

Insulin resistance changes calcium-dependent regulation of hypoxic ventilatory response and gas exchange in rats

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Calcium-dependent mechanisms of ventilator response and gas exchange under the influence of acute hypoxia in Wistar rats with insulin resistance caused by the use of a high-fat diet were investigated. The effect of acute hypobaric hypoxia was carried out by "lifting" in a hyperbaric chamber (3 hours at an "altitude" of 5600 m). For L-type calcium channel blockade, verapamil was administered at a dose of 1 mg/kg intraperitoneally before exposure to hypoxia. Ventilation and gas exchange were recorded using a pneumotachograph for small laboratory animals and a mass spectrograph. It was found that hypobaric hypoxia in rats of the control group caused a decrease in ventilation and gas exchange. Instead, in rats with insulin resistance, an increase in ventilator response and gas exchange in response to hypoxia was observed. With calcium channel blockade, a moderate increase in the ventilatory response and oxygen consumption was observed in animals with insulin resistance, but not in the control group. Electron microscopic examination showed that in a group of insulin-resistant rats after exposure to acute hypoxia, lung damage associated with increased ventilatory response was observed, but the introduction of a blocker demonstrates a protective effect on hypoxia in these rats. Thus, insulin resistance alters the fan response and gas exchange in response to acute hypoxia with the activation of calcium-dependent mechanisms, and the use of verapamil may have a protective effect against hypoxic lung damage.