

BroadcastMed | Taking Research to New Heights on Mount Everest: Insights from Altitude

RAJEEV GULATI: Hello, I'm Rajeev Gulati. I'm one of the cardiologists at Mayo Clinic in Rochester, and I'm delighted to be joined, again, today by Dr. Bruce Johnson. Bruce spoke with [INAUDIBLE] a few weeks ago, and at the time, he was getting ready to head a group of extreme physiologists, so exercise specialists to Mt. Everest with experienced climbers.

And Bruce is now back, and we're delighted to have him here today. Bruce, welcome.

**DR. BRUCE
JOHNSON:** Thank you.

RAJEEV GULATI: Perhaps you can fill us in in the interim period of what happened over the last six weeks.

**DR. BRUCE
JOHNSON:** Yes. So we left around April 16 for Kathmandu, and we brought a team of-- there was four from our laboratory and somebody from public affairs at Mayo Clinic. And again, this was a joint project with National Geographic and the North Face Company.

And we hiked to base camp. We had about 1,300 pounds of medical gear that we put on the backs of porters and yaks and brought to base camp with us. We had some challenges along the way. Some of our equipment requires electricity, and so there's challenges between solar power and some of the generators we brought up.

But in all, it ended up being a really good experience. The data collection went well. All of us had periods of time where we didn't feel well, and we struggled with the altitude and other bugs we acquired along the way. But I would say the data collection went extremely well. The team worked really hard. It was a good collaborative effort, and we collected our data.

We worked with some of the athletes that were already there, acclimatizing, and they finally summited yesterday and are on their way back down. Although two of the athletes are going to try to summit another peak within a 24-hour period, and then they'll come back to Mayo, and we'll do some follow-up testing with them.

RAJEEV GULATI: Well, congratulations for an incredible effort and an incredible experience, no doubt. So Bruce, your particular area of interest from physiology is the lungs. Is that right?

**DR. BRUCE
JOHNSON:** Yeah. And my background is in exercise physiology and respiratory physiology. And I work clinically in the cardiovascular health clinic at Mayo, which is part of the Cardiovascular Division. And I've had an interest in how heart failure influences lung physiology.

RAJEEV GULATI: That's interesting. So your climb is extremely healthy people at high altitude and not very common over here, maybe you can give us an idea of how you link the findings you're going to get on Everest with a standard heart failure population that we see over here.

**DR. BRUCE
JOHNSON:** Yeah. Well, one of the major problems with patients with heart failure is they come into the hospital with pulmonary congestion. And it's still a little bit unclear what pulmonary congestion consists of. There's the pulmonary circulation. There's the bronchial circulation. There is interstitial fluid. There's alveolar fluid.

And some people think it's just an engorgement of the central vessels. And so we've been picking apart in the laboratory with certain studies, how these different circulatory beds and fluid beds change with heart failure under different conditions.

RAJEEV GULATI:Fascinating. So are you going to continue to monitor the people when they return to look for reversible changes?

DR. BRUCE JOHNSON: Yeah. So on the mountain, we brought with some of the same techniques we use to understand lung physiology here. And we've developed techniques that allow us to measure, really non-invasively the pulmonary blood flow, pulmonary blood volume, conductance across the alveolar capillary bed, bronchi blood flow, and we made some of these same measurements up on the mountain.

RAJEEV GULATI:This is very interesting. Is there anything more you think you've learned or you might learn that cardiologists will find interesting?

DR. BRUCE JOHNSON: Well, one of the major problems that altitude for climbers is high altitude pulmonary edema. And even though the mechanisms are thought to be somewhat different than what goes on in heart failure, we think there's enough similarities that we can learn from that model of high altitude.

And so for example, we've been using inhaled beta-agonist to try to clear fluid in our heart failure population. It's also been used as a technique up on the mountains to help clear fluid. And it's rather understudied and so one of the things we looked at was how well that works at high altitude.

RAJEEV GULATI:Very interesting. So what limitations will these athlete climbers have with wearing the sensor equipment that is needed to get the information.

DR. BRUCE JOHNSON: Yeah. So some of the measurements we made while they were at base camp and they'd acclimatized at the higher camps and come down, and then we would study them. But we also have devices that they're wearing that tell us about how oxygenated the blood is, tells us something about their heart rate variability, which tells us about the autonomic nervous system.

And then they had a very sensitive device that quantifies their energy expenditure. And so we're tying all this together into some of the questions we have about lung fluid regulation. And so they've summited. We're hoping they come back down quickly, and we're hoping to get them back down to Mayo for some follow-up testing as well.

RAJEEV GULATI:Well, that's wonderful. Well, we're extremely anxious to see the results and to see everyone back safely, as I'm sure you are. Thank you once again for joining us. I look forward to reading all the data and the scientific literature in the next few months.

DR. BRUCE JOHNSON: OK thank you.

RAJEEV GULATI:And thanks to you for joining us today.