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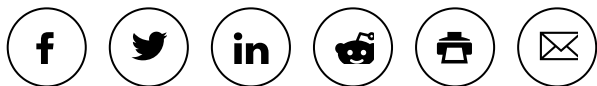
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## Light-Based Therapy Shows Promise in Treating Mucositis in Pediatric Cancer Patients

Victoria Forster, PhD

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A new light-based device for wound healing is showing excellent early results in the treatment of mucositis in pediatric cancer patients.<sup>1</sup> The therapy, referred to as photobiomodulation, uses low-level lasers in the near-infrared range to stimulate and promote wound healing and regeneration. The device is being studied in the prevention and treatment of mucositis in pediatric cancer patients at WVU Medicine in Morgantown, West Virginia, and other centers in the United States.

Mucositis is characterized by painful and debilitating sores in the mouth, tongue, oropharynx, and throat. It is caused by certain treatments common to cancer regimens, particularly chemotherapeutic agents that preferentially affect fast-dividing cells. Along with the direct effects on the oral cavity, therapy-associated immunosuppression can result in dramatically reduced wound healing. “The mucositis generally won’t resolve until the immune system recovers, which depending on the type of chemotherapy used, can result in 7 to 14 days of sores and oral pain,” said Patrick Tomboc, DO, chief of the Division of Pediatric Hematology-Oncology at WVU Medicine Children’s, who is using the new light-based device on his pediatric oncology patients.

The pain caused by mucositis can sometimes be so extreme that children require intravenous pain medication and feeding tubes. Aversions to food and oral medication can develop in very young children as a consequence of enduring mucositis-associated pain. Affected children are also at risk for infection via oral sores. “Some of the worst mucositis I have seen has been in the setting of bone marrow transplantation. The throat can be so inflamed that the child vomits throat tissue. Mucositis also can lead to serious infections, as the mucosal barriers are often our best way to protect against

The photobiomodulation device is thought to improve tissue repair by reducing inflammation via reduced oxidative stress in mitochondria.<sup>2</sup> The treatment involves inserting a probe-like device into the mouth for 1 to 2 minutes per treatment. It also can be applied on the outside of the skin in very young patients whose oral cavity is too small for the device.

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Currently, the device is used prophylactically 3 times a week in patients who are at risk for mucositis or daily as a treatment in those in whom mucositis has developed. Because limitations such as device size exist in the use of photobiomodulation in the pediatric setting, Dr Tomboc and his team are developing a smaller device. "It seems to be a painless intervention, and I don't know of any side effects," he explained. The team is planning a prospective study to evaluate photobiomodulation in pediatric cancer patients with mucositis.

In relating observations regarding device efficacy, Dr Tomboc noted that hospitalization time can be greatly reduced. "One patient admitted for mucositis was in for 13 days and on patient-controlled analgesia for 10 days. When the same patient was admitted a second time, he was treated with photobiomodulation. Hospital stay was reduced to 4 days, and his mucositis resolved long before his white blood cell counts recovered," said Dr Tomboc. "Clinically, the results have been very surprising. Although the number of patients that we have treated so far has been small, we have seen very effective results. We have achieved resolution of mucositis without immune system suppression," he added.

"Low-level laser therapy is indicated by a multinational supportive care association for treatment of oral mucositis in adults," explained Geraldine Jacobson, MD, chair of the Department of Radiation Oncology at the WVU Cancer Institute. "We have been using this treatment in the Department of Radiation Oncology since June to reduce oral mucositis in our head and neck cancer patients."

Studies on the benefit in children so far have been inconclusive.<sup>3</sup> A clinical trial that is looking at photobiomodulation in pediatric patients who have received hematopoietic stem cell transplants is currently underway ([NCT04227340](https://clinicaltrials.gov/ct2/show/study/NCT04227340)).

"We've seen some amazing responses," said Belinda N. Mandrell, PhD, RN, principal investigator of the

Memphis, Tennessee. “We have a few patients who did not get the light therapy with first transplant but did with subsequent transplants. One patient had grade 3 mucositis before light therapy. Following light therapy with second transplant, no mucositis developed at all. The patients and their families are very impressed with the difference that light therapy has made,” said Dr Mandrell.

The clinical trial has recruited approximately 60 patients, most of whom have acute lymphoblastic or acute myelogenous leukemia and are undergoing hematopoietic stem cell transplantation. In this trial, the light therapy is being used preventatively, with the results being compared with historical controls. “We start the therapy on the first day of conditioning and continue until Day 20 or engraftment is confirmed for 2 consecutive days. We’ve treated children as young as 4 months without difficulty,” she explained.

Dr Mandrell and colleagues will be doing an interim analysis shortly, with a look at metrics of success, such as days of hospitalization, use of pain medication, and emergence of infections. Although results of the trial are pending, she has been impressed with the therapy so far and hopes that it will become more widely used. “After I look at the study data, I want to get the evidence into clinical practice to help prevent oral mucositis. I will then look outside of the hematopoietic stem cell transplant population to other patients, such as those getting high-dose chemotherapy,” said Dr Mandrell.

## References

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