PII-30: Diaphragm Fatigue in the Prevention and Treatment of Emphysema (NIH NINR NR009371-1A1)

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Abstract:
Introduction: In emphysema (EMP), static hyperinflation and dynamic hyperinflation impose a chronic load on the diaphragm impairing its mechanical efficiency. Diaphragm muscle fatigue (DF) can cause respiratory failure in EMP. The combination of exercise conditioning and DOB in
improvement of diaphragm muscle contractility has not been investigated and may be of significant clinical importance. Aims of this study were to investigate the effects of DOB in prevention or treatment of DF in exercised EMP hamsters.

Method(s): EMP was induced in 75 male adult Golden Syrian Hamsters. At 21 days post EMP induction, the hamsters were randomized into four groups: G1- Prevention/Saline(NS) G2- Prevention/DOB G3- Treatment/NS G4- Treatment/DOB and G5- Prevention/DOB. All groups except G5 received a progressive treadmill exercise program to 30m/min conducted for 12 weeks with gradual incline increases. Afterwards, experiments were conducted to induce DF with 3 experimental periods. In G1,G2 and G5 experiments: Period 1 Baseline, Period 2- 15 min of infusion of normal NS or DOB, and period 3 application of inspiratory resistance loading(IRL) for 1 hour. In the G3 and G4 experiments: Period 1 baseline, Period 2- application of IRL for 1 hour, Period 3- infusion of NS or DOB. Variables included time to fatigue(FT), diaphragm shortening (DS) and blood flow (LBF).

Results: Data were analyzed using ANOVA and paired t test. Time to FT was significant greater in between G2 versus G1(F=11.38, p>0.003). FT for G2 was significantly greater than G5 t(6.15),p<.0001. DS was significantly increased following administration of DOB in G2 versus G1 (t(16.09),p<0.0001 and G5 t(13.46), p<.0001. DS was significantly higher in G4 (F=27.98, p>0.001) versus G3. LBF with prevention administration of DOB was significantly higher in G2 than G1 t(7.83)p<0.0001 and in G5 t(5.51)p.0001. LBF following administration of DOB was significantly higher in G4, t(9.44), p<0.0001 than in G3.

Discussion & Conclusions: Results suggest administration of DOB as prevention and treatment of DF is effective in delaying the onset of DF. DS improved when DOB was administered in all groups. Exercise did not make a significant impact in prevention of DF. DOB may be beneficial in the prevention and treatment of DF in EMP.

Abstract History: This abstract has not been presented or accepted for presentation in whole or in part at the SNRS or other scientific meeting.

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