Online Data Supplement

Effects of the Menstrual Cycle on Lung Function Variables in Women with Asthma

Samar Farha, Kewal Asosingh, Daniel Laskowski, Jeffrey Hammel, Raed A Dweik,

Herbert P. Wiedemann,Serpil C. Erzurum

Lung function and diffusing capacity for carbon monoxide

The forced expiratory volume at 1 second (FEV_1) and vital capacity (FVC) were measured using an Eagle^{TM} spirometer (Ferraris Respiratory, Colorado). The single breath carbon monoxide diffusing capacity was performed weekly using Eagle^{TM} equipment (Ferraris Respiratory, Colorado) with volunteers rested and in a seated position. On each visit, DLCO was measured at 2 different oxygen concentrations (21% and 42%). DLCO measurements were performed at the same time of the day on each visit to minimize the effect of diurnal variations. The single breath DLCO method was performed in duplicate, ~3 minutes apart using a washout volume of 750 ml and an alveolar volume of 750 ml. The breathhold time was ~10 seconds. DLCO was adjusted for hemoglobin (Hgb) using the Amercian Thoracic Society (ATS) guidelines. Exhaled O_2 was obtained from the alveolar gas at each measurement of the diffusing capacity. Dm and Vc were calculated from DLCO measurements at inspired O_2 concentrations 21% and 42% as described by Roughton and Forster. Theta was calculated from the formula described by Cotes (1):

$$1/\theta = [0.34 + (0.0061 \times P_cO_2)] \times (14.6/Hgb)$$

P_cO_2 represents the capillary partial pressure of oxygen and was determined to be nearly equivalent to the alveolar partial pressure of oxygen ($P_A O_2$) measured at end expiration:

$$P_cO_2 = P_A O_2 - 5$$

End expiration P_AO_2 was determined from the direct measure of end expiration oxygen concentration, and the daily barometric pressure. Since measurements of Dm and Vc are best made when Hgb is fully saturated with oxygen, DLCO was measured over a range of inspired O_2 concentrations 21%, 42%, 60% and 80% to confirm that 1/DLCO relative to

FiO_2 was linear ($R^2 = 0.97$). This validated the use of inspired oxygen concentrations of 21% and 42% to determine Dm and Vc in the study. Prior to DLCO determinations, single-breath on-line measurement of fractional NO concentration in expired breath (F_ENO) was also measured at each visit using the NIOX (Aerocrine, NY).

Reference:

E1. Cotes J. Lung function. *Oxford: Blackwell Scientific Publications* 1993.