

OXIDATIVE STATUS AND LUNG FUNCTIONS DURING THE LONG-TERM INHALATION OF MEDICINAL OXYGEN (O₂) IN COMPARISON WITH PARTIALLY IONIZED OXYGEN (O₂⁻ AND O₂⁺) IN GUINEA PIGS

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Aim: This study was performed to prove the hypothesis that the long-term application of partially ionized oxygen is a safe method with less serious impairment of lung functions than classical oxygen therapy. **Methods:** Experiments were carried out on 40 male guinea pigs (220±35 g). Animals were placed in metabolic cage and inhaled 100% medicinal oxygen (O₂), or partially negatively (O₂⁻) or positively (O₂⁺) ionized oxygen during 17 and 60 hr. Control animals inhaled atmospheric air. Wet/dry weight (W/D) ratio was determined to evaluate the degree of lung edema. Accumulation of dityrosine and lysine-LPO (lipid peroxidation) products demonstrating oxidative modification of proteins were determined in lung homogenate by fluorescence method. Relative numbers of cells were evaluated in bronchoalveolar lavage (BAL) fluid and in peripheral blood. **Results:** After 17 hr the concentration of dityrosines (in arbitrary units; AU) increased in group with O₂⁻ and decreased in group with O₂⁺ as compared with controls (both P<0.01). In group inhaling non-ionized medicinal oxygen the raise was not statistically significant. After 60 hr, the fluorescence of dityrosines significantly rose after inhalation of O₂ and after O₂⁻ as compared with controls (both P<0.01), while there was no increase after inhalation of O₂⁺. After 17 hr values of lysine conjugates with LPO products significantly increased in comparison with controls after inhalation of O₂ (P<0.05) and O₂⁻ (P<0.001). In the group with O₂⁺, the fluorescence of lysine conjugates with LPO products did not rise significantly as compared with controls. After 60 hr the changes were comparable to those after 17 hr. After inhalation of O₂⁻ and O₂⁺ W/D ratio did not change significantly, while after inhalation of O₂ it was reduced. Relative number of neutrophils in BAL fluid was elevated in all groups with oxygen therapy. However, in the O₂⁺ group this value was reduced when compared with O₂ and O₂⁻ groups. **Conclusions:** The

results indicate that the long-term inhalation of positively ionized oxygen is associated with less adverse effects on lung functions than non-ionized or negatively ionized oxygen.