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Preparing for the American Board  
of Pathology (ABPath)  
Examination of Fundamental  
Knowledge and Skills

## Chemical Pathology

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*Content Specifications*

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## Overview:

### Chemical Pathology Content Specifications

This guide outlines the content that may appear on the American Board of Pathology Chemical Pathology Subspecialty exam. It provides a framework based on the knowledge and skills typically covered in Fellow-level training, along with applicable Core and Advanced Resident topics from residency training that the trainee is expected to know or be able to perform.

#### Key to Designations:

C = Core/Foundational Knowledge

AR = Advanced Resident Knowledge

F = Fellow/Advanced Practitioner Knowledge

The exam assesses the knowledge, judgment, skills, and abilities necessary to identify specific entities, properly process specimens, and diagnose and monitor diseases using methods common in the practice of Chemical Pathology. The specific diseases, tests, and concepts listed in this document are important for candidates to know, but it is not possible to create a fully comprehensive list of all the material needed for certification and effective practice. Candidates should use this guide as a reference for preparing for certification and professional practice.

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66	1. Analytical Techniques and Safety	
67	a. Concept of Solute and Solvent	
68	i. Expressing Concentrations of Solutions	

C

69	b. Units of Measurement	
70	i. International Units, Decimal Multiples, and Submultiples of SI units	C
71	ii. Problem Areas in the Use of SI Units	C
72	iii. Standardized Reporting of Test Results	C
73	c. Safety	C
74	d. Basic Measurement Techniques and Procedures	
75	i. Centrifugation	C
76	ii. Controlling Hydrogen Ion Concentration (Buffer Solution)	C
77	iii. Procedures for Processing Solutions	
78	(Dilution, Evaporation, Filtration)	AR
79	iv. Viscosity	AR
80	v. Extraction	F
81	vi. Gravimetry	F
82	vii. Measurement of Radioactivity	F
83	e. Interference with Testing, General	AR
84	f. Chemicals	
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86	ii. Ultrapure Reagents	F
87	g. Reference Materials (Primary, Secondary, Standard, Certified)	F
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89	<b>2. Specimen Collection and Processing</b>	
90	a. Patient Preparation	C
91	b. Handling of Specimens for Testing	C
92	i. Maintenance of Specimen Identification	C
93	ii. Preservation of Specimens in Transit	C
94	iii. Separation and Storage of Specimens	C
95	iv. Transport of Specimens	C
96	c. Specimens	
97	i. Blood	
98	1. Venipuncture (Prolonged Occlusions; Order of Draw)	C
99	2. Additives	
100	(EDTA, Heparin, Citrate, Fluoride, Oxalate, ACD, Gel)	C
101	3. Infant (Heel Stick, Small Needles)	C
102	4. Hemolysis	C
103	ii. Urine (Timed, Random, Preservatives)	C
104	iii. Cerebrospinal Fluid	C
105	iv. Pleural, Pericardial, and Ascitic Fluids	C
106	d. Feces (Timed, Random)	AR
107	e. Synovial Fluid	AR
108	f. Amniotic Fluid (Amniocentesis)	AR
109	g. Saliva	AR
110	h. Solid Tissue	F
111	i. Hair and Finger Nails	F

112		
113	<b>3. Optical Techniques</b>	
114	a. Nature of Light	C
115	b. Spectrophotometry	
116	(Beer's Law, Wavelengths, Calibration, Performance Checks)	C
117	c. Fluorometry	AR
118	d. Chemiluminescence, Bioluminescence, Electrochemiluminescence	AR
119	e. Nephelometry and Turbidimetry	AR
120	f. Atomic Absorption Spectrophotometry	F
121		
122	<b>4. Electrochemistry and Chemical Sensors</b>	
123	a. Potentiometry and Ion-Selective Electrodes	AR
124	b. Voltammetry/Amperometry	AR
125	c. Conductometry	F
126	d. Coulometry	F
127	e. Optical Chemical Sensors	F
128	f. Biosensors	F
129		
130	<b>5. Electrophoresis</b>	
131	a. Theory of Electrophoresis	C
132	b. Conventional Electrophoresis (Slab Gel, IEF, 2-D)	C
133	c. Capillary Electrophoresis	C
134		
135	<b>6. Chromatography</b>	
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137	i. Ion-Exchange Chromatography	AR
138	ii. Partition Chromatography	AR
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140	iv. Affinity Chromatography	AR
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142	b. Column Chromatography	AR
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144	ii. Liquid Chromatography	AR
145	c. Qualitative and Quantitative Analyses in Chromatography	AR
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148		
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151	b. Clinical Applications	
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153	ii. Liquid Chromatography	AR
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155	iv. SELDI Mass Spectrometry	F
156	v. ICP Mass Spectrometry	F
157	vi. TOF Mass Spectrometry	F
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160	ii. Vacuum System	F
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164		
165	<b>8. Enzyme and Rate Analyses</b>	
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168	i. Measurement of Reaction Rates	AR
169	ii. Measurement of Enzyme Mass Concentration	AR
170	iii. Enzymes as Analytical Reagents	AR
171	iv. Measurement of Isoenzymes and Isoforms	AR
172	v. Units for Expressing Enzyme Activity	F
173	vi. Measurement of Substrates	F
174	vii. Optimization, Standardization, and Quality Control of Enzymes	F
175	c. Enzyme Kinetics	
176	i. The Enzyme-Substrate Complex	F
177	ii. Factors Governing the Rate of Enzyme-Catalyzed Reactions	
178	(Michaelis-Menton, Temperature, Substrate Concentration,	
179	pH, Inhibitor)	F
180		
181	<b>9. Principles of Immunochemical Techniques</b>	
182	a. Basic Concepts	
183	i. General Characteristics of Antigen-Antibody Reaction	C
184	ii. Characteristics of Antibodies (Polyclonal, Monoclonal)	C
185	iii. Characteristics of Antigens and Immunogens	AR
186	b. Overview of General Principles of Immunoassay	
187	i. Classes of Immunoassay	C
188	ii. Competitive Immunoassays	C
189	iii. Noncompetitive Immunoassay (Sandwich, ELISA)	C
190	iv. Interferences in Immunoassays (HAMA)	C
191	v. High-Dose Hook Effect	C
192	c. Antigen Antibody Binding	
193	i. Antigen Excess	C
194	ii. Binding Forces	F

195	iii. Reaction Mechanism	F
196	iv. Kinetics of Antigen-Antibody Reaction	F
197	v. Factors Influencing Binding (Ionic Strength, Polymer Effect)	F
198	d. Qualitative Methods	
199	i. Immunofixation Electrophoresis (IFE)	C
200	ii. Western Blotting	AR
201	iii. Dot Blotting	AR
202	iv. Principle of Precipitin Reaction	F
203	e. Quantitative Methods	
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205	ii. Particle Immunoassay	
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207	2. Latex Agglutination	AR
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210	f. Enzyme Immunoassays	
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212	1. Enzyme Immunoassays	AR
213	2. Fluorescent Immunoassays	AR
214	3. Chemiluminescent Immunoassays	AR
215	ii. Homogeneous Immunoassays (e.g., EMIT, CEDIA)	C
216	g. Simultaneous Multiple Immunoassays (e.g., Flow Cytometry, Luminex)	AR

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## 218 10. Point-of-Care Testing

219	a. Analytical and Technological Considerations	
220	i. Requirements and Design	C
221	ii. POCT Applications & Assays	C
222	1. Drugs of Abuse	C
223	2. Urinalysis	C
224	3. Glucose Strips and Meters	C
225	4. Hematology & Coagulation	C
226	5. Infectious Disease	C
227	6. Pregnancy Test	C
228	7. Blood Gases, Electrolytes, Other	C
229	8. Transcutaneous Bilirubin	F
230	b. Implementation Considerations for POCT	AR

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## 232 11. Peptides and Proteins

233	a. Interpretation of Protein Electrophoresis & Immunofixation	
234	i. Serum, Non-Monoclonal Gammopathy	
235	1. Hepatic Cirrhosis	C
236	2. Bisalbumin	C

237	3. Acute Phase Reaction	C
238	4. Chronic Inflammation	C
239	5. Alpha-1-Antitrypsin	C
240	6. Fibrinogen	C
241	7. Hypogammaglobulinemia	C
242	8. Nephrotic Syndrome	C
243	9. Hemolysis	AR
244	10. Radio Contrast Dyes	F
245	11. IgG4	F
246	ii. Serum, Monoclonal Gammopathy	
247	(Myeloma, MGUS, Waldenström)	
248	1. IgG, IgA Paraproteins	C
249	2. IgM Paraproteins	C
250	3. IgD, IgE Paraproteins	C
251	4. Kappa & Lambda Light Chains	C
252	5. Cryoglobulins	C
253	6. Therapeutic Antibodies	C
254	iii. Urine, Non-Monoclonal Gammopathy	C
255	iv. Urine, Monoclonal Gammopathy	C
256	1. Intact Immunoglobulin	C
257	2. Light Chain (Bence Jones)	C
258	v. Light Chains, Serum	
259	vi. CSF Electrophoresis	AR
260	1. Beta-Transferrin in CSF	AR
261	2. CSF Findings in Multiple Sclerosis	
262	(Oligoclonal immunoglobulin bands in CSF, Albumin, IgG)	AR
263		
264	<b>12. Enzymes</b>	
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267	ii. Aldolase	F
268	b. Liver Enzymes	
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270	ii. Alkaline Phosphatase	C
271	iii. Gamma-Glutamyl Transferase	C
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274	ii. Lipase	C
275	iii. Trypsin	F
276	d. Red Cell Enzymes	
277	i. Hexose Monophosphate Pathway (G6PD)	AR
278	ii. The Embden-Meyerhof Pathway (Pyruvate Kinase)	F
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281	ii. Acid Phosphatase	F
282	f. Other Enzymes	
283	i. Lactate Dehydrogenase	C
284	ii. Cholinesterase	AR

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### 286 13. Tumor Markers

287	a. Clinical Utility of Tumor Markers	
288	i. Distribution of Tumor Marker Values	C
289	ii. Disease Management using Tumor Markers	C
290	b. Individual Tumor Markers	
291	i. Prostate-Specific Antigen	C
292	ii. Alpha Fetoprotein	C
293	iii. Beta-2-Microglobulin	C
294	iv. Carcinoembryonic Antigen	C
295	v. CA 15-3	C
296	vi. CA 125	C
297	vii. CA 19-9	C
298	viii. Thyroglobulin and Antibodies	C
299	ix. Calcitonin	AR
300	x. S-100 Proteins	F
301	xi. Chromogranins	F
302	xii. Neuron-Specific Enolase	F

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### 304 14. Carbohydrates

305	a. Chemistry of Carbohydrates,	
306	including Disaccharides, Polysaccharides, and Glycoproteins	C
307	b. Metabolism of Carbohydrates	
308	i. Digestion and Absorption of Carbohydrates	AR
309	ii. Intermediary Metabolism of Carbohydrates	AR
310	iii. Regulation of Blood Glucose Concentration	AR
311	c. Determination of Glucose	
312	i. Specimen Collection and Storage for Glucose	C
313	ii. Glucose Methods	C
314	iii. Glucose Reference Intervals	C
315	iv. Measurement of Glucose in Urine	C
316	v. Self-Monitoring of Blood Glucose	F
317	vi. Minimally Invasive Monitoring of Blood Glucose	F
318	d. Diabetes Mellitus	
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320	ii. Pathogenesis of Type 1 Diabetes Mellitus	C
321	iii. Pathogenesis of Type 2 Diabetes Mellitus	C
322	iv. Diagnosis of Diabetes Mellitus	C

323	v. Chronic Complications of Diabetes Mellitus	C
324	vi. Role of the Clinical Laboratory in Diabetes Mellitus	C
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327	ii. Glycated Fructosamine and Glycated Albumin	F
328	f. Ketone Bodies	
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330	ii. Determination of Ketone Bodies	C
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333	ii. Hypoglycemia in Neonates and Infants	AR
334	iii. Fasting Hypoglycemia in Adults	AR
335	iv. Postprandial Hypoglycemia	AR
336	v. Hypoglycemia in Diabetes Mellitus	AR
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339	i. Clinical Significance of Urinary Albumin	C
340	ii. Methods of Measuring Urinary Albumin	C
341	j. Autoantibodies of Diabetes Mellitus	F
342	i. Islet Cell Autoantibodies	F
343	ii. Insulin Autoantibodies	F
344	iii. Glutamic Acid Decarboxylase Autoantibodies	F
345	k. Glycogen Storage Disease	F
346		
347	<b>15. Lipids, Lipoproteins and Apolipoproteins</b>	
348	a. Cholesterol, HDL Cholesterol, LDL cholesterol, and Triglycerides	C
349	b. Apolipoprotein B	AR
350	c. Lipoprotein A	AR
351	d. Apolipoprotein A and E	F
352		
353	<b>16. Electrolytes and Blood Gases</b>	
354	a. Electrolytes	
355	i. Specimen for Electrolyte Determinations	C
356	ii. Sodium	
357	(Hypo-(e.g., SIADH) and Hypernatremia (e.g., Dehydration))	C
358	iii. Potassium	C
359	iv. Electrolyte Exclusion Effect	C
360	v. Chloride	C
361	vi. Bicarbonate	C
362	vii. Anion Gap	C
363	b. Plasma and Urine Osmolality	C
364	c. Blood Gases and pH	

365	i. Preanalytical Issues	C
366	ii. Cooximetry	C
367	iii. Determination of pCO <sub>2</sub> , pO <sub>2</sub> , and pH	C
368	iv. Temperature Correction of Measured pCO <sub>2</sub> , pO <sub>2</sub> , and pH	F
369	d. Sweat Testing	
370	i. Qualitative Screening Tests	F
371	ii. Quantitative Confirmatory Tests	F
372	iii. Reference Intervals for Sweat Chloride	F
373	iv. Sweat Stimulation and Collection	F
374	v. Sources of Error in Sweat Testing	F
375	vi. Sweat Testing Quality Assurance	F
376		
377	<b>17. Hormones</b>	
378	a. Hormone Classification	
379	i. Polypeptide or Protein Hormones	AR
380	ii. Steroid Hormones	AR
381	iii. Amino Acid-Related Hormones	AR
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383	<b>18. Catecholamines and Serotonin</b>	
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386	ii. Neuroblastoma	AR
387	iii. Carcinoid	AR
388	iv. Dysautonomias and Genetic Disorders	F
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393	ii. Folic Acid	C
394	iii. Vitamin B1, Thiamine	AR
395	iv. Vitamin B2, Riboflavin	AR
396	v. Vitamin B6, Pyridoxine, Pyridoxamine, and Pyridoxal	AR
397	vi. Vitamin A	F
398	vii. Vitamin E	F
399	viii. Vitamin C, Ascorbic Acid	F
400	ix. Biotin	F
401	x. Niacin and Niacinamide	F
402	b. Nutritional Trace Elements	
403	i. Laboratory Assessment of Nutritional Trace Element Status	F
404	ii. Individual Nutritional Trace Element	
405	(e.g., Cobalt, Copper, Zinc, Manganese, Molybdenum,	

406	Iodine, Bromine, and Selenium)	F
407	c. Iron, Transferrin, Hemochromatosis, Ferritin, and Hemoglobin	C
408	d. Hemoglobinopathy Variants and Thalassemias	
409	i. HPLC	C
410	ii. Capillary Electrophoresis	C
411	iii. Alkaline & Acid Electrophoresis	AR
412	iv. Isoelectric Focusing	F
413	v. Other Hemoglobinopathy Analysis	F

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## 415 20. Porphyrins and Disorders of Porphyrin Metabolism

416	a. Abnormalities of Porphyrin Metabolism	
417	i. The Porphyrins	
418	1. Acute Intermediate Porphyria	C
419	2. Porphyria Cutanea Tarda	C
420	3. Other Inherited Porphyrins	F
421	ii. Abnormalities of Porphyrin Metabolism Not Caused by Porphyria	F
422	iii. Pseudoporphyria	F
423	b. Laboratory Diagnosis of Porphyria	
424	i. Patients with Symptoms of Porphyria	C
425	ii. Relatives of Patients with Porphyria	F
426	c. Porphyrin Chemistry	
427	i. Structure and Nomenclature, Chelation of Metals	F
428	ii. Spectral Properties and Solubility	F
429	d. Heme Biosynthesis	
430	i. Enzymes of Heme Biosynthesis	F
431	e. Excretion of Heme Precursors	F
432	f. Regulation of Heme Biosynthesis	F
433	g. Analytical Methods	
434	i. Methods of Metabolites	F
435	ii. Methods of Blood Porphyrins	F
436	iii. Analysis of Plasma Porphyrins	F
437	iv. Enzyme Measurements	F

438

## 439 21. Therapeutic Drugs and Their Management

440	a. Definitions and Basic Concepts	
441	i. Mechanism of Action	AR
442	ii. Pharmacokinetics	AR
443	iii. Drug Disposition	AR
444	iv. Clinical Utility	AR
445	v. Analytical Techniques	AR
446	vi. Pharmacogenetics	AR
447	b. Specific Drug Groups	

448	i. Antiepileptic Drugs	C
449	ii. Antibiotics	C
450	iii. Immunosuppressants	C
451	iv. Cardioactive Drugs	AR
452	v. Bronchodilators	AR
453	vi. Antiretrovirals	AR
454	vii. Antipsychotic Drugs	AR
455	viii. Antimetabolites	AR

456

457 **22. Clinical Toxicology**

458	a. Screening Procedures for Detection of Drugs (General)	C
459	i. Immunoassay	AR
460	ii. High-Performance Liquid Chromatography	AR
461	iii. Gas Chromatography	F
462	b. Pharmacology and Analysis of Specific Drugs and Toxic Agents	
463	i. Alcohols	C
464	ii. Analgesics (Non-Prescription)	C
465	iii. Ethylene Glycol	C
466	iv. Drugs of Abuse	C
467	v. Cyanide	F

468

469 **23. Toxic Metals**

470	a. Specific Metals	
471	i. Iron	C
472	ii. Lead	C
473	iii. Arsenic	AR
474	iv. Copper, Ceruloplasmin, Wilson Disease	AR
475	v. Mercury	AR
476	vi. Aluminum	F
477	vii. Antimony	F
478	viii. Beryllium	F
479	ix. Cadmium	F
480	x. Chromium	F
481	xi. Cobalt	F
482	xii. Manganese	F
483	xiii. Nickel	F
484	xiv. Platinum	F
485	xv. Selenium	F
486	xvi. Silicon	F
487	xvii. Silver	F
488	xviii. Thallium	F
489	b. Occupational Monitoring	AR

490		
491	<b>24. Cardiac Function</b>	
492	a. Cardiac Disease	
493	i. Congestive Heart Failure	C
494	ii. Acute Coronary Syndromes	C
495	b. Cardiac Biomarkers, Analytic Measurement, and Clinical Utility	
496	i. Cardiac Troponin I and T	C
497	ii. Brain Natriuretic Peptide and NT-proBNP	C
498	iii. C-Reactive Protein	C
499	iv. Myoglobin	AR
500	v. Homocysteine	F
501		
502	<b>25. Kidney Disease</b>	
503	a. Kidney Function and Physiology	
504	i. Endocrine Function	C
505	ii. Glomerular Filtration	C
506	b. Diseases of the Kidney	
507	i. Chronic Kidney Disease	C
508	ii. End-Stage Renal Disease	C
509	iii. Diabetic Nephropathy	C
510	iv. Glomerular Diseases	C
511	v. Acute Kidney Injury	C
512	vi. Polycystic Kidney Disease	C
513	vii. Renal Calculi	C
514	viii. Tubular Diseases	AR
515	c. Kidney Function Tests	
516	i. Creatinine	C
517	ii. Urea	C
518	iii. Uric Acid	C
519	iv. Cystatin C	C
520	v. Urinary Osmolality (Assessment of Renal Concentrating Ability)	AR
521	vi. Screening for Kidney Disease	C
522	1. Urinalysis	C
523	2. Microscopic Examination of Urine	C
524	vii. Proteinuria (Quantitative Assessment of Glomerular Permeability)	C
525	1. Clinical Significance of Proteinuria	C
526	2. Specimen Collection for Total Protein and	
527	Albumin Measurement	C
528	3. Measurement of Urine Total Protein	C
529	viii. Estimation of Glomerular Filtration Rate (GFR)	
530	(Assessment of Kidney Function)	
531	1. The Concept of Clearance	C

532	2. Markers Used for GFR	C
533	3. GFR at the Extremes of Age	C
534		
535	<b>26. Physiology &amp; Disorders of Water, Electrolyte, and Acid-Base Metabolism</b>	
536	a. Water and Electrolytes-Composition of Body Fluids	C
537	b. Acid-Base Disorders	C
538	i. Metabolic Acidosis (Primary Bicarbonate Deficit)	C
539	ii. Metabolic Alkalosis (Primary Bicarbonate Excess)	C
540	iii. Respiratory Acidosis	C
541	iv. Respiratory Alkalosis	C
542		
543	<b>27. Liver Disease</b>	
544	a. Diseases of the Liver	
545	i. Disorders of Bilirubin Metabolism	C
546	ii. Hepatic Viral Infections	C
547	1. Acute Viral Hepatitis	C
548	2. Chronic Viral Hepatitis	C
549	iii. Autoimmune Hepatitis	C
550	iv. Alcoholic Liver Disease	C
551	v. Hyperbilirubinemia of the Newborn	C
552	vi. Fatty Liver Disease	AR
553	vii. Cholestatic Liver Disease	
554	1. Obstruction	AR
555	2. Primary Biliary Cirrhosis	F
556	3. Primary Sclerosing Cholangitis	F
557	viii. Cirrhosis/Fibrosis	F
558		
559	b. Diagnostic Liver Tests	
560	i. Hepatic Enzymes	C
561	ii. Albumin	C
562	iii. Prothrombin Time	C
563	iv. Bilirubin	C
564	v. Antinuclear Autoantibodies	AR
565	vi. Antimitochondrial Autoantibodies	AR
566	vii. Smooth Muscle Autoantibodies	F
567	viii. Liver-Kidney Microsomal Autoantibodies	F
568		
569	<b>28. Gastric, Pancreatic, and Intestinal Function</b>	
570	a. Intestinal Disorders and Their Laboratory Investigation	
571	i. Celiac Disease (Celiac Sprue, Gluten-Sensitive Enteropathy)	AR
572	1. IgA and IgG anti-tissue transglutaminase (anti-tTG)	AR

573	2. IgG and IgA anti-deamidated gliadin	AR
574	ii. Ulcerative Colitis and Crohn Disease	AR
575	1. Anti-Saccharomyces cerevisiae (ASCA)	AR
576	2. Calprotectin	AR
577	iii. Disaccharidase Deficiencies	F
578	iv. Bacterial Overgrowth	F
579	b. Pancreatic Insufficiency	AR
580	c. Investigation of Maldigestion/Malabsorption	
581	i. Evaluation of Fat Absorption	
582	1. Fecal Pancreatic Elastase	AR
583	2. Fecal Fat	F
584	d. Investigation of Chronic Diarrhea (General Considerations)	
585	i. Laxative Abuse	F
586	ii. Fecal Osmotic (Osmolal) Gap	F
587	e. Gastrointestinal Regulatory Peptides	
588	i. Gastrin	F
589	ii. Vasoactive Intestinal Polypeptide	F
590	iii. Glucose-Dependent Insulinotropic Peptide	
591	(GIP, Gastric Inhibitory Polypeptide)	F

592

## 593 29. Mineral and Bone Metabolism

594	a. Overview of Bone and Mineral Calcium	
595	i. Biochemistry, Physiology, and Clinical Significance of Calcium	C
596	ii. Measurement of Calcium	C
597	iii. Patient Preparation and Sources of Preanalytical Error for	
598	Total and Free Calcium Measurements	AR
599	iv. Interpretation of Total and Free Calcium Results	AR
600	v. Urinary Calcium	F
601	b. Magnesium	
602	i. Biochemistry, Physiology, and Clinical Significance of Magnesium	C
603	ii. Measurement of Total Magnesium	C
604	c. Hormones Regulating Mineral Metabolism	
605	i. Parathyroid Hormone	C
606	ii. Vitamin D and its Metabolites	C
607	iii. Parathyroid Hormone-Related Protein	F
608	d. Phosphate	
609	i. Measurement of Phosphate	AR
610	e. Biochemical Markers of Bone Turnover	
611	i. Markers of Bone Resorption	AR
612	ii. Markers of Bone Formation	AR

613



614	<b>30. Pituitary Function</b>	
615	a. Prolactin	C
616	b. Corticotropin (Adrenocorticotropin) and Related Peptides	C
617	c. Gonadotropins (Follicle-Stimulating Hormone and Luteinizing Hormone)	C
618	d. Thyrotropin	C
619	e. Growth Hormone and Insulin-Like Growth Factors	AR
620	f. Arginine Vasopressin	AR
621	g. Oxytocin	AR
622		
623	<b>31. The Adrenal Cortex</b>	
624	a. Adrenocortical Steroids	
625	i. General Biochemistry and Metabolism of Adrenocortical Steroids	C
626	ii. The Hypothalamic-Pituitary-Adrenal Cortical Axis	C
627	iii. Regulation of Adrenal Hormones	C
628	b. Pre-Analytical Testing Issues	
629	i. Hypofunction of the Adrenal Cortex	AR
630	ii. Hyperfunction of the Adrenal Cortex	AR
631	c. Disorders of the Adrenal Cortex	
632	i. Choice of Specimen (e.g., plasma, saliva)	C
633	ii. Time of Day	C
634		
635	<b>32. Thyroid</b>	
636	a. Thyroid Hormones	
637	i. Chemistry, Biological Function, & Biochemistry of Thyroid Hormones	C
638	ii. Metabolism and Physiology of Thyroid Hormones	C
639	b. Thyroid Dysfunction	
640	i. Hypothyroidism (e.g., Hashimoto Thyroiditis)	C
641	ii. Hyperthyroidism (Graves Disease)	C
642	iii. Non-Thyroidal Illnesses affecting Thyroid Function	C
643	c. Thyroid Hormones and Binding Proteins	
644	i. Thyroid-Stimulating Hormone	C
645	ii. Thyroxine (T4)	C
646	iii. Triiodothyronine (T3)	C
647	iv. Free Thyroid Hormones	C
648	v. Thyroglobulin	C
649	vi. Anti-Thyroid Peroxidase Autoantibodies	C
650	vii. Anti-Thyroglobulin Autoantibodies	C
651	viii. Anti-Thyroid-Stimulating Hormone Receptor Autoantibodies	C
652	ix. Reverse Triiodothyronine (rT3)	F
653	x. Thyroxine-Binding Globulin	F
654		

655	<b>33. Reproductive Related Disorder</b>	
656	a. Male Reproductive Biology	
657	i. Male Reproductive Development and Abnormalities	AR
658	b. Female Reproductive Biology	
659	i. Female Reproductive Development	C
660	ii. Female Reproductive Abnormalities	C
661	iii. Normal Menstrual Cycle	C
662	iv. Ovulation	C
663	v. Irregular Menses	AR
664	c. Reproductive Tests	
665	i. Total Testosterone	C
666	ii. Free and Weakly Bound Testosterone	C
667	iii. Estrogens (e.g., Estradiol, Estrone, Estriol)	C
668	iv. Progesterone	C
669	v. Dehydroepiandrosterone Sulfate (DHEAS)	AR
670	vi. Testosterone Precursors and Metabolites	F
671	vii. Anabolic Steroids	F

672

673	<b>34. Clinical Chemistry of Pregnancy</b>	
674	a. Human Pregnancy	
675	i. Maternal Adaptation to Pregnancy	AR
676	b. Maternal and Fetal Health Assessment	
677	i. Detection and Dating of Pregnancy	C
678	c. Complications of Pregnancy	
679	i. Trophoblastic Disease	C
680	ii. Abnormal Pregnancies	
681	(e.g., Preeclampsia, Ectopic, HELLP syndrome, Thyroid Disorders)	AR
682	iii. Preterm Delivery	AR
683	d. Maternal Serum Screening for Fetal Defects	
684	i. Clinical Application or Prenatal Screening	AR
685	e. Laboratory Tests	
686	i. Chorionic Gonadotropin	C
687	ii. Cell-Free Fetal DNA for Aneuploidy	C
688	iii. Alpha Fetoprotein	AR
689	iv. Unconjugated Estriol	AR
690	v. Dimeric Inhibit A	AR
691	vi. Placental Plasma Protein A	AR
692	vii. Fetal Fibronectin	AR
693	viii. Amniotic Fluid Bilirubin	F

694

695	<b>35. Inborn Errors of Amino Acid, Organic Acid, and Fatty Acid Metabolism</b>	
696	a. Biochemical Diagnosis	

697	i. Newborn Screening	C
698	ii. Evaluation of Symptomatic Patients	AR
699	iii. Prenatal Diagnosis	F
700	iv. Postmortem Screening	F
701	b. Disorders of Amino Acid Metabolism	
702	i. Classic Phenylketonuria and Other Hyperphenylalaninemas	F
703	ii. Tyrosinemia Type 1	F
704	iii. Homocystinuria	F
705	iv. Maple Syrup Urine Disease	F
706	v. Urea Cycle Defects	F
707	vi. Nonketotic Hyperglycemia	F
708	c. Disorders of Organic Acid Metabolism	
709	i. Disorders of Propionate Metabolism	F
710	ii. Isovaleric Acidemia	F
711	iii. Glutaric Acidemia Type I	F
712	iv. Ethylmalonic Encephalopathy	F
713	d. Disorders of Fatty Acid Oxidation	
714	i. Very Long-Chain Acyl-CoA Dehydrogenase Deficiency	F
715	ii. Trifunctional Protein and Long-Chain 3-Hydroxy Acyl-CoA	
716	Dehydrogenase Deficiencies	F
717	iii. Medium-Chain Acyl-CoA Dehydrogenase Deficiency	F
718	iv. Short-Chain Acyl-CoA Dehydrogenase Deficiency	F
719	e. Disorders of Carbohydrates	
720	i. Galactosemia	F

721

## 722 36. Laboratory Evaluation of Immunoglobulin Function and Humoral Immunity

723	a. Immunoglobulins	
724	i. Immunoglobulin M, IgM	C
725	ii. Immunoglobulin G, IgG	C
726	1. IgG Subclasses	AR
727	iii. Immunoglobulin A, IgA	C
728	iv. Free Light Chains, Serum	C
729	v. Immunoglobulin D, IgD	AR
730	vi. Immunoglobulin E, IgE	AR
731	b. Allergic Diseases	AR
732	c. Infectious Diseases	
733	i. Hepatitis A, B, and C	C
734	ii. HIV	C
735	iii. Syphilis	C
736	iv. EBV	C
737	v. Sepsis Evaluation (e.g., Lactate, Procalcitonin)	C
738	vi. Lyme Disease	AR
739	vii. Toxoplasma	AR

740	viii. MMR	AR
741	ix. SARS-CoV-2	AR
742	x. HSV	AR
743	xi. Tuberculosis (Interferon Gamma Release Assays)	AR
744	xii. HTLV I/II	F
745	xiii. CMV	F
746	xiv. <i>Bartonella</i>	F
747	xv. <i>Coxiella</i>	F

748

### 749 37. Mediators of Inflammation: Complement, Cytokines, and Adhesion Molecules

750	a. Structure and Function of the Complement System	
751	i. The Classical Pathway	AR
752	ii. The Alternative Pathway	AR
753	iii. The Mannan-Binding Lectin Pathway	F
754	iv. Terminal Complement Components	F
755	v. Anaphylatoxins	F
756	vi. Regulation of Complement Activation	F
757	vii. Complement Genetics	F
758	viii. Complement and Acquired Immunity	F
759	b. Complement in Disease States	
760	i. Rheumatologic Diseases	AR
761	ii. Hereditary Angioedema	AR
762	iii. Infectious Diseases	AR
763	iv. Renal Diseases	AR
764	v. Hematologic Diseases	AR
765	c. Assays of Complement	
766	i. Functional Assays	AR
767	ii. Antigenic Assays	AR
768	d. Cytokines	
769	i. General Information	AR
770	ii. Interleukin-6	F

771

### 772 38. Immunodeficiency Disorders (e.g., Neutrophil Oxidative Burst Activity) F

773

### 774 39. Rheumatological Diseases

775	a. Anti-Nuclear Antibody Methods and Interpretations	
776	i. ANA by Indirect Immunofluorescence	C
777	ii. ANA by EIA	C
778	iii. ANA by Multiplex Bead Assays	C
779	b. Specific Autoantibodies in Diseases	
780	i. Systemic Lupus Erythematosus	C

781	ii. Sjögren Syndrome	AR
782	iii. Rheumatoid Arthritis (e.g., Rheumatoid Factor, Anti-CCP)	AR
783	iv. Polymyositis and Dermatomyositis (Anti-Jo-1)	AR
784	v. Antiphospholipid Syndrome (e.g., B2GP1, Cardiolipin, PS/PT)	AR
785	vi. Mixed Connective Tissue Disease	AR
786		
787	<b>40. Vasculitis</b>	
788	a. Antineutrophil Cytoplasmic Antibody	C
789	i. c-ANCA (PR3)	C
790	ii. p-ANCA (Myeloperoxidase)	C
791	b. Polyarteritis Nodosa	AR
792	c. Churg-Strauss Syndrome	AR
793	d. Microscopic Polyangiitis	AR
794	e. Granulomatosis with Polyangiitis	AR
795		
796	<b>41. Neurological Autoimmunity</b>	
797	a. Myasthenia Gravis (e.g., ACHR)	C
798	b. Multiple Sclerosis	
799	i. Myelin Basic Protein	AR
800	ii. Oligoclonal Bands on CSF IEF	AR
801	iii. CSF IgG Synthesis Rate	F
802		
803	<b>42. Chemical Pathology-Specific Administration and Laboratory Management</b>	
804	a. Administration and Laboratory Management in Clinical Chemistry	C
805	i. Laboratory Management	F
806	ii. Rules and Regulations	F
807	iii. Laboratory Inspections	F
808	iv. QA/QC Issues	F
809	b. Automation in the Clinical Laboratory	C
810	c. Implementation and Management Considerations for POCT	
811	i. General Considerations	C
812	ii. Informatics and POCT	AR
813		
814		