Supplementary information:

Magnetic Particle Imaging Lymphography (MPIL): A technique for lymph node mapping

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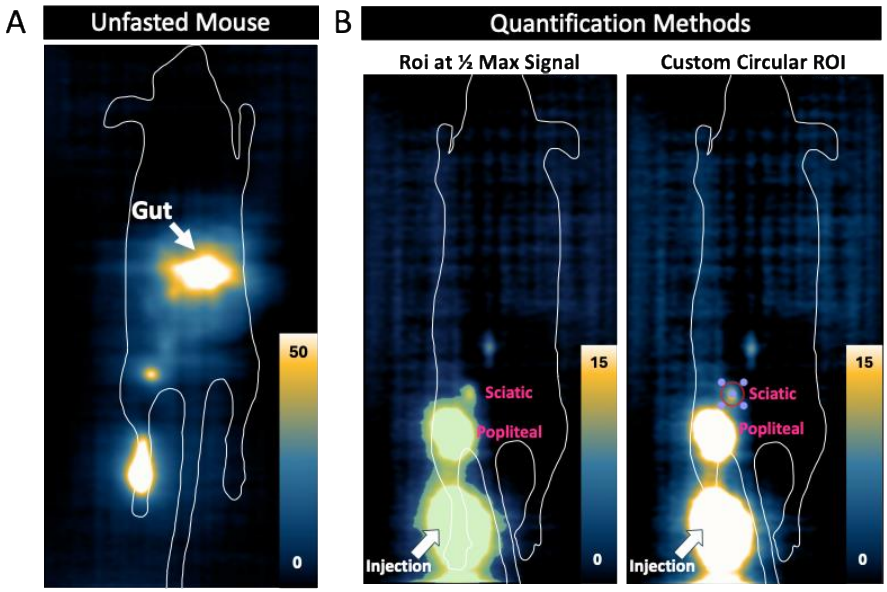

Figure S1. Considerations when imaging and quantifying mouse lymph nodes. (A) An unfasted mouse administered Synomag-D PEG 24 hours after injection is shown. Signal in the gut due to iron in mouse feed impedes on imaging of HENs. (B) There must be careful selection of quantification methods. A mouse administered Synomag-D PEG is shown 4 hours after injection. If an ROI at ½ the maximum signal of the sciatic lymph node is applied, we are unable to isolate sciatic lymph node from the SLN and injection site. In this case, accurate quantification of the sciatic lymph node is not possible. Instead, a custom circular ROI of the same size is drawn around all lymph nodes, allowing for signal isolation.

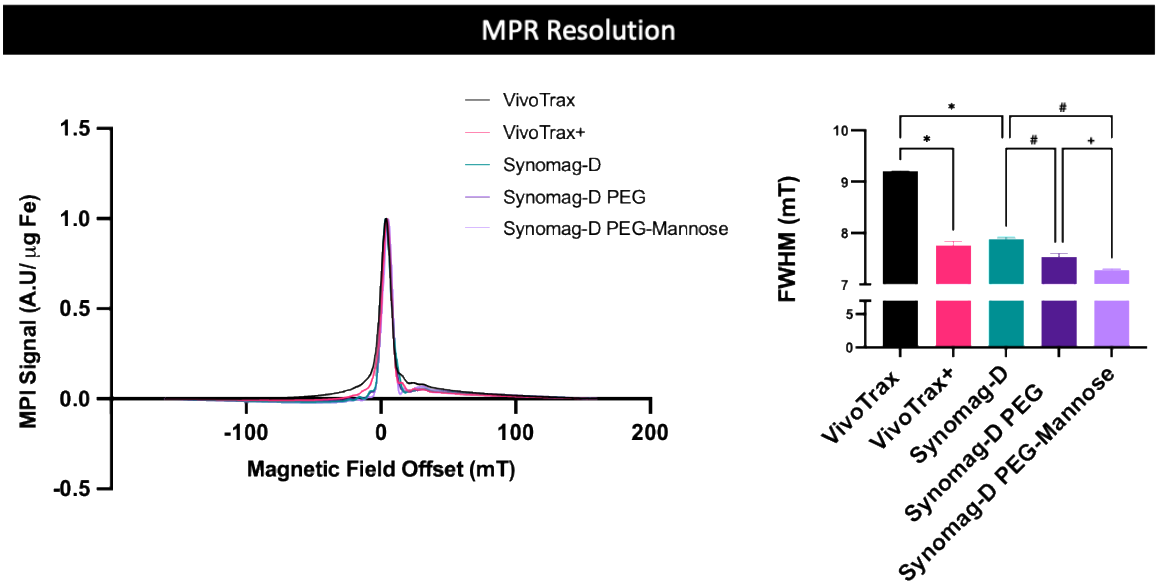

Figure S2. MPR Resolution. Particle resolution, measured by FWHM is shown. The bar graph compares FWHM for each SPION (n=3 for each SPION), where lower values indicate superior resolution (*$p<0.05$ (paired t-test with VivoTrax), $^{\#}p<0.05$ (paired t-test with Synomag-D), $^{+}p<0.05$ (paired test with Synomag-D PEG)).

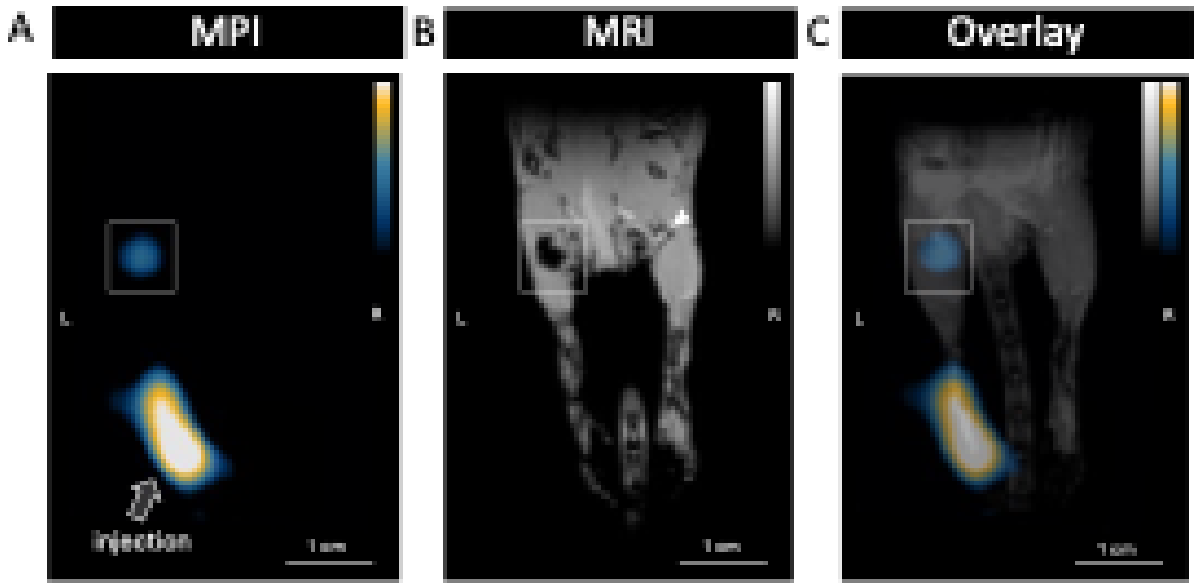

Figure S3. Dual modality imaging of SLNs. For one mouse administered VivoTrax, both MRI and MPI scans were obtained 4 hours post-injection. (A) A MPI scan is shown, with a white box around the SPION signal in the SLN. An arrow is pointing to the injection site. (B) The corresponding MRI scan provides anatomical information and the SPIONs at the injection site and the SLN can be seen as signal voids. (C) An overlay of the MPI and MRI scans is shown.

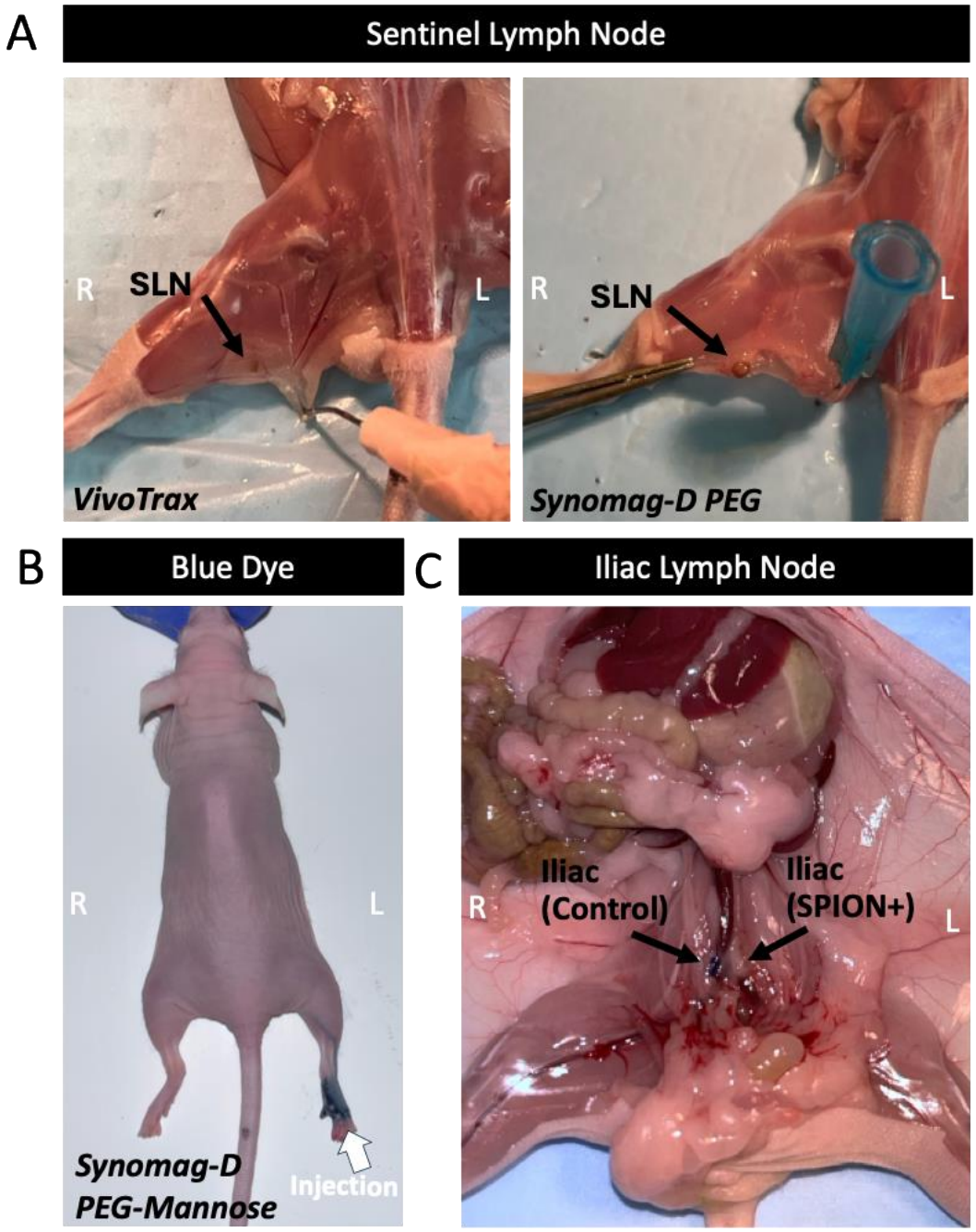

Figure S4. Dissection of SLNs and HENs. (A) Iron laden SLNs for mice administered VivoTrax and Synomag-D PEG are shown. The lymph nodes are visibly brown. (B) When performing dissections, 25 uL of 5% Evans Blue Dye was injected into contralateral footpad to guide dissections. (C) The contralateral (control) iliac lymph node and ipsilateral (SPION+) iliac lymph node are shown.

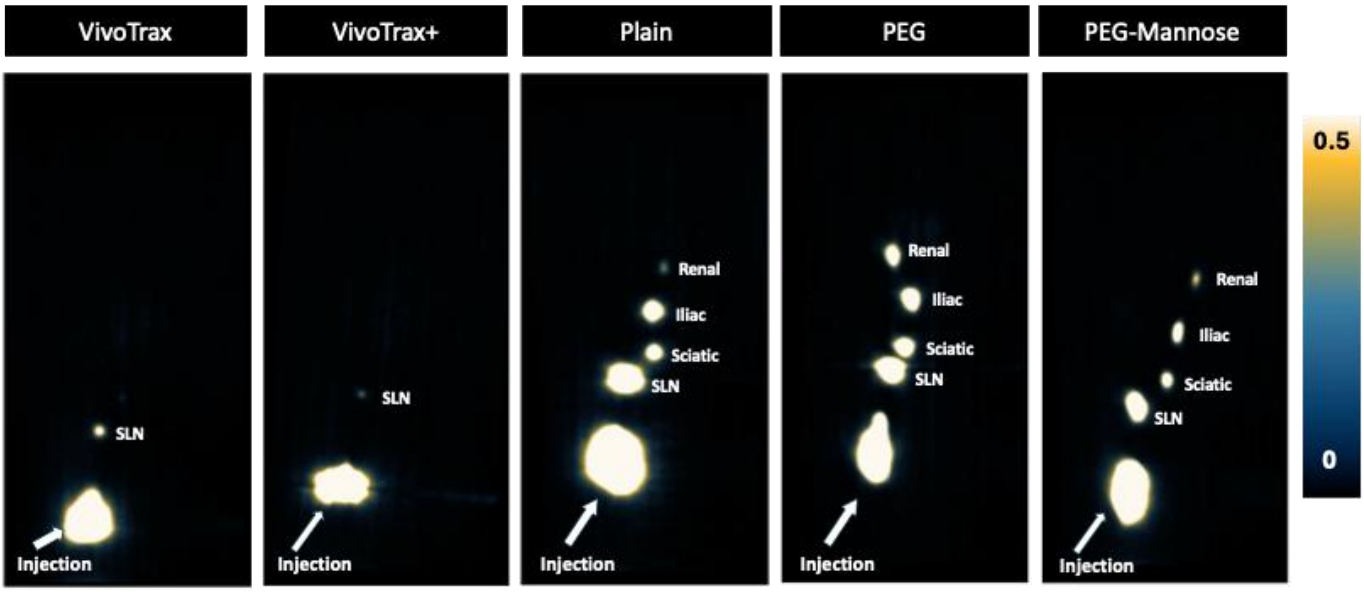

Figure S5. 3D MPI of each SPION. 3D MPI was acquired for once mouse from each SPION at the t = 4 hour timepoint. The SLN can be detected for all mice. Additionally, all HENs (sciatic, iliac, and renal) can be seen for the different for Synomag-D surface coatings.

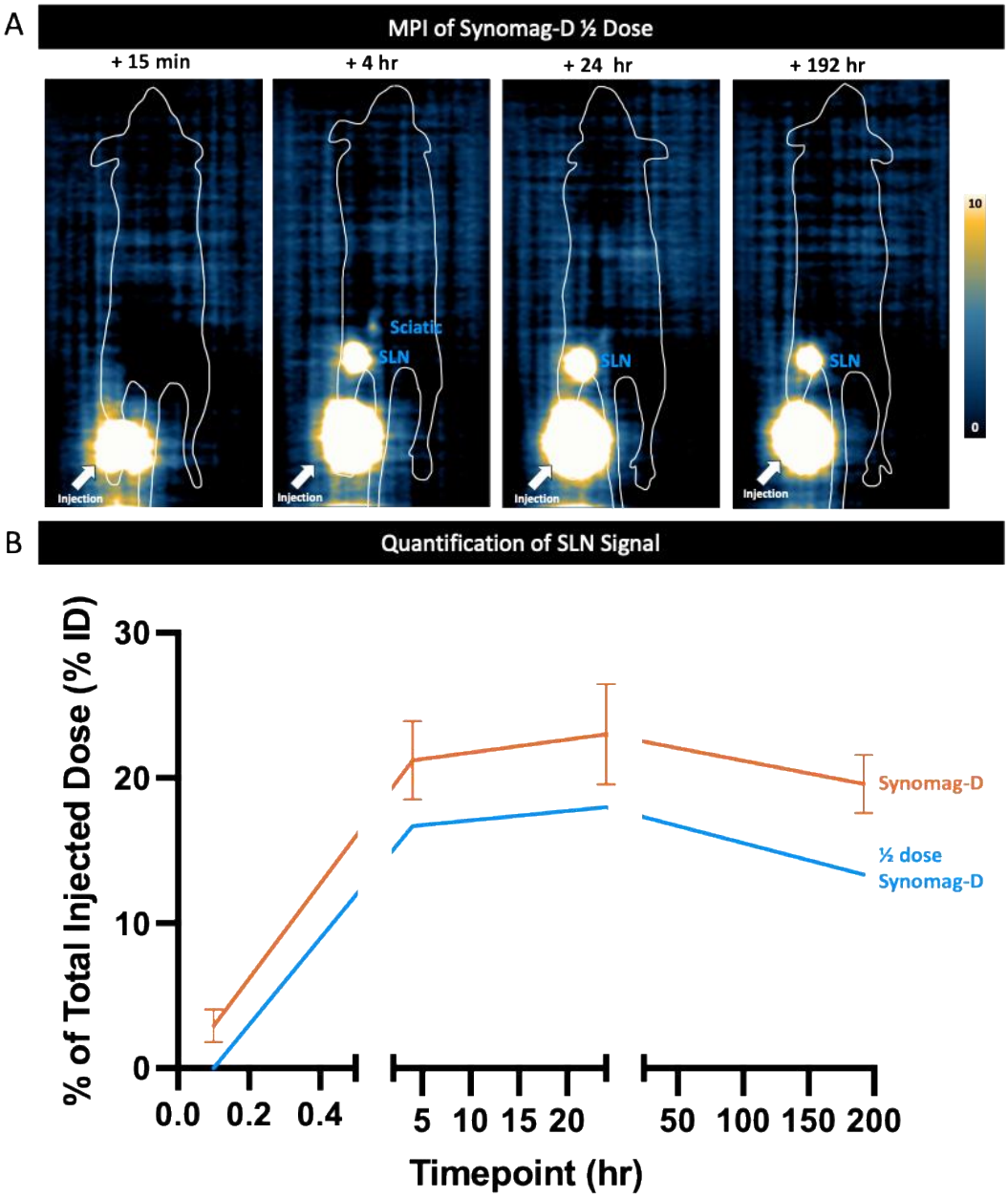

Figure S6. Administering half the tested dose of Synomag-D. (A) One mouse was administered ½ a dose (0.4 mg/kg) of Synomag-D (Plain) and imaged 10-20 minutes, 4 hours, 24 hours, 192 hours (8 days) post-injection. MPI is shown at all timepoints. The ½ dose reduced uptake to HENs. The sciatic lymph node was only detected 4 hours post-injection. (B) Quantification of SLN signal for the ½ dose (n = 1) is compared to mice administered the full dose of Synomag-D (n = 4).

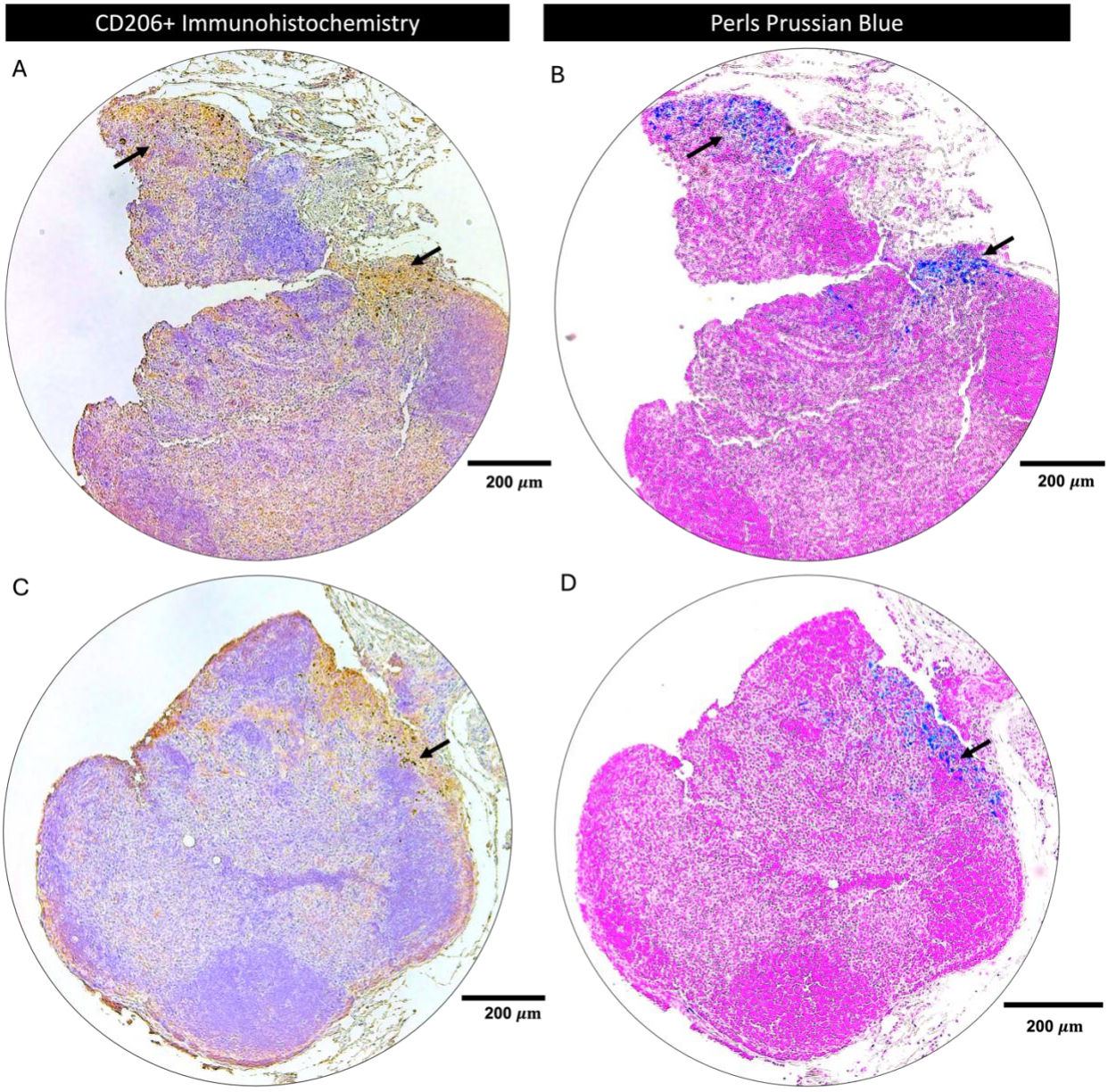

Figure S7. CD206 and PPB staining of a SLN for a mouse administered Synomag D PEG-Mannose. Adjacent tissue sections (A&B, C&D) were stained with (1) CD206 and (2) PPB. Good colocalization is seen between CD206+ cells (black), and iron (blue).