Supporting Information for:

GCIB-ToF-SIMS high resolution imaging of cardiolipin speciation in the brain: Identification of molecular losses after traumatic injury.

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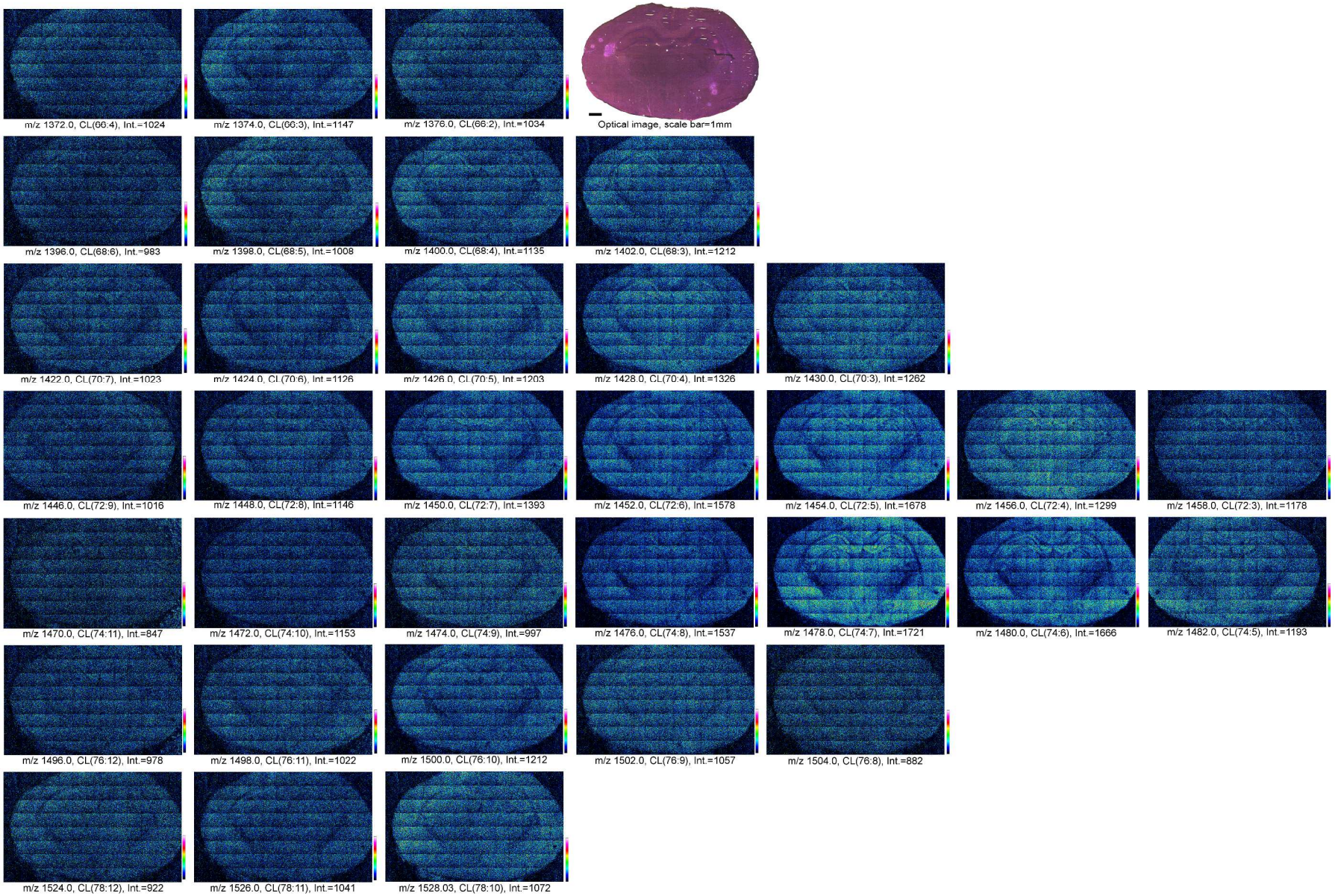
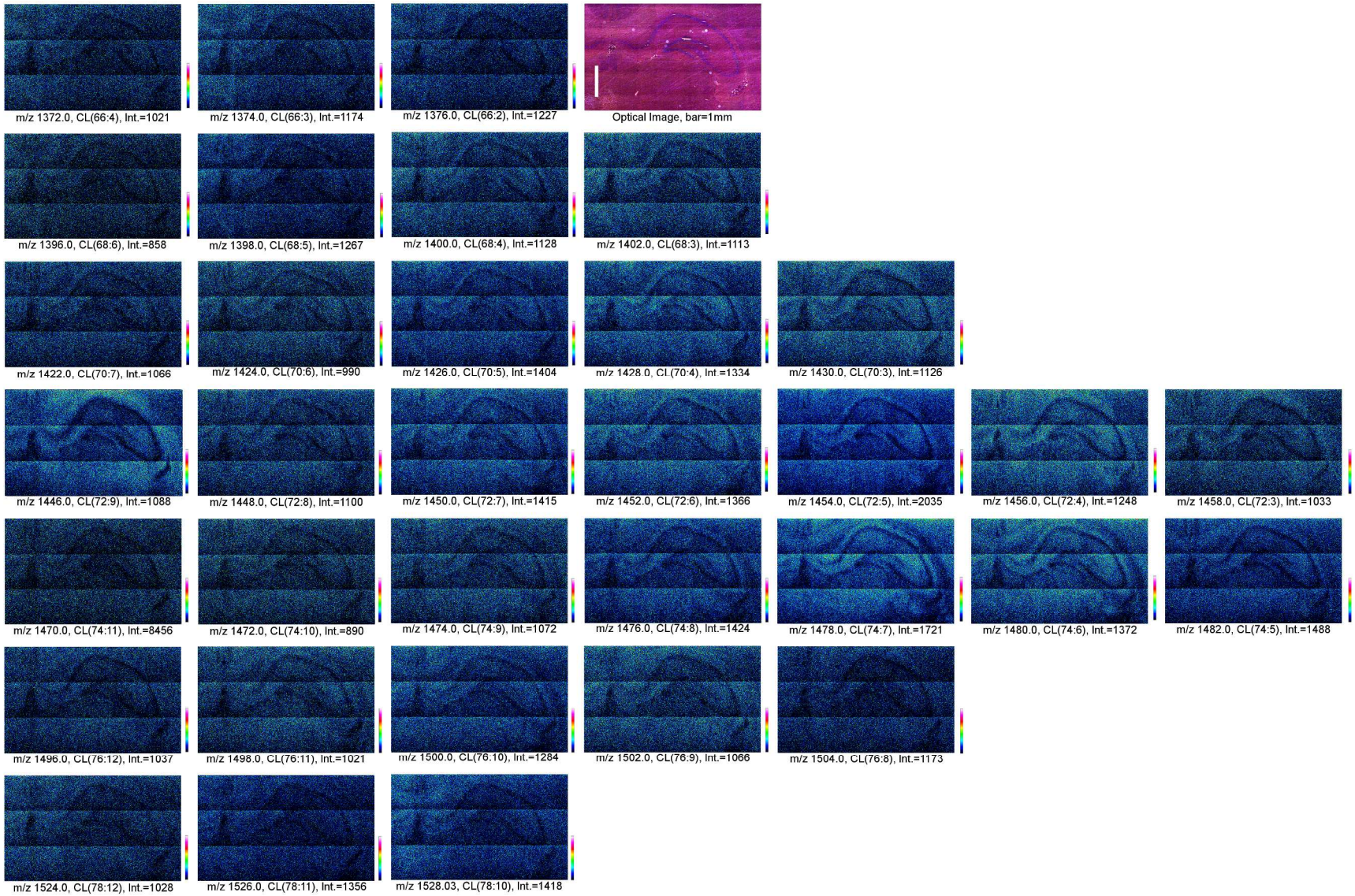
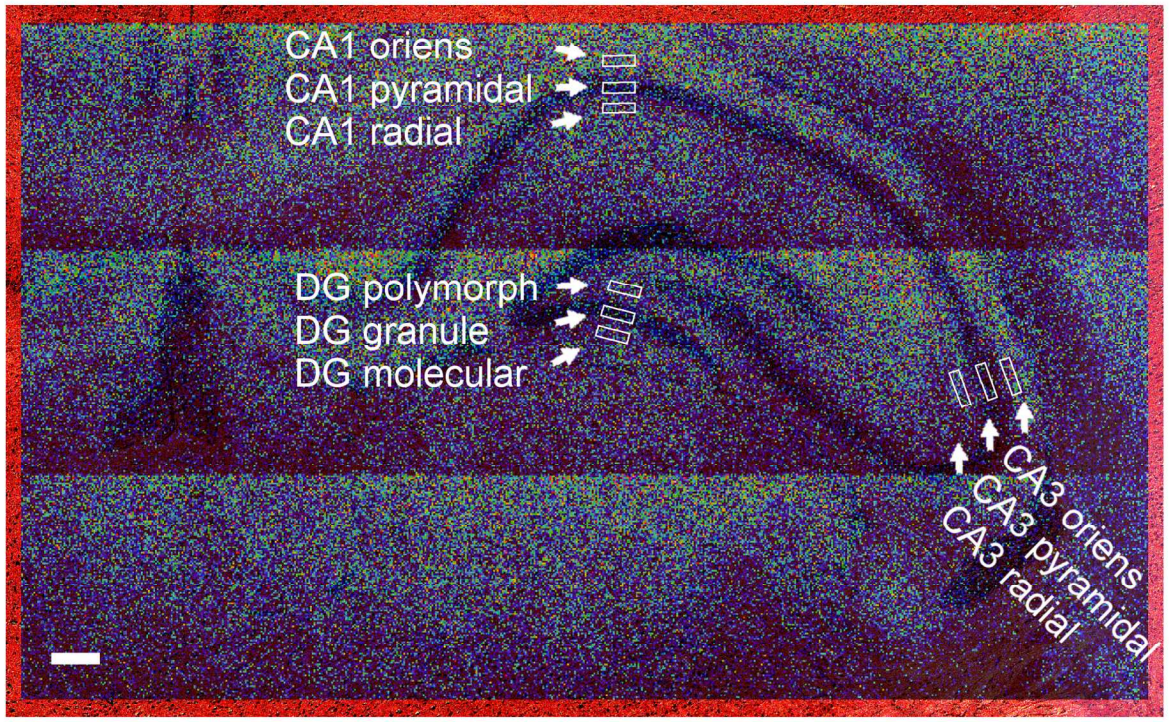


Supplemental Fig. S-1 GCIB-SIMS images of CL lipids in a whole naïve brain section: SIMS negative ion mode images of CL $[M-H]^-$ species from an entire naive rat brain coronal section (spatial resolution, 16 microns) treated with EDC/PLC. Individual images for CL species include CL clusters 66:X, 68:X, 70:X, 72:X, 74:X, 76:X and 78:X indicating the total number of fatty acyl carbons (66, 68, etc.) and the total number of double bonds (:X). The optical image of the H&E stained tissue section after GCIB-SIMS (scale bar 1 mm) is shown (top right). SIMS images are displayed as relative intensities with respect to the given ion species, with the absolute intensity of the top of the scale marked. See Table 1 for complete peak assignments.

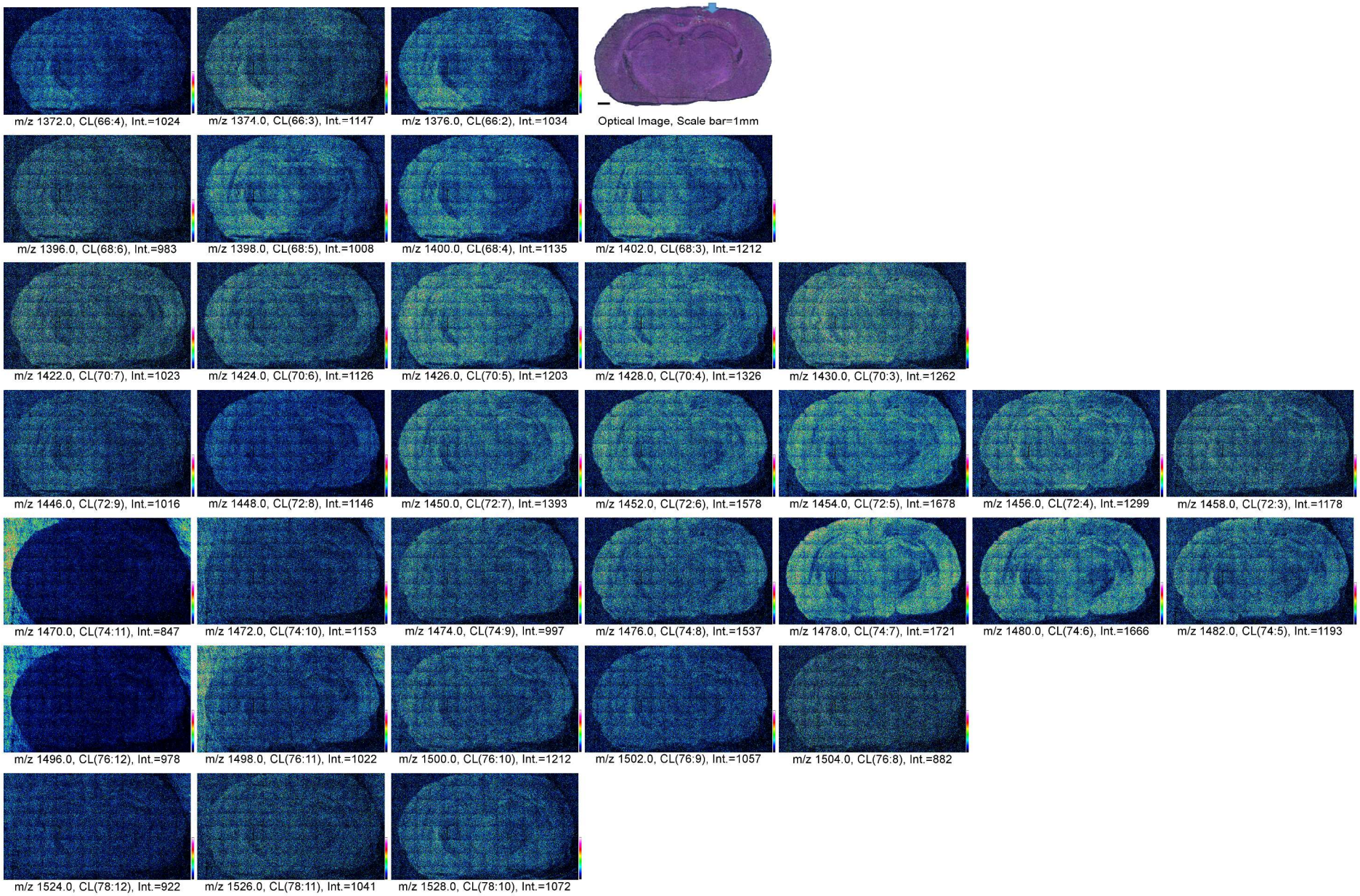


Supplemental Fig. S-2 GCIB-SIMS images of CL lipids in naive hippocampus: SIMS negative ion mode images of CL $[M-H]^-$ species from the hippocampal region of a naïve rat brain coronal tissue section (spatial resolution, 8 microns) treated with EDC/PLC. Individual images for CL species include CL clusters 66:X, 68:X, 70:X, 72:X, 74:X, 76:X and 78:X indicating the total number of fatty acyl carbons (66, 68, etc.) and the total number of double bonds (:X). The optical image of the H&E stained tissue section after GCIB-SIMS (scale bar 250 μm) is shown (top right). SIMS images are displayed as relative intensities with respect to the given ion species, with the absolute intensity of the top of the scale marked. See Table 1 for complete peak assignments.



Species / Location	CL(66:4)	CL(66:3)	CL(66:2)	CL(68:6)	CL(68:5)	CL(68:4)	CL(68:3)	CL(70:7)	CL(70:6)	CL(70:5)	CL(70:4)	CL(70:3)	CL(72:9)	CL(72:8)	CL(72:7)	CL(72:6)	CL(72:5)	CL(72:4)	CL(72:3)	CL(74:11)	CL(74:10)	CL(74:9)	CL(74:8)	CL(74:7)	CL(74:6)	CL(74:5)	CL(76:12)	CL(76:11)	CL(76:10)	CL(76:9)	CL(76:8)	CL(78:12)	CL(78:11)	CL(78:10)
DG Mo	5912	9355	6343	4797	7875	8088	10236	7318	8226	13317	18936	15850	5447	10515	17890	18146	30086	21473	11620	7029	8475	9284	14061	26664	25355	12505	8147	12717	12045	12173	7744	8209	7459	9412
DG Gr	6088	6633	4002	6002	3301	7542	6782	4865	7328	8741	12746	11522	4348	6396	10031	14016	14165	13342	7260	3901	3437	5218	9955	15255	14590	4655	4600	3911	8168	7999	3206	2307	7194	8516
DG Po	10112	10247	10178	7138	9390	17959	16918	10349	12349	22140	28103	23489	6722	11014	24311	24816	37067	29619	13269	9275	10410	15273	15961	36195	26810	18305	8514	11980	15623	11192	9404	8065	11153	11804
CA1 Or	12009	17697	18722	12553	19533	24509	24389	16771	18948	24449	34905	35357	12551	22324	31701	36064	40489	41369	26328	16232	19733	22424	29058	61174	37701	33253	13774	20381	22864	23540	16888	15978	18998	24608
CA1 Py	7170	9387	7551	5587	9718	11135	10410	8267	10093	14616	18571	13432	5499	9896	16525	17726	21583	18740	8246	5091	8445	12756	9013	20904	20896	12756	7032	9371	14113	9044	6402	7423	8754	14846
CA1 Rad	8139	14436	10357	9066	12227	17969	15955	11121	17257	16414	22303	16687	6698	14435	23360	24810	27379	26816	12482	7642	12854	12016	18230	42887	25619	19921	10565	14607	18442	16143	7440	11492	9154	17093
CA3 Or	9058	13998	12579	7982	10088	16674	17325	11025	13201	25114	23098	21395	9895	14941	25812	26202	33932	29789	15629	8490	7379	16050	20355	42374	29734	22695	13379	15103	19771	16400	11771	10477	14595	16146
CA3 Py	3006	2606	6044	3480	2858	5480	6232	4053	5182	8986	9705	7365	3298	3748	8806	10617	10827	8808	6449	2710	3838	4649	10933	11564	11692	5329	3183	5315	8103	6527	3343	5509	5494	6066
CA3 Rad	9103	10685	8864	7110	9342	11552	12707	9176	7997	12930	20349	16409	5520	9337	17372	16372	25899	15861	12704	3724	4974	11613	15288	28939	23017	13674	5107	9833	18447	14840	9402	7946	10519	11931

Supplemental Fig. S-3 Intensities of CL species in hippocampal layers: Top: SIMS negative ion mode image of *m/z* 1478.0, CL(74:7) $[M-H]^-$ species from the hippocampal region of a naïve rat brain coronal tissue section (spatial resolution, 8 microns) treated with EDC/PLC. The SIMS image is overlaid onto the optical image of the H&E stained tissue section after GCIB-SIMS (scale bar 250 μm). Three regions within the hippocampus with three layers each are marked with white rectangles. Bottom: Intensities of all the CL species according to location. 120 pixels from each location were used to determine the intensity values. CA1: Cornu Ammonis 1, CA3: Cornu Ammonis 3, DG: Dentate Gyrus, Mo: Molecular layer, Po: Polymorphic layer, Gr: Granular layer, Or: Oriens layer, Py: Pyramidal tract, Rad: Radial layer.



Supplemental Fig. S-4 GCIB-SIMS images of CL lipids in a whole CCI brain section: SIMS negative ion mode images of CL $[M-H]^-$ species from an entire CCI rat brain coronal section (spatial resolution, 16 microns) treated with EDC/PLC. Individual images for CL species include CL clusters 66:X, 68:X, 70:X, 72:X, 74:X, 76:X and 78:X indicating the total number of fatty acyl carbons (66, 68, etc.) and the total number of double bonds (:X). Optical image of H&E stain from the actual tissue section (scale bar = 1 mm) is shown, and the blue arrow indicates the point of impact on the ipsilateral hemisphere. SIMS images are displayed as relative intensities with respect to the given ion species, with the absolute intensity of the top of the scale marked. See Table 1 for complete peak assignments.