Randomized Controlled Study of Immune Mechanisms of Vitamin D to Reduce Chronic Pain After Thermal Burn Injury

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Burn injuries affect 11 million people annually worldwide and chronic pain development is common. Low vitamin D is associated with chronic pain conditions and vitamin D has improved pain outcomes for inflammatory disorders. Vitamin D deficiency is common in patients with burn injuries and observational studies have shown that low vitamin at the time of a burn injury is associated with greater chronic pain. We hypothesize that vitamin D reduces chronic pain after a burn injury by an immune mechanism, more specifically, that vitamin D is an anti-inflammatory that reduces pro-inflammatory cells and increases anti-inflammatory cells. We also predict that vitamin D decreases toll-like receptor 4 activation. To assess the mechanism and determine feasibility of a one-time dose strategy, we are conducting a follow-up study. This pilot, double-blind, randomized controlled trial enrolls adult patients who present to UNC Hospitals within 1 week of major thermal burn injury. Only individuals with total body surface area burned ≤30% are enrolled and before study drug administration, vitamin D levels are measured using a finger-prick test to prevent toxic levels. Patients are administered a one-time dose of vitamin D (300,000 IU) or placebo at enrollment. Pain severity and psychological and social interference are assessed at enrollment, 6 weeks, 3 months and 6 months after MThBI via in-person interviews and online surveys.1, 25(OH) vitamin D levels are determined from plasma obtained at enrollment and at 6 weeks. Immune mechanisms will be assessed using single-cell mass cytometry using blood samples collected as enrollment and 6 weeks.