D-Ribose Benefits COPD

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Citation

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Abstract

Patients with COPD have exercise limitations due to pulmonary function restrictions and heart stress, potentially producing alterations in energy levels. Adenosine triphosphate (ATP), a high-energy phosphate molecule, provides energy for the maintenance of cellular processes. D-ribose (DR), a natural occurring pentose carbohydrate, has shown to enhance ATP levels and improve cardiac function in ischemic cardiovascular disease2 and shown benefits in lung mechanics along with ventilation in congestive heart failure patients.3

CASE REPORT

Presented is a 65 year-old male with severe COPD due to a 42 year history of smoking, chronic ischemic heart disease with normal systolic function, hypertension and dyslipidemia. Though clinically stable, the patient continually experienced daily activity limitations. Current medications: diltiazem, isordil, atenolol, lovastatin, low dose aspirin, and an albuterol or atrovent inhaler. D-Ribose as a supplement was suggested.

Cardiopulmonary exercise evaluation utilized a sub-maximal STEP testing at baseline (pre-DR) and following 8 weeks of DR (5 gms, tid). At each evaluation, the patient exercised for 6 minutes (step up/step down cycle) with a recovery period of three minutes post exercise. During each exercise session, cardiopulmonary function and gas exchange parameters, such as Wasserman V slope, RER acceleration, VT/Ti acceleration, ventilatory efficiency (VE/ VCO_2 slope), and O_2 uptake efficiency slope were assessed. Global ventricular functional at anaerobic threshold was determined by O_2 Pulse. Accumulated data was at the nadir of the VD/VT profile during sub-maximal exercise. Lung mechanics and perfusion, dead space nadir to tidal volume ratio, patterns of dynamic changes in end-tidal (ET) CO_2 and the VT/RR ratio were also assessed.

Figure 1

	VD/VT Nadir	VT/RR (VD/VT nadir)	$ETCO_2$ (VD/VT nadir)	VE Eff Linear slope	O_2 Uptake Eff : (linear slope)
Pre- DR	.198	.041	24.3	61.3	.95
Post- DR	.221	.046	29.5	41.8	1.16

DISCUSSION

Patients with COPD commonly experience breathing difficulties with fatigue. These symptoms, even with aggressive therapies, not only reflect existing pulmonary disease, but can be associated with cardiac stress. This case study reports that DR provided benefits at anaerobic threshold.

Measured O_2 pulse (pre-DR:12.2 ml O_2/beat;post-DR:13.5 ml O_2/beat), as a surrogate determinant of cardiac function, improved along with VE/VCO_2 following DR. The slope of tidal volume to minute ventilation, as an indirect indicator of pulmonary compliance, also improved following DR. Subjectively, the patient was less short of breath.

The mechanism(s) responsible for these benefits are not obvious; however, since DR has demonstrated improvement in left ventricular diastolic dysfunction with reductions in left atrial size, left atrial pressures and volumes in heart failure patients.[4] A reduction in the pulmonary venous to left atrial pressure gradient could result in greater pulmonary venous to left atrial flow and an improvement in ventilation-perfusion ratio, which could improve gas exchange.[5]

Progressive COPD produces clinical deterioration of both

the lungs and heart. DR may potentially offer a benefit to both of these organs. The pulmonary measured parameters revealed substantial improvement with DR, but a controlled study of COPD patients is necessary to further substantiate this finding.

References

1. O'Donnell D. Exercise Limitation and Clinical Exercise Testing in Chronic Obstructive Pulmonary Disease. Progress in Respiratory Research 2002; 32:138-158
2. Pauly DF, Johnson C, St.Cyr JA. The benefits of ribose in cardiovascular disease. Med Hypoth 2003; 60(2):149-151
3. Vijay N, Mac Carter D, Washam M, Munger M, St.Cyr J. D-ribose improves
ventilatory efficiency in congestive heart failure patients (NYHA classes II-IV). J
Card Fail 2005; 11(6): abst 019,S95
4. Omran H, Illien S, MacCarter D, St.Cyr J, Luderitz B. D-ribose improves diastolic function and quality of life in congestive heart failure patients: a prospective feasibility study. Eur J Heart Fail 2003; 5(5):615-619
5. Kleber FX, Vietzke G, Wernecke KD, Bauer U, Opitz C, Wenzel R, Sperfild A,
Laser S. Impairment of Ventilatory Efficiency in Heart Failure: Prognostic Impact.
Circ 2000; 101:2803-2809.

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