	Familial hypocalciuric hypercalcemia
ELN	Williams-Beuren syndrome
AIRE	Autoimmune polyglandular syndrome type 1
COL1A1, COL1A2	Osteogenesis imperfecta
GCM2, PTH	Familial isolated hypoparathyroidism
22q11.2	DiGeorge syndrome
PHEX	Hereditary hypophosphatemic rickets

Table A.6 Lipids and obesity

Gene(s)	Endocrine condition
CETP	CETP deficiency
ABCA1	Tangier disease
LEP	Congenital leptin deficiency
Apo C-II	Hypertriglyceridemia-related disorders
LPL	Hypertriglyceridemia-related disorders
LDL-R, PCSK-9	Familial hypercholesterolemia
LCAT	Familial LCAT deficiency
MTP	Abetalipoproteinemia
Apo E	Dysbetalipoproteinemia
ABCG5	Sitosterolemia

Appendix 2: Examination of the Thyroid Gland, an Endocrine Approach

Illustration of the optimal position of the palms and use of the second, third, and fourth digits in palpating the thyroid gland in the low anterior neck

Our approach involves sequentially inspecting, palpating, percussing (where relevant), and auscultating the thyroid.

Inspection of the Thyroid Gland

- A visible anterior neck mass, which is mobile on deglutition, implies an enlarged gland. Offer the patient a glass of water to drink. The normal thyroid gland cannot be visualized on inspection.
- Positive *Pemberton's sign* is suggestive of significant retrosternal extension of a goiter.

Fig. A.1 Examination of the thyroid gland



Palpation

- Optimal positioning of the neck will facilitate palpation of the gland. The patient's neck should be in a relaxed position, which prevents extensive nuchal extension or flexion. The sternocleidomastoid muscle should not be under tension, and there should be adequate room between the chin and the sternum to allow proper positioning of the hands.
- Sequentially palpate each thyroid lobe and isthmus. Occasionally there might be an accessory extension of the isthmus – the pyramidal lobe. Check for the consistency of the gland. Avoid deep palpation if the gland is tender, as might occur in De Quervain's thyroiditis. The normal thyroid has a mild firm consistency. The overlying skin is usually freely mobile over it. If the gland is attached to the overlying skin, it might be suggestive of either a malignancy or Riedel's thyroiditis.
- Attempt to feel for any discrete thyroid nodule. These are best appreciated using the pulp of your examining fingers (second, third, and fourth digits).
- Ask the patient to swallow during palpation, and check for any retrosternal extension of the thyroid gland.
- Grade thyromegaly with the WHO classification system (see Sect. 2.3.2).
- Palpate all regional lymph node groups (I to VI).

Percussion

- Percussion of the sternal manubrium may be required in patients with a suspected retrosternal goiter. The percussion note will be dull. This step is seldom warranted, especially if there is no palpable thyroid tissue extending below the proximal portion of the manubrium (thoracic aperture).

Auscultation

- In patients with hyperdynamic circulation, as might occur in overt Graves' disease, a bruit may be appreciated over the superior poles of the thyroid in the vicinity of the superior thyroid arteries.

Appendix 3: Mnemonics in Endocrinology

Pheochromocytomas (the 10 Percent Rule)

- 10% are familial
- 10% are malignant
- 10% are extra-adrenal

More recent evidence points to a genetic cause of pheochromocytomas in up to 30% of patients. This mnemonic provides an understanding of the general behavior of these tumors.

Pheochromocytomas (8Ps of Presentation)

- Pallor (*not* flushing)
- Perspiration
- Panic
- Pain (headache)
- Postural dizziness
- Panic attack
- Palpitations
- Paradoxical hypertension in the setting of beta-receptor blockers

Insulinoma (Rule of 10s)

- 10% are malignant
- 10% are multifocal
- 10% are due to multiple endocrine neoplasia type 1
- 10% are ectopic

Insulinomas are usually unifocal and benign.

Causes of Addison's disease (ADDISON)

- Autoimmune adrenalitis (primary adrenal insufficiency)
- Drugs (inhibitors of steroidogenesis, ketoconazole, mitotane)
- Diffuse amyloid deposition (amyloidosis)
- Infectious agents (tuberculosis, human immunodeficiency virus)
- Secondary causes (hypopituitarism)
- Other causes (adrenal hemorrhage)
- Neoplasia (usually metastases from primary tumors in the lung, breast, stomach, kidney, rectosigmoid colon or melanoma)

Causes of Diabetic Ketoacidosis (6 Is)

- Infection (urinary or respiratory tract infections)
- Insulinopenia (absolute in type 1 diabetes, relative in type 2 diabetes)
- Infarction (silent myocardial infarction)
- Injury (significant trauma or stress)
- Index presentation (newly diagnosed type 1 diabetes)
- Issues of adherence to insulin therapy

Cause of Hypercalcemia (SHIFT in calcium)

- Sarcoidosis and other granulomatous diseases
- Hyperparathyroidism, hyperthyroidism, hypervitaminosis A and D
- Immobilization (increased bone resorption)
- Familial (familial hypocalciuric hypercalcemia)
- Tumors, thiazide diuretics, lithium

Clinical features of Cushing's Syndrome (MOON FACIES)

- Menstrual disorders
- Osteopenia or osteoporosis
- Obesity (central distribution of fat)
- Neurosis (depression or psychosis)
- Face (plethora, hirsutism, acne)
- Altered muscle physiology (proximal muscle weakness)
- Supraclavicular and dorsocervical fat pads
- Infection
- Elevated blood pressure
- Skin (easy bruisability)

Causes of hypoglycemia, FEELING Dizzy

- False hypoglycemia (pseudohypoglycemia not meeting Whipple's criteria)
- Exogenous (insulin or insulin secretagogue)
- Ethanol
- Liver failure
- Immune dysfunction (stimulating anti-insulin antibodies)
- Neoplastic (insulinoma or sarcomas producing IGF-2)
- Glandular dysfunction (pituitary insufficiency, adrenal insufficiency)
- Drugs (quinolones, pentamidine, beta-blockers, ACE inhibitors)

Multiple Endocrine Neoplasia Type 1 (PPP)

- Pituitary adenoma
- Pancreatic adenoma
- Parathyroid adenoma

Multiple Endocrine Neoplasia Type 2A (MPP)

- Pheochromocytoma
- Medullary thyroid carcinoma
- Parathyroid adenoma

Multiple Endocrine Neoplasia Type 2B (MPM)

- Pheochromocytoma
- Medullary thyroid carcinoma.
- Mucosal neuromas and a marfanoid body habitus

Management of Osteoporosis (ABCDE)

- Activity (weight-bearing exercise)
- **B**isphosphonates
- Calcium supplementation
- **D** (vitamin D supplementation)
- Estrogens (menopausal hormone therapy)

Causes of Gynecomastia (MAKE BREAST)

- Marijuana
- Alcohol
- Klinefelter's syndrome
- Estrogen excess
- **B**aby (circulating maternal estrogens)
- **R**eceptor blockers (ketoconazole, calcium channel blockers, and H2 blockers)
- **E**lderly
- Antineoplastic agents (alkylating agents)
- Spironolactone
- **T**umors (adrenal or testicular)

Index

A

- Acanthosis nigricans (AN), 6, 132
 - clinical features, 77
 - diabetes mellitus, 77, 78
 - estrogen resistance, 141
 - polycystic ovary syndrome, 132
- RMS
 - clinical features, 86
 - insulin resistance, 87, 88
 - insulin secretion, 87, 88
 - pathophysiology, 86
- Achlorhydria-induced gastric carcinoids, 93
- Acne, 132
- Acquired lipodystrophy syndrome, 164
- Acrochordons (skin tags), 9, 78
- Acromegaly, 9, 10
 - Acanthosis nigricans, 8–9
 - acrochordons, 9–10
 - colonic polyps, 10–11
 - frontal bossing, 9
 - hypertension, 11–12
 - prognathism, 9
 - Tinel sign, 11
- Acute abdomen, 103, 104
- Acute pancreatitis, 103, 160
- Addison's disease, 55
- Adenylyl cyclase (AC), 111
- Adipocytokine, 165
- Adiponectin, 165
- Adrenal insufficiency, 161–163
- Adult growth hormone deficiency, 14–16
 - abnormal body composition, 14–16
 - hypertriglyceridemia-induced pancreatitis management, 14
- QoL scores, 15
- Advanced glycosylated end products (AGEs), 82

- 1 α hydroxylase deficiency, 117
- Albers-Schönberg disease, 176
- Albright hereditary osteodystrophy (AHO), 111, 114
- Aldosterone-mediated sodium and water conservation, 56
- Allgrove's syndrome, 175
- Apolipoprotein CII (Apo-CII), 155
- Apoproteins/apolipoproteins, 154
- Arginine vasopressin (AVP), 19
- Aromatase deficiency, 137
- Arterial hypertension, 129
- Atrial fibrillation, 57
- Audible wheezing, 91
- Autonomic neuropathy, 84
- Autosomal dominant hypocalcemia with hypercalciuria (ADHH), 107
- Azoospermia factor (AZF) region, 138

B

- Band keratopathy/cataracts, 104, 105
- Basal insulin physiology, 88
- β adrenergic receptors, 112
- 17 β -estradiol, 140
- 11 beta-hydroxylase deficiency, 71
- 11 beta-hydroxysteroid dehydrogenase, 2
- 3beta-hydroxysteroid dehydrogenase type 2 deficiency, 70
- Bile salts, 154
- Bitemporal hemianopsia, 13–14
- Brachydactyly, 112
- Bradycardia, 28
- Bronchospasm, 91
- Brown adipose tissue, 161
- Bullosis diabeticorum, 80

C

Calcium sensing receptor (CaSR)
 kidney, 106
 parathyroid gland, 106
 Carcinoid heart disease (CHD), 92
 Carcinoid syndrome (CS), 94
 bronchospasm, 91
 carcinoid heart disease, 92
 cutaneous flushing, 89–91
 diarrhea, 90
 pellagra, 92, 93
 Cardiogenic shock, 66
 Carney complex, 12
 Carney Dyad/Carney-Stratakis syndrome, 174–175
 Carpal tunnel syndrome (CTS), 11
 Central diabetes insipidus
 NSAIDs, 20
 polyuria and polydipsia, 18, 19
 prostaglandin E2, 20
 triphasic response, 20
 Cervical lymphedema, 129
 Charcot's foot, 84
 Cholesterol esters (CEs), 154
 Chronic diarrhea, 95
 Chrousos syndrome, 62
 Chvostek's sign, 109
 Chylomicrons, 155
 Colonic polyps, 10–11
 Complete androgen insensitivity syndrome (CAIS)
 clinical features, 143
 external and internal genitalia abnormalities, 142
 normal breast tissue development, 142, 143
 pubic hair and axillary areas, 144
 undescended testes, 144
 Congenital adrenal hyperplasia, 6
 Congenital growth hormone receptor deficiency (GHRD), 18
 Congenital hyperplasia (CAH), 78
 Congenital leptin deficiency, 160, 161
 Congenital lipid hyperplasia (CLH), 70
 Congestive heart failure, 115
 Corneal arcus (CA), 151, 152
 Craniopharyngiomas, 162
 Cushings disease
 facial plethora, 4–5
 fat maldistribution, 3–4
 fragility fractures, 6, 7
 hirsutism, 5, 6
 hyperpigmentation, 7–8
 hypertension, 6
 proximal myopathy, 1–3

striae and skin atrophy, 4
 Cutaneous flushing, 89–91
 Cutaneous xanthoma, 153
 Cystic fibrosis-related diabetes (CFRD), 80

D

Dental abscess, 119
 Dental manifestations, 113
 Dermal lipids, 153
 Diabetes mellitus
 acanthosis nigricans, 77, 78
 acrochordons, 78
 diabetic dermopathy, 78
 diabetic foot
 clinical features, 83
 diabetic peripheral neuropathy, 84
 pathophysiology, 83, 84
 diabetic ketoacidosis, 81
 diabetic retinopathy
 advanced glycated end products, 82
 clinical features, 81
 fundoscopic findings, 83
 polyol pathway, 81, 82
 lipodystrophy due to insulin injections, 79
 necrobiosis lipoidica diabetorum, 78, 79
 pathophysiology, 80
 skin manifestations, 80
 Turner's syndrome, 130
 Diabetic dermopathy (DD), 78
 Diabetic dyslipidemia, 158
 Diabetic foot
 clinical features, 83
 diabetic peripheral neuropathy, 84
 insulin resistance, 84, 85
 pathophysiology, 83, 84
 Diabetic ketoacidosis (DKA), 81, 175
 Diabetic peripheral neuropathy (DPN), 83, 84
 Diabetic retinopathy
 advanced glycated end products, 82
 clinical features, 81
 fundoscopic findings, 83
 polyol pathway, 81, 82
 Diarrhea, 90
 Dietary triglycerides, 154
 Dihydrotestosterone, 132
 1,25-dihydroxy vitamin D3, 117
 Direct ophthalmoscopy, 81
 Dot-and-blot hemorrhages (NPDR), 81, 83
 Dry skin (xerosis), 29
 Dysbetalipoproteinemia, *see* Type III hyperlipoproteinemia
 Dyslipidemia, 151, 156, 158, 159
 Dyslipidemia-induced microangiopathy, 153

E

- Ectopic basal ganglia calcifications, 110
- Edward Kendall (1888-1972), 181–182
- Endogenous hypercortisolism, 6
- Enterochromaffin cells, 94
- Eruptive xanthomas (EX), 80, 152
- Estrogen receptor α gene (ESR1), 142
- Estrogen receptor β (ESR2), 142
- Estrogen resistance, 137
 - acanthosis nigricans, 141
 - clinical features, 141
 - ESR1 and ESR2 mutations, 142
 - tall stature, 141
- Euthyroid goiter with thoracic outlet syndrome
 - Horner's syndrome, 41, 42
 - nodular goiter formation, 41
 - Pemberton's sign, 39, 40
 - Riedel's thyroiditis, 41
 - superior vena cava syndrome, 40
 - WHO classification, 40

F

- Facial plethora, 4, 5
- Fahr's syndrome, 110
- Familial combined hyperlipidemia, *see* Type IIb hyperlipoproteinemia
- Familial glucocorticoid deficiency
 - generalized glucocorticoid resistance, 62
 - hyperpigmentation, 61
 - hypoglycemia, 61–63
- Familial hypercholesterolemia, *see* Type IIa hyperlipoproteinemia
- Familial hypocalciuric hypercalcemia, 106
- Familial LCAT deficiency, 159
- Fasting insulin levels, 87
- Ferriman-Gallwey score, 67, 131
- Ferrophilic fungi, 81
- Fibroblast growth factor 23 (FGF-23), 117, 119, 120
- Folic acid, 83
- Fractionated metanephrines, 65
- Fragility fractures, 104, 139
- Frank's sign, 153
- Frank-Starling law of the heart, 36, 115
- Frederick Banting (1891-1941), 180–181
- Free fatty acids (FFAs), 154, 155
- Frontal bossing, 9
- Fuller Albright (1900-1969), 179–180

G

- Galactorrhea, 12–13, 30, 31
- Gastric carcinoids, 93

- Gestational diabetes mellitus (GDM), 80
- Glucagonoma, 88, 89
- Glucocorticoid-induced osteoporosis (GIOP), 6
- Glucose transporter 4 (GLUT-4) receptors, 134
- Gonadal dysgenesis, 128, 130
- Granuloma annulare, 80
- Graves' disease, 32
 - cutaneous hyperpigmentation, 38
 - gynecomastia, 37
 - lymphadenopathy, 37
 - onycholysis, 35
 - pretibial myxedema, 34, 38
 - tachycardia, 36, 37
 - thyroid acropachy, 34, 35
 - thyroid bruit and thrill, 36
 - thyroid eye disease, 32–34
 - thyroid hormone synthesis, 38, 39
 - thyrotoxic periodic paralysis, 35
 - upper eyelid retraction, 33
 - weight loss, 38
- Growth hormone (GH) deficiency, 112
- Growth hormone-releasing hormone (GHRH) resistance, 16, 114
- Gs α gene, 113
- Guanine nucleotide binding protein, alpha stimulating (GNAS) gene, 112, 113
- Gynecomastia, 12–13, 37, 135, 137

H

- Hakaru Hashimoto (1881-1934), 178–179
- Hard exudates (NPDR), 83
- Harvey Cushing (1869-1939), 177–178
- Hashimoto's thyroiditis
 - bradycardia, 28
 - dry skin, 29
 - galactorrhea, 30, 31
 - hyporeflexia, 30
 - macroglossia, 29
 - pericardial and pleural effusions, 28
 - pituitary pseudotumor, 32
 - proximal myopathy, 30
 - Queen-Anne's sign, 27–28
- Hereditary vitamin D resistant rickets type 2
 - 1 α hydroxylase deficiency, 117
 - calcium and phosphorus homeostasis, 118
 - 1,25-dihydroxy vitamin D3, 117
 - FGF-23, 117
 - PTH, 117
 - rickets, 116, 117
- Hickam's dictum, 181
- Hirsutism, 5, 6, 14, 131

- Histiocytosis X, 172
 Homeostasis model assessment – insulin resistance (HOMA-IR), 87
 Horner's syndrome, 41, 42
 Hot flashes, 140
 Houssay phenomenon, 55
 5-HT_{2B} receptors, 92
 HVDRR-II, *see* Hereditary vitamin D resistant rickets Type 2
 Hydrolysis of TAGs, 154
 17 hydroxylase deficiency, 70
 21 hydroxylase deficiency, 71
 Hypercalcemia, 104, 106–108
 Hypergastrinemia, 103, 104
 Hyperglycemia, 80, 81, 83, 85, 96
 Hypergonadotropic hypogonadism, 138
 Hyperhidrosis, 66
 Hyperinsulinemia, 78, 85, 86, 132
 Hyperinsulinemic-euglycemic clamp, 88
 Hyperlipoproteinemia, 156–160
 Hyperparathyroidism
 acute abdomen, 103, 104
 band keratopathy, 104, 105
 clinical manifestations, 105
 fragility fractures, 104
 hypertension, 105, 106
 osteoblast-osteoclast interaction, 105
 Hyperphagia, 161
 Hyperprolactinemia, 12
 Hypertension, 55–57, 105, 106, 129
 Hypertrichosis, 86
 Hypertriglyceridemia, 160
 Hypertriglyceridemia-induced pancreatitis management, 14
 Hypocalcemia, 109–112
 Hypogonadism, 12
 Hypothalamic-pituitary-gonadal axis, 161
 Hypokalemia, 58
 Hypoparathyroidism
 Chvostek's sign, 109
 ectopic basal ganglia calcifications, 110
 hypotension, 110
 papilledema, 110
 pustular psoriasis, 111
 seizures, 109
 Trousseau's sign, 109
 Hypoplasia, 129
 Hyporeflexia, 30
 Hypotension, 110
 Hypothalamic-pituitary-testicular axis, 136
 Hypothalamic-pituitary-thyroidal axis, 161
- I**
 Idiopathic hypercalcemia, 108
 Inactivating PTH/PTHrP signaling disorders (iPPSD), 113
 Insulin-like growth factor 1 (IGF-1), 16
 Insulin resistance, 6, 84, 85
- J**
 Jerome W. Conn (1907-1994), 180
 Journal of the American Medical Association (JAMA), 110
 Juxtaglomerular apparatus, 53
- K**
 Klinefelter's syndrome (KS), 138, 139
 Koebner phenomenon, 152
 Kussmaul's breathing, 175
- L**
 Laron type dwarfism
 obesity, 16, 17
 short stature, 16
 small genitalia, 17, 18
 Latent autoimmune diabetes of adulthood (LADA), 80
 Lecithin cholesterol acyltransferase, 159
 Leptin, 161, 165
 Leptin receptor (LEPR) gene, 161
 Lipemia retinalis, 153, 154
 Lipid metabolism
 apoproteins/apolipoproteins, 154
 congenital leptin deficiency, 160, 161
 corneal arcus, 151, 152
 familial LCAT deficiency, 159
 Frank's sign, 153
 lipemia retinalis, 153, 154
 lipodystrophy syndrome (*see* Lipodystrophy syndromes)
 lipoproteins (*see* Lipoproteins)
 pancreatitis, 160
 POMC (*see* Proopiomelanocortin (POMC) deficiency)
 reverse cholesterol transport pathway, 156, 157
 Tangier disease, 159
 type I hyperlipoproteinemia, 156
 type IIa hyperlipoproteinemia, 157
 type IIb hyperlipoproteinemia, 158

type III hyperlipoproteinemia, 158
 type IV hyperlipoproteinemia, 158
 type V hyperlipoproteinemia, 158, 159
 xanthelasma, 153
 xanthomas, 152, 153
 Lipoatrophy (LA), 79
 Lipodystrophy syndromes, 79
 adipose tissue atrophy, 163
 fat loss distribution, 163
 hepatomegaly, 163
 insulin resistance, 164, 165
 mechanisms, 164
 screening for, 165
 Liphypertrophy (LH), 79
 Lipoproteins, 154
 metabolism, 154, 155
 synthesis pathway, 155
 Low-density lipoprotein (LDL), 154–156
 Lymphadenopathy, 37

M

Macroglossia, 29
 Macular edema (PDR), 83
 Male hypogonadism
 aromatase deficiency, 137
 body composition changes, 138
 estrogen resistance, 137
 fragility fracture, 137
 gynecomastia, 135, 137
 height loss, 137
 Klinefelter's syndrome, 138, 139
 normal adult testicular size, 135
 testicular volume, 134, 135
 46XX testicular disorder, 138
 Maternal Gs α gene expression, 113
 Maturity onset diabetes of the young (MODY), 80
 McCune-Albright syndrome, 12, 177
 Medullary thyroid cancer
 cervical mass, 44
 endocrine conditions, 44
 facial flushing, 44
 prophylactic total thyroidectomy, 44
 Melanocortin signaling pathways, 112
 Melanocortin type 1 receptor (MC1-R), 162
 Melanocytic nevi (MN), 130
 Melanocyte-stimulating hormone, 161
 Melanogenesis, 54
 Menopause
 body composition changes, 140
 cardioprotective effects of estrogen, 140
 fragility fractures, 139
 hot flashes, 140
 vaginal dryness, 139–141

Metformin, 83
 Microaneurysms of retinal capillaries (NPDR), 83
 Mineralocorticoid replacement therapy, 53
 Modified Ferriman–Gallway score, 131
 Monoacylglycerol (MAG), 154
 Monogenic obesity, 161
 Mosaics 45, 128
 Motor neuropathy, 84
 Mucormycosis, 81
 Multiple endocrine neoplasia (MEN)
 type 1, 12
 Muscle weakness, 57
 Myo-inositol, 83

N

Necrobiosis lipoidica diabetorum (NLD), 78, 79
 Necrolytic migratory erythema (NME), 88
 Nelson's syndrome, 7, 8
 Neovascularization (PDR), 83
 Neuroendocrine tumor cellular model, 90
 Neuroendocrine tumors (NETs), 94–96
 Niacin deficiency, 93
 Nicotinamide dehydrogenase phosphate (NADPH), 84
 NME, *see* Necrolytic migratory erythema
 Nonclassic congenital adrenal hyperplasia (NCCAH)
 clinical hyperandrogenism, 67–68
 congenital adrenal hyperplasia, 69–71
 insulin resistance, 68, 69
 steroid replacement therapy, 69
 testicular adrenal rest tumors, 68
 Non-proliferative diabetic retinopathy (NPDR), 81
 Normal adult testicular size, 135
 Normal breast tissue development, 142, 143
 Novel tryptophan hydroxylase enzyme inhibitor, 92

O

Obesity
 congenital leptin deficiency, 160, 161
 polycystic ovary syndrome, 132, 133
 proopiomelanocortin, 161
 pseudohypoparathyroidism, 112
 Occam's razor, 181
 Onycholysis, 35
 Orchidometer, 134, 135
 Organomegaly, 86
 Osteitis fibrosa cystica (OFC), 107
 Osteoblasts, 6

- Osteoclastogenesis, 115
 Osteocytes, 7
 Osteoprotegerin (OPG), 104
- P**
- Paget's disease of bone (PDB)
 cardiac manifestations, 116
 congestive heart failure, 115
 fractures and bone deformity, 114, 115
 sensorineural hearing loss, 115, 116
- Palmar xanthomas (PX), 152
- Pancreatic glands
 carcinoid syndrome (*see* Carcinoid syndrome)
 diabetes mellitus (*see* Diabetes mellitus)
 glucagonoma (*see* Necrolytic migratory erythema (NME))
 RMS (*see* Rabson-Mendenhall syndrome (RMS))
 VIPomas (*see* VIPomas)
- Pancreatic islet cells, 96
- Pancreatogenic diabetes (Type 3c DM), 80
- Parathyroid glands
 HVDRR-II (*see* Hereditary vitamin D resistant rickets Type 2 (HVDRR-II))
 hyperparathyroidism (*see* Hyperparathyroidism)
 hypoparathyroidism (*see* Hypoparathyroidism)
 PDB (*see* Paget's disease of bone (PDB))
 PHP (*see* Pseudohypoparathyroidism (PHP))
 XLHR (*see* X-linked Hypophosphatemic Rickets (XLHR))
- Parathyroid hormone (PTH)
 autosomal dominant hypocalcemia with hypercalciuria, 107
 CaSR, 106
 familial hypocalciuric hypercalcemia, 106
 osteitis fibrosa cystica, 107, 108
 skeletal effects, 108
- Parathyroid hormone-related peptide (PTHrp)
 mediated signaling, 112
- PCOS, *see* Polycystic ovary syndrome
- PDB, *see* Paget's disease of bone
- Pellagra, 92, 93
- Pendred's syndrome, 172, 173
- Persistent hyperinsulinemia, 86
- Pheochromocytomas and paraganglioma syndrome
 cardiac effects of catecholamines, 63
 cardiogenic shock, 66
 catecholamine and fractionated metanephrines, 65
 catecholamine-induced hyperglycemia, 64
 clinical features, 67
 genetic conditions, 67
 hyperhidrosis, 66
 hypertension, 63–65
 hypotension, 65
- PHP, *see* Pseudohypoparathyroidism
- Pituitary pseudotumor, 32
- Polycystic ovary syndrome (PCOS), 6, 78
 acanthosis nigricans, 132
 acne, 132
 evaluation, 134
 hirsutism, 131
 insulin resistance, 134
 obesity, 132, 133
 pathophysiology, 133
- Polyol pathway, 81, 82
- POMC, *see* Proopiomelanocortin
- Postprandial insulin physiology, 88
- Posttransplant diabetes mellitus (PTDM), 80
- Postural hypotension
 clinical features, 51
 juxtaglomerular apparatus, 52, 53
 pathophysiology, 51
- Prader orchidometer, 134, 136
- Pressure natriuresis, 58
- Pretibial myxedema (PM), 34
- Primary adrenal insufficiency
 hyperpigmentation, 53, 54
 mineralocorticoid replacement therapy, 53
 postural hypotension
 clinical features, 51
 juxtaglomerular apparatus, 52, 53
 pathophysiology, 51
- Primary hyperaldosteronism
 atrial fibrillation, 57
 dehydration, 57–59
 hypertension, 55–57
 muscle weakness, 57
 pseudohyperaldosteronism (*see* Pseudohyperaldosteronism)
 screening, 58, 59
 sodium and water-conserving effects, 58
- Prognathism, 9
- Prolactinoma
 bitemporal hemianopsia, 13–14
 galactorrhea, 12–13
 gynecomastia, 12–13
 hypogonadism, 12
- Proliferative diabetic retinopathy (PDR), 81

- Proopiomelanocortin (POMC) deficiency
 adrenal insufficiency, 162
 anorexigenic (satiety) pathway, 162
 clinical features, 162
 craniopharyngiomas, 162
 reddish hair, 161
- Propionibacterium acnes, 132
- Proprotein convertase subtilisin kexin type
 9 (PCSK9), 157
- Proximal myopathy, 30
- Pseudoglucagonoma syndrome, 89
- Pseudohyperaldosteronism
 cardiac arrest, 60
 causes, 59
 clinical manifestations, 60
 folliculitis and atopic dermatitis, 60–61
 PHA type 1 mimics, 60
- Pseudohypoparathyroidism (PHP)
 Albright hereditary osteodystrophy, 114
 brachydactyly, 112
 dental manifestations, 113
 obesity, 112
 pseudopseudohypoparathyroidism,
 113, 114
 short stature, 111, 112
- Pseudohypoparathyroidism type 1B
 (PHP1B), 113
- Pseudopseudohypoparathyroidism
 (PPHP), 113
- Pubic hair, 144
- Pustular psoriasis, 111
- Q**
- Queen-Anne's sign, 27–28
- QUICKI, 87
- R**
- Rabson-Mendenhall syndrome (RMS), 86–88
- Receptor activator of nuclear factor κ -B ligand
 (RANK-L), 7, 104
- Receptor for AGE (RAGE), 82
- Reddish hair, 161
- Renin-angiotensin-aldosterone axis, 11, 129
- Renin-angiotensin-aldosterone system
 (RAAS), 36, 106
- Resting energy expenditure (REE), 38, 140
- Retinal detachment (PDR), 83
- Reverse cholesterol transport pathway,
 156, 157
- Rhizopus species, 81
- Rickets, 116, 117
- Riedel's thyroiditis, 41, 179
- RMS, *see* Rabson-Mendenhall syndrome
- Robert Graves (1797-1853), 181
- S**
- Scleroderma diabeticorum, 80
- Secretory diarrhea, 94
- Seizures, 109
- Sensorineural hearing loss (SNHL), 115, 116
- Sensory neuropathy, 84
- Serotonin, 90, 92
- Sertoli cells (SCs), 135
- Sex hormone-binding globulin (SHBG), 140
- Sexual infantilism, 130
- Short stature, 16
 pseudohypoparathyroidism, 111, 112
 Turner's syndrome, 127, 128
 X-linked hypophosphatemic rickets,
 117, 118
- Short stature homeobox-containing (SHOX)
 gene, 128
- Simple hypertriglyceridemia, *see* Type IV
 hyperlipoproteinemia
- Skin atrophy, 4
- Skin crease, *see* Frank's sign
- Sodium-potassium adenosine triphosphatase
 (Na-K-ATPase), 106
- Somogyi effect, 175–176
- Steroid replacement therapy, 69
- Striae, 4
- Superior vena cava (SVC) syndrome, 40
- T**
- Tachycardia, 36, 37
- Tall stature, estrogen resistance, 141
- Tangier disease, 159
- TELESTAR, 92
- Telotristat ethyl, 90
- Testicular adrenal rest tumors (TARTs), 68
- Testicular volume (TV), 134, 135
- Testosterone, 132–135, 137, 138
- Thomas Addison (1793-1860), 179
- Thyroid acropachy (TA), 34, 35
- Thyroid hormone resistance syndromes
 Goiter, 42
 short stature, 42, 43
 thyroid hormone receptor alpha
 (THRA), 43
 thyroid hormone receptor beta (THRB), 43
- Thyrotoxic periodic paralysis (TPP), 35
- Triglycerides (TAGs), 154

- Trousseau's sign, 109
Tuberous xanthomas, 152
Tumor-induced osteomalacia (TIO), 119
Tumor-necrosis-factor-alpha (TNF- α), 134
Turner's syndrome (TS)
 diabetes mellitus, 130
 endocrinopathies, 130
 hypertension, 129
 lymphedema, 129
 melanocytic nevi, 130
 sexual infantilism, 130
 short stature, 127, 128
 webbed neck, 129
Type A insulin resistance,
 see Rabson-Mendenhall
 syndrome (RMS)
Type 1 diabetes mellitus (T1DM), 80
Type 2 diabetes mellitus (T2DM), 80
Type I hyperlipoproteinemia, 156
Type IIa hyperlipoproteinemia, 157
Type IIb hyperlipoproteinemia, 158
Type III hyperlipoproteinemia, 158
Type IV hyperlipoproteinemia, 158
Type V hyperlipoproteinemia, 158
- V**
Vaginal dryness, 139–141
Vasculopathy, 84
Vasoactive intestinal peptide (VIP), 95
Vellus (nonpigmented or nonsexual)
 hair, 144
- VIPoma
 biochemical abnormalities, 95
 chronic diarrhea, 95
 clinical features, 94
 effects, 95
 pathophysiology, 94
- W**
Watery diarrhea, hypokalemia, hypochlorhy-
 dria or achlorhydria (WDHA)
 syndrome, 94
Webbed neck (pterygium colli), 129
Weber and Rinne tests, 115
Wolfram syndrome (DIDMOAD), 171
- X**
Xanthelasma, 153
Xerosis, 86
X-linked hypophosphatemia (XLH), 119
X-linked hypophosphatemic rickets (XLHR)
 dental abscesses, 119
 FGF-23, 119, 120
 short stature, 117, 118
 X-linked hypophosphatemia, 119
46,XX testicular disorder, 138
XXY genotype, 138
- Z**
Zollinger-Ellison syndrome (gastrinoma), 95