Exercise Improves Function and Quality of Life for ESRD Patients

By Daniel M. Keller

Exercise may benefit patients with end stage renal disease (ESRD) by improving their functional independence, resistance to disability, and survival of acute stressors. Exercise is often broken down into endurance exercise, such as walking or running, and resistance exercise. Endurance exercise can be quantified as peak oxygen uptake or aerobic capacity. Resistance exercise is more about strength or muscle power.

Kathy Sietsema, MD, professor of medicine at the David Geffen School of Medicine at the University of California, Los Angeles, and chief of respiratory and critical care medicine at Harbor-UCLA Medical Center in Torrance, Calif., explained that energy production in muscles depends on the body getting oxygen from the atmosphere into the lungs, to the bloodstream, into muscles, and to the mitochondria.

“There are multiple points in this system where patients with renal disease can have impairments, and impairment anywhere along the line can reduce the maximum rate of oxygen uptake or the maximum level of exercise that can be sustained,” she said. Sietsema spoke on “Exercise Interventions in ESRD: Can We Improve Function, Quality of Life, or Survival?” at the symposium “Exercise, Physical Function, and Quality of Life in Patients with ESRD.”

Oxygen uptake (VO2) is measured as mL/min/kg. Maximal VO2 decreases with age even in healthy people, “so that when you get up to the 80s, you might see people with peak VO2s around 18 or 20 mL/min/kg,” Sietsema said. Several studies have reported maximal VO2 levels in people with end stage renal disease. Epoetin treatment has tended to have an effect on peak VO2, in a number of studies, “but it didn’t normal-ize exercise capacity, and it didn’t even increase exercise capacity as much as one might expect it to if the sole limitation to exercise function were the anemia or the cardiovascular system,” Sietsema said.

In a study of 193 ESRD patients from about age 20 to 80 years on hemodialysis, the majority had a peak VO2 <20 mL/min/kg across the entire age range. This value is close to that of an 80-year-old healthy but sedentary woman.

The clinical implications are ap-parent. “Exercise capacity is related to both survival and to function,” she said. Among patients with ESRD, 35 percent of patients reported exercising “almost never.” In a year’s follow-up, “the investigators found that mortality rate was considerably higher in those who answered the question that way in than in patients who answered it in any other way,” Sietsema said, suggesting that exercise behavior is related to survival in this population.

In another study of 175 high-func-tioning ESRD patients, those above the median VO2 value of 17.5 mL/min/kg had significantly better survival than patients below the median over a period of almost 1600 days.

Neither of the two studies says whether changing exercise behavior would have any effect on survival. Besides exercise capacity, physical functioning was also found to correlate strongly with peak VO2, among community dwelling elderly adults.

Studies have shown that frailty and disability are dynamic states, and “people move not only to higher levels of disabil-ity, but it’s also possible to move in the other direction,” Sietsema said. Periods of decreased physical activity, such as hospitalization, are among the most com-mon causes of a shift to a lower level of function or increased frailty. “One of the best predictors of the ability to recover independence after a period of disability was the preceding habitual activity level,” she said. While this concept may seem self-evident, it provides a scientific basis for the field of rehabilitation.

Exercise interventions can prevent disability. Sietsema cited a study in which patients with osteoarthritis of the knee were assigned to a control group or to aerobic or resistance exercise groups. Over 18 months, about half of the control group lost at least one activity of daily living whereas only about 30 percent of patients in the exercise groups did so (P = 0.03 for resistance exercise group versus control; P = 0.01 for aerobic exercise versus control; and P = 0.006 for both exercise groups versus control).

“This study is important because it is one of the few that actually demonstrates that an intervention can change the natural history of disability,” Sietsema concluded.

In a review of studies of endurance ex-ercise training in ESRD patients, Kirsten Johansen of the San Francisco VA Med-ical Center showed that the vast majority of the studies demonstrated a significant increase in peak VO2, as- sociated with the training interven-tion (J Am Soc Nephrol 2007; 18:1845–1854).

The question of clinical signifi-cance remains since Johansen calculated that the average peak increase in VO2 was only 17 percent.

In a small pilot study of intradialytic cycling exercise three times a week, Stoter et al. (Nephrology Dialysis Transplanta-tion 2005; 20:1429–1437) showed that this intervention significantly improved “strength, fatigability, and power.” An additional finding was an increase in strength, contrary to general findings in healthy people, where strength and endurance training are viewed as very separate processes.

It turns out that increasing peak VO2 by a small amount (e.g., 17 percent), can increase the endurance exercise time greatly. In daily living, this increase may translate into a patient being able to walk to a bus stop, shop in a warehouse store, or even play golf.

“I think that there are correlations between what we measure in the lab and what people really care about, the activities that people do,” Sietsema said. “And there’s beginning to be literature that suggests that we can improve these distal endpoints that really matter by the things that we learn from basic exercise physiology.”

Itch Diminishes Hemodialysis Patients’ Quality of Life

Uremic pruritus, or itch, can signifi-cantly diminish quality of life and interfere with sleep, work, and social interactions for a large proportion of hemodialysis patients, according to findings from two poster presentations at the ASN annual meeting.

“Pruritus is a horrible thing. . . . It’s one of the most debilitating facets of the disorder,” said Adrienne Ste. Marie, director of project management at Acologix in Hayward, Calif. Moderate to extreme pruritus affects about 40 percent of hemodialysis patients in the United States. Besides diminishing quality of life, it can also shorten lives. The Dialysis Outcome and Practice Patterns Study reported that associated sleep disturbances increased mortality (P<0.0001), so the condition is not just a matter of “itch.”

According to lead authors Michael Germain, MD, of Western New Eng-land Renal and Transplant Associates in Springfield, Mass., and James Tum- lin, MD, of the Chattanooga Kidney Center and the University of Tennessee in Chattanooga, this investigation, the ITCH National Registry, is the first longitudinal observational study of uremic pruritus.

Using multiple instruments of health-related quality of life, the researchers reported on temporal and spatial patterns of itching and on qual-ity of life issues related to pruritus.

The 103 patients in the multicenter study were 21.8 years old (mean = 56), on hemodialysis three or more times per week, and had an itch severity >10 mm on a visual analog scale (VAS; 0 = no itching, 100 mm = worst possible). They had had end stage renal disease for a mean of 4.1 years. The study popula-tion was two-thirds African-American, reflecting the demographics of the study sites in the southeastern United States.

Participants completed SKIN-DEX-10 and Brief Itch Inventory (BII) surveys. SKIN-DEX-10 includes ques-tions about occurrence of itching, a mood domain (annoyance, depression, or embarrassment about itching), and a social domain (influence of itching on interactions with people, desire to be with people, and effect on work or enjoyable activities). BII asks about mood and interference with work, sleep, enjoyment of life, and relations with other people. Patients also com-pleted the Beck Depression Index and the Medical Outcomes Survey Sleep Questionnaire.

Despite relatively well-controlled calcium, phosphate, PTH, and Kt/V (mean = 1.69), patients had a high degree of itching, with a median worst nighttime score on the VAS of 60 mm. Both SKINDEX-10 and BII scores reflected lower health-related quality of life, including changes in mood, sleep, and social function with each 10 mm VAS increase of itch intensity. The researchers concluded that even small reductions in itch intensity could improve patients’ quality of life.

The same patients also completed surveys of itch patterns using body diagrams. The majority (59 percent) of patients had had pruritus on a daily or nearly daily basis for more than one year, and 41 percent had it the most frequently for more than five years. The spatial pattern of pruritus was unique to each patient. Over 12 weeks of follow-up, itch intensity fluctuated for many patients, appeared to be cyclical for some, and rarely disappeared if the initial VAS intensity score was >40 mm.

The investigators concluded that uremic pruritus tends to be unremit-ting in frequency but may fluctuate in intensity over weeks to months. They also said the spatial pattern suggests a neurogenic process and is not consist-ent with calcium-phosphate deposition in the skin or other local causes. Ste. Marie added that itch did not correlate with dialysis days.

The poster sessions were titled “Correlation between Uremic Pruritus Intensity and Quality of Life: A Report from the ITCH National Registry” and “Temporal and Spatial Patterns of Uremic Pruritus: A Report from the ITCH National Registry.”

Disclosure: Ste. Marie’s employer, Acologix, has a kappa opioid agonist (TRK-820) in clinical development to treat pruritus.