Bone Densitometry as an Indicator of the Effect of Strengthening Exercise on Geriatric Muscle and Bone Health

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Introduction/Background: The deterioration of muscle and bone health are primary risk factors for falling, and mortality in the geriatric population. Every 11 seconds an older adult is treated in the Emergency department for fall related injuries. Falls result in an average hospital cost per fall of greater than $30,000. In addition, fractures in older adults at best result in a loss of function and independence and, at worst, result in death. Hip fractures are associated with significant morbidity, mortality, loss of independence, and financial burden. The reported 1-year mortality after sustaining a hip fracture is estimated at 14% to 58%. Because of the significant morbidity and mortality effects of bone health, maintenance of bone health and interventions that address it, are critical issues to today's aging population.

Causes of falls are multifactorial including cognitive impairment, slowed central processing, decreased sensation, polypharmacy, balance impairments, gait impairments, vision changes and muscle weakness. Of these factors, muscle weakness, compared to any other single factor, increases a patient's risk of fall 4.4 x. Research indicates that strengthening to address muscle weakness has the most evidentiary support and high overall success. Ultimately, strengthening treatments for fallers decrease mortality related deleterious falls in the elderly population.

Purpose: The purpose of this study is to monitor the effect of strengthening exercise on bone density and body composition.

Methods: Dual-energy x-ray absorptiometry (DXA) will be performed for subjects at baseline, 6 months and 13 months. Subjects will be instructed in a home exercise program to be performed 2x weekly. Exercise progressions will continue for 13 months; the duration of the study.

Results: To date, this long-term project has gained steady progression and the following tasks have been accomplished. Faculty along with assistance from a student assistant have completed a long term literature review of the most current outcomes associated with exercise dosing in the elderly population. A DXA scanning machine was bought and setting up of the appropriate area for scanning has been completed. One principal investigator has undergone specialized training in Europe during this past year. That investigator also successfully obtained California state licensure to become a certified DXA technician. Both investigators have undergone equipment specific training via Hologic™ for operating the DXA system. Several collaborative entities have been introduced to the project for the purpose of: cultivating a patient subject population and the possibility of working on multi-center and

multi-discipline collaboration. These entities include faculty from the department of public health, physicians from UCSF, and administrators from Sierra Clinica. The IRB for collection of subject data has been completed.

Discussion: Currently set deadlines for pre-project goals have been met (e.g. obtaining equipment, advanced training, licensure and securing both on and off campus additional stakeholders). At present the principal investigator who is the certified technician is working towards completion of the mandatory 100 scans. Following completion of these scans as proof of reliability and competency, research subject data collection is expected to begin.

Conclusion: At present significant progress has been made on this project and all pre-collection goals have been met. This coming academic year, it is anticipated that, subject pool selection and subsequent control and test group data collection will begin.