ABIM invites diplomates to help develop the Nephrology MOC blueprint

Based on feedback from physicians that MOC assessments should better reflect what they see in practice, in 2016 the American Board of Internal Medicine (ABIM) invited all certified nephrologists to provide ratings of the relative frequency and importance of blueprint topics in practice.

This review process, which resulted in a new MOC exam blueprint, will be used on a periodic basis to inform and update all MOC assessments created by ABIM, including the Knowledge Check-In introduced in 2018. No matter what form ABIM’s assessments ultimately take, they will need to be informed by front-line clinicians sharing their perspective on what is important to know.

A sample of over 400 nephrologists, similar to the total invited population of nephrologists in age, gender, geographic region, and time spent in direct patient care, provided the blueprint topic ratings. The ABIM Nephrology Exam Committee and Board have used this feedback to update the blueprint for MOC assessments (beginning with the Fall 2016 administration of the 10-year MOC exam).

To inform how exam content should be distributed across the major blueprint content categories, ABIM considered the average respondent ratings of topic frequency and importance in each of the content categories. A second source of information was the relative frequency of patient conditions in the content categories, as seen by certified nephrologists and documented by national health care data (described further under Content distribution below).

To determine prioritization of specific exam content within each major medical content category, ABIM used the respondent ratings of topic frequency and importance to set thresholds for these parameters in the exam assembly process (described further under Detailed content outline below).

Purpose of the Nephrology MOC exam

MOC assessments are designed to evaluate whether a certified nephrologist has maintained competence and currency in the knowledge and judgment required for practice. The MOC assessments emphasize diagnosis and management of prevalent conditions, particularly in areas where practice has changed in recent years. As a result of the recent blueprint review by ABIM diplomates, future assessments place less emphasis on rare conditions and focus more on situations in which physician intervention can have important consequences for patients. For conditions that are usually managed by other specialists, the focus will be on recognition rather than on management.

Exam format

The traditional 10-year exam is composed of 220 single-best-answer multiple-choice questions, of which 50 are new questions that do not count in the examinee’s score. The Knowledge Check-In is composed of 90 single-best-answer multiple-choice questions, of which a small portion are new questions that do not count in the examinee’s score (more information on how exams are developed can be found at abim.org/about/exam-information/exam-development.aspx). Examinees taking the traditional 10-year MOC exam will have access to an external resource (e.g., UpToDate®) for the entire exam. Examinees taking the Knowledge Check-In will have access to an external resource for the entire exam. Most questions describe patient scenarios and ask about the work done (that is, tasks performed) by physicians in the course of practice:

- **Diagnosis:** making a diagnosis or identifying an underlying condition
- **Testing:** ordering tests for diagnosis, staging, or follow-up
- **Treatment/Care Decisions:** recommending treatment or other patient care
- **Risk Assessment/Prognosis/Epidemiology:** assessing risk, determining prognosis, and applying principles from epidemiologic studies
- **Pathophysiology/Basic Science:** understanding the pathophysiology of disease and basic science knowledge applicable to patient care
Clinical scenarios presented take place in outpatient or inpatient settings as appropriate to a typical Nephrology practice. Clinical information presented may include patient photographs, ultrasound images, angiograms, micrographs, radiographs, electrocardiograms, and other media to illustrate relevant patient findings.

Tutorials for the traditional 10-year MOC exam and for the Knowledge Check-In, including examples of ABIM exam question format, can be found at abim.org/maintenance-of-certification/exam-information/nephrology/exam-tutorial.aspx.

~ Content distribution ~

Listed below are the major medical content categories that define the domain for the Nephrology MOC exam and Knowledge Check-In. The relative distribution of content is expressed as a percentage of the total exam. To determine the content distribution, ABIM considered the average respondent ratings of topic frequency and importance. To cross-validate these self-reported ratings, ABIM also considered the relative frequency of conditions seen in Medicare patients by a cohort of certified nephrologists. Informed by these data, the Nephrology Exam Committee and Board have determined the content category targets shown below.

<table>
<thead>
<tr>
<th>CONTENT CATEGORY</th>
<th>Target %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium and Water Abnormalities</td>
<td>7%</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>25%</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>11%</td>
</tr>
<tr>
<td>Kidney Transplantation</td>
<td>10%</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>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

The Nephrology MOC assessments may cover other dimensions of medicine as applicable to the medical content categories, such as adolescent medicine, critical care medicine, clinical epidemiology, geriatric medicine, ethics, and nutrition.

~ How the blueprint ratings are used to assemble the MOC assessments ~

Blueprint reviewers provided ratings of relative frequency in practice for each of the detailed content topics in the blueprint and provided ratings of the relative importance of the topics for each of the tasks described in Exam format above. In rating importance, reviewers were asked to consider factors such as the following:

- High risk of a significant adverse outcome
- Cost of care and stewardship of resources
- Common errors in diagnosis or management
- Effect on population health
- Effect on quality of life
- When failure to intervene by the physician deprives a patient of significant benefit

Frequency and importance were rated on a three-point scale corresponding to low, medium, or high. The median importance ratings are reflected in the Detailed content outline below. The Nephrology Exam Committee and Board, in partnership with the physician community, have set the following parameters for selecting MOC assessment questions according to the blueprint review ratings:

- At least 75% of exam questions will address high-importance content (indicated in green)
- No more than 25% of exam questions will address medium-importance content (indicated in yellow)
- No exam questions will address low-importance content (indicated in red)

Independent of the importance and task ratings, no more than 15% of exam questions will address low-frequency content (indicated by “LF” following the topic description).
The content selection priorities below are applicable beginning with the Spring 2017 MOC exam and are subject to change in response to future blueprint review.

**Note:** The same topic may appear in more than one medical content category.

### Detailed content outline for the Nephrology MOC Exam and Knowledge Check-In

<table>
<thead>
<tr>
<th>SODIUM AND WATER ABNORMALITIES (7% of exam)</th>
<th>Diagnosis</th>
<th>Testing</th>
<th>Treatment/ Care Decisions</th>
<th>Risk Assessment/ Prognosis/ Epidemiology</th>
<th>Pathophysiology/ Basic Science</th>
</tr>
</thead>
</table>

#### HYponatREMIA (3% of exam)

**Hypotonic**

- Syndrome of inappropriate antidiuretic hormone secretion (SIADH)
  ```markdown
  - High Importance: At least 75% of exam questions will address topics and tasks with this designation.
  - Medium Importance: No more than 25% of exam questions will address topics and tasks with this designation.
  - Low Importance: No exam questions will address topics and tasks with this designation.
  - LF - Low Frequency: No more than 15% of exam questions will address topics with this designation, regardless of task or importance.
  ```

- Hypervolemic
- Low solute intake
- Thiazides
- Other hypotonic (secondary adrenal insufficiency)

**Hypertonic**

- Isotonic (pseudohyponatremia)

**HYPERNATREMIA OR SERUM HYPEROSMOLALITY (<2% of exam)**

### 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)
### SODIUM AND WATER ABNORMALITIES continued…

<table>
<thead>
<tr>
<th>(7% of exam)</th>
<th>Diagnosis</th>
<th>Testing</th>
<th>Treatment/ Care Decisions</th>
<th>Risk Assessment/ Prognosis/ Epidemiology</th>
<th>Pathophysiology/ Basic Science</th>
</tr>
</thead>
</table>

#### SALT EXCESS (EDEMA) (2.5% of exam)

<table>
<thead>
<tr>
<th></th>
<th>Diagnosis</th>
<th>Testing</th>
<th>Treatment/ Care Decisions</th>
<th>Risk Assessment/ Prognosis/ Epidemiology</th>
<th>Pathophysiology/ Basic Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart failure</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Cirrhosis</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Nephrotic syndrome</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

#### SALT DEPLETION (<2% of exam)

<table>
<thead>
<tr>
<th></th>
<th>Diagnosis</th>
<th>Testing</th>
<th>Treatment/ Care Decisions</th>
<th>Risk Assessment/ Prognosis/ Epidemiology</th>
<th>Pathophysiology/ Basic Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renal sodium losses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postobstructive diuresis</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Post-acute kidney injury diuresis</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Salt-wasting nephropathy</td>
<td>LF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cerebral salt wasting</td>
<td>LF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diuretics</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other renal sodium losses (chemotherapy-induced)</td>
<td>LF</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Extrarenal sodium losses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### POLYURIA (<2% of exam)

<table>
<thead>
<tr>
<th></th>
<th>Diagnosis</th>
<th>Testing</th>
<th>Treatment/ Care Decisions</th>
<th>Risk Assessment/ Prognosis/ Epidemiology</th>
<th>Pathophysiology/ Basic Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary polydipsia</td>
<td>LF</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Other polyuria (iatrogenic)</td>
<td>LF</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

#### ACID-BASE AND POTASSIUM DISORDERS (9% of exam)

<table>
<thead>
<tr>
<th></th>
<th>Diagnosis</th>
<th>Testing</th>
<th>Treatment/ Care Decisions</th>
<th>Risk Assessment/ Prognosis/ Epidemiology</th>
<th>Pathophysiology/ Basic Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metabolic acidosis (normal anion gap)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renal tubular acidosis</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>(normokalemic or hypokalemic)</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Renal tubular acidosis</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>(hyperkalemic)</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Nonrenal causes</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

#### METABOLIC ACIDOSIS (3.5% of exam)

<table>
<thead>
<tr>
<th></th>
<th>Diagnosis</th>
<th>Testing</th>
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<th>Pathophysiology/ Basic Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metabolic acidosis (normal anion gap)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renal tubular acidosis</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>(normokalemic or hypokalemic)</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Renal tubular acidosis</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>(hyperkalemic)</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Nonrenal causes</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

**Notes:**
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**ACID-BASE AND POTASSIUM DISORDERS continued…**

(9% of exam)

<table>
<thead>
<tr>
<th></th>
<th>Diagnosis</th>
<th>Testing</th>
<th>Treatment/Care Decisions</th>
<th>Risk Assessment/Prognosis/Epidemiology</th>
<th>Pathophysiology/Basic Science</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>METABOLIC ACIDOSIS continued… (3.5% of exam)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metabolic acidosis (elevated anion gap)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Lactic acidosis</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Ketoacidosis</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Toxins</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Uremic</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

| Other metabolic acidosis (low anion gap in multiple myeloma) | LF | | | | |

| **METABOLIC ALKALOSIS (<2% of exam)** |           |         |                          |                                        |                               |
| 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 (<2% of exam)** |           |         |                          |                                        |                               |
| Respiratory acidosis              | ✓         | ✓       | ✓                        | ✓                                      | ✓                             |
| Respiratory alkalosis             | ✓         | ✓       | ✓                        | ✓                                      | ✓                             |

<p>| <strong>MIXED ACID-BASE DISTURBANCES (&lt;2% of exam)</strong> |           |         |                          |                                        |                               |
| Mixed acid-base disturbances      | ✓         | ✓       | ✓                        | ✓                                      | ✓                             |</p>
<table>
<thead>
<tr>
<th>ACID-BASE AND POTASSIUM DISORDERS continued... (9% of exam)</th>
<th>Diagnosis</th>
<th>Testing</th>
<th>Treatment/Care Decisions</th>
<th>Risk Assessment/Prognosis/Epidemiology</th>
<th>Pathophysiology/Basic Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYPERKALEMIA (LF 3.5% of exam)</td>
<td>LF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pseudohyperkalemia</td>
<td>LF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transcellular shifts</td>
<td>LF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medication-induced</td>
<td>LF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Genetic abnormalities</td>
<td>LF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other tubular disorders (hepatitis-associated)</td>
<td>LF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postsurgical</td>
<td>LF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other hyperkalemia (peritoneal dialysis)</td>
<td>LF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HYPOKALEMIA (LF 9% of exam)</td>
<td>LF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transcellular shifts</td>
<td>LF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renal losses</td>
<td>LF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonrenal losses</td>
<td>LF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other hypokalemia (combined therapeutic hypothermia and barbiturate coma)</td>
<td>LF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
High Importance: At least 75% of exam questions will address topics and tasks with this designation.

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### Calcium, Phosphorus, and Magnesium Disorders and Stones (4% of exam)

#### Disorders of Calcium Metabolism (<2% of exam)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Diagnosis</th>
<th>Testing</th>
<th>Treatment/Care Decisions</th>
<th>Risk Assessment/Prognosis/Epidemiology</th>
<th>Pathophysiology/Basic Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypercalcemia</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
<td>![Medium Importance]</td>
<td>![Low Importance]</td>
</tr>
<tr>
<td>Primary hyperparathyroidism</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
<td>![Medium Importance]</td>
<td>![Low Importance]</td>
</tr>
<tr>
<td>Granulomatous diseases</td>
<td>![Low Frequency]</td>
<td>![Medium Importance]</td>
<td>![Medium Importance]</td>
<td>![Medium Importance]</td>
<td>![Medium Importance]</td>
</tr>
<tr>
<td>Malignancy</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
<td>![Medium Importance]</td>
<td>![Low Importance]</td>
</tr>
<tr>
<td>Familial hypocalciuric hypercalcemia (FHH)</td>
<td>![Low Frequency]</td>
<td>![Medium Importance]</td>
<td>![Medium Importance]</td>
<td>![Medium Importance]</td>
<td>![Medium Importance]</td>
</tr>
<tr>
<td>Vitamin D toxicity</td>
<td>![Low Frequency]</td>
<td>![Medium Importance]</td>
<td>![Medium Importance]</td>
<td>![Medium Importance]</td>
<td>![Medium Importance]</td>
</tr>
<tr>
<td>Medications and vitamins</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
</tr>
<tr>
<td>Milk alkali syndrome</td>
<td>![Low Frequency]</td>
<td>![Medium Importance]</td>
<td>![Medium Importance]</td>
<td>![Medium Importance]</td>
<td>![Medium Importance]</td>
</tr>
</tbody>
</table>

#### Disorders of Phosphate Metabolism (<2% of exam)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Diagnosis</th>
<th>Testing</th>
<th>Treatment/Care Decisions</th>
<th>Risk Assessment/Prognosis/Epidemiology</th>
<th>Pathophysiology/Basic Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyperphosphatemia</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
</tr>
<tr>
<td>Decreased renal excretion</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
</tr>
<tr>
<td>Increased intake</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
</tr>
<tr>
<td>Tissue redistribution</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
<td>![High Importance]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Condition</th>
<th>Diagnosis</th>
<th>Testing</th>
<th>Treatment/Care Decisions</th>
<th>Risk Assessment/Prognosis/Epidemiology</th>
<th>Pathophysiology/Basic Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypophosphatemia</td>
<td>![Low Frequency]</td>
<td>![Medium Importance]</td>
<td>![Low Importance]</td>
<td>![Low Importance]</td>
<td>![Low Importance]</td>
</tr>
<tr>
<td>Increased renal excretion</td>
<td>![Low Frequency]</td>
<td>![Low Importance]</td>
<td>![Low Importance]</td>
<td>![Low Importance]</td>
<td>![Low Importance]</td>
</tr>
<tr>
<td>Decreased intake and gastrointestinal absorption</td>
<td>![Low Frequency]</td>
<td>![Low Importance]</td>
<td>![Low Importance]</td>
<td>![Low Importance]</td>
<td>![Low Importance]</td>
</tr>
<tr>
<td>Tissue redistribution</td>
<td>![Low Frequency]</td>
<td>![Low Importance]</td>
<td>![Low Importance]</td>
<td>![Low Importance]</td>
<td>![Low Importance]</td>
</tr>
<tr>
<td>Genetics causes</td>
<td>![Low Frequency]</td>
<td>![Low Importance]</td>
<td>![High Importance]</td>
<td>![Low Importance]</td>
<td>![Low Importance]</td>
</tr>
</tbody>
</table>
### DISORDERS OF MAGNESIUM METABOLISM (<2% of exam)

#### Hypermagnesemia
- Decreased renal excretion: High Importance
- Increased intake: Low Frequency

#### Hypomagnesemia
- Increased renal excretion: High Importance
- Decreased gastrointestinal absorption: High Importance

### NEPHROLITHIASIS (<2% of exam)

#### Calcium stones
- Idiopathic hypercalciuria: High Importance
- Hypocitraturia: Medium Importance
- Hyperoxaluria: High Importance
- Primary hyperparathyroidism: Medium Importance
- Distal renal tubular acidosis: High Importance
- Other calcium stones (medullary sponge kidney; hypercalciuria in hypoparathyroidism): Low Frequency

#### Other calcium stones (medullary sponge kidney; hypercalciuria in hypoparathyroidism): Low Frequency

#### Uric acid stones
- Idiopathic: Low Frequency
- Other uric acid (postileostomy): Low Frequency

#### Struvite stones: Low Frequency

#### Cystine stones: Low Frequency

#### Drug stones: Low Frequency
### CHRONIC KIDNEY DISEASE (25% of exam)

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Testing</th>
<th>Treatment/ Care Decisions</th>
<th>Risk Assessment/ Prognosis/ Epidemiology</th>
<th>Pathophysiology/ Basic Science</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>KIDNEY FUNCTION PARAMETERS (&lt;2% of exam)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glomerular filtration rate (creatinine clearance; estimated glomerular filtration rate)</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Proteinuria</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Other kidney function parameters (glycemic control; biopsy)</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td><strong>ETIOLOGIES OF CHRONIC KIDNEY DISEASE (&lt;2% of exam)</strong></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Diabetic kidney disease</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Nondiabetic kidney disease</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic glomerulonephritis</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Hypertensive nephropathy</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Chronic interstitial nephritis</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Genetic diseases</td>
<td>LF</td>
<td></td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td><strong>PROGRESSION OF CHRONIC KIDNEY DISEASE (&lt;2% of exam)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Progression of chronic kidney disease</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td><strong>CHRONIC KIDNEY DISEASE COMPLICATIONS (2% of exam)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Fluid overload</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Anemia and iron deficiency</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Hyperkalemia</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Acidosis</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Protein-energy wasting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other complications of chronic kidney disease (hyperparathyroidism; hyperphosphatemia)</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

**High Importance:** At least 75% of exam questions will address topics and tasks with this designation.

**Medium Importance:** No more than 25% of exam questions will address topics and tasks with this designation.

**Low Importance:** No exam questions will address topics and tasks with this designation.

**LF – Low Frequency:** No more than 15% of exam questions will address topics with this designation, regardless of task or importance.
### CHRONIC KIDNEY DISEASE

(25% of exam)

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Testing</th>
<th>Treatment/Care Decisions</th>
<th>Risk Assessment/Prognosis/Epidemiology</th>
<th>Pathophysiology/Basic Science</th>
</tr>
</thead>
</table>

### STAGE IV AND V CHRONIC KIDNEY DISEASE (2.5% of exam)

- Advanced uremic symptoms: ![High Importance]
- Preparation for end-stage renal disease: ![Medium Importance] Not Applicable
- Initiation and discontinuation of maintenance dialysis: ![Low Importance] Not Applicable
- Other stage IV and V chronic kidney disease (parathyroid hormone monitoring): ![Low Importance]![Low Importance]![Low Importance]![Low Importance]![Low Importance]![Low Importance]

### END-STAGE RENAL DISEASE (12.5% of exam)

#### Hemodialysis

- Adequacy and prescription: ![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]
- Dialyzers and dialysate: ![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]
- Vascular access: ![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]
- Water treatment: ![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]

#### Hemodialysis complications

- Hypertension: ![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]
- Hypotension: ![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]
- Interdialytic weight gain: ![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]
- Electrolyte abnormalities: ![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]
- Vascular access complications (clotting, dysfunction, infection): ![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]
- Other hemodialysis complications (embolism and thrombosis; heparin-induced thrombocytopenia; loss of residual renal function; hypoalbuminemia): ![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]

#### Peritoneal dialysis

- Adequacy and prescription: ![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]
- Dialysate: ![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]
- Catheters: ![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]
- Other peritoneal dialysis issues (hypokalemia and hyperkalemia): ![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]![High Importance]
### CHRONIC KIDNEY DISEASE

**continued…**

*(25% of exam)*

<table>
<thead>
<tr>
<th>Diagnosis</th>
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</tr>
</thead>
</table>

### END-STAGE RENAL DISEASE

**continued…** *(12.5% of exam)*

#### 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 polynephropathy)

#### Medical director responsibilities and conditions of coverage

*Not Applicable*

### MINERAL BONE DISEASE *(3% of exam)*

#### 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)
**CHRONIC KIDNEY DISEASE continued…**

<table>
<thead>
<tr>
<th>(25% of exam)</th>
<th>Diagnosis</th>
<th>Testing</th>
<th>Treatment/ Care Decisions</th>
<th>Risk Assessment/ Prognosis/ Epidemiology</th>
<th>Pathophysiology/ Basic Science</th>
</tr>
</thead>
</table>

**MINERAL BONE DISEASE continued… (3% of exam)**

<table>
<thead>
<tr>
<th>Extraosseous and vascular calcification</th>
<th>Diagnosis</th>
<th>Testing</th>
<th>Treatment/ Care Decisions</th>
<th>Risk Assessment/ Prognosis/ Epidemiology</th>
<th>Pathophysiology/ Basic Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medial calcification</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Calciphylaxis</td>
<td>LF</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Other extraosseous and vascular calcification, including visceral organs</td>
<td>LF</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

**SPECIAL TOPICS IN CHRONIC KIDNEY DISEASE (<2% of exam)**

<table>
<thead>
<tr>
<th>Epidemiology</th>
<th>Diagnosis</th>
<th>Testing</th>
<th>Treatment/ Care Decisions</th>
<th>Risk Assessment/ Prognosis/ Epidemiology</th>
<th>Pathophysiology/ Basic Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethical considerations</td>
<td>Not Applicable</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Pregnancy</td>
<td>LF</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Laboratory studies</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>✓</td>
</tr>
<tr>
<td>Dermatology</td>
<td>LF</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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</table>

<table>
<thead>
<tr>
<th>Nephrotoxicity of environmental and occupational agents</th>
<th>Diagnosis</th>
<th>Testing</th>
<th>Treatment/ Care Decisions</th>
<th>Risk Assessment/ Prognosis/ Epidemiology</th>
<th>Pathophysiology/ Basic Science</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>LF</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Organic solvents</td>
<td>LF</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Other nephrotoxicity of environmental and occupational agents (cadmium; mercury)</td>
<td>LF</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Other special topics in chronic kidney disease (obesity)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

**HYPERTENSION (10% of exam)**

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Testing</th>
<th>Treatment/ Care Decisions</th>
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<th>Pathophysiology/ Basic Science</th>
</tr>
</thead>
</table>

**ESSENTIAL HYPERTENSION (3.5% of exam)**

| Isolated systolic hypertension | ✓ | ✓ | ✓ | ✓ | ✓ |
| Severe hypertension | ✓ | ✓ | ✓ | ✓ | ✓ |
| Resistant hypertension | ✓ | ✓ | ✓ | ✓ | ✓ |
| White coat hypertension | ✓ | ✓ | ✓ | ✓ | ✓ |
**HYPERTENSION**

*continued*…

<table>
<thead>
<tr>
<th>(10% of exam)</th>
<th>Diagnosis</th>
<th>Testing</th>
<th>Treatment/ Care Decisions</th>
<th>Risk Assessment/ Prognosis/ Epidemiology</th>
<th>Pathophysiology/ Basic Science</th>
</tr>
</thead>
</table>

**ESSENTIAL HYPERTENSION** continued… (3.5% of exam)

- **Pseudohypertension**
  - LF

- **Masked hypertension**
  - LF

- **General essential hypertension**
  - ✓

**SECONDARY CAUSES OF HYPERTENSION** (4% of exam)

- **Pheochromocytoma**
  - LF

- **Renal vascular disease**

  - **Dissection**
    - LF

  - **Atherosclerotic**

- **Hyperaldosteronism**

  - **Adrenal adenoma**
    - LF

  - **Adrenal hyperplasia**
    - LF

- **Genetic causes**

  - **Liddle syndrome**
    - LF

  - **Cushing syndrome**
    - LF

  - **Dexamethasone suppressible hyperaldosteronism**
    - LF

  - **Other genetic causes (fibromuscular dysplasia)**
    - LF
### Hypertension

**continued…** (10% of exam)

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Testing</th>
<th>Treatment/ Care Decisions</th>
<th>Risk Assessment/ Prognosis/ Epidemiology</th>
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</thead>
</table>

#### Secondary Causes of Hypertension

**continued…** (4% of exam)

<table>
<thead>
<tr>
<th>Miscellaneous causes</th>
<th>LF</th>
<th>LF</th>
<th>LF</th>
<th>LF</th>
<th>LF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renin-secreting tumor (juxtaglomerular cell tumor)</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Syndrome of apparent mineralocorticoid excess</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Coarctation</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Vasculitis and arteritis</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Tuberous sclerosis</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Sleep apnea</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Drug-induced</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Obstructive uropathy</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Renal compression (Page kidney)</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Other miscellaneous causes (chronic kidney disease; obesity; hypothyroidism)</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
</tbody>
</table>

#### End-Organ Damage Resulting from Hypertension

(<2% of exam)

| Acute kidney injury | ✔️ | ✔️ | ✔️ | ✔️ | ✔️ |
| Central nervous system and ophthalmologic | ✔️ | ✔️ | ✔️ | ✔️ | ✔️ |
| Cardiac (left ventricular hypertrophy; heart failure) | ✔️ | ✔️ | ✔️ | ✔️ | ✔️ |

#### Hypertension in Special Situations

(<2% of exam)

| Pregnancy | ✔️ | ✔️ | ✔️ | ✔️ | ✔️ |
| Stroke or subarachnoid bleeding | ✔️ | ✔️ | ✔️ | ✔️ | ✔️ |
| Other hypertension in special situations (nocturnal hypertension) | ✔️ | ✔️ | ✔️ | ✔️ | ✔️ | LF |
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<table>
<thead>
<tr>
<th>Tubular, Interstitial, and Cystic Disorders (4% of exam)</th>
<th>Diagnosis</th>
<th>Testing</th>
<th>Treatment/Care Decisions</th>
<th>Risk Assessment/Prognosis/Epidemiology</th>
<th>Pathophysiology/Basic Science</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RENAL TUBULAR DISORDERS AND FANCONI’S SYNDROME (&lt;2% of exam)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug-induced</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crystal deposition</td>
<td>LF</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Genetic</td>
<td>LF</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TUBULOINTERSTITIAL NEPHRITIS (2% of exam)</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Acute</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug-induced</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immune</td>
<td>LF</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infectious</td>
<td>LF</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other acute tubulointerstitial nephritis (multifactorial)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Drug-induced</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immune</td>
<td>LF</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
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<tr>
<td>Granulomatous</td>
<td>LF</td>
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<tr>
<td>Toxins</td>
<td>LF</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Hemoglobinopathy</td>
<td>LF</td>
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<tr>
<td>Urinary tract infection</td>
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<td>✓</td>
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<tr>
<td>Other chronic tubulointerstitial nephritis (hypokalemic nephropathy; medullary cystic kidney)</td>
<td>LF</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td><strong>RENAL CYSTIC DISEASE (&lt;2% of exam)</strong></td>
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<tr>
<td>Autosomal dominant polycystic kidney disease (ADPKD)</td>
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<tr>
<td>Genetics</td>
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<tr>
<td>Renal manifestations</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Nonrenal manifestations</td>
<td>✓</td>
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<tr>
<td>End-stage renal disease</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Drug-induced</td>
<td>LF</td>
<td>✓</td>
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</tbody>
</table>
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<tr>
<th>TUBULAR, INTERSTITIAL, AND CYSTIC DISORDERS continued… (4% of exam)</th>
<th>Diagnosis</th>
<th>Testing</th>
<th>Treatment/ Care Decisions</th>
<th>Risk Assessment/ Prognosis/ Epidemiology</th>
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<td><strong>RENAL MASS (&lt;2% of exam)</strong></td>
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<tr>
<td>Cystic</td>
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<td>Solid</td>
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<table>
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<th>Treatment/ Care Decisions</th>
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<tr>
<td>IgA nephropathy and Henoch-Schonlein purpura</td>
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<td>Vasculitis and antineutrophil cytoplasmic antibody</td>
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<td>✔</td>
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<tr>
<td>Anti-glomerular basement membrane disease</td>
<td><strong>LF</strong></td>
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<tr>
<td>Lupus nephritis</td>
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<td>Postinfectious glomerulonephritis</td>
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<tr>
<td>Membranoproliferative glomerulonephritis and C3 glomerulopathies</td>
<td><strong>LF</strong></td>
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<td>Cryoglobulinemic glomerulonephritis</td>
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<tr>
<td>Crescentic glomerulonephritis</td>
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<tr>
<td>Other disorders (rapidly progressive glomerulonephritis)</td>
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<table>
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<td>Minimal change disease</td>
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<tr>
<td>Primary</td>
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<tr>
<td>Secondary</td>
<td><strong>LF</strong></td>
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<th>Focal segmental glomerulosclerosis</th>
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<td>✔</td>
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<tr>
<td>Secondary</td>
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<td>✔</td>
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<tr>
<td>Genetic</td>
<td><strong>LF</strong></td>
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### GLOMERULAR AND VASCULAR DISORDERS

**Continued…**

*(11% of exam)*

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<tr>
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<th>Testing</th>
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<th>Pathophysiology/ Basic Science</th>
</tr>
</thead>
</table>

| NEPHROTIC AND HEAVY-PROTEINURIC GLOMERULAR DISORDERS **Continued…** *(4.5% of exam)* |
|-----------------------------------|-------------------|---------------------------|---------------------------------|--------------------------------|
| Membranous nephropathy             |                   |                           |                                 |                               |
| Primary                            | ✓                  | ✓                         | ✓                               | ✓                             |
| Secondary                          | ✓                  | ✓                         | ✓                               | ✓                             |

| Paraprotein-related disorders      |                   |                           |                                 |                               |
| Primary amyloidosis                | LF                | ✓                         | ✓                               | ✓                             |
| Secondary amyloidosis              | LF                | ✓                         | ✓                               | ✓                             |
| Light chain deposition disease and myeloma | ✓          | ✓                         | ✓                               | ✓                             |

| Fibrillary and immunotactoid glomerulonephritis | LF | ✓ | ✓ | ✓ | ✓ |
| Fabry’s disease                      | LF | ✓ | ✓ | ✓ | ✓ |
| Other disorders (biopsy complication) | LF | ✓ | ✓ | ✓ | ✓ |

**THIN BASEMENT MEMBRANE NEPHROPATHY AND ALPORT’S SYNDROME (<2% of exam)**

| Thin basement membrane nephropathy and Alport’s syndrome | LF | ✓ | ✓ | ✓ | ✓ |

**THROMBOTIC MICROANGIOPATHIES (<2% of exam)**

| Thrombotic microangiopathies | ✓ | ✓ | ✓ | ✓ | ✓ |

**HEMOLYTIC UREMIC SYNDROME (<2% of exam)**

| Shiga toxin-mediated hemolytic uremic syndrome | LF | ✓ | ✓ | ✓ | ✓ |
| Atypical hemolytic uremic syndrome |                   |                           |                                 |                               |
| Drug-associated atypical hemolytic uremic syndrome (anticancer drugs, clopidogrel, interferon, quinine) | LF | ✓ | ✓ | ✓ | ✓ |
| Other atypical hemolytic uremic syndrome (pregnancy-associated) | LF | ✓ | ✓ | ✓ | ✓ |

**SCLERODERMA RENAL DISEASE (<2% of exam)**

<p>| Scleroderma renal disease | LF | ✓ | ✓ | ✓ | ✓ |</p>
<table>
<thead>
<tr>
<th>KIDNEY TRANSPLANTATION (10% of exam)</th>
<th>Diagnosis</th>
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<th>Treatment/ Care Decisions</th>
<th>Risk Assessment/ Prognosis/ Epidemiology</th>
<th>Pathophysiology/ Basic Science</th>
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</thead>
<tbody>
<tr>
<td><strong>PRE-TRANSPLANTATION (&lt;2% of exam)</strong></td>
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<tr>
<td>Transplant immunology</td>
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<tr>
<td>Detection of pre-transplant alloreactivity and immunologic evaluation of transplant candidates</td>
<td>LF</td>
<td></td>
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<tr>
<td>Desensitization</td>
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<tr>
<td>Potential kidney transplant recipient evaluation</td>
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<tr>
<td>Glomerular filtration rate listing requirements</td>
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<td>Cancer concerns</td>
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<tr>
<td>Infection concerns</td>
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<tr>
<td>Cardiac concerns</td>
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<td>Age concerns</td>
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<td>Comorbidities</td>
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<tr>
<td>Other potential kidney transplant recipient evaluation (recurrent autoimmune kidney disease)</td>
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<tr>
<td>Potential living kidney donor</td>
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<tr>
<td>Donor evaluation</td>
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<tr>
<td>Risks</td>
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<tr>
<td>Ethics</td>
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<tr>
<td>Organ allocation</td>
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<tr>
<td>Deceased donor wait list</td>
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<tr>
<td>Organ shortage strategies</td>
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<tr>
<td>Paired kidney donation and chains</td>
<td>LF</td>
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</tbody>
</table>

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<tr>
<th>KIDNEY TRANSPLANTATION</th>
<th>Diagnosis</th>
<th>Testing</th>
<th>Treatment/Care Decisions</th>
<th>Risk Assessment/Prognosis/Epidemiology</th>
<th>Pathophysiology/Basic Science</th>
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<tbody>
<tr>
<td>continued... (10% of exam)</td>
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**TRANSPLANTATION (<2% of exam)**

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<tr>
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<th>✔️</th>
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<td>Contraindications</td>
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Deceased donor kidney transplantation

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<th>Types</th>
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<th>✔️</th>
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<th>✔️</th>
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</thead>
<tbody>
<tr>
<td>Outcomes</td>
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<td>✔️</td>
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Living donor kidney transplant

<table>
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<tr>
<th>Types</th>
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<th>✔️</th>
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<th>✔️</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcomes</td>
<td>Not Applicable</td>
<td>✔️</td>
<td>✔️</td>
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**POST-TRANSPLANTATION (7% of exam)**

Immunosuppression

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<th>Induction</th>
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<th>✔️</th>
<th>✔️</th>
<th>✔️</th>
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<tr>
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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 | LF | ✔️ | ✔️ | ✔️ | ✔️ | ✗ |
| T cell | LF | ✔️ | ✔️ | ✔️ | ✔️ | ✔️ |
| Antibody-mediated | ✔️ | ✔️ | ✔️ | ✔️ | ✔️ | ✔️ |
### KIDNEY TRANSPLANTATION

**continued...**

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### POST-TRANSPLANTATION

**continued...** (7% of exam)

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<table>
<thead>
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<th>Diagnosis</th>
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<td>Male fertility</td>
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### MULTIORGAN AND EXTRARENAL TRANSPLANTATION

(<2% of exam)

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<thead>
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<th>Risk Assessment/Prognosis/Epidemiology</th>
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### ETHICS, SOCIETY, AND PUBLIC POLICY

(<2% of exam)

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<th>Pathophysiology/Basic Science</th>
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<table>
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<tr>
<th>Ethics, society, and public policy</th>
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<th>Risk Assessment/Prognosis/Epidemiology</th>
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<tbody>
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### PHARMACOLOGY

(5% of exam)

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<th>Pathophysiology/Basic Science</th>
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<table>
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<th>Diagnosis</th>
<th>Treatment/Care Decisions</th>
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<th>Pathophysiology/Basic Science</th>
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<table>
<thead>
<tr>
<th>Principles of dialytic drug removal</th>
<th>Diagnosis</th>
<th>Treatment/Care Decisions</th>
<th>Risk Assessment/Prognosis/Epidemiology</th>
<th>Pathophysiology/Basic Science</th>
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### BASIC PHARMACOLOGY

(<2% of exam)

<table>
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<tr>
<th>Diagnosis</th>
<th>Treatment/Care Decisions</th>
<th>Risk Assessment/Prognosis/Epidemiology</th>
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<table>
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<tr>
<th>Pharmacokinetics and other basic concepts</th>
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<th>Risk Assessment/Prognosis/Epidemiology</th>
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<table>
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<tr>
<th>Renal handling of drugs</th>
<th>Diagnosis</th>
<th>Treatment/Care Decisions</th>
<th>Risk Assessment/Prognosis/Epidemiology</th>
<th>Pathophysiology/Basic Science</th>
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<table>
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<tr>
<th>Principles of dialytic drug removal</th>
<th>Diagnosis</th>
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### DRUG SELECTION IN KIDNEY DISEASE

(<2% of exam)

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<th>Pathophysiology/Basic Science</th>
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<table>
<thead>
<tr>
<th>Antibiotics</th>
<th>Diagnosis</th>
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<th>Risk Assessment/Prognosis/Epidemiology</th>
<th>Pathophysiology/Basic Science</th>
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<tbody>
<tr>
<td>Vancomycin</td>
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<table>
<thead>
<tr>
<th>Aminoglycosides</th>
<th>Diagnosis</th>
<th>Treatment/Care Decisions</th>
<th>Risk Assessment/Prognosis/Epidemiology</th>
<th>Pathophysiology/Basic Science</th>
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</table>

<table>
<thead>
<tr>
<th>Other antibiotics (cephalosporins)</th>
<th>Diagnosis</th>
<th>Treatment/Care Decisions</th>
<th>Risk Assessment/Prognosis/Epidemiology</th>
<th>Pathophysiology/Basic Science</th>
</tr>
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<tbody>
<tr>
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<table>
<thead>
<tr>
<th>Antineoplastic agents</th>
<th>Diagnosis</th>
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<th>Pathophysiology/Basic Science</th>
</tr>
</thead>
<tbody>
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<table>
<thead>
<tr>
<th>Antiviral agents</th>
<th>Diagnosis</th>
<th>Treatment/Care Decisions</th>
<th>Risk Assessment/Prognosis/Epidemiology</th>
<th>Pathophysiology/Basic Science</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Other drug selection in kidney disease (metformin; fentanyl)</th>
<th>Diagnosis</th>
<th>Treatment/Care Decisions</th>
<th>Risk Assessment/Prognosis/Epidemiology</th>
<th>Pathophysiology/Basic Science</th>
</tr>
</thead>
<tbody>
<tr>
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</table>
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### PHARMACOLOGY continued...

(5% of exam)

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<tr>
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<th>testing</th>
<th>treatment care decisions</th>
<th>risk assessment prognosis epidemiology</th>
<th>pathophysiology basic science</th>
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### NEPHROTOXICITY OF MEDICATIONS (2% of exam)

<table>
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<tr>
<th>Principles and mechanisms of nephrotoxicity</th>
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<th>✓</th>
<th>✓</th>
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</thead>
<tbody>
<tr>
<td>Antibacterial agents</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Aminoglycosides</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Vancomycin</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Antiviral agents</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Antifungal agents</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Amphotericin B</td>
<td>LF</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Antiparasitic agents</td>
<td>LF</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Additional antimicrobials</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Pain medications</td>
<td></td>
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<tr>
<td>Nonsteroidal anti-inflammatory drugs</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Fentanyl</td>
<td>LF</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Gabapentin</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Renin-angiotensin-aldosterone system (RAAS) blockade</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, and renin inhibitors</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Aldosterone antagonists</td>
<td></td>
<td>✓</td>
<td>✓</td>
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<td>Antihypertensive agents</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Beta-adrenergic blockers</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Calcium channel blockers</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Minoxidil</td>
<td>LF</td>
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</tr>
</thead>
</table>

### NEPHROTOXICITY OF MEDICATIONS continued… *(2% of exam)*

#### Antineoplastic chemotherapy agents

- **Interferon**
  - LF
- **Cisplatin**
  - LF
- **Methotrexate**
  - LF
- **Vascular endothelial growth factor inhibitors**
  - LF

#### Iodinated contrast and other imaging agents

- LF

#### Lithium

- LF

#### Supplements and herbs

- **Aristolochic acid**
  - LF

#### Other nephrotoxicity of medications (cardiac glycosides; bisphosphonates)

- LF

### NEPHROTOXICITY OF ILLICIT DRUGS *(<2% of exam)*

- **Heroin and other intravenous drugs**
  - LF

#### Ecstasy

- LF

#### Cocaine

- LF

### DRUG-DRUG INTERACTIONS AND ADVERSE EFFECTS OTHER THAN NEPHROTOXICITY *(<2% of exam)*

- **Drug-drug interactions and adverse effects other than nephrotoxicity**
  - LF

### DIALYSIS AND OTHER TREATMENT OF TOXIC SUBSTANCES *(<2% of exam)*

- **Ethylene glycol**
  - LF

#### Methanol

- LF

#### Other alcohols

- LF

#### Lithium

- LF

#### Other dialysis and treatment of toxic substances (salicylates; dialysis duration prescription)

- LF
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<table>
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<th>ACUTE KIDNEY INJURY AND INTENSIVE CARE UNIT NEPHROLOGY (15% of exam)</th>
<th>Diagnosis</th>
<th>Testing</th>
<th>Treatment/Care Decisions</th>
<th>Risk Assessment/Prognosis/Epidemiology</th>
<th>Pathophysiology/Basic Science</th>
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<tbody>
<tr>
<td><strong>HEMODYNAMIC (PRERENAL) ACUTE KIDNEY INJURY (4% of exam)</strong></td>
<td></td>
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<tr>
<td>True volume depletion</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Renal fluid losses</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>Extrarenal fluid losses</td>
<td>✔️</td>
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<tr>
<td>Effective volume depletion</td>
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</tr>
<tr>
<td>Heart failure</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<td>Cirrhosis</td>
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<td>✔️</td>
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<tr>
<td>Nephrotic syndrome</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>Drugs</td>
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<td>Nonsteroidal anti-inflammatory drugs</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>Calcineurin inhibitors</td>
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<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Angiotensin-converting enzyme inhibitors and angiotensin receptor blockers</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>Radiocontrast agents</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>Other drugs (tenofovir, cisplatin)</td>
<td>LF</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>Abdominal compartment syndrome</td>
<td>LF</td>
<td>✔️</td>
<td>✔️</td>
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<td>✔️</td>
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<tr>
<td><strong>PARENCHYMAL (INTRINSIC) ACUTE KIDNEY INJURY (4.5% of exam)</strong></td>
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<tr>
<td>Vascular</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Systemic diseases and vasculitis</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Atheroemboli</td>
<td>LF</td>
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<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Renal vein thrombosis</td>
<td>LF</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>Glomerular</td>
<td></td>
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<tr>
<td>Drug-induced</td>
<td>✔️</td>
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<tr>
<td>Infectious</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>General glomerular parenchymal acute kidney injury</td>
<td>LF</td>
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JULY 2020

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**ACUTE KIDNEY INJURY AND INTENSIVE CARE UNIT NEPHROLOGY continued...**

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<tr>
<th>(15% of exam)</th>
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<th>Testing</th>
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<th>Pathophysiology/ Basic Science</th>
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**PARENCHYMAL (INTRINSIC) ACUTE KIDNEY INJURY continued... (4.5% of exam)**

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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Nephrotoxic</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Systemic disease</td>
<td>✓</td>
<td>✓</td>
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<td>✓</td>
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<table>
<thead>
<tr>
<th>Interstitial</th>
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<tbody>
<tr>
<td>Drugs</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Systemic disease</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Malignancy (infiltrative)</td>
<td>LF</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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**POSTRENAL ACUTE KIDNEY INJURY (<2% of exam)**

<table>
<thead>
<tr>
<th>Retroperitoneal and ureteral</th>
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<tbody>
<tr>
<td>Idiopathic retroperitoneal fibrosis</td>
<td>LF</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Malignancy</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Crystals and stones</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Bleeding (intrarenal hemorrhage)</td>
<td>LF</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Bladder, bladder outlet, and benign prostatic hyperplasia</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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**RENEAL REPLACEMENT THERAPY (4.5% of exam)**

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<tr>
<th>Indications</th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Solute accumulation (potassium, hydrogen ions, phosphate, urea)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Hemodynamic</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Acute kidney injury associated with intoxication</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Tumor lysis syndrome</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
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<th>Pathophysiology/ Basic Science</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RENAL REPLACEMENT THERAPY continued… (4.5% of exam)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Techniques</td>
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<td>Intermittent hemodialysis</td>
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<td>Continuous renal replacement therapy</td>
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<td>Dialysate and replacement fluid</td>
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<td>Anticoagulation</td>
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<td>Complications</td>
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<td>Hemodynamic</td>
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<td>Citrate intoxication</td>
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<td>Other complications (dialysis disequilibrium syndrome, electrolyte abnormalities)</td>
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<td><strong>INTENSIVE CARE UNIT NEPHROLOGY (&lt;2% of exam)</strong></td>
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<td>Hemodynamic measures</td>
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<td>Intravenous fluids and volume status</td>
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