

218 A PHYSIOLOGICAL COMPARISON OF FORWARD vs REVERSE WHEELCHAIR ERGOMETRY.

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This study compared metabolic and cardiopulmonary responses for forward (FOR) and reverse (REV) wheelchair ergometry, utilizing 2 modified indoor bike trainers (Cateye CS1000). Moderately active males (n=21), 19-30 yrs, exercised at power output (PO) levels of 15, 20, 25, and 30 watts, for each mode of ergometry. Oxygen uptake ($\dot{V}O_2$), pulmonary ventilation (VE), and heart rate (HR) responses were higher for FOR ($P<0.05$) than REV exercise at each PO. Percent net mechanical efficiency (ME) increased with PO and was higher ($P<0.05$) for REV than FOR at each PO. Hand strikes on the pushrim per min (SPM) values for REV were 44 percent lower ($P<0.01$) than FOR exercise, although revolutions per min (RPM) remained constant for both modes. This indicated that the REV exercise required less SPM to achieve the same distance overall. These data suggest that REV is physiologically more efficient than conventional wheelchair ergometry. Further research should be directed at development of a wheelchair prototype utilizing REV for forward propulsion.

220 MAXIMUM EXERCISE PERFORMANCE IN INDIVIDUALS WITH PARKINSON'S DISEASE AND HEALTHY INDIVIDUALS

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The purpose of this study was to determine if individuals with Parkinson's Disease (PD) could reach maximum exercise compared to healthy individuals (HI). There were 8 subjects with PD (mean age 61.4 years +/- 6.9) and 7 HI subjects (mean age 63.9 +/- 6.3). Each subject underwent a progressive exercise test on an electronically braked bicycle ergometer. After a one minute warm-up at 20 watts, the power was increased by 20 watts every 2 minutes beginning at 40 watts until the subject reached exhaustion. Heart rate (HR) was monitored continuously throughout exercise on a physiograph. Oxygen consumption ($\dot{V}O_2$) and the respiratory exchange ratio (RER) were measured every 20 seconds on a computerized gas analysis system. Maximum values were recorded during the last stage of exercise. A Mann-Whitney U-Wilcoxon Rank 2-tailed test was used to compare maximum values on $\dot{V}O_2$, HR, and RER between the PD and HI groups. The maximum values and the standard deviations were:

GROUP	$\dot{V}O_2$	HR	RER
PD	23.7 (+/-6.4)	147.8 (+/-17.0)	1.15 (+/-0.09)
HI	25.5 (+/-5.1)	153.4 (+/-10.9)	1.13 (+/-0.07)
p value	0.42	0.45	0.77

No significant differences existed between the two groups. This suggests that individuals in stage 2 and 3 PD can reach a maximal level of exercise on a bicycle protocol.

B-15 P-CASE PELVIS & LOWER EXTREM TRAUMA**222 NON SURGICAL KNEE TRAUMA-SOCCER**
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HISTORY - This 17 - year old girl was competing in a high school varsity soccer match when involved in a collision with an opponent. Her left knee suffered a direct blow and twisting injury. She was unable to continue participation and had the onset of swelling within six hours. Physician's evaluation the next day revealed an interval history of increased stiffness, pain, and joint swelling.

PHYSICAL EXAMINATION - The patient had a 2+ effusion and the inability to squat. Tenderness was diffuse with no ligamentous instability detected and with the patella-extensor mechanism appearing to be uninvolved. Lochman, posterior drawer, varus, and valgus testing appeared stable. Examination five days post injury demonstrated continued stability, observable bruising about the knee, and an effusion resolving to the 1+ level. Protected weight bearing, isometric strengthening, and aggressive ice therapy had been utilized.

(Will be presented in Session D-16.)

219 INFLUENCE OF LUMBAR POSTURE, TRUNK ROTATION, AND ASYMMETRICAL LOADING ON PARASPINAL MUSCLE ACTIVITY. R.J. Heinz*, S.J. Hall, FACSM, California State University, Northridge, CA.

Myoelectric activity at T6 and L3 levels of the paraspinal muscles was recorded bilaterally with surface electrodes as 29 subjects performed 14 static lifting simulations holding 4.54 kg just above floor level. Each trial required a different combination of lumbar posture (kyphotic, neutral, lordotic), trunk rotation (left, none, right), and loading symmetry (one hand vs. two hand hold). MANOVA results ($p<0.01$) included more activity present with hyperlordosis than with kyphosis at all electrode sites, more activity with neutral posture than with kyphosis at the L3 sites, more activity with hyperlordosis than with neutral posture at the T6 sites, increased ipsilateral activity with rotation and one hand hold as compared to the neutral posture, two hand hold at the L3 sites, and increased ipsilateral activity with rotation and two hand hold as compared to all rotation/loading symmetry conditions at the T6 sites. The effects of these three variables on trunk muscle activity have been reported previously, but not in combination. It appears that the effects of loading asymmetry can override the effects of trunk rotation on paraspinal muscle activity during load bearing.

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221 MUSCLE STRENGTH IN HEART TRANSPLANT RECIPIENTS

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Mechanisms responsible for diminished peak oxygen uptake ($\dot{V}O_{2peak}$) in heart transplant recipients (HTR) (~ 60% of predicted) are reduced cardiac index, depressed oxidative capacity of skeletal muscle, and peripheral vascular abnormalities. The amount of skeletal muscle is another important determinant of $\dot{V}O_{2peak}$. Skeletal muscle atrophy in heart failure patients is well documented. However, there is a paucity of data concerning postoperative muscle strength in HTR. To examine the relation between $\dot{V}O_{2peak}$, leg strength, and body composition we studied 11 HTR (50±14yrs) 18±12mo post-Tx and 11 matched sedentary controls (CONT). $\dot{V}O_{2peak}$ was measured on a cycle ergometer, one repetition knee extension strength (1-RM) was measured on a Nautilus™ machine, and body composition was estimated from the sum of 7 skinfolds. Mean±SD are shown. * $p<0.05$ HTR vs CONT

	$\dot{V}O_{2peak}$ (ml/kg/min)	1-RM (kg)	1-RM (kg/kg LBM)	FAT (%)	LEAN MASS (kg)
HTR	18.3±3.3*	66.1±9.6*	1.07±0.05*	27.5±5.6	61.5±9.7
CONT	32.0±8.7	95.0±19.4	1.49±0.11	24.7±6.0	63.7±8.9

$\dot{V}O_{2peak}$ in HTR was 57% of CONT ($p<0.05$). Peak power output (W) in HTR was 55% of CONT ($p<0.05$). Absolute 1-RM in HTR was 69% of control despite the fact that the two groups did not differ with respect to age, height, weight, percent fat or lean body mass (LBM). A strength difference of this magnitude was not explained by the 2.2kg difference in LBM between groups. When 1-RM was normalized for LBM, relative 1-RM in HTR was 73% of CONT and remained significantly different ($p<0.05$). 1-RM and $\dot{V}O_{2peak}$ were not significantly correlated ($p>0.05$) with months post-Tx. However, $\dot{V}O_{2peak}$ was highly correlated with 1-RM strength ($r=.89$; $p<0.05$). These data indicate that a leg strength deficit persists up to 18mo post-Tx and the decrement in $\dot{V}O_{2peak}$ observed in HTR is partially explicable by skeletal muscle weakness.

NON SURGICAL KNEE TRAUMA - SOCCER
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DIFFERENTIAL DIAGNOSIS:

1. Anterior cruciate ligament disruption.
2. Internal derangement, i.e. meniscus tear or articular cartilage fracture.
3. Occult patellar subluxation.
4. Occult fracture.
5. Epiphyseal injury in maturing late adolescence.

TEST AND RESULTS:

Plain xrays were normal. MRI: "bone bruise" - occult subcortical fractures involving articular surfaces of lateral tibia and lateral femoral condyle.

FINAL/WORKING DIAGNOSIS:
"Bone bruise".**TREATMENT**

Six weeks of decreased weight bearing with crutch protection. Physical therapy for control of effusion and range of motion. Isometric progressing to isotonic weight training. Resolved effusion at four weeks with painless walking at six weeks. Completed recovery and rehabilitation at eight weeks post injury. No surgery required.