60 minutes while asleep. Baseline demographic data were obtained on arrival at 2860 m and 24h-ABPM measured between 2860 to 3440 m and 3440 to 4400 m. Hypertensive subjects were defined by self-reported diagnosis of hypertension (HTN). Acute mountain sickness was measured by Lake Louise Score (LLS).

Results.—Eight subjects were enrolled, 4 with pre-existing treated HTN. Data were insufficient or incomplete for 2 subjects with HTN. Between 2860 and 3400 m, the 4 normotensive subjects (NTN) had the expected decrease in BP during sleep. Mean arterial pressure (MAP) decreased from an average of 95 mm Hg (95% CI, 89.76–100.24 mm Hg) while awake to 82.5 mm Hg (95% CI, 74.72–90.28 mm Hg). The 2 with HTN had an increase in BP from awake hours (95.5 mm Hg [95% CI, 84.81–106.11 mm Hg]) to sleep (112.5 mm Hg [95% CI, 100.48–124.52 mm Hg]). The observed pattern in awake vs sleeping BP was similar between 3440 and 4400 m, ($N = 4$, 3 NTN, 1 HTN). The NTN had an average awake MAP of 94.67 mm Hg (95% CI, 90.1–99.24 mm Hg) that decreased to 86 mm Hg (95% CI, 74.03–97.97 mm Hg) and the HTN subject had an increase from awake MAP (90 mm Hg) to sleep MAP (106 mm Hg). No subject developed AMS at any altitude. No differences in heart rate, maximum or minimum BP, or number of BPs above normal were found between NTN and HTN groups at altitude.

Conclusions.—These findings suggest that those with baseline HTN may have an increase in BP while sleeping compared with NTN individuals at high altitude. The clinical significance of these findings remains to be studied.

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The Effect of Riociguat on Gas Exchange, Exercise Performance, and Pulmonary Artery Pressure During Acute Altitude Exposure

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Introduction.—Impairment of exercise performance during altitude exposure results in hypoxemia and decreased oxygen delivery to exercising muscles. Hypoxic pulmonary vasoconstriction (HPV) and ventilation/perfusion (V_A/Q) mismatch further contribute to hypoxemia. Therefore, if pharmacologic blockade could attenuate HPV, then V_A/Q matching, arterial PO_2 , and exercise performance might improve. The nitric oxide (NO) pathway has been targeted in this context with sildenafil, but NO is limited at high altitude, which may explain the variable effectiveness of this approach. Riociguat is a soluble guanylate cyclase stimulator that does not require NO for its action.

Objective.—To examine the acute effect of riociguat on pulmonary artery pressure, arterial oxygenation, and exercise performance at 15,000 feet simulated altitude.

Methods.—Subjects instrumented with radial and pulmonary artery (PA) catheters performed incremental exercise tests on a bicycle ergometer at a simulated altitude of 15,000 feet before and after administration of 1 mg riociguat. The following parameters were measured: mean and PA pressures, pulmonary vascular resistance (PVR), systemic vascular resistance (SVR), heart rate (HR), cardiac output, arterial and mixed venous O_2 saturation, alveolar-arterial PO_2 difference, oxygen consumption (VO_2), and arterial O_2 delivery (DO_2). Statistical analysis was performed using a generalized estimating equation model, and the effect of riociguat on outcome was examined, accounting for exercise impact.

Results.—Preliminary results ($N = 11$ subjects) demonstrated decreased PVR ($P = .014$), while DO_2 and cardiac output were increased ($P < .01$) at rest and at 50 W of exercise intensity after administration of riociguat. There was no statistically significant effect on mean arterial or PA pressures, arterial O_2 saturation, alveolar-arterial PO_2 difference, or VO_2 .

Conclusion.—We conclude that at 15,000 feet simulated altitude, a one-time dose of 1 mg riociguat appears to decrease pulmonary vascular resistance

while increasing peripheral O_2 delivery and cardiac output at rest and low exercise levels.

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The Influence of Snow Density on O_2 and CO_2 Levels in Subjects Breathing into an Artificial Airpocket

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Introduction.—Survival time in an avalanche depends on factors such as patency of the airway and the volume of an airpocket. It also was suspected that the characteristics of snow, especially snow density, affects the development of hypoxia and hypercapnia.

Objective.—To evaluate the influence of snow density on the development of hypoxia and hypercapnia in subjects breathing into an artificial airpocket.

Methods.—Twelve male healthy subjects breathed through an airtight face mask and 40-cm tube into an artificial airpocket of 4 L. Every subject performed 3 tests on different days with variable snow densities (range 155–481 kg/m³). Symptoms, gas, and cardiovascular parameters were monitored for up to 30 minutes. Tests were interrupted at $SpO_2 < 75\%$. Snow density was measured around the airpocket. A scatterplot of rate of CO_2 decrease and O_2 increase in the airpocket per snow density revealed 2 clusters (snow density $\leq$ or > 250 kg/m³) that were confirmed by a 2-step cluster analysis. The second cluster then was divided by the median of about 400 kg/m³ into 2 subgroups. Test duration was analyzed by means of Kaplan-Meier estimator and log-rank test.

Results.—Eighteen of 36 test subjects completed the test duration of 30 minutes. Test duration was different in the 3 groups of snow density ($P < .05$) and was shorter in the highest density group than in the other 2 groups ($P < .05$). Test duration in the lowest and middle snow density groups was not different ($P > .05$).

Conclusion.—Snow density > 250 kg/m³ was positively correlated with difference from baseline to maximum value of CO_2 and negatively correlated with difference from baseline to minimum value of O_2 levels. Unexpectedly, lower densities showed a different behavior on CO_2 levels that could affect survival in avalanche-buried victims.

Burial Duration and Airpocket Explain Avalanche Survival Patterns in Austria

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Introduction.—An avalanche survival curve is a graphical representation of the cumulative survival probability during complete avalanche burial as a function of time. Thus far, survival patterns have been calculated using data from Switzerland and Canada.

Objective.—To calculate an avalanche survival curve using data from Austria.

Methods.—The analysis included avalanche accidents between 2005 and 2006 and 2012 and 2013 in Austria involving completely buried victims (ie, burial of the head and chest) in open terrain with known outcome at hospital discharge (survived or did not survive). Extrication and survival curves were calculated using the Turnbull algorithm, as in previous studies.

Results.—Three hundred thirty-three completely buried victims were included. Median time to extrication was 15 minutes (25th to 75th quartile: 5–50 minutes). Overall survival was 59%. The survival curve showed a rapid