



Supplementary Materials for **Oxygen Gas–Filled Microparticles Provide Intravenous Oxygen Delivery**

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Other Supplementary Material for this manuscript includes the following:
(available at www.sciencetranslationalmedicine.org/cgi/content/full/4/140/140ra88/DC1)

Movie S1. Oxygen transfer kinetics from LOMs to blood.

SUPPLEMENTARY FIGURES

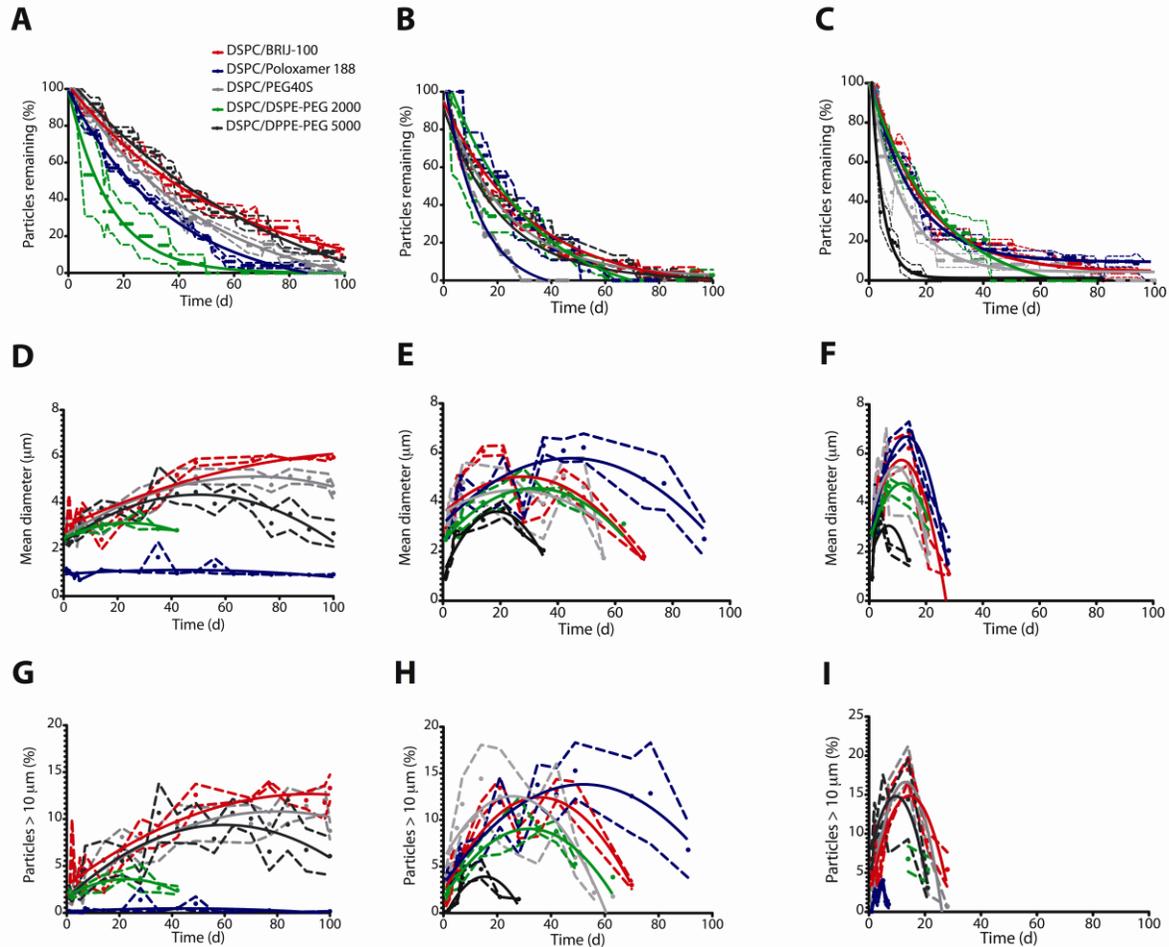


Figure S1. LOM stability and growth at various storage temperatures. (A to C) Degradation of particles over the 100-day observation period at 4°C (A), room temperature (B), and 37°C (C). (D to F) Mean particle diameter over 100-day observation period at 4°C (D), room temperature (E), and 37°C (F). (G to I) Proportion of particles exceeding 10 µm over time at 4°C (G), room temperature (H), and 37°C (I). For (D to I), lines end when there was no remaining intact suspension for particle sizing. For all graphs, dots and dotted lines represent means and SEM of 5 replicate measurements, respectively. Solid lines represent the one-phase decay line from a nonlinear regression analysis for (A to C) and second order polynomial regression line for (D to I) of the raw data. DSPC, 1,2-distearoyl-sn-glycero-3-phosphocholine; BRIJ100, polyoxyethylene (100) stearyl ether; Poloxamer 188, polyethylene-poly(propylene glycol); PEG40S, polyoxyethylene (40) stearate; DSPE-PEG 2000, 1,2-distearoyl-sn-glycero-3-phosphoethanolamine-*N*-[carboxy(poly(ethylene glycol))-2000]; DPPE-PEG 5000, 1,2-dipalmitoyl-sn-glycero-3-phosphoethanolamine-*N*-[carboxy(poly(ethylene glycol))-5000] (DPPE-PEG 5000).

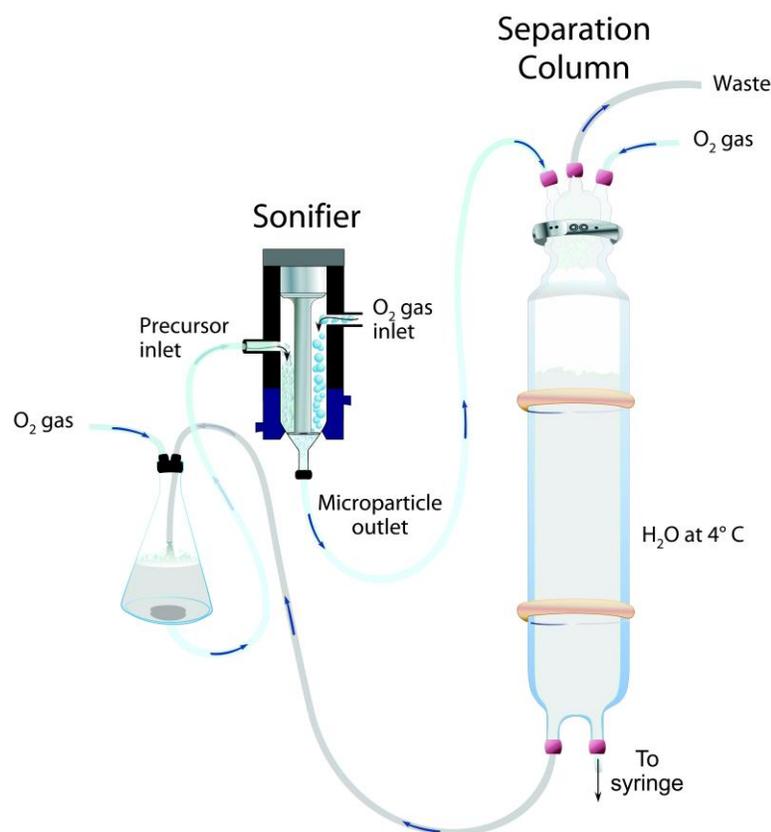


Figure S2. Apparatus used for LOM manufacture. Hydrated lipid excipients (75 ml/min) and oxygen gas (60 ml/min) were infused into a sonifier fitted with a continuous flow attachment and run at maximal continuous output. LOMs exited and flowed into a 2-liter, oxygenated glass separation column maintained at $4^\circ C$ and washed with oxygen gas. Each column was filled to the top, at which point a clamp occluding a recycling port draining the bottom of the column was released, returning the lowest portion of the suspension to the infusion system described above. LOMs were recycled for 10 minutes, at which point recycling was terminated and 200 ml of suspension was pushed out of the waste port. The resultant suspension stood for 10 minutes, allowing larger LOMs to rise to the top of the column. The lower 1000 ml was withdrawn into syringes and concentrated by centrifugation at $500 \times g$ for 10 minutes. Concentrated LOMs were combined into containers for storage at $4^\circ C$ and further testing.

SUPPLEMENTARY TABLE**Table S1. Combinations of lipid excipients used in LOM manufacture.**

Combination #	Base lipid	Block copolymer	Block copolymer fraction (mol %)
1	1,2-Distearoyl-sn-glycero-3-phosphocholine (DSPC)	Polyoxyethylene (100) stearyl ether (BRIJ 100)	10
2	DSPC	Polyethylene-poly(propylene glycol) (Poloxamer 188)	10
3	DSPC	Polyoxyethylene (40) stearate (PEG40S)	10
4	DSPC	1,2-Distearoyl-sn-glycero-3-phosphoethanolamine- <i>N</i> -[carboxy(poly(ethylene glycol))-2000] (DSPE-PEG 2000)	10
5	DSPC	1,2-Dipalmitoyl-sn-glycero-3-phosphoethanolamine- <i>N</i> -[carboxy(poly(ethylene glycol))-5000] (DSPE-PEG 5000)	10

SUPPLEMENTARY MOVIE

Movie S1. Oxygen transfer from LOMs to blood. Timed oxygen transfer from 70 vol % and 90 vol % LOMs. Oxyhemoglobin saturation was read continuously by the monitor to the right.