Nephrology
Certification Examination Blueprint

**Purpose of the exam**

The exam is designed to evaluate the knowledge, diagnostic reasoning, and clinical judgment skills expected of the certified nephrologist in the broad domain of the discipline. The ability to make appropriate diagnostic and management decisions that have important consequences for patients will be assessed. The exam may require recognition of common as well as rare clinical problems for which patients may consult a certified nephrologist.

**Exam content**

Exam content is determined by a pre-established blueprint, or table of specifications. The blueprint is developed by the ABIM and is reviewed annually and updated as needed for currency. Trainees, training program directors, and certified practitioners in the discipline are surveyed periodically to provide feedback and inform the blueprinting process.

The primary medical content categories of the blueprint are shown below, with the percentage assigned to each for a typical exam:

<table>
<thead>
<tr>
<th>Medical Content Category</th>
<th>% of Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium and Water Abnormalities</td>
<td>8%</td>
</tr>
<tr>
<td>Acid-Base and Potassium Disorders</td>
<td>9%</td>
</tr>
<tr>
<td>Calcium, Phosphorus, and Magnesium Disorders and Stones</td>
<td>4%</td>
</tr>
<tr>
<td>Chronic Kidney Disease</td>
<td>22%</td>
</tr>
<tr>
<td>Hypertension</td>
<td>10%</td>
</tr>
<tr>
<td>Tubular, Interstitial, and Cystic Disorders</td>
<td>4%</td>
</tr>
<tr>
<td>Glomerular and Vascular Disorders</td>
<td>12%</td>
</tr>
<tr>
<td>Kidney Transplantation</td>
<td>11%</td>
</tr>
<tr>
<td>Pharmacology</td>
<td>5%</td>
</tr>
<tr>
<td>Acute Kidney Injury and Intensive Care Unit Nephrology</td>
<td>15%</td>
</tr>
</tbody>
</table>

100%
Exam questions in the content areas above may also address clinical topics in adolescent medicine, critical care medicine, clinical epidemiology, geriatric medicine, and nutrition that are important to the practice of nephrology.

**Exam format**

The exam is composed of multiple-choice questions with a single best answer, predominantly describing patient scenarios. Questions ask about the work done (that is, tasks performed) by physicians in the course of practice:

- Making a diagnosis
- Ordering and interpreting results of tests
- Recommending treatment or other patient care
- Assessing risk, determining prognosis, and applying principles from epidemiologic studies
- Understanding the underlying pathophysiology of disease and basic science knowledge applicable to patient care

Clinical information presented may include patient photographs, ultrasound images, angiograms, micrographs, radiographs, electrocardiograms, and other media to illustrate relevant patient findings.

A tutorial including examples of ABIM exam question format can be found at [http://www.abim.org/certification/exam-information/nephrology/exam-tutorial.aspx](http://www.abim.org/certification/exam-information/nephrology/exam-tutorial.aspx).

The blueprint can be expanded for additional detail as shown below. Each of the medical content categories is listed there, and below each major category are the content subsections and specific topics that may appear in the exam. **Please note**: actual exam content may vary.

<table>
<thead>
<tr>
<th>Sodium and Water Abnormalities</th>
<th>8% of Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hyponatremia</strong></td>
<td>3%</td>
</tr>
<tr>
<td>Hypotonic</td>
<td></td>
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<tr>
<td>Syndrome of inappropriate antidiuretic hormone secretion (SIADH)</td>
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<tr>
<td>Hypervolemic</td>
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<tr>
<td>Low solute intake</td>
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<tr>
<td>Thiazides</td>
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<tr>
<td>Other hypotonic (secondary adrenal insufficiency)</td>
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</tr>
<tr>
<td>Hypertonic</td>
<td></td>
</tr>
<tr>
<td>Isotonic (pseudohyponatremia)</td>
<td></td>
</tr>
</tbody>
</table>
Hypernatremia or serum hyperosmolality <2%
  Osmotic diuresis
  Urea
  Glucose
  Water diuresis
    Central diabetes insipidus
    Nephrogenic diabetes insipidus
    Other water diuresis (physiologic saline diuresis)
  Other hypernatremia or serum hyperosmolality
    (hypodipsia; extrarenal water loss)
Salt excess (edema) 2.5%
  Heart failure
  Cirrhosis
  Nephrotic syndrome
  Chronic kidney disease
Salt depletion <2%
  Renal sodium losses
    Postobstructive diuresis
    Post-acute kidney injury diuresis
    Salt-wasting nephropathy
    Cerebral salt wasting
    Diuretics
    Other renal sodium losses (chemotherapy-induced)
  Extrarenal sodium losses
Polyuria <2%
  Primary polydipsia
  Other polyuria (iatrogenic)

<table>
<thead>
<tr>
<th>Acid-Base and Potassium Disorders</th>
<th>9% of Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metabolic acidosis 3.5%</td>
<td></td>
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<tr>
<td>Metabolic acidosis (normal anion gap)</td>
<td></td>
</tr>
<tr>
<td>Renal tubular acidosis (normokalemic or hypokalemic)</td>
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<tr>
<td>Renal tubular acidosis (hyperkalemic)</td>
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<tr>
<td>Nonrenal causes</td>
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<tr>
<td>Metabolic acidosis (elevated anion gap)</td>
<td></td>
</tr>
<tr>
<td>Lactic acidosis</td>
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<tr>
<td>Ketoacidosis</td>
<td></td>
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<tr>
<td>Toxins</td>
<td></td>
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<tr>
<td>Uremic</td>
<td></td>
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<tr>
<td>Other metabolic acidosis (low anion gap in multiple myeloma)</td>
<td></td>
</tr>
</tbody>
</table>
Metabolic alkalosis

Associated with normal or low blood pressure
Renal origin
Other metabolic alkalosis associated with normal or low blood pressure (chemotherapy-induced; hypokalemia; post-hypercapnic)

Associated with high blood pressure
Adrenal
Other metabolic alkalosis associated with high blood pressure (malignant hypertension)

Respiratory acid-base disturbances

Respiratory acidosis
Respiratory alkalosis

Mixed acid-base disturbances

Potassium disturbances

Hyperkalemia
Pseudohyperkalemia
Transcellular shifts
Medication-induced
Genetic abnormalities
Other tubular disorders (hepatitis-associated)
Postsurgical
Other hyperkalemia (peritoneal dialysis)

Hypokalemia
Pseudohypokalemia
Transcellular shifts
Renal losses
Nonrenal losses
Other hypokalemia (combined therapeutic hypothermia and barbiturate coma)

Calcium, Phosphorus, and Magnesium Disorders and Stones

Disorders of calcium metabolism

Hypercalcemia
Primary hyperparathyroidism
Granulomatous diseases
Malignancy
Familial hypocalciuric hypercalcemia (FHH)
Vitamin D toxicity
Medications and vitamins
Milk alkali syndrome
Hypocalcemia
    Hypoparathyroidism
    Pseudohypoparathyroidism
Medications
Tissue deposition
Vitamin D deficiency

**Disorders of phosphate metabolism**

<2%

Hyperphosphatemia
    Decreased renal excretion
    Increased intake
    Tissue redistribution

Hypophosphatemia
    Increased renal excretion
    Decreased intake and gastrointestinal absorption
    Tissue redistribution

**Disorders of magnesium metabolism**

<2%

Hypermagnesemia
    Decreased renal excretion
    Increased intake

Hypomagnesemia
    Increased renal excretion
    Decreased gastrointestinal absorption

**Nephrolithiasis**

<2%

Calcium stones
    Idiopathic hypercalciuria
    Hypocitraturia
    Hyperoxaluria
    Primary hyperparathyroidism
    Distal renal tubular acidosis
    Other calcium stones (medullary sponge kidney; hypercalciuria in hypoparathyroidism)

Uric acid stones
    Idiopathic
    Other uric acid (postileostomy)

Struvite stones

Cystine stones

Drug stones
<table>
<thead>
<tr>
<th>Chronic Kidney Disease</th>
<th>22% of Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Kidney function parameters</strong></td>
<td>&lt;2%</td>
</tr>
<tr>
<td>Glomerular filtration rate</td>
<td></td>
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<tr>
<td>Proteinuria</td>
<td></td>
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<tr>
<td>Other kidney function parameters (glycemic control; biopsy)</td>
<td></td>
</tr>
<tr>
<td><strong>Etiologies of chronic kidney disease</strong></td>
<td>&lt;2%</td>
</tr>
<tr>
<td>Diabetic kidney disease</td>
<td></td>
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<tr>
<td>Nondiabetic kidney disease</td>
<td></td>
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<tr>
<td>Chronic glomerulonephritis</td>
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<tr>
<td>Hypertensive nephropathy</td>
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<tr>
<td>Chronic interstitial nephritis</td>
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<tr>
<td>Genetic diseases</td>
<td></td>
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<tr>
<td><strong>Progression of chronic kidney disease</strong></td>
<td>&lt;2%</td>
</tr>
<tr>
<td><strong>Chronic kidney disease complications</strong></td>
<td>&lt;2%</td>
</tr>
<tr>
<td>Hypertension</td>
<td></td>
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<tr>
<td>Fluid overload</td>
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<tr>
<td>Anemia and iron deficiency</td>
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<tr>
<td>Hyperkalemia</td>
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<tr>
<td>Acidosis</td>
<td></td>
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<tr>
<td>Protein-energy wasting</td>
<td></td>
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<tr>
<td>Other complications of chronic kidney disease</td>
<td></td>
</tr>
<tr>
<td>hyperparathyroidism; hypervitaminosis D; hyperphosphatemia</td>
<td></td>
</tr>
<tr>
<td><strong>Stage IV and V chronic kidney disease</strong></td>
<td>&lt;2%</td>
</tr>
<tr>
<td>Advanced uremic symptoms</td>
<td></td>
</tr>
<tr>
<td>Preparation for end-stage renal disease</td>
<td></td>
</tr>
<tr>
<td>Initiation and discontinuation of maintenance dialysis</td>
<td></td>
</tr>
<tr>
<td>Other stage IV and V chronic kidney disease</td>
<td></td>
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<tr>
<td>(parathyroid hormone monitoring)</td>
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<tr>
<td><strong>End-stage renal disease</strong></td>
<td>11.5%</td>
</tr>
<tr>
<td>Hemodialysis</td>
<td></td>
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<tr>
<td>Adequacy and prescription</td>
<td></td>
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<tr>
<td>Dialyzers and dialysate</td>
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<tr>
<td>Vascular access</td>
<td></td>
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<tr>
<td>Water treatment</td>
<td></td>
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<tr>
<td>Hemodialysis complications</td>
<td></td>
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<tr>
<td>Hypertension</td>
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<tr>
<td>Hypotension</td>
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<tr>
<td>Interdialytic weight gain</td>
<td></td>
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<tr>
<td>Electrolyte abnormalities</td>
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<tr>
<td>Vascular access complications (clotting, dysfunction, infection)</td>
<td></td>
</tr>
</tbody>
</table>
Other hemodialysis complications (embolism and thrombosis; heparin-induced thrombocytopenia; loss of residual renal function; hypoalbuminemia)

Peritoneal dialysis
Adequacy and prescription
Dialysate
Catheters
Other peritoneal dialysis issues (hyperkalemia)

Peritoneal dialysis complications
Peritonitis and infections
Ultrafiltration failure
Other peritoneal dialysis complications (inguinal hernia; atrial fibrillation; peripheral edema)

Home hemodialysis
End-stage renal disease complications
Anemia
Cardiovascular disease
Blood pressure abnormalities
Other complications (hemolysis; hypoalbuminemia; thrombosis; calciphylaxis; uremic polyneuropathy)

Medical director responsibilities and conditions of coverage

**Mineral bone disease**

Laboratory abnormalities
Hyperphosphatemia
Hyperparathyroidism
Other laboratory abnormalities (calcium balance)

Renal osteodystrophy (and related pathophysiology)
Osteitis fibrosis
Adynamic bone disease
Osteomalacia
Mixed uremic osteodystrophy
Other renal osteodystrophy, including low bone mass (osteoporosis)

Extraosseous and vascular calcification
Medial calcification
Calciphylaxis
Other extraosseous and vascular calcification, including visceral organs

**Special topics in chronic kidney disease**
Epidemiology
Ethical considerations
Pregnancy
Laboratory studies
Dermatology
Nephrotoxicity of environmental and occupational agents
  Lead
  Organic solvents
  Other nephrotoxicity of environmental and occupational agents
    (cadmium; mercury)
Other special topics in chronic kidney disease (obesity)

<table>
<thead>
<tr>
<th>Hypertension</th>
<th>10% of Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Essential hypertension</td>
<td>3.5%</td>
</tr>
<tr>
<td>Isolated systolic hypertension</td>
<td></td>
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<tr>
<td>Malignant hypertension</td>
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<tr>
<td>Resistant hypertension</td>
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<td>White coat hypertension</td>
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<tr>
<td>Pseudohypertension</td>
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<tr>
<td>Masked hypertension</td>
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<tr>
<td>Other essential hypertension (stage 2 hypertension; thiazide effect)</td>
<td></td>
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<tr>
<td>Secondary causes of hypertension</td>
<td>4%</td>
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<tr>
<td>Pheochromocytoma</td>
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<tr>
<td>Renal vascular disease</td>
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<td>Dissection</td>
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<tr>
<td>Atherosclerotic</td>
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<tr>
<td>Hyperaldosteronism</td>
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<tr>
<td>Adrenal adenoma</td>
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<tr>
<td>Adrenal hyperplasia</td>
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<tr>
<td>Genetic causes</td>
<td></td>
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<tr>
<td>Liddle syndrome</td>
<td></td>
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<tr>
<td>Gordon syndrome (pseudohypoaldosteronism type II)</td>
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<tr>
<td>Cushing syndrome</td>
<td></td>
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<tr>
<td>Dexamethasone suppressible hyperaldosteronism</td>
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<tr>
<td>Other genetic causes (Hashimoto’s thyroiditis; scleroderma renal crisis)</td>
<td></td>
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<tr>
<td>Miscellaneous causes</td>
<td></td>
</tr>
<tr>
<td>Renin-secreting tumor (juxtaglomerular cell tumor)</td>
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<tr>
<td>Syndrome of apparent mineralocorticoid excess</td>
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<tr>
<td>Coarctation</td>
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<tr>
<td>Vasculitis and arteritis</td>
<td></td>
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<tr>
<td>Tuberous sclerosis</td>
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</tbody>
</table>
Sleep apnea
Drug-induced
Obstructive uropathy
Renal compression (Page kidney)
Other miscellaneous causes
  (chronic kidney disease; obesity)

**End-organ damage resulting from hypertension**  <2%
  Acute kidney injury
  Central nervous system and ophthalmologic
  Cardiac (left ventricular hypertrophy; heart failure)

**Hypertension in special situations**  <2%
  Pregnancy
  Stroke or subarachnoid bleeding
  Other hypertension in special situations
    (nocturnal hypertension)

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### Tubular, Interstitial, and Cystic Disorders  4% of Exam

**Renal tubular disorders and Fanconi’s syndrome**  <2%
  Drug-induced
  Crystal deposition
  Genetic

**Tubulointerstitial nephritis**  2%
  Acute
    Drug-induced
    Immune
    Infectious
    Other acute tubulointerstitial nephritis (multifactorial)
  Chronic
    Drug-induced
    Immune
    Granulomatous
    Toxins
    Hemoglobinopathy
    Urinary tract infection
    Other chronic tubulointerstitial nephritis (hypokalemic nephropathy; medullary cystic kidney)

**Renal cystic disease**  <2%
  Autosomal dominant polycystic kidney disease (ADPKD)
  Genetics
  Renal manifestations
Nonrenal manifestations
End-stage renal disease
Drug-induced

**Renal mass**
- Cystic
- Solid

<table>
<thead>
<tr>
<th>Glomerular and Vascular Disorders</th>
<th>12% of Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nephritic glomerular disorders, vasculitis, and vasculopathy</strong></td>
<td>5%</td>
</tr>
<tr>
<td>IgA nephropathy and Henoch-Schönlein purpura</td>
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<tr>
<td>Vasculitis and antineutrophil cytoplasmic antibody</td>
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<tr>
<td>Anti-glomerular basement membrane disease</td>
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<tr>
<td>Lupus nephritis</td>
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<tr>
<td>Postinfectious glomerulonephritis</td>
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<tr>
<td>Membranoproliferative glomerulonephritis and C3 glomerulopathies</td>
<td></td>
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<tr>
<td>Cryoglobulinemic glomerulonephritis</td>
<td></td>
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<tr>
<td>Crescentic glomerulonephritis</td>
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<tr>
<td>Other disorders (rapidly progressive glomerulonephritis)</td>
<td></td>
</tr>
<tr>
<td><strong>Nephrotic and heavy-proteinuric glomerular disorders</strong></td>
<td>5%</td>
</tr>
<tr>
<td>Minimal change disease</td>
<td></td>
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<tr>
<td><strong>Primary</strong></td>
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<tr>
<td><strong>Secondary</strong></td>
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<tr>
<td>Focal segmental glomerulosclerosis</td>
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<tr>
<td><strong>Primary</strong></td>
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<tr>
<td><strong>Secondary</strong></td>
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<tr>
<td><strong>Genetic</strong></td>
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<tr>
<td>Membranous nephropathy</td>
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<tr>
<td><strong>Primary</strong></td>
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<tr>
<td><strong>Secondary</strong></td>
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<tr>
<td>Paraprotein-related disorders</td>
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<tr>
<td><strong>Primary amyloidosis</strong></td>
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<tr>
<td><strong>Secondary amyloidosis</strong></td>
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<tr>
<td>Light chain deposition disease and myeloma</td>
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<tr>
<td>Fibrillary and immunotactoid glomerulonephritis</td>
<td></td>
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<tr>
<td>Fabry’s disease</td>
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<tr>
<td>Other disorders (biopsy complication)</td>
<td></td>
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<tr>
<td><strong>Thin basement membrane nephropathy and Alport’s syndrome</strong></td>
<td>&lt;2%</td>
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<tr>
<td><strong>Thrombotic microangiopathies</strong></td>
<td>&lt;2%</td>
</tr>
<tr>
<td><strong>Hemolytic uremic syndrome</strong></td>
<td>&lt;2%</td>
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<tr>
<td>Shiga toxin-mediated hemolytic uremic syndrome</td>
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</tr>
</tbody>
</table>
Atypical hemolytic uremic syndrome
- Drug-associated atypical hemolytic uremic syndrome (anticancer drugs, clopidogrel, interferon, quinine)
- Other atypical hemolytic uremic syndrome (pregnancy-associated)

Scleroderma renal disease <2%

### Kidney Transplantation 11% of Exam

#### Pre-transplantation <2%

- Transplant immunology
  - Detection of pre-transplant alloreactivity and immunologic evaluation of transplant candidates
- Desensitization
- Potential kidney transplant recipient evaluation
  - Glomerular filtration rate listing requirements
  - Cancer concerns
  - Infection concerns
  - Cardiac concerns
  - Age concerns
  - Comorbidities
- Other potential kidney transplant recipient evaluation (recurrent autoimmune kidney disease)

- Potential living kidney donor
  - Donor evaluation
  - Risks
  - Ethics

#### Organ allocation
- Deceased donor wait list
- Organ shortage strategies
- Paired kidney donation and chains

#### Transplantation <2%

- Indications
- Contraindications
- Deceased donor kidney transplantation
  - Types
  - Outcomes
- Living donor kidney transplant
  - Types
  - Outcomes
Post-transplantation

Immunosuppression
  Induction
  Maintenance
Short-term post-transplantation management
  Perioperative management and complications
  Graft dysfunction
Long-term post-transplantation management
  Graft dysfunction
  Complications
  Other long-term post-transplantation management (graft failure)
Rejection
  Hyperacute
  T cell
  Antibody-mediated
Male and female fertility
  Pregnancy
  Male fertility

Multiorgan and extrarenal transplantation  <2%

Ethics, society, and public policy  <2%

Pharmacology  5% of Exam

Basic pharmacology  <2%
  Pharmacokinetics and other basic concepts
  Renal handling of drugs
  Principles of dialytic drug removal

Drug selection in kidney disease  <2%
  Antibiotics
    Vancomycin
    Aminoglycosides
    Other antibiotics (cephalosporins)
  Antineoplastic agents
  Antiviral agents
  Other drug selection in kidney disease (metformin; fentanyl)

Nephrotoxicity of medications  2%
  Principles and mechanisms of nephrotoxicity
  Antibacterial agents
    Aminoglycosides
    Vancomycin
  Antiviral agents
Antifungal agents
   Amphotericin B
Antiparasitic agents
Additional antimicrobials
Pain medications
   Nonsteroidal anti-inflammatory drugs
   Fentanyl
   Gabapentin
Renin-angiotensin-aldosterone system (RAAS) blockade
   Angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, and renin inhibitors
   Aldosterone antagonists
Antihypertensive agents
   Beta-adrenergic blockers
   Calcium channel blockers
   Minoxidil
Antineoplastic chemotherapy agents
   Interferon
   Cisplatin
   Methotrexate
   Vascular endothelial growth factor inhibitors
Iodinated contrast and other imaging agents
Lithium
Supplements and herbs
   Aristolochic acid
   Other nephrotoxicity of medications (cardiac glycosides; bisphosphonates)

Nephrotoxicity of illicit drugs <2%
   Heroin and other intravenous drugs
   Ecstasy
   Cocaine

Drug-drug interactions and adverse effects other than nephrotoxicity <2%

Dialysis and other treatment of toxic substances <2%
   Ethylene glycol
   Methanol
   Other alcohols
   Lithium
   Other dialysis and treatment of toxic substances (salicylates; dialysis duration prescription)
Hemodynamic (prerenal) acute kidney injury 4%
   True volume depletion
      Renal
      Extrarenal
   Effective volume depletion
      Heart failure
      Cirrhosis
      Nephrotic syndrome
Drugs
   Nonsteroidal anti-inflammatory drugs
   Calcineurin inhibitors
   Angiotensin-converting enzyme inhibitors and angiotensin receptor blockers
   Radiocontrast agents
   Other drugs (anticoagulants; interferon)
Abdominal compartment syndrome
Parenchymal (intrinsic) acute kidney injury 4.5%
   Vascular
      Systemic diseases and vasculitis
      Atheroemboli
      Renal vein thrombosis
   Glomerular
      Drug-induced
      Infectious
      Other glomerular parenchymal acute kidney injury (relapsed microscopic polyangiitis)
   Tubular
      Ischemic
      Nephrotoxic
      Systemic disease
   Interstitial
      Drugs
      Systemic disease
      Malignancy (infiltrative)
Postrenal acute kidney injury <2%
   Retroperitoneal and ureteral
      Idiopathic retroperitoneal fibrosis
      Malignancy
      Stones and crystals
Bleeding
Bladder, bladder outlet, and benign prostatic hyperplasia

**Renal replacement therapy**

**Indications**
- Solute accumulation
- Hemodynamic
- Acute kidney injury associated with intoxication
- Tumor lysis syndrome

**Techniques**
- Intermittent hemodialysis
- Continuous renal replacement therapy

**Renal replacement therapy prescription**
- Dialysate and replacement fluid
- Anticoagulation

**Complications**
- Hemodynamic
- Citrate intoxication
- Other complications (dialysis disequilibrium syndrome)

**Intensive care unit nephrology**

- Hemodynamic measures
- Intravenous fluids and volume status
- Ethics and palliative care

January, 2018