

Physiology of Respirator Wear: Why Adding Resistance Shortens Endurance Time

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Duration of heavy exercise while wearing an air-purifying respirator is never as long as the same exercise without the respirator. The resistance added by the filter to the respiratory effort has profound effects; most notably that it causes hypoventilation by the wearer. Both minute volume and oxygen consumption decrease with added resistance. One would think that the extra work of breathing would increase total oxygen consumption, but the reverse is actually true. This decrease in oxygen consumption adds to the oxygen deficit of the body, but the maximum oxygen deficit is limited. Once the maximum oxygen deficit is reached, the wearer has no choice except to quit voluntary physical activity.