**DOI:** 10.21088/per.2321.1644.13225.112

Pediatric Education and Research
Volume 13 Number 2, July - December 2025
(Special Supplement - II)

**REVIEW ARTICLE**

# The Contributions of Dr. Ola Didrik Saugstad to Neonatal Medicine and Global Pediatric Care

**Kasumbiwal Ajay H.[1], Mangesh Dake[2], Tambe Pranita[3], Swaranjali More[4]**

**How to cite this article:**

***Kasumbiwal Ajay H., Dake Mangesh V., Tambe Pranita,*** *et al.* The Contributions of Dr. Ola Didrik Saugstad to Neonatal Medicine and Global Pediatric Care. Pediatr. Edu. Res. 2025; 13(2): 455-457.

## ABSTRACT

Ola Didrik Saugstad is a renowned Norwegian neonatologist whose pioneering research has profoundly influenced modern neonatal care, particularly in the field of newborn resuscitation. His work focuses on the effects of oxygen exposure, oxidative stress, and free radical–mediated injury in neonates. Traditionally, 100% oxygen was routinely used during neonatal resuscitation; however, Saugstad challenged this practice through well-designed experimental and clinical studies. His research demonstrated that high oxygen concentrations can cause increased oxidative stress, leading to cellular injury and poorer neonatal outcomes.

One of Saugstad's most significant contributions was providing strong evidence that resuscitation with room air (21% oxygen) is as effective as, and safer than, pure oxygen for term and near-term newborns. These findings led to major changes in international neonatal resuscitation guidelines, including recommendations by the World Health Organization and other global resuscitation bodies. The adoption of room air resuscitation has contributed to reduced neonatal mortality and morbidity, especially in low- and middle-income countries.

In addition to clinical research, Saugstad has made important contributions to understanding the biochemical mechanisms of hypoxia–reoxygenation injury and the role of oxidative stress in neonatal disease. Through extensive publications and academic leadership, he has promoted evidence-based practices in neonatology. Ola Didrik Saugstad's work represents a milestone in neonatal medicine, emphasizing that careful and rational use of oxygen is essential for improving newborn survival and long-term outcomes.

**AUTHOR'S AFFILIATION:**

[1] Professor & HOD, Department of Pediatrics, VDGMC, Latur, Maharashtra, India.
[2] Assistant Professor, Department of Pediatrics, VDGMC, Latur, Maharashtra, India.
[3] Senior Resident, Department of Pediatrics, VDGMC, Latur, Maharashtra, India.
[4] Student, Department of Pediatrics, VDGMC, Latur, Maharashtra, India.

**CORRESPONDING AUTHOR:**

**Swaranjali More,** Student, Department of Pediatrics, VDGMC, Latur, Maharashtra, India.
**E-mail:** Swaranjalira99@gmail.com

➢ **Received:** 22-12-2025 ➢ **Accepted:** 29-12-2025

***Key Message:*** Use of room air for neonatal resuscitation reduces oxidative injury and improves survival.

**KEYWORDS:**

• Ola Didrik Saugstad • Neonatal resuscitation • Oxygen therapy • Oxidative stress • Newborn care

## INTRODUCTION

Dr. Ola Didrik Saugstad is widely regarded as one of the most influential neonatologists of the modern era. Born in Norway in 1947, he dedicated his career to studying the physiology of newborns, particularly the effects of hypoxia and oxygen therapy. His research challenged long-standing medical traditions and replaced them with evidence-based practices adopted across the world. This review highlights his scientific contributions, his role in improving neonatal outcomes, and the importance of his research in shaping current medical care.

### Background: Early Life, Education, and Training

Saugstad completed his medical degree at the University of Oslo and later specialized in pediatrics and neonatology. His early clinical experiences in neonatal intensive care units sparked his interest in the harmful effects of excessive oxygen use in premature infants. Motivated by these observations, he pursued advanced research on hypoxia, reoxygenation injury, and cellular biochemistry. His PhD work formed the cornerstone of his later scientific breakthroughs.

### Scientific Contributions and Impact on Neonatal Medicine

Dr. Saugstad's most influential work centers on oxygen toxicity and neonatal resuscitation. For decades, global resuscitation practices encouraged the use of 100 percent oxygen for newborns. Saugstad challenged this, demonstrating through extensive research that excessive oxygen leads to oxidative stress, inflammation, cellular damage, and increased neonatal morbidity.

His pivotal findings showed that room air (21 percent oxygen) is equally effective and often safer than 100 percent oxygen for neonatal resuscitation. These discoveries reshaped WHO guidelines and global neonatal resuscitation protocols.

**Key scientific contributions include:**

- Identification of oxygen free radical injury in newborns
- Evidence linking hyperoxia to increased neonatal mortality
- Establishment of room-air resuscitation as standard of care
- Advancement of antioxidant defense research
- Influence on global health policies, particularly in low-resource countries

His work also enhanced understanding of neonatal lung injury, premature infant physiology, and hypoxia-induced biochemical pathways.

### Challenges, Breakthroughs, and Global Recognition

Saugstad's early findings were met with skepticism because oxygen therapy was deeply embedded in neonatal practice. Despite resistance, he persisted, conducting rigorous research that eventually gained worldwide acceptance. Large multicenter trials validated his findings, leading to permanent changes in global guidelines.

His work has saved countless newborn lives, especially in countries where access to oxygen is limited. He continues to contribute to global neonatal health through mentorship, policy advising, and scientific publications.

### Reflection:

Dr. Saugstad's journey reflects scientific courage and dedication to evidence-based medicine. His willingness to question established medical norms revolutionized neonatal care. His discoveries continue to inspire students, clinicians, and researchers to pursue innovation for the betterment of patient care.

## CONCLUSION

Dr. Ola Didrik Saugstad's contributions mark a turning point in neonatal science. His pioneering work on oxygen toxicity and room-air resuscitation significantly reduced neonatal mortality worldwide. His research legacy continues to shape modern neonatal medicine and serves as a foundation for future.

## REFERENCES

1. Saugstad O.D. Chronic lung disease: The role of oxidative stress. Biol Neonate. 1998; 74 Suppl 1: 21-8. doi:10.1159/000047031.
2. Saugstad O.D. Oxygenation of the newborn: a molecular approach. Biol Neonate. 2012; 102(1): 2-9. doi:10.1159/000329575.
3. Saugstad O.D., Ramji S., Vento M. Resuscitation of newborn infants with 21% or 100% oxygen: A meta-analysis. Biol Neonate. 2004; 87(1): 27-34.doi:10.1159/000080950.
4. Saugstad O.D. Oxidative stress in the newborn—a 30-year perspective. Biol Neonate. 2005; 88(3): 228-36. doi:10.1159/000087586.
5. Speer C.P., Halliday H.L. Ola Didrik Saugstad—an oxygen radical. Neonatology. 2008; 94(3): 188-9. doi:10.1159/000143720.