



## **Exercise in Chronic Kidney Disease and the Elderly**

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Chronic kidney disease is a progressive condition that leads to a decreased muscle mass and weakness. Often patients become sedentary, but this only worsens the problems related to their disease. The elderly have a similar course. Several studies have shown that involvement in an exercise routine helps slow the decline in muscle mass, improving exercise tolerance and quality of life, helping to prevent functional decline and frailty.

The decline in muscle mass is related to dysfunction of mitochondria. Mitochondria are structures inside cells that convert nutrients along with oxygen into energy. They are the subcellular “engines” of the body and can be damaged by the accumulation of uremic toxins and by insulin resistance because of oxidative stress and inflammation. All of this leads to a breakdown of the mitochondria and results in atrophy or withering of muscle cells. This manifests itself as difficulty walking short distances or climbing stairs. The gait is slower, as is the time it takes to move from the sitting to standing position. When one becomes frail, the grip may be weaker, and the gait slow. There may be low physical activity with decreased energy and weight loss. Although an increase in frailty is a predictor for a poor prognosis and even death in CKD patients, interventions to increase activity may help to prevent or delay frailty.

Exercise training activates several mechanisms that fight weakness and frailty. It increases mitochondrial function and reduces oxidative stress. It increases the capacity of the body to utilize oxygen. It also reduces inflammation (1).

### **Exercise in the elderly**

A study looked at increasing activity and training in a sedentary population of elderly people. This was the Lifestyle Interventions and Independence for Elders (LIFE) trial where 1635 sedentary participants 70-89 years of age participated for an average of 2.6 years, having been randomized to a structured web-based home-centered physical activity program. The intervention was to exercise – including walking 150 minutes per week. This included 30 minutes of daily walking, 10 minutes of lower extremity strength training using ankle weights, 10 minutes of balance training and large muscle group flexibility exercises. The program also included workshops relevant to the elderly. The main outcome was the ability to complete a 400 meter walk in under 15 minutes. Although the subgroup with lower physical function at the onset of the study represented 44.7% of the study subjects, 71% received considerable benefit. Major mobility disability was decreased (HR 0=0.82) P=0.03) (2, 3).

### **Exercise in kidney disease**

Patients with CKD often wonder if exercise is worthwhile. While is still inconclusive whether physical exercise will slow the progression of kidney disease, it has been shown that resistance training leads to a significant improvement in muscle strength and serum prealbumin levels in CKD patients not on dialysis (4). In a systemic review of 41 trials, 928 CKD participants from stages 2 through 5 were compared. This trial included dialysis patients, and demonstrated that regular exercise is generally associated with improved health (5). The Kidney Disease: Improving Global Outcomes KDIGO CKD Guidelines recommend that in addition to smoking cessation and maintaining a body mass index of 20 to 25, patients with kidney disease undergo regular exercise, aiming for at least 30 minutes 5 times a week (6).

### **Exercise in dialysis patients**

Many dialysis patients want to exercise but are not sure as to how much or what exercises to do. In general, exercise is not contraindicated in dialysis patients, but it is recommended that you check with your doctor to assure you do not have any problems that first must be addressed. A large meta-analysis was performed to look at the value of physical exercise in hemodialysis patients. This was a large systemic review of 1254 patients in 33 studies – a review of the medical literature. 301 patients were engaged in aerobic training and 90 in resistance training. 312 were doing combined training, and 551 patients were allocated as controls. Many of the exercise sessions were performed during dialysis treatments – three times a week. Compliance was 74% where reported. The duration of exercise varied, but only 13% were in exercise programs less than 8 weeks, and the rest longer; 28% were in exercise programs greater than 24 weeks. The studies showed that both aerobic exercise (WMD 3.35 ml/kg/min, 95% CI 1.79 to 4.91) and a combination of aerobic and resistance training also significantly improved aerobic capacity (WMD 5.00 ml/kg/min, 95% CI 3.50 to 6.50). While aerobic training alone did not improve systolic blood pressure, a combination of resistance and aerobic training did (WMD -9

mmHg 95% CI -13 to -4). WMD stands for weighted mean difference, a statistical term to estimate the influence a study has on the overall results of the meta-analysis (7).

The group of dialysis patients who are the frailest are the elderly. In a multicenter Italian study, 115 dialysis patients over 65 years of age, 53 were randomized to home-based walking activity program and 62 served as controls. The activities were performed either at home or outdoors. At the end of 6 months, the 6-minute walking distance improved by 34 meters (95% CI: 14.4 to 53.5 m). The 5 time sit to stand times improved by 1.9 seconds 95% CI: -3.6 to -0.3 seconds). Cognitive function was preserved with activity but declined in the control arm. Physical activity was safe, well tolerated and not associated with angina or death in the population studied. (8) This has since been confirmed by a large metanalysis of 27 studies and 1,156 participants. (9)

### **Exercise Recommendations**

1. Increasing physical activity is beneficial regardless of your age or stage of kidney disease. However, your ability to exercise and the benefits you achieve will vary,
2. Exercise activity should be tailored to your individual needs. See your doctor before beginning an exercise program.
3. Stretching is important – It is important to avoid overdoing exercise. Pulling a muscle can set you back. Be especially careful with your knees, shoulders, hips and back. Start slow.
4. When possible use a trainer. Someone who understands fitness will help guide you so that you use your exercise time more efficiently. The trainer can help you avoid hurting yourself.
5. Walking is an ideal exercise – try to take a 20 to 30 minute walk each day. For dialysis patients, working out during dialysis is ideal.
6. It seems that a combination of resistance training with light weights or bands along with aerobic exercises are ideal.

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Stretching is very important



Sit to stand



Work on balance



Weight training – start slow

Walking is beneficial