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Title: Computer simulation of counterlungs

Authors: Tomlinson, SP
Livesey, J
Tilley, DG
Himmens, I

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Abstract: We have developed a computer model of chest-mounted counterlungs, which accounts for counterlung shape, effective volume, and pressure centroid. The model has been validated and the principles are applicable to other counterlung systems. The highly non-linear and discontinuous behavior of a counterlung is predicted by use of a sophisticated numerical integration method that computes variables such as pressure and volume in the time domain. Three separate stiffness (reciprocal of compliance) terms have been used which contribute to the diver's work of breathing: material elastic stiffness, "gas" stiffness, and "hydrostatic" stiffness. The model provides a significant advance in the understanding of counterlung behavior, allowing the performance of practical equipment to be predicted.

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