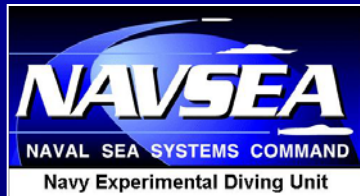


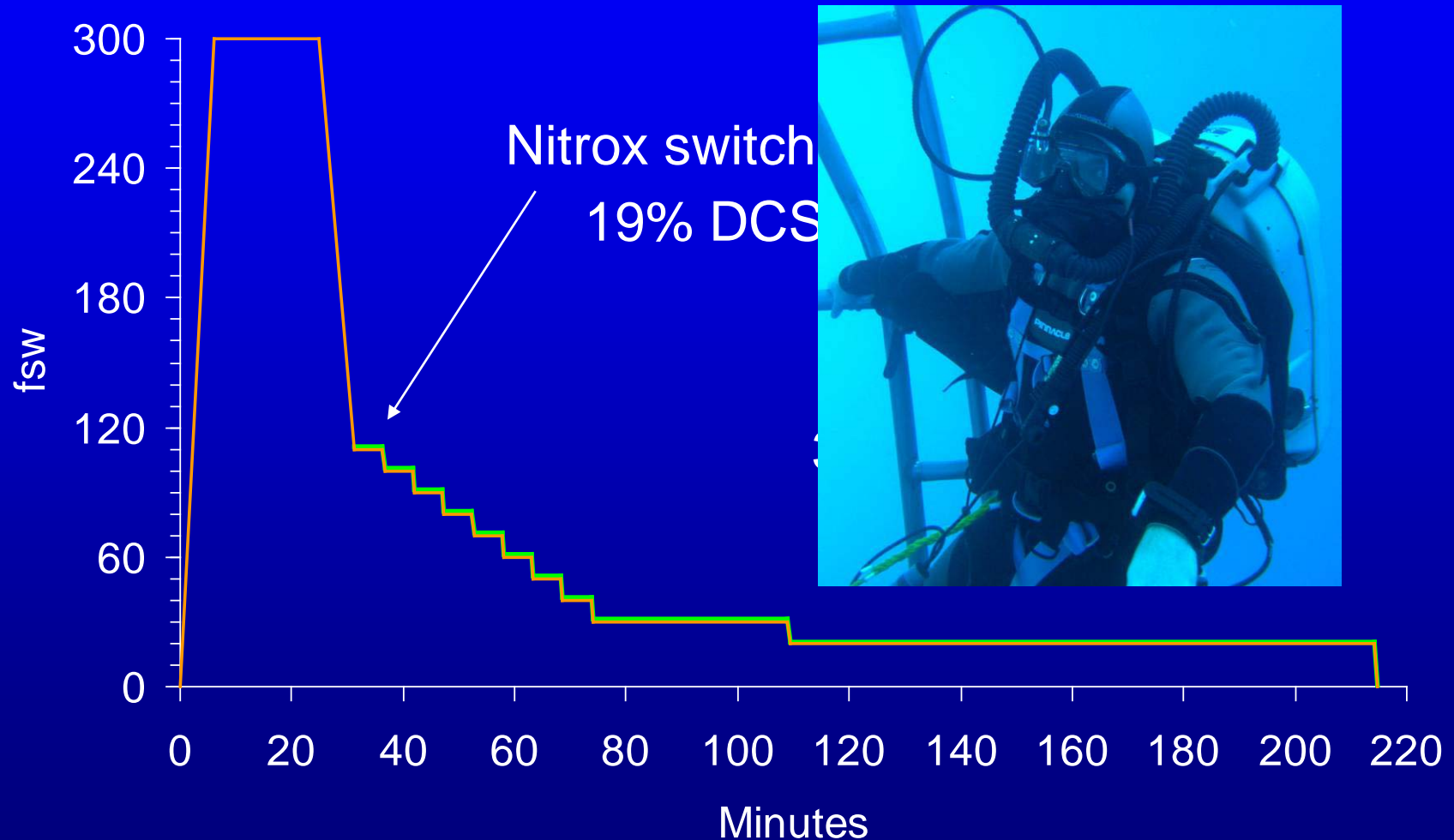
# Safe Inner Ear Inert Gas Tension for Switch from Heliox to Air Breathing at 100 Fsw During Decompression

David J. Doolette, Wayne A. Gerth,  
Keith A. Gault, and F. Greg Murphy

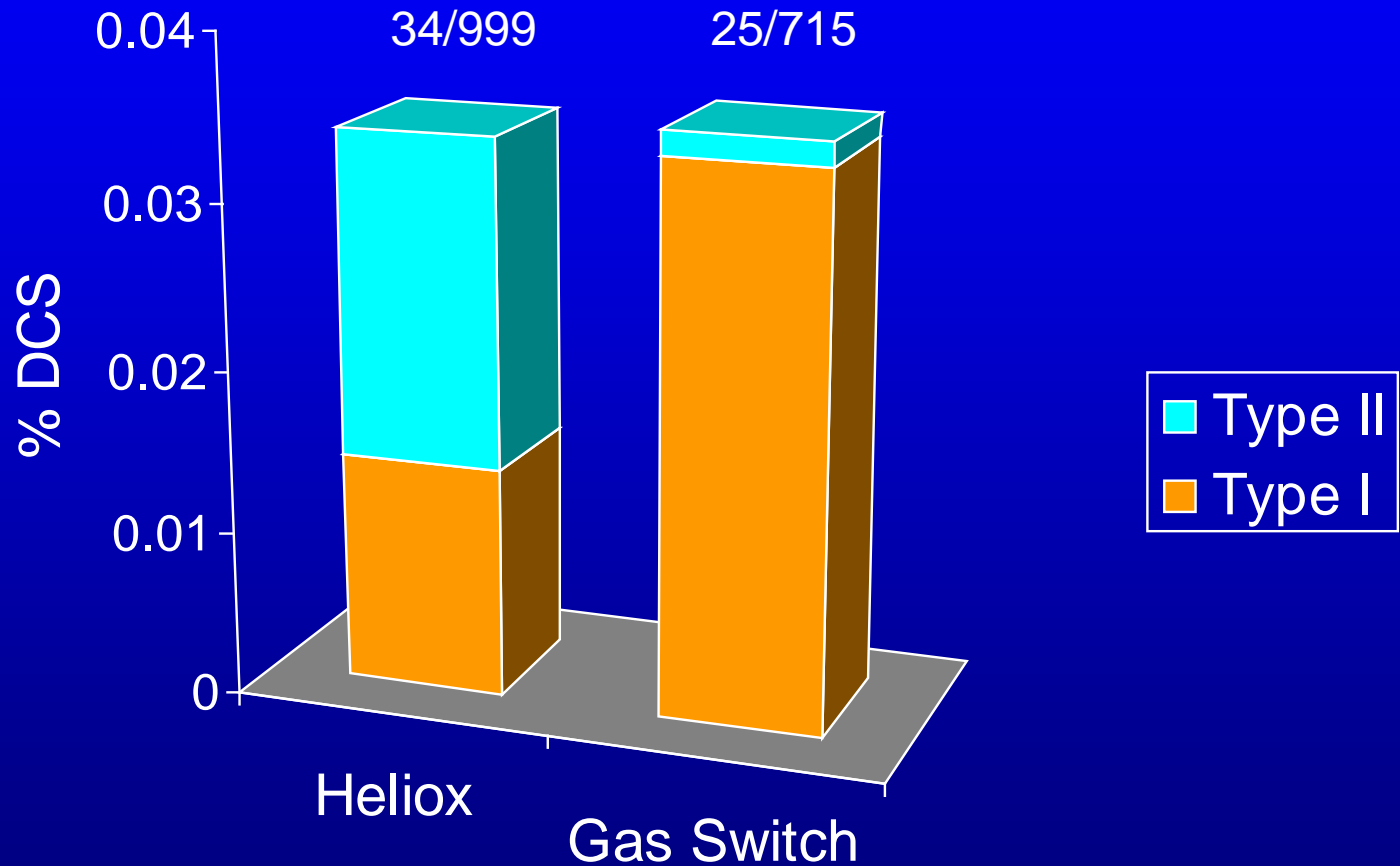
*Navy Experimental Diving Unit,  
Panama City (FL)*



# Heliox to Nitrox Switch: Accelerated Decompression?



# Heliox to Nitrox Switch: Less Type II DCS?

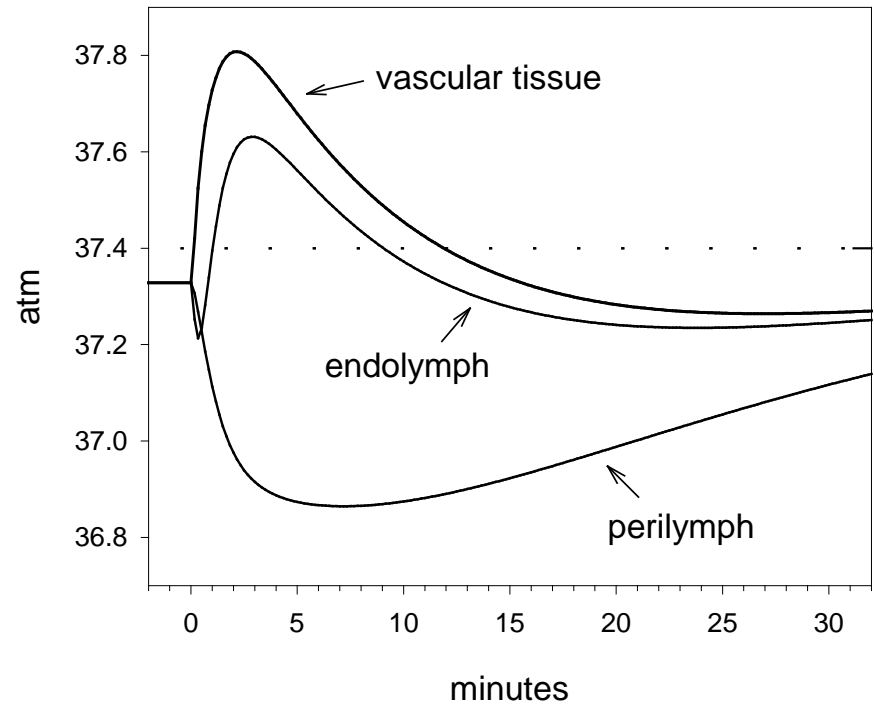
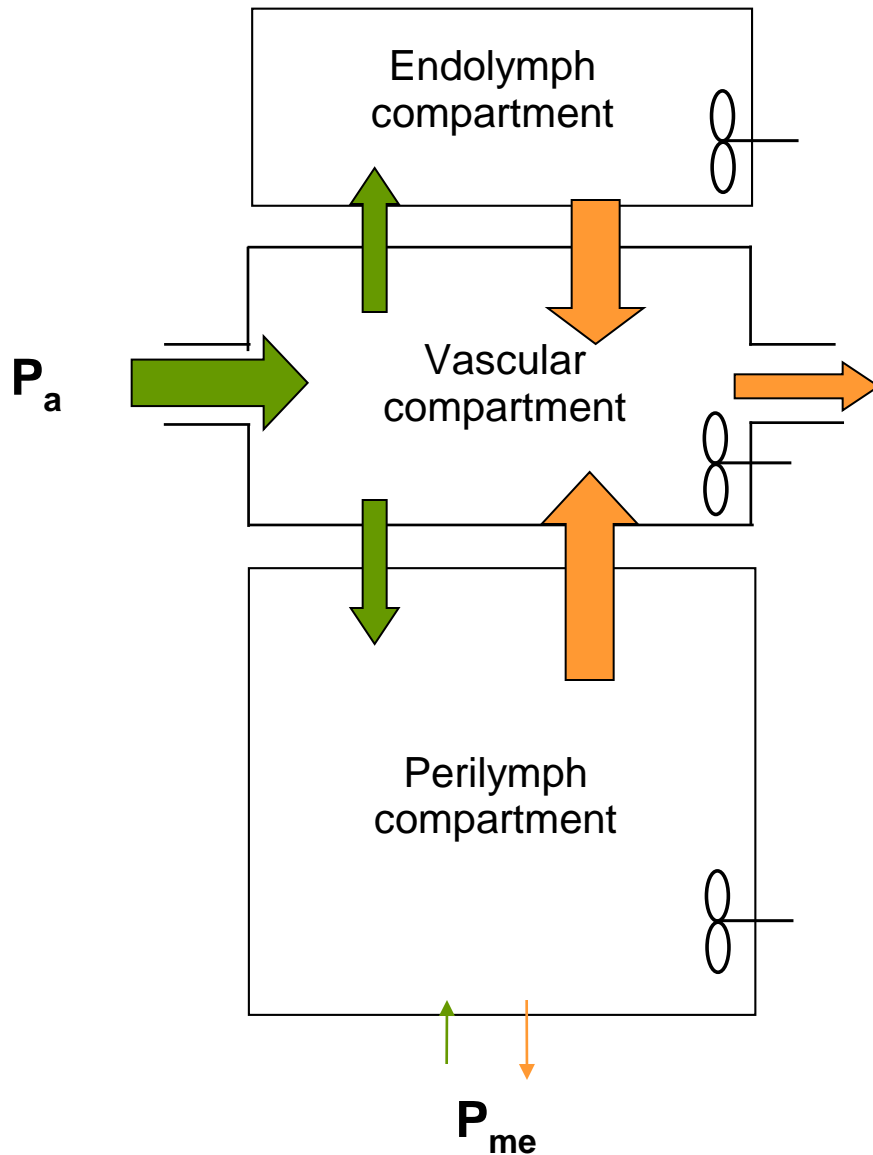


# Isobaric Counterdiffusion – Inner Ear

- Injury to vestibulo-cochlear apparatus
  - vertigo, nausea, tinnitus, hearing loss
  - often no other manifestations
- Transient breathing of nitrox at 28–37 atm heliox saturation\*
- Deep Heliox diving
  - often proximal to switch to nitrox breathing†

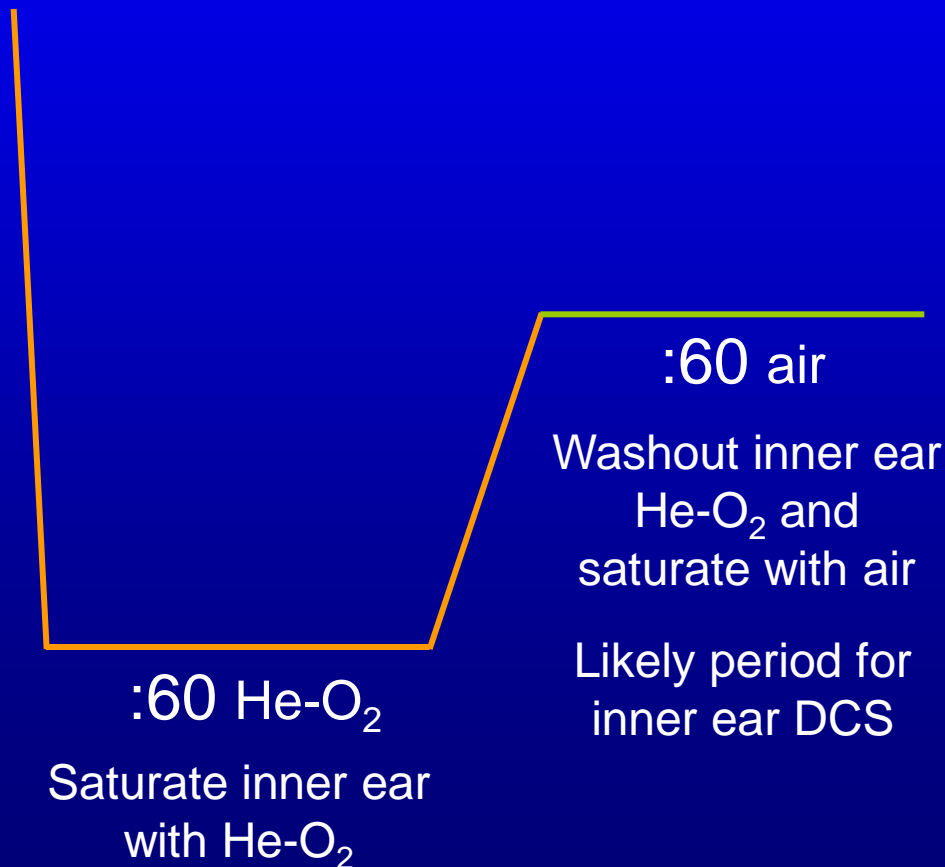


# Inner Ear Model



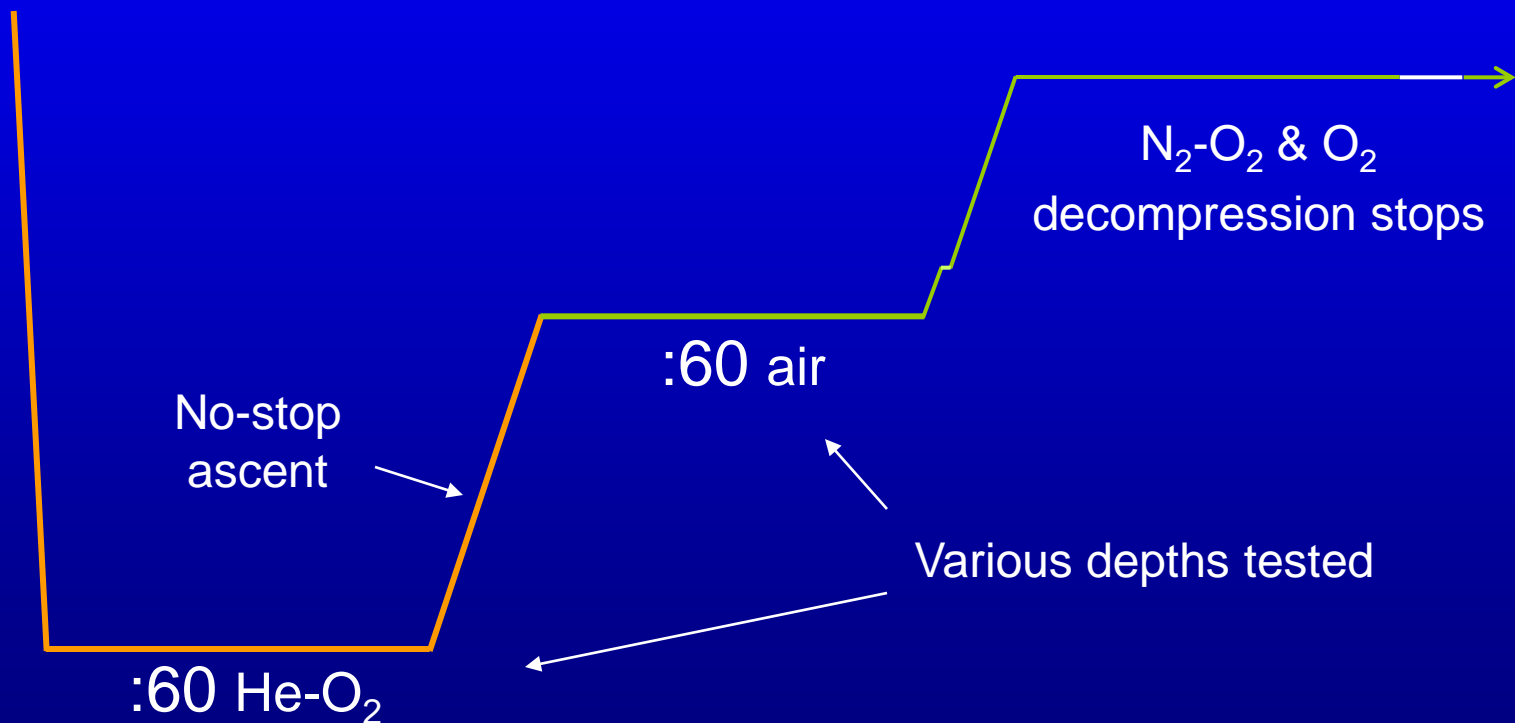
# Heliox to Nitrox Switch Experiment

Inner ear “Saturation – Excursion”

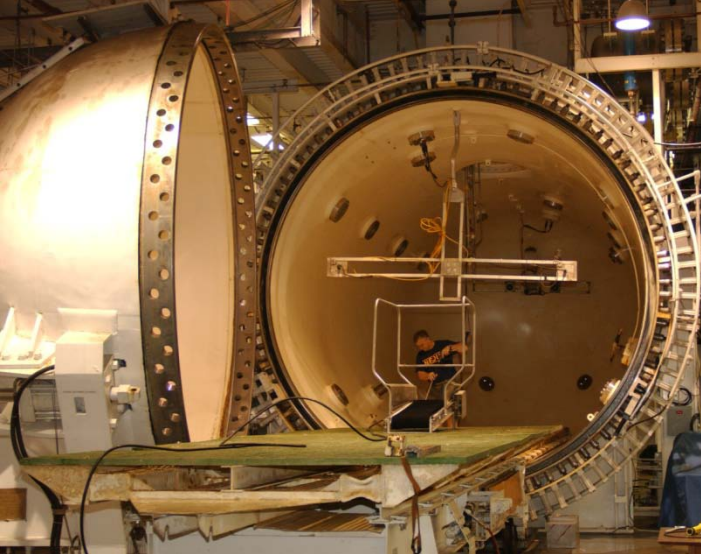


# Heliox to Nitrox Switch Experiment

Test for safe gas switch depths

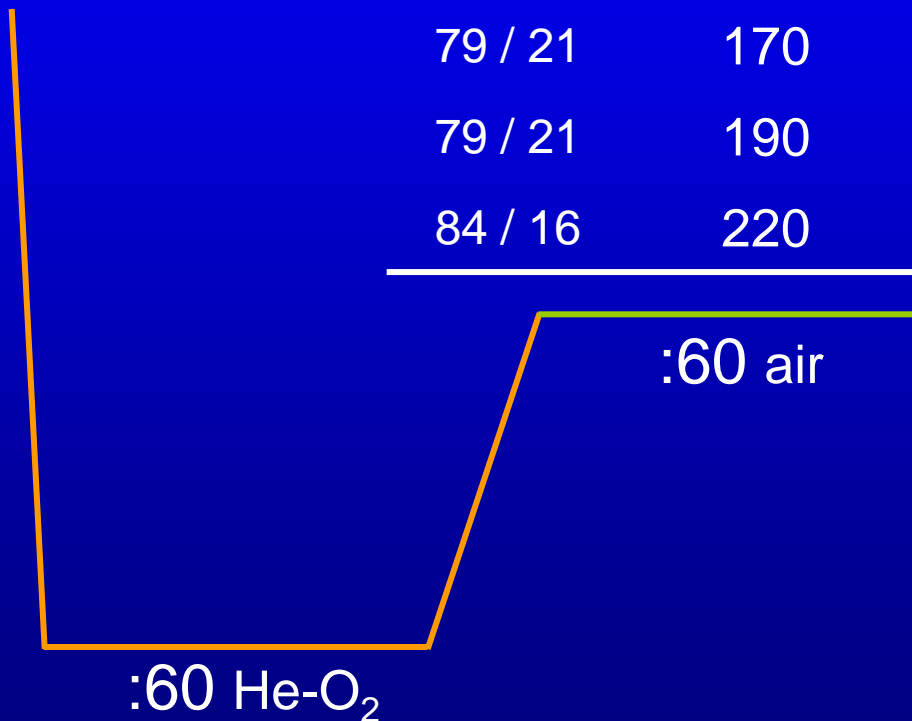


Sequential stopping rule: any CNS DCS in 25 or fewer dives  
Monte Carlo Simulation: identify  $P_{DCS}$

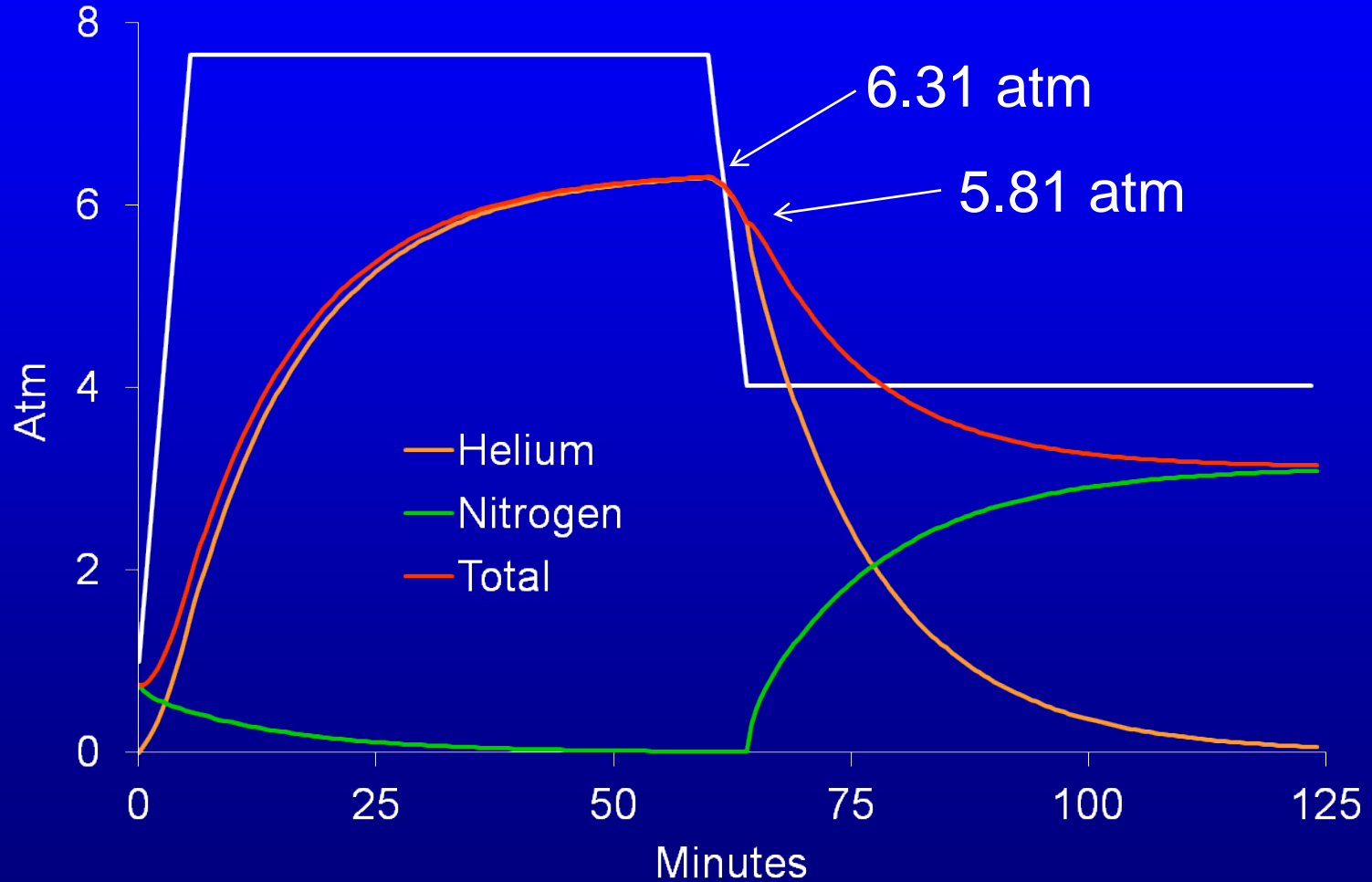


# Heliox to Nitrox Switching Results

Heliox		Air	DCS/dives
He / O <sub>2</sub>	fsw	fsw	
79 / 21	150	70	0/27
79 / 21	170	100	0/25
79 / 21	190	100	0/26
84 / 16	220	100	0/26



# Inner Ear Gas Tensions



# Conclusion

- Switch from heliox to air breathing at 4.02 atm abs (100 fsw) with inner gas tension of 5.81 atm has low risk of inner ear DCS