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Peak Inspiratory Flow Rates in Respirators during Graded Treadmill Exercise.

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ABSTRACT

Recently the standard air flow rate for testing filters have been criticized for being too low. The purpose of this study was to directly measure ventilation flow rates. Six male subjects walked on a treadmill at 5 km/h with increasing grade every five minutes by 5 %. Metabolic rate was measured at 10sec intervals using a portable equipment (Metamax, Cortex, Germany). The same subjects applied the same protocol breathing through a half facemask with direct fitting single particle filter (Sundstrom SR100). The turbine flow meter of the Metamax equipment was mounted outside, on top of the filter. Metabolic rates and minute volumes increased with work rates to individual values in the range of 500-690 W/m2 and 71-117 l/min (BTPS), respectively, during the 20 % grade. Mean peak inspiratory flow rates during the 4th exercise minute ranged between 4.9-5.7 l/s (290-340 l/min). A standard speech scheme during the 5th exercise minute increased values to 6.1-7.4 l/s (370-445 l/min). Maximal peak flows were always highest during speech and the highest individual value was 7.78 l/s (467 l/min). It is concluded that intensive exercise is not significantly hampered by this type of filter respirator. The respirator allowed high minute volumes and peak inspiratory flow rates in excess of 400 l/min.