We thank Dr Dean, Ms Ross, and Ms Maclntyre for the opportunity to clarify any misconceptions regarding our case report entitled "Exercise Programs for Patients with Post-Polio Syndrome."1 Perhaps the most critical issue raised is their interpretation of the conclusions of our report. They apparently believe we have argued for the implementation of aggressive isokinetic exercise programs for patients with post-polio syndrome. They also indicate that we do not have an "understanding of the literature to date" related to exercise programs for these patients.

We do not believe the current literature, including our own report,1 conclusively supports any specific guidelines for exercise programs for the patient with post-polio syndrome. Alsentzer has provided opinions on appropriate exercise programs for the patient with post-polio syndrome based on clinical observations.2 Our case report1 and that of Twist and Ma3 both involved a single-case study. Neither case study is conclusive regarding appropriate exercise programs for the more than 514,000 individuals in the United States who have experienced an initial episode of paralytic poliomyelitis between 1920 and 1987 (Centers for Disease Control, Atlanta, Ga; unpublished data; April 1988). The citations for Wiechers and for Einarrsson and Grimby also reflect only opinions and conjecture regarding the long-term effects of rigorous muscle strengthening programs for patients with post-polio syndrome.4 Dean et al suggest that "optimal management of post-polio syndrome probably consists of a balance between not too much and not too little exercise based on the patient's subjective reports of fatigue and discomfort." We believe clinicians have more objective means available for determining the efficacy of their treatment programs.

Our intent in conducting our case study was to play devil's advocate. We believe there are no well-controlled studies to support a conservative approach for exercise programs for post-polio patients. We also believe there are no well-controlled studies to support authors who argue against strenuous exercise programs for these patients.2,4 These authors have suggested that strenuous exercise programs would have deleterious effects for post-polio patients. We conducted our case study to test this hypothesis.

The results of our case study did not support the hypothesis of deleterious effects from strenuous exercise. Our patient demonstrated neither an increase nor decrease in muscle strength during or after the implementation of the exercise program. We interpret "deleterious effects" as a diminution in muscle strength. Dean et al apparently have interpreted deleterious effects as the failure to demonstrate a training response or as an increase in muscle strength.

Regardless of the operational definition selected for deleterious effects, we believe that Dean et al have not accurately interpreted our conclusions. We did not conclude, as they suggest, that strenuous exercise programs are appropriate for patients with post-polio syndrome. Our major conclusion was that the current literature and the results of our single-case study do not support any specific exercise guidelines for patients with post-polio syndrome. A careful reading of our case report would indicate...
that we support the following position:

Future studies in this area should involve large numbers of subjects, and the research design should control for initial differences in muscle strength and age among subjects. Investigators should examine the efficacy of varying levels of exercise intensity, mode of muscle contraction, and duration of exercise program in comparing experimental groups against a control group. We also suggest that in addition to measuring peak torque, other dependent variables (eg, work, power, muscular endurance, functional task performance) may be valuable in assessing treatment efficacy for post-polio syndrome exercise regimens.

Very little research is available to guide the clinician in treating patients with post-polio syndrome who complain of diminished muscle strength. The results of this case study suggest that an intensive exercise program may not have deleterious effects on the muscular performance of patients with post-polio syndrome. We suggest that clinicians should document and report the results of the exercise programs implemented with these patients to add to the knowledge base in this area. Controlled studies are needed to investigate the efficacy of post-polio syndrome exercise programs.1

We do not believe that in this age of accountability clinicians should be satisfied with the selection of treatment programs that are based on opinion, on case studies, or entirely on the subjective report of patients in response to "a balance between not too much and not too little exercise."

A final and less important issue raised by Dean et al concerns their exception to our identification of our patient’s right leg as the unaffected leg based on flexion-extension torque ratios. They accurately report that previous investigators have identified a range of peak knee flexion-to-peak knee extension torque of between 60% and 70% for contractions performed at 60°/sec5–7 and 79% for contractions performed at 180°/sec.7 Dean et al, however, do not indicate the ages of the subjects in these studies. In two of these studies, torque ratios were reported for subjects aged 18 to 31 years5 and 25 to 34 years.7 Subjects in the third study were aged 20 to 61 years, but the analysis was reported for all subjects and no torque ratios were reported by age group.6

Dean et al have accurately noted that our patient demonstrated “normal” knee flexion-extension torque ratios at the 60°/sec test speed. They suggest, however, that the unaffected right leg was not normal because flexion torques exceeded extension torques at 180°/sec for some of the test sessions. Some previously reported data indicate that knee flexion-extension torque ratios approach or exceed 1.0 for subjects aged 40 to 80 years.8 Our patient was aged 59 years and demonstrated knee flexion-extension torque ratios for the right leg that fall within the “normal” range for his age. The changes in knee flexion-extension torque ratios reported in the current literature, including our case report, may reflect the relatively higher proportion of type II fibers in the quadriceps femoris muscle group9 and the selective atrophy of type II fibers that occurs as humans age.10

We again thank Dean et al for the opportunity to clarify any misconceptions regarding the conclusions of our case report and for the opportunity to provide information on the effect of aging on normal knee flexion-extension torque ratios. We continue to encourage clinicians and researchers to gather and report data that will provide support for the efficacy of treatments for patients with post-polio syndrome.

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