Investigating the Efficacy of Hyperbaric Oxygen in Modulating IL-6 and EPO in Stem Cell Transplant Patients

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Although stem cell transplants have made promising clinical progress as a treatment for leukemia and other blood cancers, their safety and the severe complications they pose have significantly limited their efficacy and widespread use. Setbacks with stem cell transplants (SCTs) are widely attributed to one post-transplant complication: engraftment syndrome (ES). This inflammatory complication results in many transplant mortality-related incidents due to the conditions that arise from the influx of IL-6 that characterizes ES. Such conditions include capillary leak, a condition in which the contents of capillaries leak into surrounding tissues, resulting in dangerously low blood pressure, and pulmonary infiltrates. As such, this research aims to propose a preventative measure against ES to overcome the risks that SCTs pose. In this study, hyperbaric oxygen therapy (HBOT) was administered to designated patients prior to undergoing an allogeneic stem cell transplant as part of their preparative regimen. Tissue samples were collected 1-day pre-transplant (day -1) and up to 100 days post-transplant. Samples from day -1, day 7, and day 15 were analyzed via an ELISA to indirectly quantify levels of IL-6 by converting optical density to concentration (pg/mL). Additionally, erythropoietin (EPO) readings for each timepoint were taken from a mentor database and analyzed as an indicator for hypoxia post-transplant. Findings indicate that HBOT did decrease the severity of ES post-transplant, as evidenced by significantly lower levels of IL-6 and EPO in samples from patients treated with HBOT ($p<0.05$). Thus, this study successfully establishes the potential for HBOT to be a preventative treatment for ES and sets the groundwork for eliminating one of the major risks posed by SCTs.

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