

MEASURED INCREASE IN LUNG VOLUMES IN COMPETITIVE FREEDIVING

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Freediving has been practised for more than 2000 years. Its recent popularity as an extreme sport has been in the pursuit of depth records. The current “no limits” world record now stands at 171m. This has brought attention to physiological theories that allow humans to maintain thoracic integrity at these depths. One technique that freedivers employ to increase entrained air is to “pack” via buccal pumping. Our aim was to record changes in measured lung volume due to “packing” and to determine the proportion of these changes that is due to increased pressure.

METHODS: 7 healthy male freedivers that “pack” train, age 33(8) (mean(SD)) years were recruited. Subjects performed baseline spirometry, TL_{CO} and body plethysmography (“Pre”). Body plethysmography and mouth pressure were recorded immediately following a maximal “packing” (“Pack”) manoeuvre and within five minutes after the final “pack” (“Post”).

RESULTS:

	TLC (L)		VC (L)		RV (L)	
	mean (SD)	% pred	mean (SD)	% pred	mean (SD)	% pred
Pre	8.25 (1.41)	110	6.39 (1.18)	115	1.86 (0.41)	98
Pack	10.20 (1.73)*	135*	8.31 (1.54)*	150*	1.89 (0.33)	99
Post	8.41 (1.43)*	112*	6.52 (1.18)*	117*	1.89 (0.45)	99

* $p < 0.03$ versus Pre

Average measured mouth pressure when “packed” was 65(19) cmH₂O. Percentage change in TLC was 24% and in VC was 30%.

CONCLUSION: Freedivers are able to achieve significant increases in measured lung volumes using buccal pumping. There was a correlation between percent change in measured lung volume and mouth pressure. The displaced volume above TLC approximated two thirds of the “packed” air.

Key Words: freediving, lung packing, hyperinflation, lung volumes