Hypoxia causes glucose intolerance in humans

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Hypoxic respiratory diseases are frequently accompanied by glucose intolerance. We examined whether hypoxia is a cause of glucose intolerance in healthy subjects. In a double-blind within-subject crossover design, hypoxic versus normoxic conditions were induced in 14 healthy men for 30 minutes by decreasing oxygen saturation to 75% (versus 96% in control subjects) under the conditions of a euglycemic clamp. The rate of dextrose infusion needed to maintain stable blood glucose levels was monitored. Neurohormonal stress response was evaluated by measuring catecholamine and cortisol concentrations as well as cardiovascular parameters, and symptoms of anxiety. To differentiate between the effects of stress hormonal response, and hypoxia itself, on glucose intolerance, we performed hypoglycemic clamps as a nonspecific control. We found a significant decrease in dextrose infusion rate over a period of 150 minutes after the start of hypoxia \( (p < 0.01) \). Hypoxia also increased plasma epinephrine concentration \( (p < 0.01) \), heart rate \( (p < 0.01) \), and symptoms of anxiety \( (p < 0.05) \), whereas the other parameters remained unaffected. Glucose intolerance was closely comparable between hypoxic and hypoglycemic conditions \( (p < 0.9) \) despite clear differences in stress hormonal responses. Hypoxia acutely causes glucose intolerance. One of the factors mediating this effect could be an elevated release of epinephrine.

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