

# NEONATAL PULMONARY RESEARCH

*Mesenchymal stem cells protects hyperoxia-induced lung injury in newborn rats via inhibiting receptor for advanced glycation end-products/nuclear factor  $\kappa$ B signaling.*

## Background

Mesenchymal stem cells have been shown recently to ameliorate hyperoxia-induced lung injury in diseases such as bronchopulmonary dysplasia. As possible mechanisms for this protection, tissue repair and suppression of inflammation are discussed. The authors hypothesize that alveolar epithelial cells may play an important role in the process of inflammation. The receptor for advanced glycation end-products (RAGE) is considered to be a marker of alveolar cell injury. RAGE activates signal pathways among which NF- $\kappa$ B is one of the most important.

Newborn rats were randomly divided into three groups:

- (A) rats with hypoxia-induced lung injury and transplantation of mesenchymal stem cells
- (B) rats with hypoxia-induced lung injury
- (C) control group with no intervention

## Summary of results

The authors first show that after placing rats in a sealed Plexiglas chamber with O<sub>2</sub> concentration above 95 % (group A and B), lung tissues show higher concentrations of RAGE and TNF- $\alpha$ . Both are markers of inflammation. This inflammation can be reduced by transplantation of mesenchymal stem cells (group A).

## Strength

This is the first study reporting the importance of the RAGE/NF- $\kappa$ B pathway in hyperoxia-induced lung injury of newborn rats. In the study a broad range of methods were used. Differences of RT-PCR were consistent with the protein level of Western blot analysis. These findings were in line with histological analysis.

## Limitations

Rats were sacrificed three days after transplantation of mesenchymal stem cells which may be too short to show long-term effects.

## Practical conclusion

The data suggest that transplantation of mesenchymal stem cells is a promising therapeutic approach for hyperoxia-induced lung injury. The receptor for advanced glycation end-products (RAGE) could be one parameter to monitor the effectiveness of regenerative therapies with mesenchymal stem cells.

**Tian Z**, Li Y, Ji P, Zhao S, Cheng H. "Mesenchymal stem cells protects hyperoxia-induced lung injury in newborn rats via inhibiting receptor for advanced glycation end-products/nuclear factor  $\kappa$ B signaling." *Exp Biol Med* (Maywood). 2013 Feb;238(2):242-7. doi: 10.1177/1535370212473706.

Written by:

Dr. med. Isabell Bretschneider, MD