End-Stage Renal Disease

Advanced Clinical Exercise Science

End-Stage Renal Disease

- 308,000 patients in U.S. with kidney failure
- Most are older adults
- Treatment is costly
  - Dialysis is $51,000/patient per year
  - Kidney transplant is $18,000/patient per year

Pathophysiology

- Diabetes, hypertension, autoimmune disease, congenital abnormalities
- Increased filtration and excretion rate per nephron
- 10 to 15% of kidney functions
- Uremic syndrome
- Diagnosis:
  - Serum creatinine
  - Urea
  - Reduced glomerular filtration
Medical Management

- Accurate Diagnosis
- Specific signs and symptoms
- Dietary adjustment

Treatment

- Treatment is based on management of creatinine clearance to try to keep above 5 ml/min
  - Dietary
- Aggressive treatment
  - Hemodialysis
  - Peritoneal Dialysis
  - Transplant

Hemodialysis

- 63 percent of all patients treated this way
- Process of ultra-filtration and clearance of toxic solute from the blood
- Takes 3 to 4 hours per treatment, 3 times per week
Peritoneal Dialysis

- 8 percent of patients treated this way
- A dialysis fluid is introduced into the peritoneal cavity via a catheter in the lower abdomen
- Allows more freedom of treatment

Renal Transplant

- 12,000 kidney transplants per year
- Usually, healthier, younger patients
- Medical management after involves
  - Glucocorticoid treatment (immunosuppressives)
  - Cyclosporin derivative,
  - Monoclonal antibody therapy
- 5 year graft survival rates are 67 percent

<table>
<thead>
<tr>
<th>Complication</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Rejection</td>
<td>Can be acute or chronic, in recent cases treated with increased immunosuppression dosages.</td>
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<tr>
<td>Cardiovascular disease</td>
<td>Most frequent cause of death: hypertension, All known risk factors are present, prior immunosuppressive medications may increase risk.</td>
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<tr>
<td>Infection</td>
<td>Immunosuppression may increase infection rate.</td>
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<td>Mucosa-associated disorders</td>
<td>Glucocorticoid therapy (prednisone) reduces bone density and causes muscle protein breakdown.</td>
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<td>Obesity</td>
<td>Very prevalent, often accompanied with prednisone therapy. However, more likely attributable to calorie intake or exercise intolerance (i.e., lifestyle issues).</td>
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Exercise Testing

- Low capacity
- Functional tests may be best
  - Stair climbing
  - 6 min walk test
  - Sit-to-stand test
  - Gait speed testing
## Exercise Prescription for ESRD Treated With Transplantation

**Exertion Zones**:
- Exercise should employ the following guidelines to preserve cardiovascular exercise for transplant patients:
- Moderate intensity: 50-70% of target heart rate
- Vigorous intensity: 70-85% of target heart rate

**Strengthening Exercise**
- Following guidelines for prescribing strengthening exercises for transplant patients:
- Progressive muscle strength training
- Isometric exercises for joint stabilization

**Special Considerations**
- Insufficient data on specific training regimens for transplant patients
- Progression of exercise intensity should be gradual

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