

CPET in Lung Diseases

Patients with respiratory disease exhibit a range of abnormalities on cardiopulmonary exercise testing. Exercise capacity is often reduced as shown by a reduced maximum $\dot{V}O_2$. The anaerobic threshold may not be reached in patients with severe respiratory impairment as respiratory mechanics limit exercise before there is sufficient cardiovascular stress to result in significant lactic acidosis. In patients with less severe impairment, the anaerobic threshold is likely to be low in absolute terms, reflecting deconditioning. The respiratory exchange ratio ($\dot{V}CO_2/\dot{V}O_2$) at peak exercise tends to be low, often failing to rise above 1.0. The low respiratory exchange ratio reflects a low rate of lactate production. The ventilatory reserve, i.e. the difference between maximum voluntary ventilation and the maximum ventilation used during the exercise test, is typically low. Ventilatory efficiency is low in many respiratory disorders and this is reflected in elevated ventilatory equivalents for CO_2 and O_2 ($\dot{V}E/\dot{V}CO_2$ and $\dot{V}E/\dot{V}O_2$). There may also be oxyhaemoglobin desaturation with exercise, particularly in patients with lung fibrosis. Exercise flow-volume loops may be compared with the maximum resting loop to study ventilation further. Patients with lung fibrosis exhibit volume limitation, consistent with their inability to augment tidal volume. Patients with obstructive lung disease often show expiratory flow limitation. However, obstructive lung disease may also result in volume limitation as well as flow limitation due to dynamic hyperinflation.