

## AVALANCHE AIR SPACE PHYSIOLOGY

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**ABSTRACT:** International data on avalanche burial survival strongly suggests acute asphyxia as the predominant early premortal pathophysiological event. We studied air space volumes in horizontally buried victims at 8,000 ft. using standard oximetry to determine rate of de-saturation in both closed (plastic bowls) and open (colanders) systems to assess the contribution of the oxygen content in the surrounding snow. The air spaces were packed tightly around the devices to avoid extraneous tracts. The O<sub>2</sub> Saturation end point was selected to be 79% which correlates to an acclimatized pO<sub>2</sub> of about 50 at 8,000 ft. The snow density was determined to be 296 - 310 kg/cm<sup>3</sup>.

Air space volumes included: 3900cc, 1700cc and 1000cc bowls in the closed system and 700cc, 150cc colanders in the open system. O<sub>2</sub> Sats were recorded from time zero, when a small caliber external breathing tube was clamped to the buried subject at baseline O<sub>2</sub> sat.

<u>Results:</u>	<u>volume (cc)</u>	<u>time (minutes)</u>
closed	3900	3:55
	1700	2:50
	1000	1:15
open	1700	10:58
	700	2:10
	150	0:50

The larger the volume air space, the longer time to lethal desaturation and asphyxia. Also, surprisingly, a significant quantity of oxygen is extracted from the surrounding high density snow involved in avalanche debris burials, causing a slower decay in oxygenation and survival. This phenomenon probably contributes to the prolonged survival during the plateau phase. Eventually, hypercapnea along with hypoxia and conversion to a closed system by the development of frozen face masks, eventuates in late asphyxia.

**KEYWORDS:** avalanche rescue, snow density

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