

# LIQUIVENT® LUNG LAVAGE

*Liquivent is intended to be used as an aid in removing debris, secretions, and foreign matter from the lungs via bronchoalveolar lavage (BAL).*

**OriGen**  
BIOMEDICAL

## RADIOPAQUE PERFLUBRON FOR LUNG LAVAGE

Removal of aspirated debris or liquids from the lungs is especially difficult. Saline lavage is quite painful for the patient and has numerous drawbacks, including reducing  $\text{PaO}_2$ , removing surfactant, eliciting a cough reflex, and is ineffective in removing debris from the lungs. Liquivent, a perfluorocarbon (PFC) compound liquid (also known as perfluorooctylbromide or Perflubron or PFOB), has notable advantages as a lavage medium that may reduce the risk of these known issues.

Perfluorocarbon (PFC) liquids are water-clear, very dense, and low-viscosity. PFCs are immiscible with both water and lipids. Due to the density, the PFCs penetrate to the lowest levels in the lung and displace most solids and liquids. This causes any debris, secretions, or foreign matter to float to the top of the meniscus, where it is easily removed.

## ADVANTAGES OF LIQUIVENT LUNG LAVAGE

**Bioinert:** PFOBs are minimally absorbed<sup>6</sup> and have no deleterious histological cellular or biochemical effects<sup>1</sup>.

**Buoyancy:** Most liquids and solids float on top of PFOBs due to their high density and low viscosity, allowing toxic, damaging exudates, as well as infectious material, to float to the top of the PFOB, where they can be removed using suction<sup>7</sup>.

**Hydrophobic:** PFCs do not mix with water, inhaled liquids, or solids.

**Respiratory:** Does not block oxygen transfer during lavage<sup>8</sup>, improves lung function, and also reduces inflammation<sup>9</sup>.

## OUR QUALITY STANDARDS

A Certificate of Analysis (CoA) is included with each Perflubron product. OriGen's Liquivent is CE marked. OriGen is certified to ISO 13485:2016, and all products are manufactured to GMP guidelines.





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OriGen Biomedical™ supplies a pharmaceutical-grade perfluorocarbon compound called Perflubron (PFOB). Perflubron's chemical name is perfluorooctyl bromide and it is radiopaque (opaque on x-ray).

Perflubron (PFOB) has been extensively studied in both the lungs and circulation. PFOB is bioinert, minimally absorbed, and has no deleterious histological cellular or biochemical effects<sup>10</sup>. PFOB molecules are too large to be metabolized<sup>5</sup> and are therefore non-reactive in the respiratory or circulatory system. In addition, due to its high vapor pressure, Perflubron evaporates quickly<sup>1</sup>, making vigorous attempts to remove the liquid from the lungs virtually unnecessary<sup>7</sup>.

Clinical studies have shown that Perflubron is eliminated from the lungs primarily by evaporation during normal respiration, with radiographic clearance of most of the PFOB by 48 hours. Trace amounts of PFOB are detectable via X-ray, but has no documented health effects<sup>1</sup>. PFOB use in the lungs enhances surfactant phospholipid production<sup>2</sup>. Instillation of Perflubron into the lungs was found to diminish oxidative damage to injury-prone tissues compared to standard saline usage/procedures<sup>3</sup>. And when used with exogenous surfactant, PFOB actually improved pulmonary gas exchange after meconium aspiration<sup>4</sup>.

## TECHNICAL INFORMATION

### LIQUIVENT: RADIOPAQUE PERFLUBRON

PART CODE	VOLUME (ml)	CASE QUANTITY	STOCK/NON-STOCK
PFB-3	3ml in 10ml vial	12	Non-Stock
PFB-50	50ml vial	6	Stock

## ORDERING INFORMATION

Supplied sterile, non-pyrogenic, individually packed, for single use only. To place an online order, [please fill out this form](#). **For research use only in the United States.**

## REFERENCES

1. Reickert C, Praniko T, Overbeck M, Kazerooni E, Massey K, Bartlett R, Hirschl R. "The Pulmonary and Systemic Distribution and Elimination of Perflubron from Adult Patients Treated with Partial Liquid Ventilation" Chest. 2001 Feb; 119(2):515-522.
2. Steinhorn DM, Leach CL, Fuhrman BP, Holm BA. "Partial Liquid Ventilation Enhances Surfactant Phospholipid Production." Critical Care Med. 1996 Jul; 24(7):1252-6.
3. Rotta AT, Gunnarsson B, Fuhrman BP, Wiryawan B, Hernan LJ, Steinhorn DM. "Perfluorooctyl bromide (perflubron) attenuates oxidative injury to biological and nonbiological systems." Pediatr Crit Care Med. 2003 Apr;4(2):233-8.
4. Schlösser R, L, Veldman A, Fischer D, Funk B, Brand J, von Loewenich V. "Comparison of Effects of Perflubron and Surfactant Lung Lavage on Pulmonary Gas Exchange in a Piglet Model of Meconium Aspiration." Biol Neonate. 2002 Feb; 81:126-131.
5. Flaim SF. Pharmacokinetics and side effects of perfluorocarbon-based blood substitutes. Artif Cells Blood Substit Immobil Biotechnol. 1994;22(4):1043-54. doi: 10.3109/10731199409138801. PMID: 7849908.
6. Broadbuss, V. C., Ernst, J. D., King, T. E., Lazarus, S. C., Sarmiento, K. F., Schnapp, L. M., Stapleton, R. D., & Gotway, M. B. (2022). Murray & Nadel's textbook of Respiratory Medicine (7th ed.). Elsevier.
7. Farnham, RRT, Bill. "An American Perspective." RT Magazine, 7 Feb. 2007. <https://rtmagazine.com/disorders-diseases/critical-care/ards/an-american-perspective/>.
8. Patankar, Nikhil; Al-Ibrahim, Omar 716, Critical Care Medicine: December 2015 - Volume 43 - Issue 12 - p 180. doi: 10.1097/01.ccm.0000474544.58195.50.
9. Haerberle H. A., Nesti F., Dieterich H.-J., Gatalica Z., Garofalo R. P. (2002). Perflubron Reduces Lung Inflammation in Respiratory Syncytial Virus Infection by Inhibiting Chemokine Expression and Nuclear Factor- $\kappa$ B Activation. Am. J. Respir. Crit. Care Med. 165, 1433-1438. Doi:10.1164/rccm.2109077.
10. Houmes, R.J.M., Verbrugge, S.J.C., Hendrik, E.R. et al. Hemodynamic effects of partial liquid ventilation with perfluorocarbon in acute lung injury. Intensive Care Med 21, 966-972 (1995). <https://doi.org/10.1007/BF01700657>

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