International Journal of Pharmacology

ISSN 1811-7775

science alert

ansinet
Asian Network for Scientific Information

International Journal of Pharmacology 7 (5): 546-547, 2011
ISSN 1811-7775 / DOI: 10.3923/ijp.2011.546.547

Are Iron Chelators Safe to Be Used in Hyperoxia-induced Lung Injury?

Niloofar Rezvani
Graduate School of Nursing, Uniformed Services University of the Health Sciences (USUHS),
Bethesda, MD, USA

Commentary on:
Mousavi *et al*., Place of iron chelators like desferrioxamine and deferasirox in management of hyperoxia-induced lung injury; a systematic review. Int. J. Pharmacol., 2010; 6(4): 397-408.

Although oxygen is essential to sustain life, hyperoxia is a common cause of cellular oxidative stress. Too much oxygen is known to be toxic due to the production and accumulation of reactive oxygen species. These oxygen species, when released at the tissue or cell level, play a significant role in the pathogenesis of tissue injury and pathogenesis of some common complicated diseases such as inflammatory bowel disease (Rezaie *et al*., 2007), diabetes (Rahimi *et al*., 2005), osteoporosis (Abdollahi *et al*., 2005), acute respiratory distress syndrome (Soltan-Sharifi *et al*., 2007) or toxicity-related chronic debilitating diseases (Abdollahi *et al*., 2004; Mohammadirad and Abdollahi, 2011). Antioxidant therapy is believed to be useful in such cases, particularly in patients with impaired oxidative defense mechanism (Hasani-Ranjbar *et al*., 2009, 2010).

Iron is the most abundant metal ion in the body and is responsible for oxidative injuries. Although iron is a vital source especially in erythrocytes, if it is not appropriately chelated by citrate, carboxylates, nucleotides and other ligands in biological tissues, it can form harmful free radicals such as hydroxyl radicals (Kakhlon and Cabantchik, 2002; Leonard *et al*., 2004). It has been suggested that iron chelators may have protective effect in the cardiovascular system and prevent the formation of superoxide radicals during reperfusion injury (Jomova and Valko, 2011). Iron chelators are found neuroprotective in patients with Alzheimer's disease, in which oxidative stress play a significant role (Amit *et al*., 2008).

The systematic review conducted by Mousavi *et al*. (2010) has searched several broad-based databases and examined the usefulness and therapeutic effect of iron chelators in the management of hyperoxia-induced lung injury within the constraint of the available research data. Although, many studies have been published on the advantages of iron chelators, such as Desferrioxamine, however, the clinical efficacy of these agents is inconclusive, especially in the management of oxidative-induced pulmonary injury. This review concludes that the clinical advantages of iron chelators should outweigh the disadvantages if they are to be considered a strong therapeutic agent and recommended by clinicians.

A major point to consider is that iron is involved in many important biological processes in the body, including cellular biosynthesis, cell division, gene regulation and signal transduction. Therefore, interference with iron can potentially cause widespread disruption to a range of cellular functions despite offering a beneficial therapeutic effect. Thus, the clinical role and therapeutic application of iron chelators deserve well-designed preclinical studies to evaluate the efficacy and safety of these agents in various medical conditions including oxidative-induced pulmonary injury. In that regard, this systematic review is an important step in examining the true beneficial effects of iron chelators, either alone or in combination with other drugs to improve the management of hyperoxia-induced pulmonary injury.

REFERENCES

Abdollahi, M., A. Ranjbar, S. Shadnia, S. Nikfar and A. Rezaie, 2004. Pesticides and oxidative stress: A review. Med. Sci. Monit., 10: 141-147.

Abdollahi, M., B. Larijani, R. Rahimi and P. Salari, 2005. Role of oxidative stress in osteoporosis. Therapy, 2: 787-796.

Amit, T., Y. Avramovich-Tirosh, M.B. Youdim and S. Mandel, 2008. Targeting multiple Alzheimer?s disease etiologies with multimodal neuroprotective and neurorestorative iron chelators. J. Fed. Am. Soc. Exp. Biol., 22: 1296-1305.

Hasani-Ranjbar, S., B. Larijani and M. Abdollahi, 2009. A systematic review of the potential herbal sources of future drugs effective in oxidant-related diseases. Inflamm. Allergy Drug Targets, 8: 2-10.

Hasani-Ranjbar, S., N. Nayebi, B. Larijani and M. Abdollahi, 2010. A systematic review of the efficacy and safety of *Teucrium* species; from anti-oxidant to anti-diabetic effects. Int. J. Pharmacol., 6: 315-325.

Jomova, K. and M. Valko, 2011. Advances in metal-induced oxidative stress and human disease. Toxicology, 283: 65-87.

Kakhlon, O. and Z.I. Cabantchik, 2002. The labile iron pool: characterization, measurement and participation in cellular processes. Free Radical Biol. Med., 33: 1037-1046.

Leonard, S.S., G.K. Harris and X. Shi, 2004. Metal-induced oxidative stress and signal transduction. Free Radical Biol. Med., 37: 1921-1942.

Mohammadirad, A. and M. Abdollahi, 2011. A systematic review on oxidant/antioxidant imbalance in aluminium toxicity. Int. J. Pharmacol., 7: 12-21.

Mousavi, S., M. Mojtahedzadeh and M. Abdollahi, 2010. Place of iron chelators like desferrioxamine and deferasirox in management of hyperoxia-induced lung injury; a systematic review. Int. J. Pharmacol., 6: 326-337.

Rahimi, R., S. Nikfar, B. Larijani and M. Abdollahi, 2005. A review on the role of antioxidants in the management of diabetes and its complications. Biomed. Pharmacother., 59: 365-373.

Rezaie, A., R.D. Parker and M. Abdollahi, 2007. Oxidative stress and pathogenesis of inflammatory bowel disease: An epiphenomenon or the cause. Dig. Dis. Sci., 52: 2015-2021.

Soltan-Sharifi, M.S., M. Mojtahedzadeh, A. Najafi, M.R. Khajavi, M.R. Rouini, M. Moradi, 2007. Improvement by N-acetylcysteine of acute respiratory distress syndrome through increasing intracellular glutathione and extracellular thiol molecules and antioxidant power: Evidence for underlying toxicological mechanisms. Hum. Exp. 26: 697-703.