Post-exposure antioxidant treatment in rats decreases airway hyperplasia and hyperreactivity due to chlorine inhalation.

We assessed the safety and efficacy of combined intravenous and aerosolized antioxidant administration to attenuate chlorine gas-induced airway alterations when administered after exposure. Adult male Sprague-Dawley rats were exposed to air or 400 parts per million (ppm) chlorine (a concentration likely to be encountered in the vicinity of industrial accidents) in environmental chambers for 30 minutes, and returned to room air, and they then received a single intravenous injection of ascorbic acid and deferoxamine or saline. At 1 hour and 15 hours after chlorine exposure, the rats were treated with aerosolized ascorbate and deferoxamine or vehicle. Lung antioxidant profiles, plasma ascorbate concentrations, airway morphology, and airway reactivity were evaluated at 24 hours and 7 days after chlorine exposure. At 24 hours after exposure, chlorine-exposed rats had significantly lower pulmonary ascorbate and reduced glutathione concentrations. Treatment with antioxidants restored depleted ascorbate and deferoxamine or saline. At 1 hour and 15 hours after chlorine exposure, the rats were treated with aerosolized ascorbate and deferoxamine or vehicle. Lung antioxidant profiles, plasma ascorbate concentrations, airway morphology, and airway reactivity were evaluated at 24 hours and 7 days after chlorine exposure. At 24 hours after exposure, chlorine-exposed rats had significantly lower pulmonary ascorbate and reduced glutathione concentrations. Treatment with antioxidants restored depleted ascorbate and reduced glutathione concentrations. Treatment with antioxidants restored depleted ascorbate and reduced glutathione concentrations.
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To the best of our knowledge, that severe injury to major airways in rats exposed to chlorine, as characterized by epithelial hyperplasia, mucus accumulation, and airway hyperreactivity, can be reversed in a safe and efficacious manner by the post-exposure administration of ascorbate and deferoxamine.

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