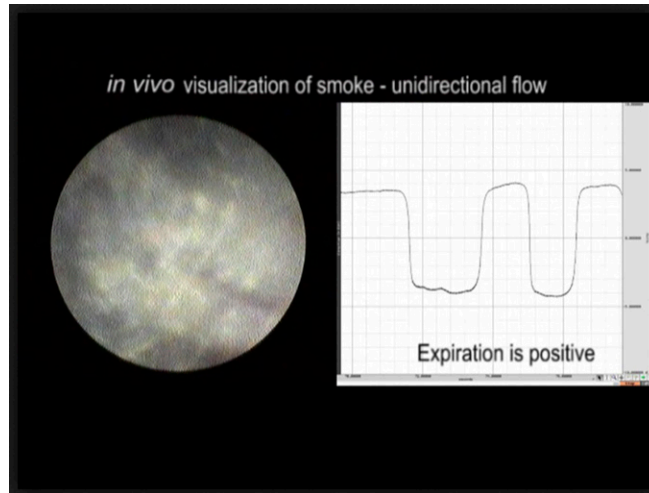


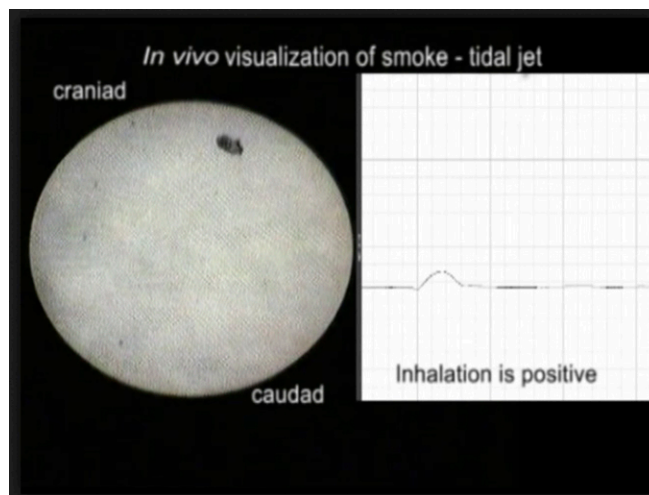
# Supporting Information

Cieri et al. 10.1073/pnas.1405088111



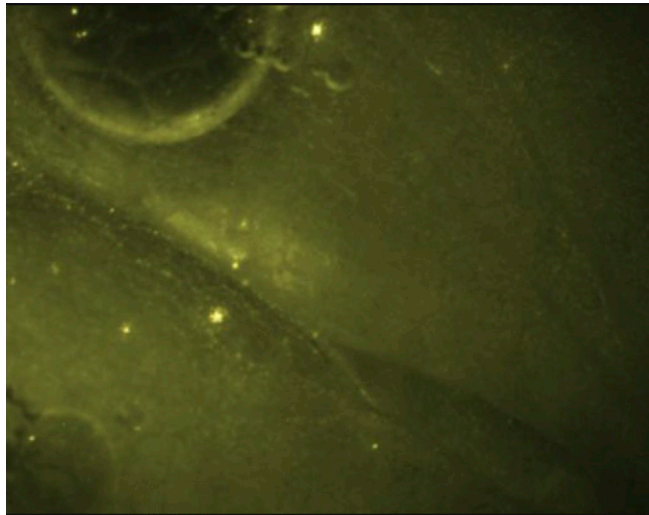
**Movie S1.** In vivo visualization of synthetic smoke showing unidirectional flow. Endoscopic video (left circle) of synthetic smoke moving in the caudal chamber of a lung at the location illustrated in Fig. 2 *B* and *C*, and a recording of the direction of airflow at the nares (right panel) from a dual thermistor flow meter. Expiration occurs as the trace becomes positive. Airflow is craniad during both inspiration and expiration, indicated by the particles of smoke moving from lower right toward the upper left hand side of the screen. The red line in the background is a blood vessel in the wall of the lung. Several of the pockets illustrated in Fig. 1 can also be seen in the background. The head of the animal is toward the left and dorsal is toward the top of the page.

[Movie S1](#)



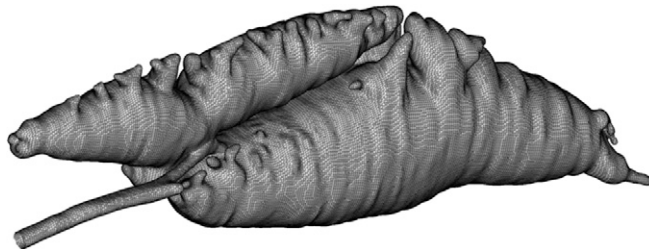
**Movie S2.** In vivo visualization of synthetic smoke showing tidal flow. Endoscopic video (left circle) of synthetic smoke moving in the caudal chamber of a green iguana at the plane illustrated in Fig. 2 *D* and *E*. During exhalation particles of smoke move at slow speed craniad (toward the upper left-hand corner of the field of view). During inhalation a high-velocity stream of smoke emanates rapidly caudad (toward the lower right hand field of view). Airflow at the nares was measured with a pneumotachograph (right panel). Expiration is negative.

[Movie S2](#)



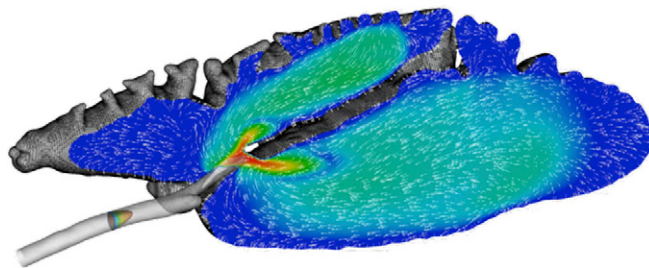
**Movie S3.** Ventral view of the movement of fluorescent microspheres in water-filled lungs. Craniad is toward the bottom right hand corner of the field of view. The medial region of both lungs can be seen. The right lung contains an air bubble visible in the upper left hand corner of the field of view. The bubble can be seen moving toward the top of the screen as water is infused into the lungs and toward the bottom as it is withdrawn. In the ventromedial regions of both lungs microspheres move craniad during both phases of respiration. A few of the microspheres can be seen moving laterocaudad in the high-velocity fluid stream on inspiration.

[Movie S3](#)



**Movie S4.** Simulation of lung expansion and contraction. Medial view of the mesh of the right lung showing expansion and contraction over the respiratory cycle. Head is toward the left, dorsal toward the top of the field of view. A complete respiratory cycle (inspiration + expiration) was 4 s.

[Movie S4](#)



**Movie S5.** Vector diagram of simulation of bulk flow patterns in the lung. Medial, parasagittal view of the right lung showing bulk patterns of flow over two respiratory cycles with periods of approximately 4 s. Inspiration occurs when the colored cone in the trachea moves caudad and expiration when it moves craniad (left side of page). Speed is in meters per second with warm colors indicating more rapid flow. Unidirectional flow occurs in both the cranial and caudal chambers.

[Movie S5](#)