We wish to thank Ms McConnell for taking the time to write her commentary. The main criticism in Ms McConnell's commentary appears to be that she believes our paper deals primarily with a comparison of the straight-leg-raising (SLR) and quadriceps femoris muscle setting (QS) exercises, and thus adds little to the existing literature. Specifically, she cites two studies by Soderberg and associates\textsuperscript{1,2} as being similar to the research we have presented.

The primary aim of our research was, as the title denotes, to test specific exercises that have been proposed for preferentially strengthening the vastus medialis obliquus component (VMO) to a greater degree than the vastus lateralis component (VL). Neither of those exercises, the SLR in the laterally rotated hip position (SLR/LR) or the SLR combined with isometric hip adduction (SLR/ADD), were mentioned in either of the studies by Soderberg and associates\textsuperscript{1,2} Further more, neither of those studies attempted to draw any conclusions about the relative activity of the VMO and VL during any exercise, because no electromyographic data were even reported for the VL. We did report that our results concerning the relative activity of the rectus femoris (RF) and vastus medialis muscles during QS and SLR were in agreement with previous findings by Soderberg and associates\textsuperscript{1,2} but we did not imply that such a finding was new, and we certainly did not intend for that to be the principal message of the manuscript. That comparison was included to enhance the credibility of our findings by demonstrating that, insofar as our data could be compared with data from other laboratories, our findings were compatible with previously published results based on larger populations of healthy subjects\textsuperscript{1,2} as well as with results from subjects with knee pathologies.\textsuperscript{2}

Ms McConnell takes issue with “unchallenged assumptions” in our contention that exercises combining activation of the hip adductors and knee extensor strengthening activities have been advocated as a means of preferentially activating the VMO. We wish to point out that we are simply stating a fact: The use of such exercises has been advocated in a number of published works,\textsuperscript{5-13} including one authored by Ms McConnell, in which she states that “the addition of adduction while performing knee extension might facilitate VMO activity during the early stages of rehabilitation.”\textsuperscript{6} The heretofore “unchallenged assumption” is whether those exercises actually result in preferential activation of the VMO to a greater degree than the VL. Our data clearly do not support that claim. In this context, we would also note that of the 11 references we found advocating hip adduction as a means of facilitating VMO activity,\textsuperscript{5-13} none actually involved study of the SLR/LR or SLR/ADD, and only one\textsuperscript{6} provided any experimental data addressing a possible interaction between hip adduction and VMO activity. Thus, it seems that the notion of a functional link between hip adduction and selective VMO activation is becoming “conventional wisdom” in physical therapy practice merely on the basis of repetitive hearsay, rather than scientific evidence.

On a similar note, we are puzzled by Ms McConnell's statement that “the theoretical rationale for SLR exercises performed with the hip in lateral rotation [that are based] on an anatomical link between the VMO and the adductor magnus muscle, as stated by the authors, seems to be unfounded,” when earlier in the same paragraph, as well as in previous writings,\textsuperscript{6} she argues for the use of isometric hip adduction as a means of preferentially activating the VMO by citing an anatomic study by Bose et al.\textsuperscript{14} Again, we wish to note that this anatomic study was based on a supposed functional link between the adductor magnus and the VMO has been cited repeatedly in the literature,\textsuperscript{5,6,8-10,12} but is neither advocated by us nor supported by the results of this study.

Ms McConnell does raise a pertinent point in her citation of a recent study by Hanten and Schulthies,\textsuperscript{9} which suggests that the VMO may be activated to a relatively greater degree than the VL when subjects perform isolated hip adduction with the knee in 50 degrees of flexion. The possible conflicts between their findings and those of our study have been dealt with in the “Discussion” section of our manuscript, and will not be repeated here.

We do wish to address, however, Ms McConnell's contention that “the VMO is not an extensor of the knee” and her endorsement of isolated hip adduction based on the results of the study by Hanten and Schulthies.\textsuperscript{9} The fact is that all available data, including the findings of Hanten and Schulthies, clearly indicate that maximal recruitment of the VMO occurs when the subject is instructed to extend the knee. Hanten and Schulthies' data show that asking subjects to maximally adduct the hip resulted in a mean VMO activity of less than 62% of that obtained when they asked the subjects to perform isometric knee extension. Moreover, the large standard deviation of that mean (45.69%) indicates that a number of subjects must have achieved substantially less than 62% of maximal VMO activation when instructed only to adduct the hip. Finally, Ms McConnell's endorse-
ment of the exercise studied by Hanten and Schulthies (subject seated, with knee flexed 50°, and instructed to adduct the thigh) seems at odds with her pleas for task-specific functional strength training. In light of these considerations and the results of our study, hip adduction exercises, with or without concurrent knee extension, do not appear to deserve a blanket endorsement as a means of selectivity strengthening the VMO. Though the remainder of Ms McConnell's commentary is more an overview of her philosophy on treatment of patellofemoral dysfunction than a critical review of our report, she does reiterate the point made in our discussion that other interesting possibilities for preferentially activating the VMO remain to be tested. The use of electromyography, either for biofeedback or as a means for the therapist to tailor exercise programs to individual patients, certainly seems to hold promise. Likewise, careful evaluation of various weight-bearing exercises in terms of medial-to-lateral activation ratios is essential. Finally, we found Ms McConnell's closing statements regarding research and physical therapy to be both thought provoking and disturbing. Her contention that "researchers in physical therapy examine current clinical practice . . . ; it is our (the clinicians') responsibility to direct the research focus" is disturbing for several reasons. First, it fosters the notion that one is either a researcher or a clinician, and never the twain shall meet, a notion that, in our opinion, is antiquated and detrimental to the profession. Furthermore, the idea that untested "clinical hypotheses" are a sufficient basis for implementing (and advocating) an unproven form of treatment is the complete antithesis of modern medical research, in which new treatment principles derive from the application of sound anatomical and physiological principles and are deemed worthy of acceptance into current clinical practice only after having undergone critical evaluation (ie, studies published in appropriate peer-reviewed journals). If physical therapy is to advance as a profession, we need to break down the imagined wall between "clinician" and "researcher" and develop a great many more clinician-researchers (be they individuals or teams) who not only generate scientifically based hypotheses but, more importantly, take the responsibility for critically evaluating those hypotheses before advocating their incorporation into clinical practice.

Again, we would like to thank Ms McConnell for her commentary, and in particular for her comments regarding research in physical therapy, the rebuttal of which provided us with a soapbox from which to express our own opinions. We hope that both the results of our study and our reply to her commentary will stimulate research and discussion that will ultimately promote the scientific basis of our profession.

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References