Avanti Research

Lipidomics Standards

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SMART SCIENCE TO IMPROVE LIVES™

Avanti Research

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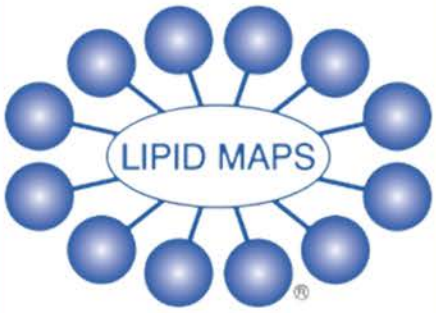

Through our collaboration with LIPID MAPS®, our standards are directly linked to LMSD entries—making it easier to match structures, confirm identities, and select the exact standard for your workflow.

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Don't see it? We'll make it.

From modified lipid standards to entirely novel structures, our Custom Synthesis team partners with you to create precisely what your research demands—tailored to your analytical or biological system.

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Accelerate your lipidomics workflow with expert support—from formulation guidance to analytical insight. Our team helps you move from question to answer with confidence.

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UltimateSPLASH™ ONE

Product code: A83820
Legacy code: 330820

Lipids comprise an amazingly complex and diverse set of molecules that are involved in numerous biological processes including energy storage/release, signaling, growth, disease, and death. Over the last 20 years, use of soft ionization techniques in conjunction with single and multistage mass spectrometry both with and without prior separations have enabled unprecedented levels of sensitivity, speed, and specificity for identification, structure determination, and quantitation of these highly diverse ensemble of molecules. However, one of the primary challenges that remained was the development of a comprehensive set of internal standards which would allow accurate quantitation of numerous individual molecular species.

Each unit of UltimateSPLASH™ ONE contains 69 high-purity, deuterium-labeled internal standards in a single vial of 1.2 mL of 1:1 DCM:MeOH. Each component has been meticulously characterized, quantitated, and blended for accurate quantitation using multiple lipidomics techniques.

UltimateSPLASH™ ONE was created to address the need for a comprehensive set of internal standards and greatly expands the number of chain length and unsaturation variants within a given class, which may be used to control for differences in ionization and fragmentation efficiency. These internal standards are intentionally designed to appear in the spectral gaps between naturally occurring lipid species, and their relative abundances have been varied to reflect the patterns found in nature. Additionally, **UltimateSPLASH™** incorporates these features into more lipid classes than ever before; PI, PS, PG, LPI, LPS, and LPG are now included for even broader lipidomics applications. The resulting final mixture contains a total of 69 unique and highly pure lipids across 15 lipid classes, which have been meticulously characterized, quantitated, and blended for accurate quantitation using multiple lipidomics-workflows.

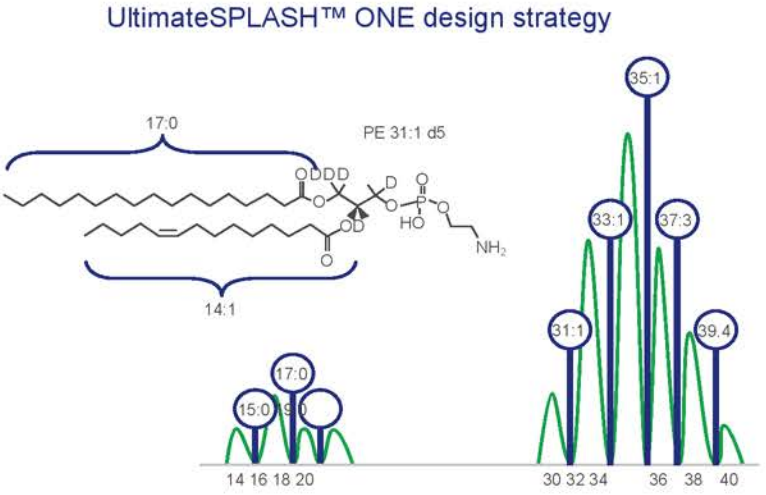

Figure 1: Simulated RP separation of total acyl chain carbon for PE and LPE

In addition to our easy to use mixture of all 69 internal standards in one vial, **UltimateSPLASH™** internal standards are available in class specific mixtures, as well as individual internal standards. Details on ordering individual internal standards can be found on our website, along with the 15 separate class mixtures.

UltimateSPLASH™ ONE

Product code: A83820

Legacy code: 330820

Compound name	Exact mass	Chemical formula	Target conc (µg/mL)	$(M-H)^-$	$(M+H)^+$	$(M-NH4)^-$	$(M+NH4)^+$	$(M-Na)^-$	$(M+Na)^+$	$(M+AcO)^-$
14:0-13:0-14:0 TG-d5	713.6582	$C_{44}H_{79}D_5O_6$	25				731.692			
14:0-15:1-14:0 TG-d5	739.6738	$C_{46}H_{81}D_5O_6$	50				757.7077			
14:0-17:1-14:0 TG-d5	767.7051	$C_{48}H_{85}D_5O_6$	75				785.739			
16:0-15:1-16:0 TG-d5	795.7364	$C_{50}H_{89}D_5O_6$	100				813.7703			
16:0-17:1-16:0 TG-d5	823.7677	$C_{52}H_{93}D_5O_6$	125				841.8016			
16:0-19:2-16:0 TG-d5	849.7834	$C_{54}H_{95}D_5O_6$	100				867.8172			
18:1-17:1-18:1 TG-d5	875.799	$C_{56}H_{97}D_5O_6$	75				893.8329			
18:1-19:2-18:1 TG-d5	901.8147	$C_{58}H_{99}D_5O_6$	50				919.8485			
18:1-21:2-18:1 TG-d5	929.846	$C_{60}H_{103}D_5O_6$	25				947.8798			
14:1 cholesteryl-d7 ester	601.5815	$C_{41}H_{63}D_7O_2$	25				619.6153		624.5707	
16:1 cholesteryl-d7 ester	629.6128	$C_{43}H_{67}D_7O_2$	50				647.6466		652.602	
18:1 cholesteryl-d7 ester	657.6441	$C_{45}H_{71}D_7O_2$	75				675.6779		680.6333	
20:3 cholesteryl-d7 ester	681.6441	$C_{47}H_{71}D_7O_2$	50				699.6779		704.6333	
22:4 cholesteryl-d7 ester	707.6598	$C_{49}H_{73}D_7O_2$	25				725.6936	725.6936	730.649	
C16:1 Ceramide-d7	542.5404	$C_{34}H_{58}D_7NO_3$	75	541.5331	543.5477				565.5296	601.5542
C18:1 Ceramide-d7	570.5717	$C_{36}H_{62}D_7NO_3$	50	569.5644	571.579				593.5609	629.5855
C20:1 Ceramide-d7	598.603	$C_{38}H_{66}D_7NO_3$	25	597.5957	599.6103				621.5922	657.6168
C22:1 Ceramide-d7	626.6343	$C_{40}H_{70}D_7NO_3$	50	625.627	627.6416				649.6235	685.6481
C24:1 Ceramide-d7	654.6656	$C_{42}H_{74}D_7NO_3$	75	653.6583	655.6729				677.6548	713.6794
16:1 SM (d18:1/16:1)-d9	709.6084	$C_{39}H_{68}D_9N_2O_6P$	75		710.6157					768.6223
18:1 SM (d18:1/18:1)-d9	737.6397	$C_{41}H_{72}D_9N_2O_6P$	50		738.647					796.6536
20:1 SM (d18:1/20:1)-d9	765.671	$C_{43}H_{76}D_9N_2O_6P$	25		766.6783					824.6849
22:1 SM (d18:1/22:1)-d9	793.7023	$C_{45}H_{80}D_9N_2O_6P$	50		794.7096					852.7162
24:1 SM (d18:1/24:1)-d9	821.7336	$C_{47}H_{84}D_9N_2O_6P$	75		822.7409					880.7475
17:0-14:1 PC-d5	722.5622	$C_{39}H_{71}D_5NO_8P$	50		723.5695					781.5761
17:0-16:1 PC-d5	750.5935	$C_{41}H_{75}D_5NO_8P$	100		751.6008					809.6074
17:0-18:1 PC-d5	778.6248	$C_{43}H_{79}D_5NO_8P$	150		779.6321					837.6387
17:0-20:3 PC-d5	802.6248	$C_{45}H_{79}D_5NO_8P$	100		803.6321					861.6387
17:0-22:4 PC-d5	828.6405	$C_{47}H_{81}D_5NO_8P$	50		829.6478					887.6543
17:0-14:1 PE-d5	680.5153	$C_{36}H_{65}D_5NO_8P$	25	679.508	681.5226					
17:0-16:1 PE-d5	708.5466	$C_{38}H_{69}D_5NO_8P$	50	707.5393	709.5539					
17:0-18:1 PE-d5	736.5779	$C_{40}H_{73}D_5NO_8P$	75	735.5706	737.5852					
17:0-20:3 PE-d5	760.5779	$C_{42}H_{73}D_5NO_8P$	50	759.5706	761.5852					
17:0-22:4 PE-d5	786.5935	$C_{44}H_{75}D_5NO_8P$	25	785.5863	787.6008					
17:0-14:1 PG-d5	733.4918	$C_{37}H_{65}D_5NaO_{10}P$	25		734.4991		751.5256	710.5026		

UltimateSPLASH™ ONE

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Compound name	Exact mass	Chemical formula	Target conc (µg/mL)	$(M-H)^-$	$(M+H)^+$	$(M-NH4)^-$	$(M+NH4)^+$	$(M-Na)^-$	$(M+Na)^+$	$(M+AcO)^-$
17:0-16:1 PG-d5	761.5231	$C_{39}H_{69}D_5NaO_{10}P$	50		762.5304		779.5569	738.5339		
17:0-18:1 PG-d5	789.5544	$C_{41}H_{73}D_5NaO_{10}P$	75		790.5617		807.5882	766.5652		
17:0-20:3 PG-d5	813.5544	$C_{43}H_{73}D_5NaO_{10}P$	50		814.5617		831.5882	790.5652		
17:0-22:4 PG-d5	839.5701	$C_{45}H_{75}D_5NaO_{10}P$	25		840.5773		857.6039	816.5808		
17:0-14:1 PS-d5	746.4871	$C_{37}H_{64}D_5NNaO_{10}P$	25	745.4798	747.4943			723.4978		
17:0-16:1 PS-d5	774.5184	$C_{39}H_{68}D_5NNaO_{10}P$	50	773.5111	775.5256			751.5291		
17:0-18:1 PS-d5	802.5497	$C_{41}H_{72}D_5NNaO_{10}P$	75	801.5424	803.5569			779.5604		
17:0-20:3 PS-d5	826.5497	$C_{43}H_{72}D_5NNaO_{10}P$	50	825.5424	827.5569			803.5604		
17:0-22:4 PS-d5	852.5653	$C_{45}H_{74}D_5NNaO_{10}P$	25	851.558	853.5726			829.5761		
17:0-14:1 DG-d5	557.5068	$C_{34}H_{59}D_5O_5$	25				575.5406		580.496	
17:0-16:1 DG-d5	585.5381	$C_{36}H_{63}D_5O_5$	50				603.5719		608.5273	
17:0-18:1 DG-d5	613.5694	$C_{38}H_{67}D_5O_5$	75				631.6032		636.5586	
17:0-20:3 DG-d5	637.5694	$C_{40}H_{67}D_5O_5$	50				655.6032		660.5586	
17:0-22:4 DG-d5	663.585	$C_{42}H_{69}D_5O_5$	25				681.6188		686.5742	
17:0-14:1 PI-d5	816.5525	$C_{40}H_{73}D_5NO_{13}P$	25			798.5186				
17:0-16:1 PI-d5	844.5838	$C_{42}H_{77}D_5NO_{13}P$	50			826.5499				
17:0-18:1 PI-d5	872.6151	$C_{44}H_{81}D_5NO_{13}P$	75			854.5812				
17:0-20:3 PI-d5	896.6151	$C_{46}H_{81}D_5NO_{13}P$	50			878.5812				
17:0-22:4 PI-d5	922.6307	$C_{48}H_{83}D_5NO_{13}P$	25			904.5969	940.6645			
15:0 Lyso PI-d5	580.3384	$C_{24}H_{45}D_5NO_{12}P$	25			562.3046	598.3723			
17:0 Lyso PI-d5	608.3697	$C_{26}H_{49}D_5NO_{12}P$	50			590.3359	626.4036			
19:0 Lyso PI-d5	636.401	$C_{28}H_{53}D_5NO_{12}P$	25			618.3672	654.4349			
15:0 Lyso PS-d5	510.273	$C_{21}H_{36}D_5NNaO_9P$	25	509.2658				487.2838		
17:0 Lyso PS-d5	538.3043	$C_{23}H_{40}D_5NNaO_9P$	50	537.2971				515.3151		
19:0 Lyso PS-d5	566.3356	$C_{25}H_{44}D_5NNaO_9P$	25	565.3284				543.3464		
15:0 Lyso PG-d5	497.2778	$C_{21}H_{37}D_5NaO_9P$	25					474.2886		
17:0 Lyso PG-d5	525.3091	$C_{23}H_{41}D_5NaO_9P$	50					502.3199		
19:0 Lyso PG-d5	553.3404	$C_{25}H_{45}D_5NaO_9P$	25					530.3512		
15:0 Lyso PC-d5	486.3482	$C_{23}H_{43}D_5NO_7P$	25	485.341	487.3555					545.3621
17:0 Lyso PC-d5	514.3795	$C_{25}H_{47}D_5NO_7P$	50	513.3723	515.3868					573.3934
19:0 Lyso PC-d5	542.4108	$C_{27}H_{51}D_5NO_7P$	25	541.4036	543.4181					601.4247
15:0 Lyso PE-d5	444.3013	$C_{20}H_{37}D_5NO_7P$	25	443.294	445.3086					
17:0 Lyso PE-d5	472.3326	$C_{22}H_{41}D_5NO_7P$	50	471.3253	473.3399					
19:0 Lyso PE-d5	500.3639	$C_{24}H_{45}D_5NO_7P$	25	499.3566	501.3712					

EquiSPLASH™ LIPIDOMIX™

Product code: A83731
Legacy code: 330731

EquiSPLASH™ is popular for its higher concentrations of internal standard for each lipid class, allowing users to apply to multiple sample types (tissues, cell extracts, plasma). Each vial contains 1mL of internal standard mixture in methanol solution, 13 lipid classes supplied at 100µg/mL each. Concentrations are verified for use as a quantitative standard. This standard is also ideal for use in method development and system verification experiments to determine linearity and sensitivity prior to analyzing samples.

Compound name	Exact mass	Chemical formula	Target conc (µM)	Target conc (µg/mL)
15:0-18:1(d7) PC	752.61	$C_{41}H_{73}D_7NO_8P$	133	100
18:1(d7) Lyso PC	528.39	$C_{26}H_{45}D_7NO_7P$	141	100
15:0-18:1(d7) PE	710.56	$C_{38}H_{67}D_7NO_8P$	129	100
18:1(d7) Lyso PE	486.35	$C_{23}H_{39}D_7NO_7P$	131	100
15:0-18:1(d7) PG (Na Salt)	763.54	$C_{39}H_{67}D_7NaO_{10}P$	118	100
15:0-18:1(d7) PI (NH4 Salt)	846.6	$C_{42}H_{75}D_7NO_{13}P$	189	100
15:0-18:1(d7) PS (Na Salt)	776.53	$C_{39}H_{66}D_7NNaO_{10}P$	205	100
15:0-18:1(d7)-15:0 TG	811.77	$C_{51}H_{89}D_7O_6$	152	100
15:0-18:1(d7) DG	587.55	$C_{36}H_{61}D_7O_5$	275	100
18:1(d7) MG	363.34	$C_{21}H_{33}D_7O_4$	170	100
18:1(d7) Chol Ester	657.64	$C_{45}H_{71}D_7O_2$	123	100
d18:1-18:1(d9) SM	737.64	$C_{41}H_{72}D_9N_2O_6P$	135	100
C15 Ceramide-d7 (d18:1-d7/15:0)	530.54	$C_{33}H_{58}D_7NO_3$	188	100

LightSPLASH™ LIPIDOMIX™

Product code: A83732
Legacy code: 330732

This mixture is a complement to **EquiSPLASH**; it contains the same lipids as **EquiSPLASH** but without deuterium labels. If you need a primary lipid standard mixture for your assay development, look no further!

Compound name	Exact mass	Chemical formula	Target conc (µg/mL)
15:0-18:1 PC	745.56	$C_{41}H_{80}NO_8P$	100
18:1 Lyso PC	521.348	$C_{26}H_{52}NO_7P$	100
15:0-18:1 PE	703.52	$C_{38}H_{74}NO_8P$	100
18:1 Lyso PE	479.301	$C_{23}H_{46}NO_7P$	100
15:0-18:1 PG	756.49	$C_{39}H_{74}NaO_{10}P$	100
15:0-18:1 PI	839.55	$C_{42}H_{82}NO_{13}P$	100
15:0-18:1 PS	769.49	$C_{39}H_{73}NNaO_{10}P$	100
15:0-18:1-15:0 TG	804.72	$C_{51}H_{96}O_6$	100
15:0-18:1 DG	580.51	$C_{36}H_{68}O_5$	100
18:1 MG	356.29	$C_{21}H_{40}O_4$	100
18:1 Chol Ester	650.6	$C_{45}H_{78}O_2$	100
d18:1-18:1 SM	728.583	$C_{41}H_{81}N_2O_6P$	100
C15 Ceramide (d18:1/15:0)	523.5	$C_{33}H_{65}NO_3$	100

SPLASH™ LIPIDOMIX™

Best seller

Product code: A83707
Legacy code: 330707

The original **SPLASH** internal standard mixture has been a best-seller since it was first developed in 2016. It contains one deuterium labeled internal standard for each of 14 lipid classes at ratios relative to human plasma lipids. Each vial contains 1mL of internal standard mixture in methanol solution with a suggested sample spiking ratio of 10µL **SPLASH** to 10µL human plasma, allowing for up to 100 samples to be analyzed with one vial. Concentrations are verified for use as a quantitative standard.

Compound name	Exact mass	Chemical formula	Target conc (µM)	Target conc (µg/mL)
15:0-18:1(d7) PC	752.61	$C_{41}H_{73}D_7NO_8P$	160	213
15:0-18:1(d7) PE	710.56	$C_{38}H_{67}D_7NO_8P$	5	8
15:0-18:1(d7) PS (Na Salt)	776.53	$C_{39}H_{66}D_7NNaO_{10}P$	5	5
15:0-18:1(d7) PG (Na Salt)	763.54	$C_{39}H_{67}D_7NaO_{10}P$	30	38
15:0-18:1(d7) PI (NH4 Salt)	846.6	$C_{42}H_{75}D_7NO_{13}P$	10	11
15:0-18:1(d7) PA (Na Salt)	689.5	$C_{36}H_{61}D_7NaO_8P$	7	11
18:1(d7) Lyso PC	528.39	$C_{26}H_{45}D_7NO_7P$	25	48
18:1(d7) Lyso PE	486.35	$C_{23}H_{39}D_7NO_7P$	5	11
18:1(d7) Chol Ester	657.64	$C_{45}H_{71}D_7O_2$	350	541
18:1(d7) MAG	363.34	$C_{21}H_{33}D_7O_4$	2	6
15:0-18:1(d7) DAG	587.55	$C_{36}H_{61}D_7O_5$	10	16
15:0-18:1(d7)-15:0 TAG	811.77	$C_{51}H_{89}D_7O_6$	55	71
d18:1-18:1(d9) SM	737.64	$C_{41}H_{72}D_9N_2O_6P$	30	42
Cholesterol (d7)	393.4	$C_{27}H_{39}OD_7$	100	248

Oxysterol SPLASH™

Product code: A83700

Legacy code: 330700

Oxysterols are intermediates in the biosynthesis of both bile acids and steroids, but some may also have their own biological activities in vivo. Conditions such as Alzheimer's Disease, Multiple Sclerosis, and various cancers may be connected to altered oxysterol levels as well. **OxysterolSPLASH** contains 13 deuterated oxysterols at equal concentrations, making the mixture a useful tool for lipidomic analysis of these compounds.

Compound name	Exact mass	Chemical formula	Target conc (µg/mL)
24(R/S)-hydroxycholesterol-d7	409.394	$C_{27}H_{39}D_7O_2$	150
25-hydroxycholesterol-d6	408.387	$C_{27}H_{40}D_6O_2$	150
27-hydroxycholesterol-d6	408.387	$C_{27}H_{40}D_6O_2$	150
7α-hydroxycholesterol-d7	409.394	$C_{27}H_{39}O_2D_7$	150
7ß-hydroxycholesterol-d7	409.394	$C_{27}H_{39}O_2D_7$	150
7-ketocholesterol-d7	407.378	$C_{27}H_{37}O_2D_7$	150
7α-hydroxycholestenone-d7	407.378	$C_{27}H_{37}D_7O_2$	150
7α,25-dihydroxycholesterol-d6	424.382	$C_{27}H_{40}D_6O_3$	150
7α,27-dihydroxycholesterol-d6	424.382	$C_{27}H_{40}D_6O_3$	150
7α-Hydroxy-3-oxocholest-4-enoic acid-d3	433.33	$C_{27}H_{39}D_3O_4$	150
4ß-hydroxycholesterol-d7	409.394	$C_{27}H_{39}O_2D_7$	150
22(R)-hydroxycholesterol-d7	409.394	$C_{27}H_{39}O_2D_7$	150
5α,6ß-dihydroxycholestanol-d7	427.404	$C_{27}H_{41}D_7O_3$	150

SPLASH™ BOOSTER

Product code: A83740

Legacy code: 330740

SPLASH™ Booster is a deuterated internal standard mixture designed to expand lipid class coverage in quantitative lipidomics workflows. Developed to complement **UltimateSPLASH™ ONE**, it adds five additional subclasses—including phosphatidic acid, dihydroceramide, and glycosphingolipids—to improve quantification of underrepresented lipids. It can be used alongside existing mixtures and is validated for shotgun lipidomics workflows, including the UCLA Shotgun Lipidomics Assistant (SLA).

Compound name	Molecular weight	Exact mass	Chemical formula	Concentration (µg/mL)*
15:0-18:1 (d7) PA (Na Salt)	689.927	689.499	$C_{36}H_{61}D_7NaO_8P$	40
C13-dihydroceramide-d7 (d18:0-d7/13:0)	504.88	504.52	$C_{31}H_{56}D_7NO_3$	4
C15 Glucosyl (B) Ceramide-D7 (d18:1-D7/15:0)	693.06	692.59	$C_{39}H_{68}D_7NO_8$	80
C15 Lactosyl (B) Ceramide-d7 (d18:1-D7/15:0)	855.21	854.65	$C_{45}H_{78}D_7NO_{13}$	40
Oleic acid-d9	291.517	291.312	$C_{18}H_{25}D_9O_2$	40

**Concentrations are based on the isotopic purity of each individual compound*

MSI SPLASH™

Product code: A83841

Legacy code: 330841

As the role of lipids in neurodegenerative diseases such as Parkinson's Disease is increasingly acknowledged, it has become essential to consider what lipids may have a hand in neuropathology. **MSI SPLASH** is made specifically for Mass Spec Imaging of neurological tissue. The mixture of thirteen internal standards is designed to be applied to brain sections using a sprayer, similarly to the application of matrix for MALDI. **MSI SPLASH** allows not only for quantitation of lipids within the brain, but also localization of those lipids to provide more detailed information for answering biological questions. This mixture was designed in collaboration with Michiel Vandenbosch, Shadrack Mutuku, Shane Ellis & Kim Ekroos.

Toward Omics-Scale Quantitative Mass Spectrometry Imaging of Lipids in Brain Tissue Using a Multiclass Internal Standard Mixture. Michiel Vandenbosch, Shadrack M. Mutuku, Maria José Q. Mantas, Nathan H. Patterson, Tucker Hallmark, Marc Claesen, Ron M. A. Heeren, Nathan G. Hatcher, Nico Verbeeck, Kim Ekroos, and Shane R. Ellis. Analytical Chemistry 2023 95 (51), 18719-18730 DOI: 10.1021/acs.analchem.3c02724

Compound name	Exact mass	Chemical formula	Target conc (µM)	Target conc (µg/mL)
15:0-18:1 (d7) PA	689.499	$C_{36}H_{61}D_7NaO_8P$	159.44	0.11
15:0-18:1 (d7) PE	710.559	$C_{38}H_{67}D_7NO_8P$	140.64	0.1
15:0-18:1 (d7) PG	763.536	$C_{39}H_{67}D_7NaO_{10}P$	64.14	0.049
15:0-18:1 (d7) PI	846.596	$C_{42}H_{75}D_7NO_{13}P$	27.15	0.023
17:0-16:1 PS-d5	774.52	$C_{39}H_{68}D_5NNaO_{10}P$	135.48	0.105
17:0 Lyso PE-d5	472.33	$C_{22}H_{41}D_5NO_7P$	6.35	0.003
C12 Mono-sulfo galactosyl(beta) ceramide (d18:1/12:0)	740.486	$C_{36}H_{72}N_2O_{11}S$	25.64	0.019
C15 Lactosyl(beta) ceramide-d7 (d18:1/15:0)	854.65	$C_{45}H_{78}D_7NO_{13}$	15.2	0.013
C18 Ceramide-d7 (d18:1/18:0)	572.587	$C_{36}H_{64}D_7NO_3$	19.2	0.011
C17 Glucosyl(beta) Ceramide (d18:1/18:0)	713.581	$C_{45}H_{78}D_7NO_{13}$	186.26	0.133
SM d18:1/18:1(d9)	737.64	$C_{41}H_{72}D_9N_2O_6P$	42	0.031
17:0 Lyso PC-d5	514.38	$C_{25}H_{47}D_5NO_7P$	5.83	0.003
15:0-18:1 (d7) PC	752.606	$C_{41}H_{73}$ D_7NO_8P	213.79	0.161

Sphingo SPLASH™ I

Product code: A83734

Legacy code: 330734

Sphingolipids are increasingly recognized as a fascinating class of lipids involved in a variety of molecular functions from membrane composition to cellular signaling. As such, it is vital that sphingolipids can be accurately quantitated- that is why we developed **SphingoSPLASH I**. This mix is composed of equimolar concentrations of lipids representative of the sphingolipid class.

Compound name	Exact mass	Chemical formula	Target conc (µM)	Target conc (µg/mL)
C15 Ceramide-d7 (d18:1-D7/15:0) C15	530.54	$C_{33}H_{58}D_7NO_3$	5.31	10
Glucosyl(β) Ceramide-D7 (d18:1-D7/15:0)	692.59	$C_{39}H_{68}D_7NO_8$	6.93	10
C13 Galactosyl(β) Ceramide-D7 (d18:1-D7/13:0)	664.56	$C_{37}H_{64}D_7NO_8$	6.65	10
C15 Lactosyl(β) Ceramide-D7 (d18:1-D7/15:0)	854.65	$C_{45}H_{78}D_7NO_{13}$	8.55	10
C13 Dihydroceramide-d7 (d18:0-D7/13:0)	504.52	$C_{31}H_{56}D_7NO_3$	5.05	10
15:0 SM(d18:1/15:0)-D9	697.61	$C_{38}H_{68}D_9N_2O_6P$	6.98	10

Sphingo SPLASH™ II

Product code: A83735

Legacy code: 330735

Sphingosine and sphinganine serve as precursors to potent signaling molecules, and despite differing in only one double bond, the compounds have functionally distinct roles. Sphingadiene and the sphinganine precursor 3-ketosphinganine also have unique cellular activities. **SphingoSPLASH II** allows researchers to target these compounds for quantitative analysis.

Compound name	Exact mass	Chemical formula	Target conc (µM)	Target conc (µg/mL)
Sphinganine D7	308.342	$C_{18}H_{32}D_7NO_2$	10	3.09
Sphingosine D7	306.326	$C_{18}H_{30}D_7NO_2$	10	3.07
Sphingadiene-d7	342.3	$C_{18}H_{32}D_7NO_2$	10	3.43
3-ketosphinganine-d7	304.31	$C_{18}H_{31}D_7ClNO_2$	10	3.05

Sphingo SPLASH™ III

Product code: A83737

Legacy code: 330737

While SphingoSPLASH I focuses on modified ceramides, SphingoSPLASH III targets modified sphingosine. This mix includes sugar-conjugated sphingosines, lyso-sulfatide, and lyso-sphingomyelin, making this a highly useful internal standard for those studying sphingosine metabolism.

Compound name	Exact mass	Chemical formula	Target conc (µM)	Target conc (µg/mL)
Lyso-sphingomyelin-d9	473.39	$C_{23}H_{40}D_9N_2O_5P$	10	4.74
Glucosyl(β) Sphingosine-d7	468.38	$C_{24}H_{40}D_7NO_7$	10	4.69
Galactosylsphingosine-d7	468.38	$C_{24}H_{40}D_7NO_7$	10	4.69
Lactosylsphingosine-d7	630.43	$C_{30}H_{50}D_7NO_{12}$	10	6.31
3-O-sulfogalactosyl(beta) sphingosine-d7	565.36	$C_{24}H_{43}D_7N_2O_{10}S$	10	5.66

Bile Acid SPLASH™

Product code: A83736

Legacy code: 330736

Bile acids have long been known to play important functions in digestion and absorption of lipids. More recently, bile acids have been recognized as important signalling molecules with roles in microbiome homeostasis and metabolic disease. Dysregulation of bile acids can be indicative of various pathologies, making them promising targets of disease research. We created **Bile Acid SPLASH** so researchers can measure a wide array of bile acids in plasma using one pre-mixed internal standard mixture.

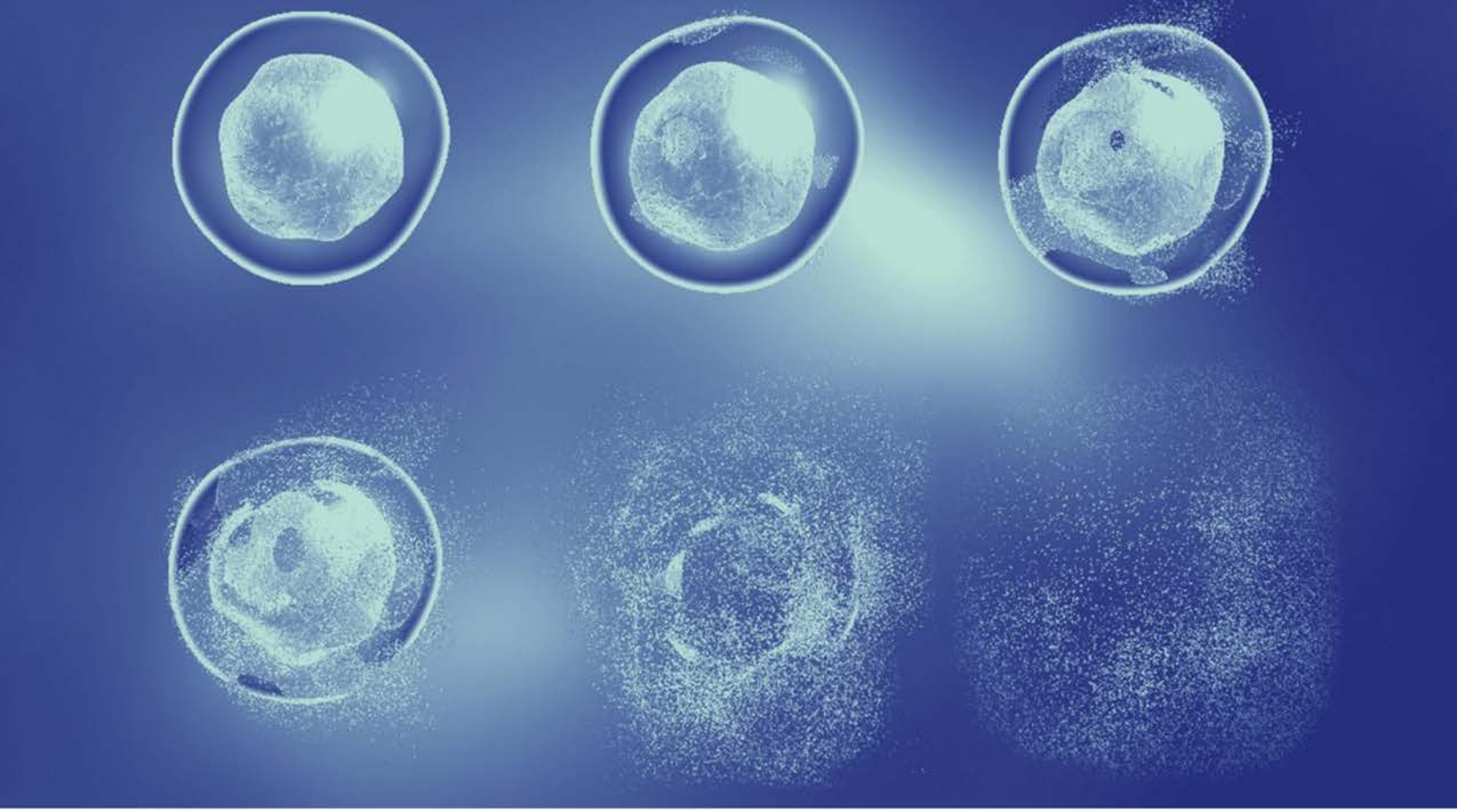
Compound name	Exact mass	Chemical formula	Target conc (µM)	Target conc (µg/mL)
Cholic acid-d4	412.31	$C_{24}H_{36}D_4O_5$	1150	0.474
Taurocholic acid-d4, sodium salt	541.3	$C_{26}H_{40}D_4NNaO_7S$	1000	0.542
Glycocholic-d4 acid	469.33	$C_{26}H_{39}D_4NO_6$	1150	0.571
Deoxycholic acid-d4	396.32	$C_{24}H_{36}D_4O_4$	1650	0.654
Taurodeoxycholic acid-d4, sodium salt	525.3	$C_{26}H_{40}D_4NNaO_6S$	1000	0.526
Glycodeoxycholic acid-d4	453.34	$C_{26}H_{39}D_4NO_5$	1275	0.578
Chenodeoxycholic acid-d4	396.32	$C_{24}H_{36}D_4O_4$	1150	0.425
Taurochenodeoxycholic acid-d4, sodium salt	525.3	$C_{26}H_{40}D_4NNaO_6s$	1000	0.526
Glycochenodeoxycholic-d4 acid	453.34	$C_{26}H_{39}D_4NO_5$	3800	1.724
Tauroursodeoxycholic acid-d4, sodium salt	525.3	$C_{26}H_{40}D_4NNaO_6S$	500	0.263
Glycoursodeoxycholic acid-d4	453.34	$C_{26}H_{39}D_4NO_5$	600	0.272
3β,5α,6β-trihydroxycholanoic acid-d4	412.31	$C_{24}H_{36}D_4O_5$	250	0.103
lithocholic acid-d4	380.32	$C_{24}H_{36}D_4O_3$	250	0.095
Taurolithocholic acid-d4, sodium salt	509.31	$C_{26}H_{40}D_4NNaO_5S$	250	0.127
Glycolithocholic-acid-d4	437.34	$C_{26}H_{39}D_4NO_4$	250	0.109
Ursodeoxycholic acid-d4	396.32	$C_{24}H_{36}D_4O_4$	300	0.119
Cholenic acid-d4	378.31	$C_{24}H_{34}D_4O_3$	250	0.095

Light Bile Acid SPLASH™

Product code: A83738
Legacy code: 330738

This mixture is a complement to **Bile Acid SPLASH**. It contains the same compounds as **Bile Acid SPLASH** but without deuterium labels, making this the ideal primary standard mixture for bile acid analysis.

Compound name	Exact mass	Chemical formula	Target conc (µM)
Cholic acid	408.29	$C_{24}H_{40}O_5$	1150
Taurocholic acid, sodium salt	537.27	$C_{26}H_{44}NNaO_7S$	1000
Glycocholic acid	465.31	$C_{26}H_{43}NO_6$	1150
Deoxycholic acid	392.29	$C_{24}H_{40}O_4$	1650
Taurodeoxycholic acid, sodium salt	521.28	$C_{26}H_{44}NNaO_6S$	1000
Glycodeoxycholic acid	449.31	$C_{26}H_{43}NO_5$	1275
Chenodeoxycholic acid	392.29	$C_{24}H_{40}O_4$	1150
Taurochenodeoxycholic acid, sodium salt	521.28	$C_{26}H_{44}NNaO_6S$	1000
Glycochenodeoxycholic acid	449.31	$C_{26}H_{43}NO_5$	3800
Tauroursodeoxycholic acid, sodium salt	521.28	$C_{26}H_{44}NNaO_6S$	500
Glycoursodeoxycholic acid	449.31	$C_{26}H_{43}NO_5$	600
3β,5α,6β-trihydroxycholanoic acid	408.29	$C_{24}H_{40}O_5$	250
Lithocholic acid	376.3	$C_{24}H_{40}O_3$	250
Taurolithocholic acid, sodium salt	505.28	$C_{26}H_{44}NNaO_5S$	250
Glycolithocholic acid	433.32	$C_{26}H_{43}NO_4$	250
Ursodeoxycholic acid	392.29	$C_{24}H_{40}O_4$	300
Cholenic acid	374.28	$C_{24}H_{38}O_3$	250



Carnitine SPLASH™

Product code: A83379

Legacy code: 330739

Acylcarnitines transport fatty acids into mitochondria for β-oxidation, making them essential for the regulation of carbohydrate and lipid metabolism within a cell. A variety of health conditions are associated with dysregulated acylcarnitine levels, such as mitochondrial dysfunction, sepsis, cancer, and autoimmune disorders. **Carnitine SPLASH** contains deuterated forms of L-carnitine and 13 acylcarnitines for analysis of a wide array of sample types.

Compound name	Exact mass	Chemical formula	Target conc (µg/mL)
L-carnitine-d9	170.16	$C_7H_6D_9NO_3$	10
C2:0 L-Carnitine-d9	212.17	$C_9H_8D_9NO_4$	10
C3:0 L-Carnitine-d9	262.16	$C_{10}H_{11}D_9ClNO_4$	10
C4:0 L-Carnitine-d9	240.2	$C_{11}H_{12}D_9NO_4$	10
C5:0 L-Carnitine-d9	254.22	$C_{12}H_{14}D_9NO_4$	10
C6:0 L-Carnitine-d9	268.23	$C_{13}H_{16}D_9NO_4$	10
C8:0 L-Carnitine-d9	296.27	$C_{15}H_{20}D_9NO_4$	10
C10:0 L-Carnitine-d9	360.27	$C_{17}H_{25}D_9ClNO_4$	10
C12:0 L-Carnitine-d9	388.31	$C_{19}H_{29}D_9ClNO_4$	10
C14:0 L-Carnitine-d9	380.36	$C_{21}H_{32}D_9NO_4$	10
C16:0 L-Carnitine-d9	408.39	$C_{23}H_{36}D_9NO_4$	10
C18:0 L-Carnitine-d9	472.4	$C_{25}H_{41}D_9ClNO_4$	10
C18:1 L-Carnitine-d9	434.41	$C_{25}H_{38}D_9NO_4$	10
C18:2 L-Carnitine-d9	432.39	$C_{25}H_{36}D_9NO_4$	10

Plasma Ceramide SPLASH™

New products!

Product code: A83342

Legacy code: 330842

Ceramides are critical bioactive lipids and emerging biomarkers for cardiovascular disease, insulin resistance, and type 2 diabetes, with strong predictive value for clinical outcomes. Plasma Ceramide SPLASH™ is a clinically relevant, deuterium-labeled internal standard mixture designed to reflect the natural ratios found in human plasma. It supports accurate, reproducible quantitation by accounting for extraction losses and ionization variability.

Compound name	Exact mass	Chemical formula	Target conc (µg/mL)
C16 Ceramide-d7 (d18:1-d7/16:0)	544.56	$C_{34}H_{60}D_7NO_3$	0.07
C18 Ceramide-d7 (d18:1-d7/18:0)	572.59	$C_{36}H_{64}D_7NO_3$	0.03
C24 Ceramide-d7 (d18:1-d7/24:0)	656.68	$C_{42}H_{76}D_7NO_3$	0.99
C24:1 Ceramide-d7 (d18:1-d7/24:1(15Z))	654.67	$C_{42}H_{74}D_7NO_3$	0.33

Light Plasma Ceramide SPLASH™

Product code: A83343

Legacy code: 330843

Light Plasma Ceramide SPLASH™ is the non-deuterated complement to Plasma Ceramide SPLASH™, designed for assay optimization and calibration. Ceramides are key biomarkers for cardiovascular and metabolic disease. Together, these standards enable accurate and reliable quantitation.

Compound name	Exact mass	Chemical formula	Target conc (µg/mL)
C16 Ceramide (d18:1/16:0)	537.51	$C_{34}H_{67}NO_3$	1.08
C18 Ceramide (d18:1/18:0)	565.54	$C_{36}H_{71}NO_3$	1.13
C24 Ceramide (d18:1/24:0)	649.64	$C_{42}H_{83}NO_3$	12.99
C24:1 Ceramide (d18:1/24:1(15Z))	647.62	$C_{42}H_{81}NO_3$	12.95

Neuroblastoma Ganglioside SPLASH™

Product code: A89865

Legacy code: N/A

Neuroblastoma Ganglioside SPLASH™ Mix is a precisely defined internal standard for quantitative LC-MS/MS analysis of gangliosides linked to neuroblastoma and other neuroectodermal tumors. As interest grows in targets like GD2 and GD3 for cancer immunology and therapy, accurate lipid profiling is essential. This ready-to-use mixture contains five stable isotope-labeled gangliosides—dGD2, dGD3, dGM2, dGD1b, and dGM3—formulated at optimized concentrations for reliable glycolipid extraction and analysis.

Compound name	Exact mass	Chemical formula	Target conc (µM)
C18:0-d7 GD2 ceramide	1684.96	$C_{23}H_{40}D_9N_2O_5P$	40
C18:0-d7 GD3 ceramide	1479.8	$C_{24}H_{40}D_7NO_7$	40
C18:0-d7 GM2 ceramide	1390.87	$C_{24}H_{40}D_7NO_7$	20
C18:0-d7 GD1b ceramide	1844.02	$C_{30}H_{50}D_7NO_{12}$	20
C18:0 GM3-d5 (synthetic)	1202.8	$C_{24}H_{43}D_7N_2O_{10}S$	10

Ceramide LIPIDOMIX™

Product code: A83712
Legacy code: 330712

Ceramides have significant clinical implications with regards to inflammation, immune response, and a variety of diseases. **Ceramide LIPIDOMIX** was developed to provide a clinically relevant ceramide mixture, and as suc1h it contains several key ceramides shown to be correlated to cardiovascular disease.

Compound name	Exact mass	Chemical formula	Target conc (µM)	Target conc (µg/mL)
C16 Ceramide (d18:1/16:0)	537.512	$C_{34}H_{67}NO_3$	30	16.1
C18 Ceramide (d18:1/18:0)	565.543	$C_{36}H_{71}NO_3$	15	8.5
C24 Ceramide (d18:1/24:0)	649.637	$C_{42}H_{83}NO_3$	75	48.8
C24:1 Ceramide (d18:1/24:1(15Z))	647.622	$C_{42}H_{81}NO_3$	37.5	24.3

[1] European Heart Journal, Volume 37, Issue 25, 1 July 2016, Pages 1967–1976, https://doi.org/10.1093/eurheartj/ehw148

SPLASH™ II

Product code: A83709
Legacy code: 330709

SPLASH II is a variation on the original SPLASH designed for plasma lipidomics. Modifications include the addition of plasmalogens and the removal of cholesterol, PG, PA, and MAG.

Compound name	Exact mass	Chemical formula	Target conc (µM)	Target conc (µg/mL)
15:0-18:1(d7) PC	752.61	$C_{41}H_{73}D_7NO_8P$	210	158.2
15:0-18:1(d7) PE	710.56	$C_{38}H_{67}D_7NO_8P$	7	5
15:0-18:1(d7) PS (Na Salt)	776.53	$C_{39}H_{66}D_7NNaO_{10}P$	10	7.8
15:0-18:1(d7) PI (NH4 Salt)	846.6	$C_{42}H_{75}D_7NO_{13}P$	10	8.5
18:1(d7) Lyso PC	528.39	$C_{26}H_{45}D_7NO_7P$	45	23.80
18:1(d7) Lyso PE	486.35	$C_{23}H_{39}D_7NO_7P$	1	0.50
18:1(d7) Chol Ester	657.64	$C_{45}H_{71}D_7O2$	530	348.80
C18(Plasm)-18:1(d9) PC	780.67	$C_{44}H_{77}D_9NO_7P$	10	7.80
15:0-18:1(d7) DAG	587.55	$C_{36}H_{61}D_7O_5$	20	11.80
15:0-18:1(d7)-15:0 TAG	811.77	$C_{51}H_{89}D_7O_6$	70	56.90
d18:1-18:1(d9) SM	737.64	$C_{41}H_{72}D_9N_2O_6P$	40	29.50
C18(Plasm)-18:1(d9) PE	738.62	$C_{41}H_{71}D_9NO_7P$	0.1	0.07

Mouse SPLASH™

Product code: A83710
Legacy code: 330710

Mouse SPLASH is similar to the original SPLASH, but with concentrations based on the lipid composition of murine samples.

Compound name	Exact mass	Chemical formula	Target conc (µM)	Target conc (µg/mL)
15:0-18:1(d7) PC	752.61	$C_{41}H_{73}D_7NO_8P$	100	75.3
15:0-18:1(d7) PE	710.56	$C_{38}H_{67}D_7NO_8P$	7	5
15:0-18:1(d7) PS (Na Salt)	776.53	$C_{39}H_{66}D_7NNaO_{10}P$	20	15.5
15:0-18:1(d7) PG (Na Salt)	763.54	$C_{39}H_{67}D_7NaO_{10}P$	5	3.8
15:0-18:1(d7) PI (NH4 Salt)	846.6	$C_{42}H_{75}D_7NO_{13}P$	20	16.9
15:0-18:1(d7) PA (Na Salt)	689.5	$C_{36}H_{61}D_7NaO_8P$	10	6.9
18:1(d7) Lyso PC	528.39	$C_{26}H_{45}D_7NO_7P$	45	23.8
18:1(d7) Lyso PE	486.35	$C_{23}H_{39}D_7NO_7P$	2	1
18:1(d7) Chol Ester	657.64	$C_{45}H_{71}D_7O_2$	250	164.5
C18(Plasm)-18:1(d9) PC	780.67	$C_{44}H_{77}D_9NO_7P$	20	15.6
15:0-18:1(d7) DAG	587.55	$C_{36}H_{61}D_7O_5$	15	8.8
15:0-18:1(d7)-15:0 TAG	811.77	$C_{51}H_{89}D_7O_6$	35	28.4
d18:1-18:1(d9) SM	737.64	$C_{41}H_{72}D_9N_2O_6P$	20	14.8
C18(Plasm)-18:1(d9) PE	738.62	$C_{41}H_{71}D_9NO_7P$	5	3.7

Frequently asked questions

How do I handle Avanti Research Mass Spec Standards properly?

Your Avanti Research Mass Spec Standard should be stored in a -10°C to -25°C freezer until ready for use. It is designed to be a one-time use ampule, and we do not recommend extended storage after opening.

Always make sure to warm bath sonicate the unopened ampoule for approximately 2 minutes prior to opening the ampoule. Lipids in solution may precipitate during shipping and storage conditions, and it may not be visible with a solution at extremely low concentrations such as this.

Directly transfer from ampule to sample preparation glass vial for immediate use. General handling guidelines for lipids should be followed as outlined on our website.

How do I order Avanti Mass Spec Standards?

Please visit the Avanti Research website. Customers in the United States can order directly from Avanti Research, and customers outside the United States will be directed to our worldwide distribution partner for country specific ordering information and pricing.

Can I use my Avanti Research Mass Spec Standard more than once?

Avanti Research quantitative mass spectrometry standards are designed to be "one-time use" items. It is important to directly transfer from the ampule to the experiment or prepare as a dilution for immediate use. Avanti Research cannot guarantee product purity and subsequent performance if used outside these guidelines.

How do I reference an Avanti Research Mass Spec Standard in my publication?

Please list the full name and product number of the Avanti Research product in your materials and methods sections, along with "Avanti Research, Alabaster, AL" as the source. If you publish using an Avanti Research product we would love to hear about it! Please drop us an email and share your success stories.

How do I open the sealed glass ampule?

Ampules are pre-scored for easy opening. With the ampule upright, hold the ampule in a gloved hand and firmly push the top section away from you with even pressure. The top should cleanly snap off, but proceed with care, as it will leave a sharp glass edge.

Can I get a Custom Mass Spec Standard?

Yes, we custom formulate mass spec standards using the lipids and solvents of your choice. We work with you to design your custom mass spec standard and can make recommendations if needed. Let us know how we can help by emailing lipidomics@avantiresearch.com.

Avanti Research's Lipidomics Division has been making Custom Quantitative Mass Spec Standards for the Lipidomics community for over 15 years. We specialize in high-accuracy quantitative packaging of lipids for use as mass spec standards, robotic assisted packaging of solutions, accurate quantitation of lipid concentrations, and rigorous quality control testing.

Who do I contact if I have additional questions?

Please e-mail us at lipidomics@avantiresearch.com if you have any additional questions.

Custom Synthesis

Avanti Research prides itself on being innovative by discovering new lipids for our customers. We are constantly adding to our extensive list of products for research. However, if you cannot find the perfect lipid to make your project a success, or you have a suggestion for a new product that is needed in the field, our synthesis team is ready to take on a new challenge. With over 150 years of combined lipid synthesis experience, our team can solve most synthesis problems and deliver custom lipids with our signature quality.

Please contact our synthesis team at Avanti.customsynthesis@avantiresearch.com to discuss the amazing things we can do for you.

Other Products

Bile acids

Bile acids are potent digestive surfactants which promote the absorption of lipids. They also represent the primary pathway for cholesterol catabolism and account for approximately 50% of the daily turnover of cholesterol[2]. However, bile acids are no longer limited to solely that. They have now been recognized as hormones involved in the regulation of various metabolic processes. Bile acids regulate not only their own synthesis and enterohepatic circulation, but also triglyceride, cholesterol, glucose and energy homeostasis. Current metabolomic and lipidomic efforts aim to provide new insights into the mechanism of bile acid signaling in the regulation of lipid metabolism and the maintenance of lipid homeostasis.[1,2] Avanti Research's comprehensive line of pure bile acid primary standards and internal standards are the perfect complement to primary, secondary, and/or conjugated bile acid research in any clinical, toxicology, or research laboratory.

Scan here to learn more about our bile acid offerings!

IsoPure Phospholipids

Scan here to learn more about our IsoPure line!

Mixed-acyl glycerophospholipids are among the most abundant lipids in nature. Famously, 1-palmitoyl-2-oleoyl phosphatidylcholine (POPC) is the most abundant phospholipid in most eukaryotic cells and tissues. The molecular structure of POPC follows the textbook consensus that unsaturated fatty acyl chains occupy the sn-2 position of the glycerol backbone while saturated fatty acyl chains are relegated to the sn-1 position. As our analytical technologies advance, this conventional wisdom is being turned inside out with the isomer 1-oleoyl-2-palmitoyl phosphatidylcholine (OPPC) being identified at high abundance in samples ranging from plasma to tissue[3,4,5]. Adding to the complexity, both isomers are present in many instances in ratios ranging from 1:100 to 1:1. Resolving the puzzle of lipid isomers requires advanced analytical tools in conjunction with structurally defined reference materials. Until recently, commercially available synthetic lipids were also comprised of mixtures, as transacylation occurring in the round-bottom flask always led to 10-20% OPPC in any preparation of POPC. Moreover, the regiopurity of the product was difficult to define. Avanti Research™ has now introduced the IsoPure line wherein innovative synthetic procedures produce mixed-acyl glycerophospholipids with >99% regiopurity. These next-generation standards will be pivotal to isomer-resolved identification of glycerophospholipids in biological samples.

1 Qi Y, Jiang C, Cheng J, Krausz KW, Li T, Ferrell JM, Gonzalez FJ, Chiang JY. Bile acid signaling in lipid metabolism: metabolomic and lipidomic analysis of lipid and bile acid markers linked to anti-obesity and anti-diabetes in mice. Biochim Biophys Acta. 2015 Jan;1851(1):19-29. PMID: 24796972

2 Staels B, Fonseca VA. Bile acids and metabolic regulation: mechanisms and clinical responses to bile acid sequestration. Diabetes Care. 2009 Nov;32 Suppl 2(Suppl 2):S237-45. PMID: 19875558

3 Ekroos K, Ejsing CS, Bahr U, Karas M, Simons K, Shevchenko A. Charting molecular composition of phosphatidylcholines by fatty acid scanning and ion trap MS3 fragmentation. J. Lipid Res. 2003, 44, 2181. PMID: 12923235

4 Zacek P, Bukowski M, Rosenberger TA, Picklo M. Quantitation of isobaric phosphatidylcholine species in human plasma using a hybrid quadrupole linear ion-trap mass spectrometer. J. Lipid Res. 2016, 57, 2225. PMID: 27688258

5 Maccarone AT, Duldig J, Mitchell TW, Blanksby SJ, Duchoslav E, Campbell JL. Characterization of acyl chain position in unsaturated phosphatidylcholines using differential mobility-mass spectrometry.J. Lipid Res. 2014, 55, 1668. PMID: 24939921

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