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"Adaptive Photo-Protection Trial"

Background

A growing body of literature has demonstrated a moderate negative correlation between vitamin D insufficiency and morbidity and mortality from Covid-19 infection.[1] Confounding this is the fact that serum vitamin D levels are also low in comorbidities that also correlate with higher Covid-19 mortality.[2,3] However, studies of oral vitamin D have not consistently improved COVID outcomes.[4,5]

Vitamin D – and at least 30 other immunoregulatory compounds – is produced in response to ultraviolet B (UVB) light.[1] UVB light is standard of care in several autoimmune diseases, including graft vs. host disease, cutaneous T-cell lymphoma, and psoriasis.[6,7,8] To date, no studies have aimed to determine whether or not UVB phototherapy can improve Covid-19 outcomes.[9]

We hypothesize that improving immunoregulation with UVB phototherapy will reduce disproportionate inflammation during the infection, as well as hypercoagulation that are hallmarks of severe COVID infections.[10,11] To test our hypothesis, we are conducting a placebo-controlled, double-blinded, randomized clinical trial of narrow-band UVB (NB-UVB) light (Anthem One, AOMI Lights) in hospitalized Covid-19 patients (NCT04818970).[6]

Methods

The pilot phase enrolled 30 patients at a single site and will be followed by an adaptive design up to 300 patients at 10 sites. Inclusion criteria includes age over 50, positive PCR Covid-19 testing, at least one comorbidity and oxygen saturation below 94% at room air or requiring oxygen supplementation by mask or nasal prongs. Subjects will are randomized 1:1 to either treatment or placebo arms. The phototherapy is an adjunct treatment and will not interfere with the patient's care management. A visually identical light that emits no UVB is used as placebo.

The primary objective is to demonstrate safety and efficacy of NB-UVB phototherapy by showing improved clinical outcomes. Secondary objectives are to demonstrate a decrease in Th1 levels, with an increase in Th2 and Treg T-cells, which translates to higher anti-inflammatory cytokines. D-dimer and partial thromboplastin time (PTT) are also measured and are expected to decrease as an indication of improved hemostasis. Lastly, vitamin D levels are measured to demonstrate the efficacy of NB-UVB in this regard.

The phototherapy consists of 8 days of treatment and 20 days of follow-up, and will be interrupted in case of patient discharge, transfer to ICU or withdrawal from the study. A minimum of 25% body surface area will be exposed to the UVB light. The doses administered

are based on American Academy of Dermatology (AAD) Guidelines and depend on skin color and residual erythema from previous exposures. Blood draws are performed on day 1 pre-treatment and on days 3, 5 and 8 post-treatment. Blood is processed commercially for clinical labs, and in an immunology research lab (Baylor College of Medicine) for cytokine and T-cell analysis.

Results

Between May 24, 2021 and August 19, 2021, 206 hospitalized Covid+ patients were screened for study inclusion. 75% (n=153) did not meet inclusion criteria due to being <50 years of age (n=82), age-eligible but asymptomatic (n=36), and age-eligible but admitted to the ICU (n=22).

Of the eligible subjects (n=53), 57% (n=30) enrolled in the trial. Key demographics included a mean age of 67.3 years (range 50-92), 60% male, and mean body mass index of 32.4 kg/m2 (range 22.9-61.0). On average, patients received 3.8 treatments (range 1-8 treatments) and 2.63 blood draws were successfully completed.

Conclusion

Enrollment for the pilot phase is completed. Data are currently embargoed and are being analyzed. We anticipate reporting the results of this trial in the next month.

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