THE RELATIONSHIP OF VENTILATORY MUSCLE STRENGTH TO CHEST WALL EXCURSION IN NORMAL SUBJECTS AND PERSONS WITH CERVICAL SPINAL CORD INJURY.

Feldman D
Ouellette M
Villamez A
Massery M
Cahalin L
Sargent College of Health & Rehabilitation Sciences, Boston University, Boston. MA.

PURPOSE: We sought to investigate the relationship of maximal inspiratory and expiratory pressure (MIP and MEP, respectively) to upper, middle, and lower chest wall excursion (UCWE, MCWE, and LCWE, respectively). **SUBJECTS:** 7 normal persons and 7 persons with cervical spinal cord injury (CSCI). **METHODS:** MIP and MEP were measured while seated with a Magnahelic manometer and chest wall excursion was measured while supine with a tape measure at the 3rd rib (UCWE), xiphoid process (MCWE), and midpoint between the xiphoid and umbilicus (LCWE) during tidal volume and vital capacity breathing. **ANALYSIS/RESULTS:** Linear regression analyses revealed good correlations between ventilatory muscle strength and chest wall excursion in the normal subjects (see table below), but the only correlation in the persons with CSCI was between MIP and vital capacity, breathing MCWE (r=078. r2=0.61: p=0.03).

	MIP (r value)	MEP (r value)
Tidal Volume Breathing LCWE	0.84	0.71
Tidal Volume Breathing MCWE	0.76	0.53
Tidal Volume Breathing UCWE	0.89	0.62
Vital Capacity Breathing LCWE	0.77	0.83
Vital Capacity Breathing UCWE	0.62	0.67

CONCLUSION: The relationships between ventilatory muscle strength and chest wall excursion in normal subjects that were absent in persons with CSCI except for MIP and vital capacity breathing MCWE (that were unrelated in normal persons), may be due to chest wall instability in persons with CSCI and sitting versus supine measurements of ventilatory muscle strength. The lack of correlation between vital capacity breathing MCWE and ventilatory muscle strength of normal persons and the correlation between these variables in persons with CSCI may be due to the positive middle chest movement in normal persons compared to the negative middle chest movement (paradox) in persons with CSCI. **RELEVANCE:** Chest wall excursion of normal subjects appears to reflect ventilatory muscle strength, but is unrelated to the ventilatory muscle strength of persons with CSCI and may be an examination technique of little value for persons with CSCI. However, future study of a larger population of normal persons and persons with CSCI who undergo measurement of ventilatory muscle strength and chest wall excursion in sitting and supine positions is warranted.

THE EFFECTS OF AEROBIC TRAINING IN A PATIENT WITH MILD APLASTIC ANEMIA.

McKee E
Hickey M
Kline-Mangione
Beaver College, Glenside, PA.

BACKGROUND & PURPOSE: Aplastic anemia (AA) is a disease in which bone marrow failure results in reduced production of circulating blood cells. Diminished levels of red blood cells and hemoglobin produce weakness, fatigue, and dyspnea on exertion. Physical activities which require cardiovascular endurance are likely to be difficult and participation in leisure activities may be avoided. Since there are no reports in the literature regarding the safety and effectiveness of exercise training in patients with AA, this case study examined whether aerobic training in a patient with mild, stable plastic anemia was safe and beneficial. **SUBJECT & METHOD:** The subject was a 26 year old male diagnosed with AA in July 1992. The disease was controlled with immunosuppressive medications. He had no prior medical history. He was a full time student and had continued weight-lifting activities since his diagnosis. He avoided all endurance type activities due to shortness of breath. Testing procedures were performed at baseline, at 8 and 16 weeks and included complete blood tests, graded exercise tests (GXT), and health status assessment. The Balke protocol was used for the GXT and breath by breath measures of oxygen consumption (VO2) were obtained. Health status was assessed with the MOS SF-12 health survey. Training consisted of treadmill walking for 25 minutes, 3 days/week, for 16 weeks at 75% of maximal heart rate. **RESULTS:** There were no adverse effects associated with testing or 16 weeks of training. The mental component of the SF- 12 improved from below 2 standard deviations (sd) from the population mean to within 1 sd of the population mean. No changes were found in blood counts, maximal VO2, anaerobic threshold, or submaximal heart rate. **DISCUSSION:** Hematological values and aerobic capacity measures indicated that the subject had poor physical performance consistent with a diagnosis of AA. Training appeared to improve the mental health component score of the SF-12 Health Survey. Training did not produce changes in disease-related measure (hematological values) or impairment measures (cardiopulmonary measures of fitness). The benefits of aerobic training to this person with AA were that he improved his mental status, and showed that he can safely participate in aerobic-type activities. It is unknown whether continued participation in aerobic exercise would produce long-term benefits such as a decreased risk of hypertension, diabetes, and coronary heart disease for a patient with AA. Future investigations could also examine the role of weight training or interval training in maintaining or improving aerobic fitness in patients with AA.

COMPARISON OF ASYNCHRONOUS VERSUS SYNCHRONOUS ARM CRANK ERGOMETRY.

Mossberg KA
Willman C
Topor MA
Crook H
Patak S
University of Texas Medical Branch, Galveston, TX. Partially funded by the Texas Physical Therapy Education and Research Foundation.

PURPOSE: Wheelchair propulsion requires synchronous movement of the upper extremities for forward motion. However, endurance training of the upper extremities usually consists of asynchronous arm cranking on cycle ergometers. The purpose of this study was to compare the physi-