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Echogenic liposomes for vasoactive gas delivery and inhibition of intima hyperplasia in atheroproliferative disease

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Our group has developed targeted echogenic liposomes (ELIP) for targeted ultrasound enhancement of atheroma as well as targeted therapeutic delivery.
Nitric oxide (NO) has potent biological activities but is too labile for in-vivo vascular delivery. We have developed a methodology to entrap NO, cause local prolonged release and retain NO effect. NO-loaded ELIP were injected into the common carotid artery after balloon injury. Fourteen days later, the carotids were removed. Administration of NO-ELIP resulted in 51±6% inhibition of intimal thickening when compared with controls.
Using a 6.0 MHz clinical Doppler diagnostic ultrasound system, we (Smith et al) have identified the optimal pressure threshold (MI 0.08) for NO diffusion from ELIP. Using these parameters we have enhanced vascular permeability of drugs and stem cells to help stabilize atherosclerotic plaques.
We have developed a novel method for encapsulating NO into ELIP demonstrating their capacity for NO delivery, inhibition of intimal hyperplasia and controlled gas diffusion with ultrasound. This methodology provides a new approach for delivering a variety of bioactive gases to target tissues, which otherwise would have negligible effects when administered systemically.