American College of Rheumatology Research and Education Foundation—ASP—Junior Career Development Award in Geriatric Medicine

Award Recipient:

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Project:

Hypovitaminosis D in Rheumatoid Arthritis: Prevalence and Benefits of Vitamin D_3 Therapy

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Osteoporosis is an epidemic in the United States; one in two women and one in four men aged 50 will experience a fragility fracture in their remaining life. Furthermore, the prevalence of osteoporosis is two-fold higher in people with rheumatoid arthritis (RA) compared to age- and gender-matched controls. Additionally, both RA and osteoporotic fractures result in diminished functional status and quality of life. Indeed, chronic pain and disability occur in 10-40 percent of people with vertebral compression fracture, and disability is noted in 20-90 percent of those with RA. Consequently, individuals with both RA and osteoporosis are more likely to experience chronic pain, disability, and loss of independence. An attendant increase in health care costs is likely, as poor functional capacity is the best predictor of health care costs related to RA. Thus, an intervention targeting both RA and osteoporosis, which 1) elevates functional capacity, 2) improves skeletal health, and 3) modulates synovitis potentially would be of great import. Vitamin D supplementation may prove to be one such intervention.

Hypovitaminosis D is common in osteoporosis, reported in 24 percent of women with the condition. Existing, albeit limited, data from other countries also suggest that up to 73 percent of people with RA have hypovitaminosis D. Low vitamin D status leads to bone loss, initially due to reduced intestinal calcium absorption. Subsequently, serum calcium falls and parathyroid hormone (PTH) rises, causing release of calcium from bone via osteoclast-mediated bone resorption. A resultant high turnover osteoporosis may ensue if the vitamin D deficit is not corrected. Furthermore, hypovitaminosis D causes muscle weakness and increased falls, an observation supported by relatively recent data, which document that vitamin D supplementation subsequently improves muscle strength and decreases the rate of falling. Finally, vitamin D inhibits production of cytokines that mediate RA disease activity including interleukin 1, interleukin 6, and tumor necrosis factor.

Thus, osteoporosis and hypovitaminosis D are common in people with RA and may cause adverse effects on quality of life, including disability. Therefore, I hypothesize that correction of hypovitaminosis D in subjects with RA will enhance skeletal status, improve functional capacity, and down-regulate excess cytokine production, thereby diminishing disease activity. Vitamin D is inexpensive, widely available, and, if proven effective, might become a mainstay of therapy for subjects with RA. The proposed study will investigate whether vitamin D offers such benefits to people with RA and hypovitaminosis D.

The first study hypothesis is that hypovitaminosis D is common in subjects with RA and is associated with high bone turnover related to secondary hyperparathyroidism. The prevalence of hypovitaminosis D will be estimated and its effects on bone will be documented by testing 40 volunteers with RA. The second hypothesis is that vitamin D therapy will reverse secondary hyperparathyroidism, decrease bone turnover, and increase bone mineral density. The third hypothesis is that vitamin D therapy will elevate functional capacity, decrease disease activity, and improve quality of life in affected patients. The second and third hypotheses will be tested by performing a randomized, double-blind, placebo-controlled pilot study assessing the effects of vitamin D on bone turnover, bone mineral density, functional status, quality of life, and RA disease activity among 84 subjects with RA and hypovitaminosis D.