Lab 8. Static and Dynamic Lung Volumes and Capacities

Physiology of Exercise

**Prior to lab read in your text p. 164-166 (Pulmonary Ventilation – Pulmonary Volumes)**

**Introduction**

In exercise physiology two types of lung volumes and capacities are of interest. One type is static volumes and capacities. Measures such as vital capacity, residual volume and total lung capacity are determined during one maximal inspiration and/or expiration. In contrast, dynamic volumes and capacities are determined during repetitive breathing, such as during exercise. One of the most common and revealing measurements is the maximal voluntary ventilation (MVV) which is a measure of how much air can be “pushed and pulled” in and out of the lungs for one minute.

Lung volumes and capacities have different relationships with various measures of body mass or weight, body height, body surface area and fitness. Static volumes and capacities are more related to body mass or weight, body height and body surface area with a relatively low relationship with fitness. On the other hand, dynamic volumes usually have a higher relationship with fitness variables rather than body size variables.

The purpose of this lab is to determine the relationship of static and dynamic lung volumes and capacities to different measures of body size and fitness.

**Procedures:**

Everyone will perform a vital capacity test and a MVV test as per instructions provided during the lab. The individual data will be entered into an Excel spreadsheet. Once data for all class members is recorded in the spreadsheet, the following computations/operations will be performed using Excel. .

1. Body Mass Index (BMI)
2. Body Surface Area (BSA) using the Mosteller formula. Look up the formula in the internet and use the units of cm for height and kg for weight.
3. VO2max in ml.kg-1.min-1 and in ml.min-1 using data (maximal power output) from the progressive exercise you performed on the bicycle ergometer last lab. You use the highest power output you reached on the test which you must convert to watts to enter in the equations below (watts = kgm.min-1 /6). The formulas for computing VO2max is as follows using gender specific equations:

**For Males:**

VO2max (ml**.**min-1 ) = ((10.51 \* watts) + (6.35 \* wt in kg) – (10.49 \* age) + 519.3

**For Females:**

VO2max (ml..min-1 **)** = ((9.39 \* watts) + (7.7 \* wt in kg) – (5.88 \* age) + 136.0

After all the variables are computed, determine the relationship (compute the correlation coefficient) between each of the following pairs of variables: BMI and vital capacity; BMI and MVV; BSA and vital capacity; BSA and MVV; VO2max ml.kg-1.min-1 and vital capacity; VO2max l.min-1 and vital capacity; VO2max ml.kg-1.min-1 and MVV; VO2max ml.min-1 and MVV; height and vital capacity; height and MVV; weight and vital capacity; weight and MVV**. Display all the correlations in a table format. Organize the data in some meaningful way and label appropriately. Write (no more than 1 page, #12 font, double spaced) a summary of what you perceive the data shows regarding the relationship of lung volumes and capacities to measures of body mass and fitness.**