SUPPORTING INFORMATION

Simultaneous Imaging of Amyloid-β and Lipids in Brain Tissue using Antibody-Coupled Liposomes and Time-of-Flight Secondary Ion Mass Spectrometry

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Table S1. Peaks used for analysis with ToF-SIMS.

Peak mass (u)	Assignment	Peak origin	Reference
Positive ions			
66.12	$C_3D_8N^+$	D13-POPC[a]	1
98.18	$C_5D_{12}N^+$	D13-POPC[a]	1
117.19	$C_5D_{13}HNO^+$	D13-POPC[a]	1
179.16	$C_5D_{13}PNO_3^+$	D13-POPC[a]	1
184.11	$C_5H_{15}NPO_4^+$	Phosphatidylcholine (PC)	2
197.18	$C_5D_{13}H_2NPO_5^+$	D13-POPC[a]	1
369.35	$C_{27}H_{45}^+$	Cholesterol ($Chol^+$)[b]	3
385.34	$C_{27}H_{45}OH^+$	Cholesterol ($Chol^+$)[b]	3
Negative ions			
26.01	CN^-	Peptide fragment[c]	4
42.00	CNO^-	Peptide fragment[c]	4
62.96	PO_2^-	Phospholipid fragment	5
140.02	$C_2H_7NO_4P^-$	Phosphatidyletanolamine (PE)[d]	6
180.04	$C_5H_{11}NO_4P^-$	Phosphatidyletanolamine (PE)[d]	6
255.22	$C_{16}H_{31}O_2^-$	Palmitic acid (16:0)	7
281.23	$C_{18}H_{31}O_2^-$	Oleic acid (18:1)	7
283.25	$C_{18}H_{35}O_2^-$	Stearic acid (18:0)	7
383.30	$C_{27}H_{43}O^-$	Cholesterol ($Chol^-$)[e]	3
385.33	$C_{27}H_{45}O^-$	Cholesterol ($Chol^-$)[e]	3
862.58	$C_{25}H_{45}O_{11}NS\text{-}C_{21}H_{43}^-$	Sulfatide 22:0[f]	5
878.59	$C_{25}H_{45}O_{11}NS\text{-}OC_{21}H_{43}^-$	Sulfatide h22:0[f]	5
888.60	$C_{25}H_{45}O_{11}NS\text{-}C_{23}H_{45}^-$	Sulfatide 24:1[f]	5
906.61	$C_{25}H_{45}O_{11}NS\text{-}OC_{23}H_{47}^-$	Sulfatide h24:0[f]	5

a-f) Peaks with the same origin were added to produce the ToF-SIMS images.

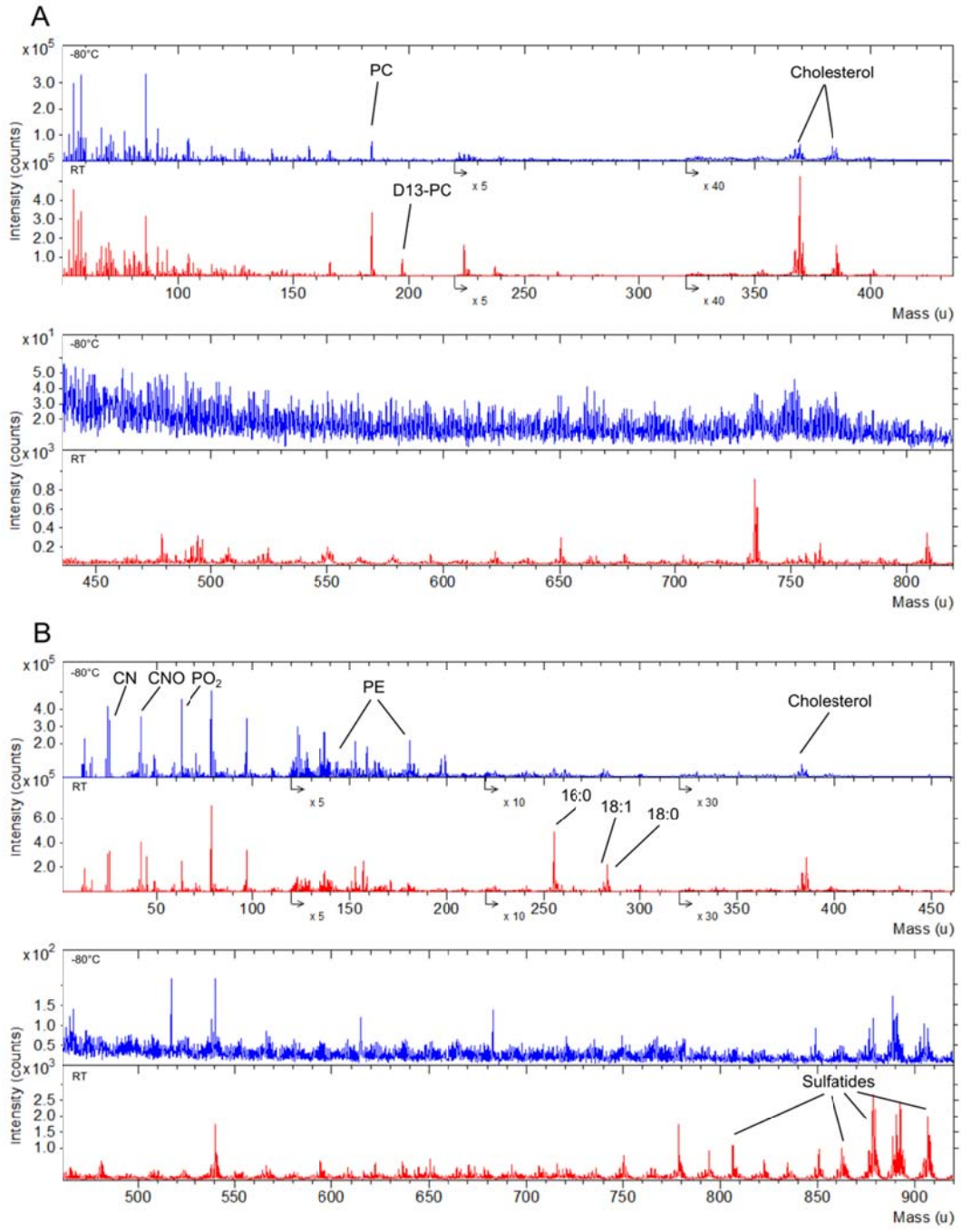

Figure S1. ToF-SIMS spectra of a mouse brain section in a) positive and b) negative ion mode. The blue (upper) spectra were acquired from the frozen untreated tissue sample (- 80 °C), while the red (lower) spectra were acquired at room temperature (RT) after preparation of the tissue with liposomes (D13-POPC). For abbreviations of analyzed peaks, see Table S1.

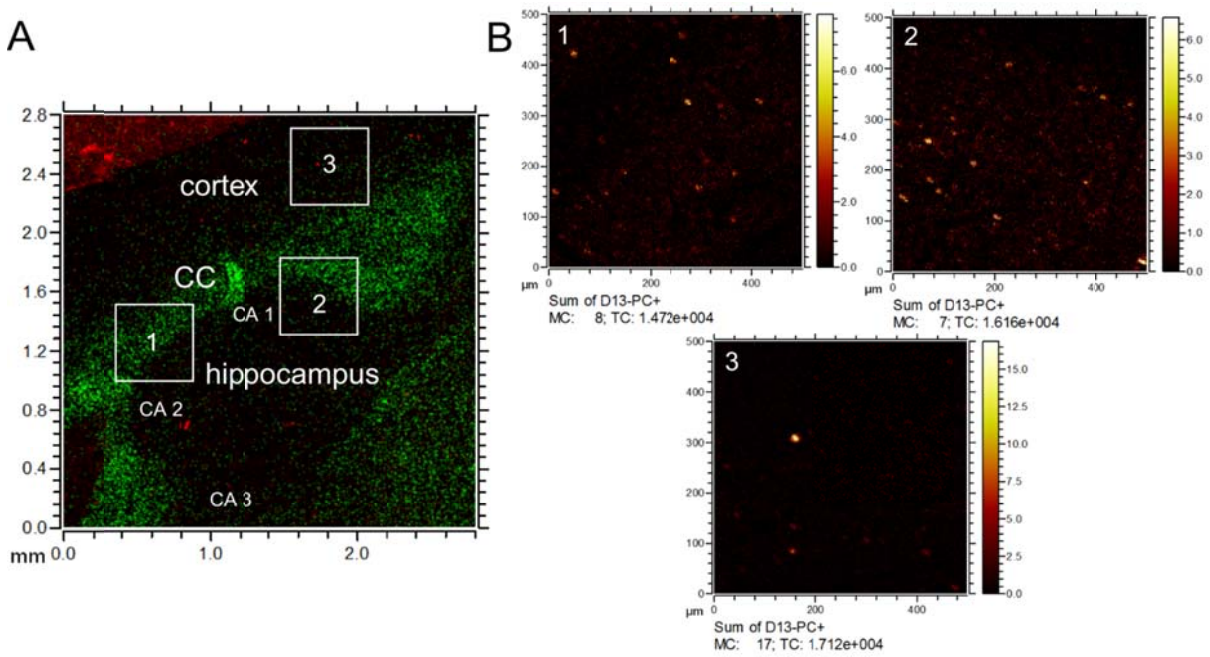

Figure S2. A) ToF-SIMS image of a wild-type mouse brain (22 months, B6SJLF1/Tac) showing the distribution of sulfatides (green) and D13-POPC liposomes (red) in parts of the hippocampus and cortex. The red area above the cortex indicates unspecific binding of liposomes to the glass microscope slide outside the tissue section. B) ToF-SIMS images showing the distribution of D13-POPC liposomes in areas marked by squares in the overview image (A). MC indicates the maximum counts of detected secondary ions per pixel and TC the total counts in the entire image. The acquisition was done using the same settings as for the data shown in Fig. 1A. Note the low values of MC in images 1 and 2 (MC: 8 and 7, respectively) as compared to the values in Fig. 1C (MC: 22) and the control in Fig. 1D (MC: 11), demonstrating low signal intensity from unspecifically bound liposomes in the controls as compared to the specifically bound liposomes in Fig. 1C.

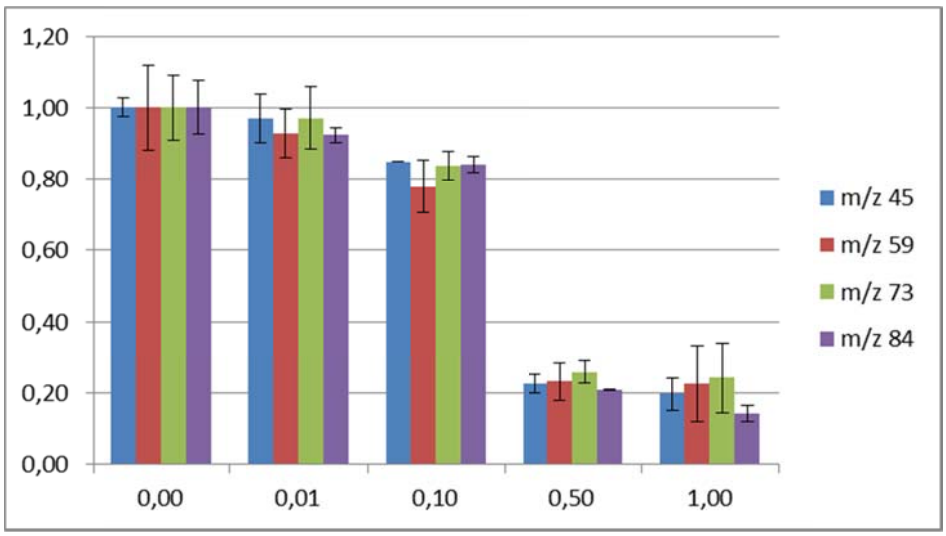

Figure S3. Normalised ToF-SIMS signal intensities of PEG-associated peaks from adsorbed PLLgPEG layers, with varying fractions of PLLgPEG-biotin (in %), onto which different concentrations of liposomes have been specifically attached using neutravidin and biotin incorporated in the liposomes [8]. A saturated liposome layer, formed at 0.5 and 1.0% of PLLgPEG-biotin on the surface, reduces the signal intensities of PEG-related peaks to ~20% of their values without liposomes. The error bars represent standard deviations of three measurements.

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