

Comment on Apfel's second comment

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This is a comment to the preceding letter [R. E. Apfel, *J. Acoust. Soc. Am.* **110**, 1740 (2001)].

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We agree that it is incumbent on the authors of an article to prove their case, whether the result is “negative” or “positive.” It is also true that it is harder to prove a “negative.” It is clear that Dr. Apfel and we are going to continue to disagree on whether we met that burden of proof in our article.¹

Three other points are as follows. (1) Although the authors of a very recent oral presentation² showed, using an active cavitation detection system, evidence of echoes characteristic of bubbles when lung hemorrhage occurs at 1-atmosphere hydrostatic pressure, this would not be surprising as the hemorrhage itself will produce mixing of blood and air in the alveoli which could be expected to produce large scattered signals. (2) In the Hill paper,³ referenced in our first response and again by Dr. Apfel in his second letter,

the liquid in the vessel was exposed directly to the air and the vessel was rotated. Under these conditions we would expect that the time for equilibration of gas partial pressures in the liquid after application of overpressure would be short compared to the three hours that Hill applied the overpressure. (3) The neonatal mouse studies using overpressure showed similar effects of overpressure at both 10 °C and 37 °C, as reported by Lee and Frizzell⁴ in one of the studies that we cited in our response to Apfel's first letter.

¹W. D. O'Brien, Jr., L. A. Frizzell, R. M. Weigel, and J. F. Zachary, “Ultrasound-induced lung hemorrhage is not caused by inertial cavitation,” *J. Acoust. Soc. Am.* **108**, 1290–1297 (2000).

²C. K. Holland, R. A. Roy, R. W. Biddinger, C. J. Disimile, and C. Ca-wood, “Cavitation mediated rat lung bioeffects from diagnostic ultrasound,” *J. Acoust. Soc. Am.* **109**, 2433(A) (2001).

³C. R. Hill, “Ultrasound exposure thresholds for changes in cells and tissues,” *J. Acoust. Soc. Am.* **52**, 667–672 (1972).

⁴C. S. Lee and L. A. Frizzell, “Exposure levels for ultrasonic cavitation in the mouse neonate,” *Ultrasound Med. Biol.* **14**, 735–742 (1988).

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