

Up, Up, and Away! Heliox Therapy: Practice, Evidence, Risk and Opportunities

Helium is a somewhat elusive element, found in great abundance in the universe, but relatively rare on Earth. This colorless, odorless, tasteless, and inert gas is lighter and less dense than air. Helium has been used for everything from children's balloons to superfluid technologies.

Since Barach first reported, in the 1930s, the use of helium-oxygen mixture (heliox) in the treatment of airway obstruction, heliox has been advocated for a wide variety of diagnostic and clinical applications. Though the physics that define the potential advantages of heliox are clear, empirical evidence to support the use of heliox appears at times to be a bit "lighter than air"—or oxygen.

Helium is inert. Unlike other gases used in respiratory care, helium is not a physiologic gas required or produced by the body. The effects of this inert gas are manifest only during its administration. The trick is to determine when the patient will benefit from its application and how to determine the benefit. This is complicated by the lack of medical devices designed, calibrated, and approved for delivery and measurement of respiratory function during application of heliox. Clinical research has reported conflicting results, and it is often difficult to determine whether clinical application, the methods of testing, or administration is at fault.

As interest in the clinical use of heliox has increased, administering heliox has required some innovative device-modification beyond the design intent of the devices used. These modifications often extend beyond the training provided by most respiratory care training programs or general texts. Unfortunately, intuitive application of basic physical principles does not always coincide with safe and effective devices, which places patients, clinicians, and institutions at risk.

To address these issues, a 4-hour symposium, "Heliox Therapy: Practice, Evidence, Risk, and Opportunities," was convened on December 3rd, 2005, at the 51st International Respiratory Congress of the American Association for Respiratory Care, held in San Antonio, Texas. The faculty was composed of clinicians and researchers who have con-

ducted a variety of clinical and bench research on heliox. The manuscripts from that symposium are presented in this issue of *RESPIRATORY CARE*.

We begin with a review of the history and physics of helium and heliox, in a manuscript that was initiated by Dean Hess, with contributions from the entire assembled cast.

In Kim then reviews the use of heliox for asthma exacerbations treated in the emergency department, with an exploration of the contradictory findings from various studies.

Tim Myers explores the rationale and methods for heliox treatment of children with airway obstruction, bronchiolitis, and croup, with a comprehensive review of the literature and analysis of the various methods of heliox administration.

Shekhar Venkataraman provides an analysis of heliox use during mechanical ventilation.

Dean Hess reviews the implications of heliox use with noninvasive ventilation, with a focus on patients with chronic obstructive pulmonary disease.

Last, and perhaps least, my contribution to the symposium offers an analysis of how clinicians have found ways to administer heliox without the benefit of commercially available devices designed for administering heliox, by resorting to in-house equipment modifications, which may or may not be in the best interest of the patient or institution. I discuss the risks of and a systematic approach to safe implementation of heliox therapy.

These manuscripts are a unique compilation of heliox-related information that should be a valuable resource for clinicians as they seek to establish when and how to use this potentially life-saving gas mixture. Our thanks to Aerogen, Praxair, and GE Health Care for the unrestricted educational grants that made the presentation of the symposium possible.

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