

# Mountaineers measure lowest human blood oxygen levels on record

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The lowest ever levels of oxygen in humans have been reported in climbers on an expedition led by UCL (University College London) doctors. The world-first measurements of blood oxygen levels in climbers near the top of Mount Everest, published in this week's *New England Journal of Medicine (NEJM)*, could eventually help critical care doctors to re-evaluate treatment strategies in some long-term patients with similarly low levels of blood oxygen.

The Caudwell Xtreme Everest team of climbing doctors made the measurements by taking blood from leg arteries close to the summit of Mount Everest at 8,400 metres above sea-level. The team climbed with oxygen tanks, then removed their masks 20 minutes prior to testing to equilibrate their lungs with the low-oxygen atmosphere. The team were unable to make the measurement on the summit of Everest as conditions were too severe, with temperatures at minus 25 degrees centigrade and winds above 20 knots. Having descended a short distance from the summit, the doctors removed their gloves, unzipped their down suits and drew blood from the femoral artery in the groin. Blood collected from four team members was then carried back down the mountain to be analysed within two hours at a science laboratory set up at the team's camp at 6,400 metres on Everest.

The purpose of the study was to establish what has long been suspected - that high-altitude climbers have incredibly low levels of oxygen in their blood, which at sea-level would only be seen in patients close to death. The expedition found the average arterial oxygen level to be 3.28

kilopascals or kPa (with the lowest value being 2.55 kPa); the normal value in humans is 12-14 kPa and patients with a level below 8 kPa are considered critically ill. Based on calculations of the expected level of oxygen in the blood, the authors also speculate that accumulation of fluid in the lungs as a result of the high altitude might have contributed to the low oxygen levels.

Caudwell Xtreme Everest expedition leader Dr Mike Grocott, a UCL Senior Lecturer in Critical Care Medicine, said: "By observing healthy individuals at high altitude where oxygen is scarce, we can learn about physiological changes that can improve critical care at the hospital bedside, because low oxygen levels are an almost universal problem in critical care. These extraordinary low levels of oxygen found in high-altitude climbers may cause doctors looking after critically ill patients to reevaluate treatment goals in some patients who have been ill for some time and might have adapted to low levels of oxygen in the blood. However, our findings will need further careful evaluation before they can be translated into clinical practice. We hope that ongoing research will eventually lead to better treatments for patients with acute respiratory distress syndrome (ARDS), cystic fibrosis, emphysema, septic shock, 'blue baby' syndrome and other critical illnesses."

Source: University College London

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