Biofiles

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Lipid Metabolism

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Coming Next Issue: Cell Based Assay

Life scientists have long realized the value in analyzing biological processes based on its most fundamental unit the cell. This issue will touch on a wide variety of topics ranging from ADMEtox to stem cell analysis to the most basic methods of analyzing and staining cells. The issue will announce the addition of 1400 more ECACC cell lines available in the US, Canada and Mexico.

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Biofilescontents

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Introduction

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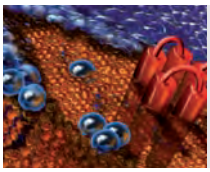
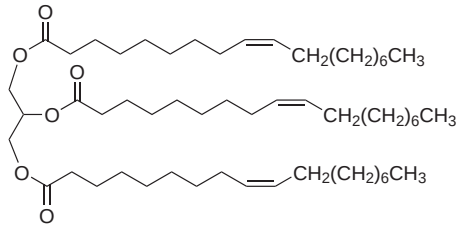
After sequencing the human genome, life scientists are now in the era "beyond the genome" and confronting the challenges of bringing this information to life. For lipid researchers, unraveling the complexities of lipid metabolism will bring answers and opportunities in fields as diverse as medicine and biofuels. Today, lipid research addresses all aspects of cell biology including cell structure, energy storage and generation, and cell signaling. The synergies between classical lipid research, systems biology, and the advancement of lipid detection technologies have led to a revolution in lipid biology and the emergence of lipidomics as a branch of metabolomics.

Lipid-based diseases are a growing and expensive challenge to health care systems. As a population ages, chronic conditions associated with aging such as cardiovascular disease, neurodegenerative disorders, and metabolic disorders take increasing tolls in terms of morbidity and mortality. Oxidation of lipids and lipid metabolites has been linked to disorders of aging like osteoporosis and vascular calcification. Additionally, research is now trying to explain how dysregulations in lipid metabolism may underlie diseases such as Alzheimer's, cancer, and asthma. Lipid synthesis pathways, such as the methyl-D-erythritol 4-phosphate (MEP) pathway of isoprenoid synthesis, are being investigated as potential targets for antibacterial therapies and drug targets. As changes in lipid profiles can mark developmental stages or more ominously, pathological states, there is great potential for the use of lipids as biomarkers. Experimental quantification of the levels of lipids and lipid metabolites is therefore essential for enhancing the understanding of different influences such as genetic, nutritional, behavioral, and environmental factors. As part of our committment to metabolomics research, Sigma offers an expanding range of lipids and lipid metabolites for the mapping and study of healthy and diseased cells.



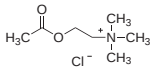
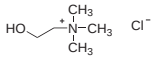
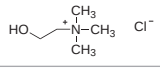
Natural Abundance Lipid Metabolites

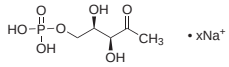
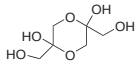
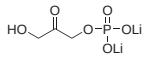
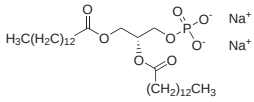
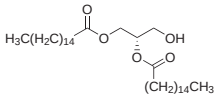
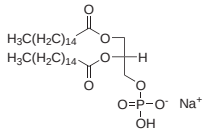
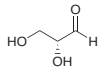
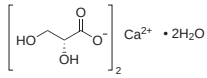
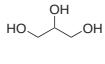
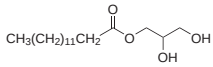
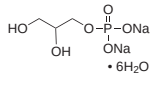
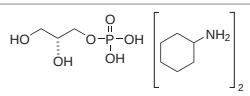
Glycerolipid Metabolism

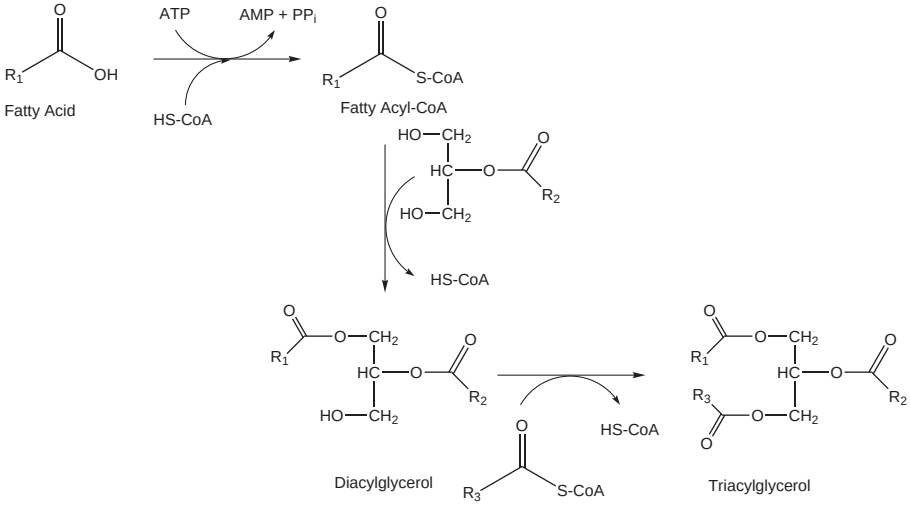


Glycerol esterified with one, two, or three fatty acids make up monoacyl-, diacyl- and triacylglycerols, with a chiral center at carbon-2 of the glycerol moiety. Fats and oils from plants and animals are triacylglycerols, while diacylglycerols are intermediates and cellular messengers, and monoacylglycerols, formed by hydrolysis, are surfactants and intermediates. Because triacylglycerols are insoluble in water, combination or emulsification with other lipids, cellular compounds, or proteins is required before transport and metabolism can occur. Complete or partial lipase-catalyzed hydrolysis yields monoacylglycerols, glycerol, and fatty acids that can be transported and utilized for energy production or biosynthetic pathways of metabolism.

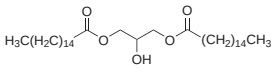
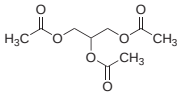
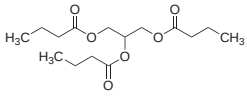
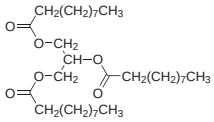
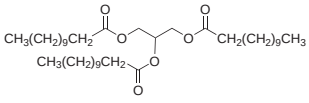
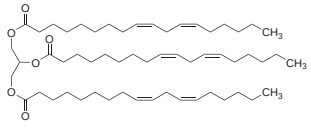
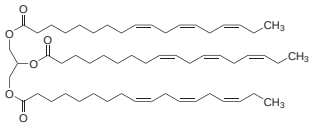
Biosynthesis of triacylglycerols is achieved in a three-step sequence from 2-monoacylglycerols and fatty acids. First, the fatty acid is activated by acyl-CoA synthetase catalyzed conversion to the corresponding fatty acyl thioester with coenzyme A. The fatty acyl-CoA is then coupled with a 2-monoacylglycerol by the catalytic action of a monoacylglycerol transferase to yield a diacylglycerol. The final triacylglycerol is obtained by coupling of fatty acyl-CoA with diacylglycerol through the action of diacylglycerol transferase.

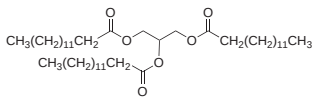
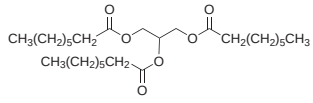
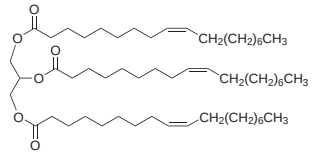
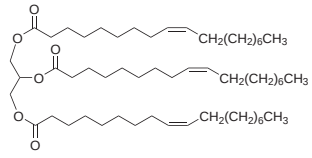
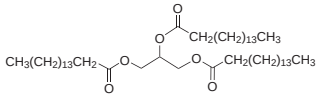
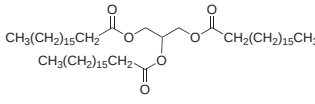
Name	Structure	Cat. No.
Acetylcholine chloride		**A6625-10MG** **A6625-25G** **A6625-100G** **A6625-500G**
Choline chloride		**C7017-10MG** **C7017-5G** **C7017-25G** **C7017-100G**
Choline chloride		**26978-25G** **26978-100G**

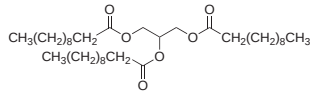
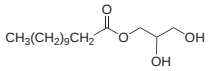
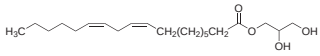
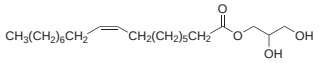
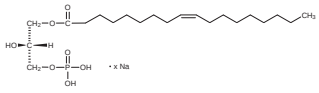
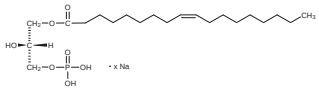
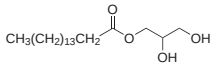
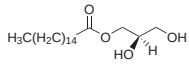
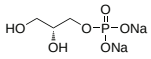
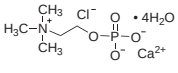
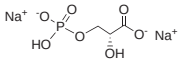
Name	Structure	Cat. No.
1-Deoxy-D-xylulose-5-phosphate sodium salt		**13368-1MG** **13368-5MG**
1,3-Dihydroxyacetone dimer		**D107204-5G** **D107204-100G** **D107204-500G**
Dihydroxyacetone phosphate dilithium salt		**D7137-5MG** **D7137-10MG** **D7137-25MG** **D7137-100MG** **D7137-250MG**
1,2-Dimyristoyl-*sn*-glycero-3-phosphate monosodium salt		**P3650-25MG** **P3650-50MG** **P3650-250MG**
1,2-Dioctanoyl-*sn*-glycerol 3-phosphate sodium salt	-	**P3591-50MG**
1,2-Dipalmitoyl-*sn*-glycerol		**D9135-25MG** **D9135-100MG**
1,2-Dipalmitoyl-*sn*-glycero-3-phosphate sodium salt		**P4013-25MG** **P4013-100MG**
D-(+)-Glyceraldehyde, viscous		**49800-1G** **49800-5G**
D-Glyceric acid calcium salt dihydrate		**367494-1G** **367494-5G**
Glycerol, anhydrous		**49767-100ML** **49767-250ML** **49767-1L**
rac-Glycerol 1-myristate		**M1890-100MG** **M1890-1G**
rac-Glycerol 1-phosphate disodium salt hexahydrate		**G2138-10MG** **G2138-5G** **G2138-25G** **G2138-100G** **G2138-500G**
sn-Glycerol 3-phosphate bis(cyclohexylammonium) salt		**G7886-250MG** **G7886-1G** **G7886-5G**

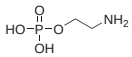
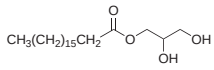


Caption Text?

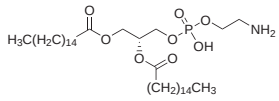
Name	Structure	Cat. No.
Glyceryl 1,3-dipalmitate		**D1639-1G**
Glyceryl 1,3-distearate	-	**D8269-10MG** **D8269-100MG**
Glyceryl triacetate		**T5376-500ML** **T5376-1L**
Glyceryl tributyrate		**T8626-25ML** **T8626-100ML**
Glyceryl tridecanoate		**T7517-1G** **T7517-5G**
Glyceryl tridodecanoate		**T4891-100MG** **T4891-5G**
Glyceryl trielaidate	-	**T7379-1G**
Glyceryl triheptadecanoate	-	**T2151-100MG** **T2151-1G**
Glyceryl trilinoleate		**T9517-50MG** **T9517-100MG** **T9517-500MG** **T9517-1G** **T9517-5G**
Glyceryl trilinolenate		**T6513-100MG**

Name	Structure	Cat. No.
Glyceryl trimyristate		**T5141-1G** **T5141-5G**
Glyceryl trinonadecanoate	-	**T4632-100MG** **T4632-1G**
Glyceryl trioctanoate		**T9126-100ML** **T9126-500ML** **T9126-1L**
Glyceryl trioleate		**T7140-500MG** **T7140-1G** **T7140-5G** **T7140-10G** **T7140-50G**
Glyceryl trioleate		**92860-5ML** **92860-10ML**
Glyceryl tripalmitate		**T5888-100MG** **T5888-500MG** **T5888-1G** **T5888-5G**
Glyceryl tripalmitelaidate	-	**T5909-5MG**
Glyceryl tripalmitoleate	-	**T2630-100MG** **T2630-1G**
Glyceryl tristearate		**T5016-5G** **T5016-25G**
Glyceryl tritricosanoate	-	**T1412-25MG**

Name	Structure	Cat. No.
Glyceryl tritridecanoate	-	**T3882-500MG** **T3882-1G**
Glyceryl triundecanoate		**T5534-1G**
1-Lauroyl-*rac*-glycerol		**M1765-100MG** **M1765-500MG** **M1765-1G** **M1765-5G**
1-Linoleoyl-*rac*-glycerol		**M7640-100MG** **M7640-1G**
Lipoteichoic acid from *Bacillus subtilis*	-	**L3265-5MG** **L3265-25MG**
Lipoteichoic acid from *Staphylococcus aureus*	-	**L2515-5MG** **L2515-10MG** **L2515-25MG**
Lipoteichoic acid from *Streptococcus faecalis*	-	**L4015-5MG** **L4015-25MG**
Lipoteichoic acid from *Streptococcus pyogenes*	-	**L3140-5MG** **L3140-10MG** **L3140-25MG**
1-Monopalmitoleoyl-*rac*-glycerol	-	**M7890-100MG** **M7890-1G**
1-Oleoyl-*rac*-glycerol		**M7765-25MG** **M7765-50MG** **M7765-100MG** **M7765-1G**
Oleoyl-L-α-lysophosphatidic acid sodium salt		**L7260-1MG** **L7260-5MG** **L7260-25MG**
Oleoyl-L-α-lysophosphatidic acid sodium salt		**75347**
DL-α-Palmitin		**M1640-100MG** **M1640-1G**
3-*sn*-Palmitoyl-*sn*-glycerol		**76184-250MG** **76184-1G**
3-*sn*-Phosphatidic acid sodium salt from egg yolk lecithin		**P9511-5MG** **P9511-10MG** **P9511-50MG** **P9511-100MG** **P9511-500MG**
Phosphocholine chloride calcium salt tetrahydrate		**P0378-10MG** **P0378-5G** **P0378-25G** **P0378-50G**
D-(−)-3-Phosphoglyceric acid disodium salt		**P8877-10MG** **P8877-1G** **P8877-5G**

Name	Structure	Cat. No.
O-Phosphorylethanol-amine		**P0503-10MG** **P0503-1G** **P0503-5G** **P0503-25G** **P0503-100G** **P0503-500G**
1,2-Propanediol		**12279-1ML-F** **12279-5ML-F**
1,3-Propanediol		**81780-500ML**
1-Propanol		**96566-5ML-F** **96566-10ML-F**
Propionaldehyde		**538124-250ML** **538124-1L**
1-Stearoyl-*rac*-glycerol		**M2015-100MG** **M2015-1G** **M2015-5G**
Tripentadecanoin	-	**T4257-100MG** **T4257-500MG** **T4257-1G**
Tripetroselaidin	-	**T5784-25MG** **T5784-100MG**

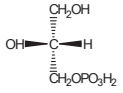
Glycerophospholipid Metabolism



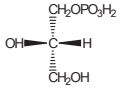
Glycerol is the backbone of the fundamental phospholipids used as the self-assembling units of lipid membranes. It is interesting that both enantiomeric glycerol configurations appear in nature. In eukaryotes and eubacteria, glycerophospholipids are based on the *sn*-3 configuration of the glycerol backbone, while archaebacteria lipids are based on the *sn*-1-configuration. The metabolic intermediate for all glycerophospholipids is phosphatidic acid (1,2-diacylglycerol-3-phosphate). Lysophosphatidic acid, which lacks the acyl chain in the 2-position, is an important cellular messenger.

Phosphatidylcholine (lecithin) is the most abundant phospholipid in animal and plant tissues. Phosphatidylethanolamine (cephalin) is an abundant phospholipid in microbial, plant, and animal cells. The corresponding lysophosphatidic acid derivatives, lysophosphatidylcholine and lysophosphatidylethanolamine, are more soluble in water and have surfactant properties, and these are not standard components of cell membranes. Phosphatidylglycerol has important functions in lung surfactants, chloroplasts, and bacterial membranes and is a metabolic intermediate in the biosynthesis of cardiolipin. Phosphatidylserine is involved in biological processes including apoptosis, blood coagulation, and activation of protein kinase C. It can be found in plasma membranes and other membranes of animals, plants, and microorganisms.

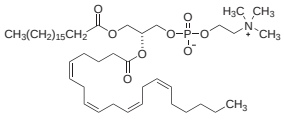
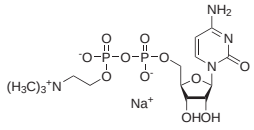
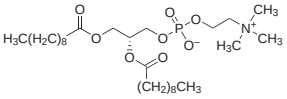
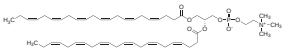
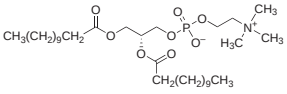
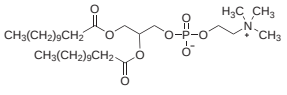
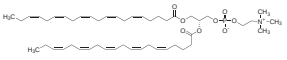
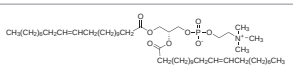
A class of phospholipids with a high rate of metabolism is the phosphatidylinositols which have varying degrees of phosphorylation in the polar head group myo-inositol. The metabolic conversion of phosphatidylinositols to diacylglycerols and inositol phosphates is important in the regulation of vital cellular functions such as differentiation, proliferation, and apoptosis, and in anchoring proteins via a glycosyl-bridge to the plasma membrane.

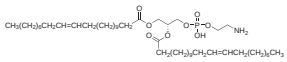
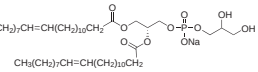
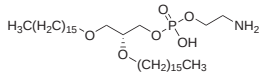
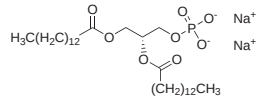
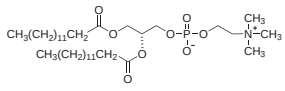
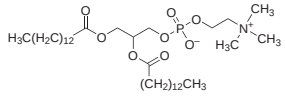
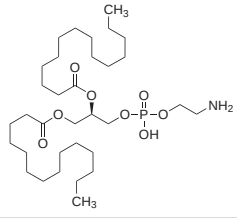
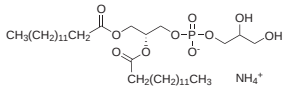
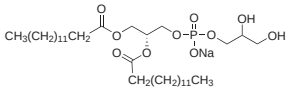


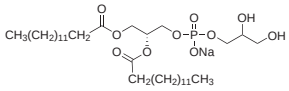
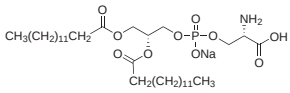
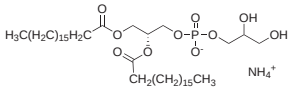
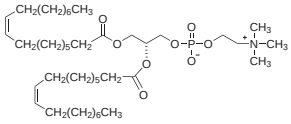
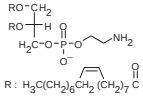
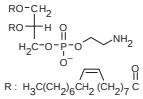
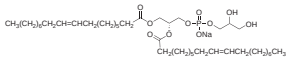
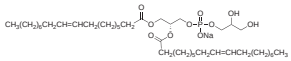
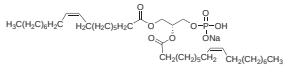
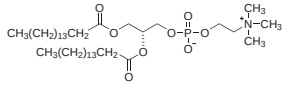
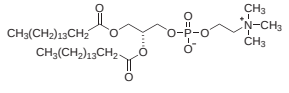
sn-Glycerol 3-phosphate
[L-(glycerol 3-phosphate) = D-(glycerol 1-phosphate)]

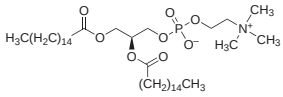
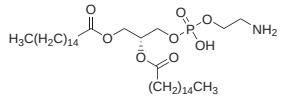
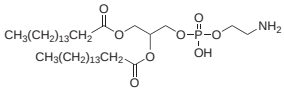
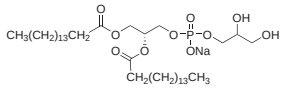
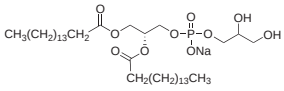
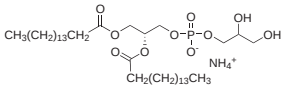
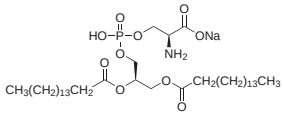
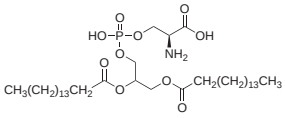
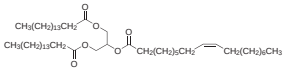
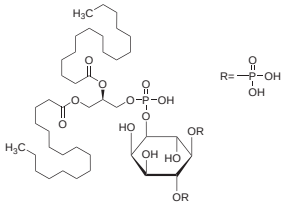
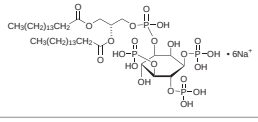


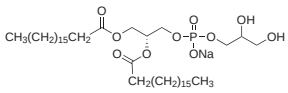
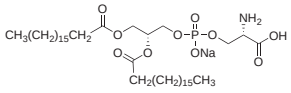
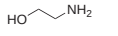
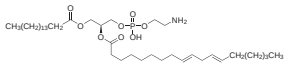
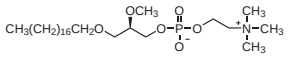
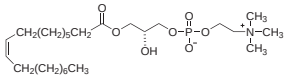
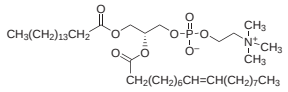
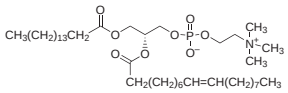
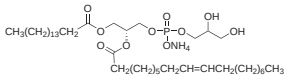
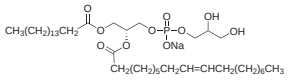
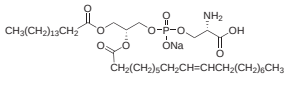
sn-Glycerol 1-phosphate
[L-(glycerol 1-phosphate) = D-(glycerol 3-phosphate)]

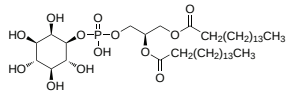
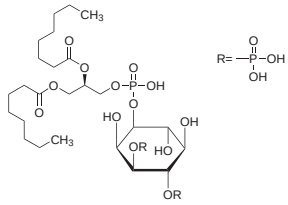
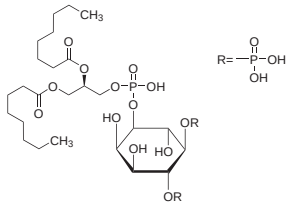
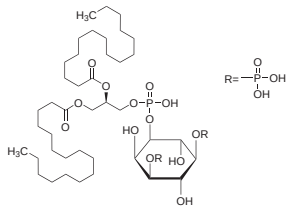
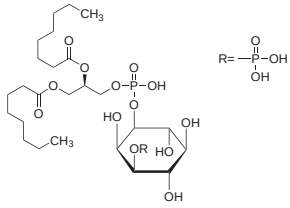
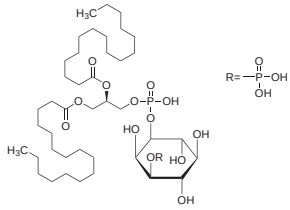
Name	Structure	Cat. No.
2-Arachidonoyl-1-stearoyl-*sn*-glycero-3-phosphocholine solution		**P1287-5MG** **P1287-25MG**
Cardiolipin sodium salt from bovine heart	-	**C0563-10MG** **C0563-25MG** **C0563-100MG** **C0563-500MG**
Cytidine 5′-diphospho-choline sodium salt dihydrate		**C0256-100MG** **C0256-500MG** **C0256-1G**
1,2-Didecanoyl-*sn*-glycero-3-phosphocholine		**P7081-25MG** **P7081-100MG** **P7081-1G**
1,2-Didocosahexaenoyl-*sn*-glycero-3-phosphocholine		**78896-100MG** **78896-500MG**
1,2-Didodecanoyl-*sn*-glycero-3-phosphocholine		**P1263-25MG** **P1263-100MG** **P1263-500MG**
1,2-Didodecanoyl-*rac*-glycero-3-phosphocholine		**P1534-100MG**
1,2-Dieicosapentaenoyl-*sn*-glycero-3-phosphocholine		**40723-100MG** **40723-500MG**
1,2-Dierucoyl-*sn*-glycero-3-phosphocholine		**77017**

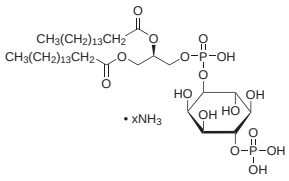
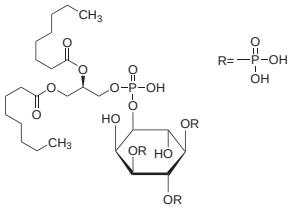
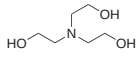
Name	Structure	Cat. No.
1,2-Dierucoyl-*sn*-glycero-3-phosphoethanolamine		**74576**
1,2-Dierucoyl-*sn*-glycero-3-phospho-*rac*-(1-glycerol) sodium salt		**00259**
Diethanolamine	$HOCH_2CH_2NHCH_2CH_2OH$	**31589-100G** **31589-500G**
1,2-Dihexadecanoyl-*rac*-glycero-3-phospho-*rac*-(1-glycerol) ammonium salt	-	**P5650-100MG**
1,2-Dihexadecyl-*rac*-glycero-3-phosphocholine	-	**P3777-25MG** **P3777-100MG**
1,2-Di-O-hexadecyl-*sn*-glycero-3-phosphocholine	-	**P1527-100MG** **P1527-500MG**
1,2-Dihexadecyl-*sn*-glycero-3-phosphoethanolamine		**37161-100MG** **37161-1G**
1,2-Dilinoleoyl-*sn*-glycero-3-phosphocholine		**P0537-5MG** **P0537-25MG**
1,2-Dimyristoyl-*sn*-glycerol-3-(5′-diphosphocytidine) potassium salt	-	**C5430-5MG** **C5430-25MG**
1,2-Dimyristoyl-*sn*-glycero-3-phosphate monosodium salt		**P3650-25MG** **P3650-50MG** **P3650-250MG**
1,2-Dimyristoyl-*sn*-glycero-3-phosphocholine		**P2663-25MG** **P2663-100MG** **P2663-500MG** **P2663-1G**
1,2-Dimyristoyl-*rac*-glycero-3-phosphocholine		**P7930-100MG** **P7930-250MG**
1,2-Dimyristoyl-*sn*-glycero-3-phosphoethanolamine		**P5693-100MG** **P5693-250MG** **P5693-1G**
1,2-Dimyristoyl-*sn*-glycero-3-phospho-*rac*-(1-glycerol) ammonium salt		**43096-100MG** **43096-1G**
1,2-Dimyristoyl-*sn*-glycero-3-phospho-*rac*-(1-glycerol) sodium salt		**P6412-25MG** **P6412-100MG** **P6412-500MG**

Name	Structure	Cat. No.
1,2-Dimyristoyl-*sn*-glycero-3-phospho-*rac*-(1-glycerol) sodium salt		**90998-100MG** **90998-1G**
1,2-Dimyristoyl-*sn*-glycero-3-phospho-L-serine sodium salt		**80114-100MG** **80114-500MG**
1,2-Dioctadecanoyl-*sn*-glycero-3-phospho-*rac*-(1-glycerol) ammonium salt		**05717-100MG** **05717-1G**
1,2-Dioleoyl-*sn*-glycero-3-phosphocholine		**P6354-25MG** **P6354-100MG** **P6354-1G**
1,2-Dioleoyl-*sn*-glycero-3-phosphoethanolamine		**42490-2.5ML** **42490-10ML**
1,2-Dioleoyl-*sn*-glycero-3-phosphoethanolamine		**76548-100MG** **76548-1G**
1,2-Dioleoyl-*sn*-glycero-3-phospho-*rac*-(1-glycerol) sodium salt		**P9664-5MG** **P9664-25MG** **P9664-100MG** **P9664-500MG**
1,2-Dioleoyl-*sn*-glycero-3-phospho-*rac*-(1-glycerol) sodium salt		**74384-100MG** **74384-1G**
1,2-Dioleoyl-*sn*-glycero-3-phosphoric acid monosodium salt		**74304-100MG** **74304-500MG**
1,2-Dioleoyl-*sn*-glycero-3-phospho-L-serine sodium salt	-	**P1060-5MG** **P1060-10MG** **P1060-25MG**
1,2-Dioleoyl-3-linoleoyl-*rac*-glycerol	-	**D9925-100MG**
1,2-Dioleoyl-3-palmitoyl-*rac*-glycerol	-	**D1782-10MG** **D1782-100MG**
1,3-Dioleoyl-2-palmitoylglycerol	-	**D1657-25MG**
1,2-Dipalmitoyl-*sn*-glycero-3-phosphocholine		**P0763-50MG** **P0763-100MG** **P0763-250MG** **P0763-1G** **P0763-5G**
1,2-Dipalmitoyl-*sn*-glycero-3-phosphocholine		**P4329-25MG** **P4329-100MG** **P4329-500MG** **P4329-1G**

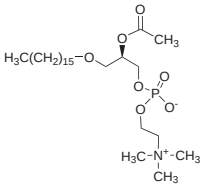
Name	Structure	Cat. No.
1,2-Dipalmitoyl-*rac*-glycero-3-phosphocholine	-	**P5911-100MG** **P5911-250MG** **P5911-1G**
2,3-Dipalmitoyl-*sn*-glycero-1-phosphocholine		**42566-25MG**
1,2-Dipalmitoyl-*sn*-glycero-3-phosphoethanolamine		**P1348-25MG** **P1348-100MG** **P1348-250MG** **P1348-1G**
1,2-Dipalmitoyl-*rac*-glycero-3-phosphoethanolamine		**P3275-100MG** **P3275-500MG**
1,2-Dipalmitoyl-*sn*-glycero-3-phospho-*rac*-(1-glycerol) sodium salt		**P9789-25MG** **P9789-100MG**
1,2-Dipalmitoyl-*sn*-glycero-3-phospho-*rac*-(1-glycerol) sodium salt		**50984-100MG** **50984-1G**
1,2-Dipalmitoyl-*sn*-glycero-3-phospho-*rac*-(1-glycerol) ammonium salt		**42627-100MG** **42627-1G**
1,2-Dipalmitoyl-*sn*-glycero-3-phospho-L-serine sodium salt		**P1185-10MG** **P1185-50MG**
1,2-Dipalmitoyl-rac-glycero-3-phospho-L-serine		**P1902-5MG** **P1902-25MG**
1,3-Dipalmitoyl-2-oleoylglycerol		**D2157-10MG** **D2157-50MG** **D2157-100MG**
1,2-Dipalmitoylphosphatidylinositol 4,5-diphosphate		**P7115-100UG**
1,2-Dipalmitoylphosphatidylinositol 3,4,5-trisphosphate tetrasodium salt		**P4240-100UG**

Name	Structure	Cat. No.
1,2-Distearoyl-*sn*-glycero-3-phospho-*rac*-(1-glycerol) sodium salt		**55845-100MG** **55845-1G**
1,2-Distearoyl-*sn*-glycero-3-phospho-L-serine sodium salt		**43307-100MG** **43307-500MG**
Ethanolamine		**398136-25ML** **398136-500ML** **398136-2.5L**
L-α-Glycerophosphoryl-choline	-	**G5291-10MG** **G5291-50MG** **G5291-100MG**
2-Linoleoyl-1-palmitoyl-*sn*-glycero-3-phosphoethanolamine		**62225-25MG**
1-O-Octadecyl-2-O-methyl-*sn*-glycero-3-phosphorylcholine		**O9262-5MG**
1-Oleoyl-*sn*-glycero-3-phosphocholine		**L1881-5MG** **L1881-25MG** **L1881-100MG**
1-Oleoyl-2-palmitoyl-*sn*-glycero-3-phosphocholine	-	**P4142-5MG** **P4142-25MG** **P4142-100MG**
2-Oleoyl-1-palmitoyl-*sn*-glycero-3-phosphocholine		**P3017-10MG** **P3017-25MG** **P3017-100MG**
2-Oleoyl-1-palmitoyl-*sn*-glycero-3-phosphocholine		**42773-100MG** **42773-500MG**
2-Oleoyl-1-palmitoyl-*sn*-glycero-3-phospho-*rac*-(1-glycerol) ammonium salt		**76559-100MG** **76559-500MG**
2-Oleoyl-1-palmitoyl-*sn*-glycero-3-phospho-*rac*-(1-glycerol) sodium salt		**63371-100MG** **63371-1G**
2-Oleoyl-1-palmitoyl-*sn*-glycero-3-phospho-L-serine sodium salt		**51581-100MG** **51581-1G**
2-Oleoyl-1-stearoyl-*sn*-glycero-3-phosphocholine	-	**P9649-10MG** **P9649-25MG**
1-O-Palmityl-2-palmitoyl-*rac*-glycero-3-phosphocholine	-	**P6284-5MG**
DL-α-Phosphatidylcholine, distearoyl	-	**P8180-100MG** **P8180-500MG**
L-α-Phosphatidylcholine, β-O-methyl-γ-O-octadecyl	-	**P1186-1MG** **P1186-5MG**

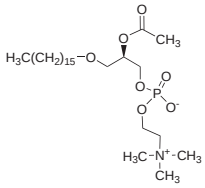
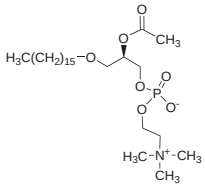
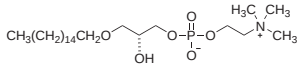
Name	Structure	Cat. No.
L-α-Phosphatidyle-thanolamine, dioleoyl	-	**P1223-25MG** **P1223-100MG** **P1223-500MG**
L-α-Phosphatidylinositol dipalmitoyl ammonium salt		**P1368-500UG**
L-α-Phosphatidyl-D-*myo*-inositol 3,4-diphosphate, dioctanoyl		**P4725-.1MG**
L-α-Phosphatidyl-D-*myo*-inositol 4,5-diphosphate, dioctanoyl		**P3584-.1MG**
L-α-Phosphatidyl-D-*myo*-inositol 3,5-diphosphate, dipalmitoyl		**P5713-.1MG**
L-α-Phosphatidyl-D-*myo*-inositol 3-monophosphate, dioctanoyl		**P5578-.1MG**
L-α-Phosphatidyl-D-*myo*-inositol 3-monophosphate, dipalmitoyl		**P3953-.1MG**

Name	Structure	Cat. No.
L-α-Phosphatidyl-D-*myo*-inositol 4-monophosphate, dipalmitoyl ammonium salt		**P7686-.1MG**
L-α-Phosphatidyl-D-*myo*-inositol 3,4,5-triphosphate, dioctanoyl		**P9953-.1MG**
1-Stearoyl-*sn*-glycero-3-phosphocholine	-	**L2131-5MG** **L2131-100MG**
Triethanolamine		**90278-100ML** **90278-500ML**

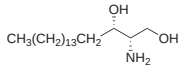
Ether Lipid Metabolism



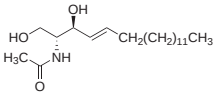
Phospholipids containing an aliphatic-ether bond or vinyl-ether bond to the carbon-1 of L-glycerol yield 1-alkylglycerols or 1-alkenylglycerols when hydrolyzed. Platelet-activating factor (PAF; 1-alkyl-2-acetyl-*sn*-glycerophosphorylcholine) produces important biological effects such as the aggregation of platelets and induction of hypertensive response at very low concentrations. The metabolic pathway for alkylglycerolipids in the endoplasmatic reticulum of tumors and certain healthy cells consist of alkylation of dihydroxyacetone phosphate, ketone reduction, acylation, dephosphorylation, acylation, and/or transfer of phosphorylcholine or phosphorylethanolamine to alkyl glycerol. Pancreatic lipases, phospholipases, and phosphatases do not attack alkyl or 1-alkenyl chains of glycerolipids. Ether-linked phosphatidylcholines and phosphatidylethanolamines containing arachidonic and docosapentaenoic fatty acids are decreased in the blood plasma of hypertensive individuals.

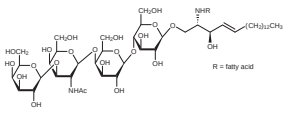
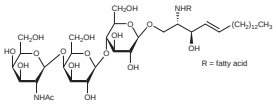
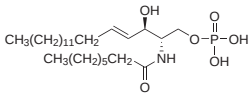
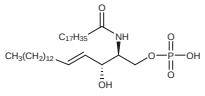
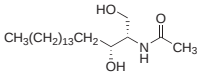
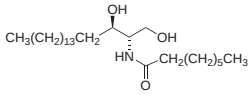
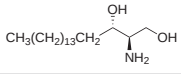
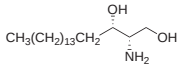
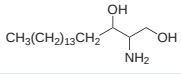
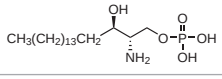
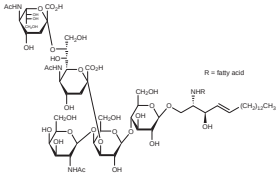
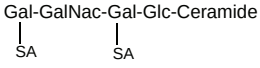
Name	Structure	Cat. No.
β-Acetyl-γ-O-alkyl-L-α-phosphatidylcholine from bovine heart lecithin		**P7568-1MG** **P7568-5MG** **P7568-10MG**
β-Acetyl-γ-O-hexadecyl-L-α-phosphatidylcholine		**P4904-1MG** **P4904-5MG** **P4904-10MG** **P4904-25MG**
1-O-Palmityl-2-acetyl-*rac*-glycero-3-phosphocholine	-	**P1402-10MG**
1-O-Palmityl-2-acetyl-*sn*-glycero-3-phospho-(N,N,N-trimethyl) hexanolamine	-	**H8771-250UG**
1-O-Palmityl-2-arachidonoyl-*sn*-glycero-3-phosphocholine	-	**P2190-5MG**
1-O-Palmityl-*sn*-glycero-3-phosphocholine		**L5016-1MG** **L5016-10MG**
1-O-Palmityl-2-O-methyl-*rac*-glycero-3-phosphocholine	-	**P6034-5MG**

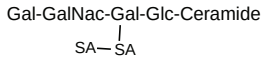
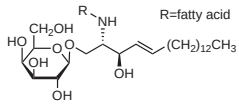
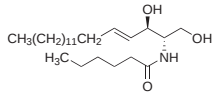
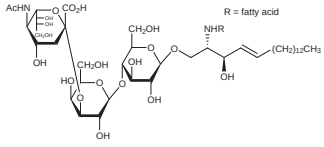
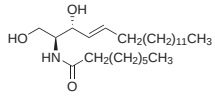
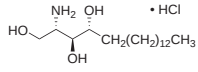
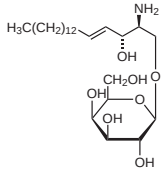
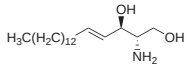
Sphingolipid Metabolism

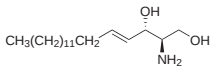
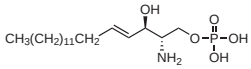
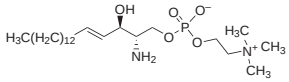


Sphingolipids contain a lipophilic long-chain amino alcohol like sphingosine, dihydrosphingosine, phytosphingosine, or dehydrophytosphingosine as the characteristic polyalcohol constituent. Sphingosine or a related base is bound to a long-chain fatty acid by an amide linkage and via the terminal hydroxyl group to either a complex carbohydrate or phosphorus-containing moiety. Cerebrosides, sulfatides, ceramide-polyhexosides, and gangliosides are glycosphingolipids, i.e., contain a carbohydrate component instead of phosphorylcholine. The carbohydrate moiety of a glycosphingolipid is oriented towards the exterior cell membrane surface and is characteristic for the cell type, species, growth phase, and differentiated/undifferentiated status.

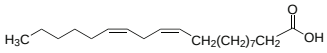
Name	Structure	Cat. No.
N-Acetyl-D-sphingosine		**A7191-1MG** **A7191-5MG**

Name	Structure	Cat. No.
Asialoganglioside GM_1 from bovine brain		**G9402-.5MG**
Asialoganglioside-GM_2 from bovine brain		**G9398-50UG** **G9398-.1MG**
Ceramide from bovine brain	-	**22244**
D-*erythro*-Ceramide C8 1-phosphate		**C8355-1MG**
Ceramide 1-phosphate from bovine brain		**C4832-1MG**
Ceramide phosphorylethanolamine	-	**C4987-5MG**
Dihydroceramide C2		**C7980-5MG** **C7980-25MG**
Dihydroceramide C6	-	**C8230-5MG** **C8230-25MG**
Dihydroceramide C8		**C8605-5MG** **C8605-25MG**
D-*erythro*-Dihydrosphingosine		**D3314-10MG** **D3314-50MG**
D-*threo*-Dihydrosphingosine		**D4556-1MG**
L-*threo*-Dihydrosphingosine		**D4681-1MG**
DL-Dihydrosphingosine		**D6783-10MG** **D6783-25MG** **D6783-100MG**
D-*erythro*-Dihydrosphingosine 1-phosphate		**D3439-1MG**
Disialoganglioside-GD_2 from bovine brain, semisynthetic		**G0776-.1MG**
Disialoganglioside GD_{1a} from bovine brain		**G2392-1MG** **G2392-5MG**

Name	Structure	Cat. No.
Disialoganglioside GD_{1b} from bovine brain		**G8146-1MG**
Galactocerebrosides from bovine brain		**C4905-10MG** **C4905-25MG**
N-Hexanoyl-D-sphingosine		**H6524-1MG** **H6524-5MG**
Lactocerebrosides from bovine brain	-	**C3166-1MG** **C3166-5MG**
Monosialoganglioside G_{M3} from canine blood		**G5642-.5MG** **G5642-1MG**
Monosialoganglioside G_{M1} from bovine brain	-	**G7641-1MG** **G7641-5MG** **G7641-10MG**
Monosialoganglioside G_{M1} from bovine brain	-	**G9652-1MG**
Monosialoganglioside G_{M2} from bovine brain	-	**G8397-1MG**
N-Octanoyl-D-sphingosine		**O1882-5MG**
N-Palmitoyl-D-sphingomyelin semisynthetic from bovine brain sphingomyelin	-	**P6778-1MG** **P6778-10MG**
Phytoceramide C2	-	**C8105-5MG**
Phytosphingosine hydrochloride		**P2795-5MG** **P2795-25MG**
Psychosine from bovine brain		**P9256-1MG** **P9256-10MG**
Sphingomyelin		**S7004-5MG** **S7004-10MG** **S7004-50MG** **S7004-100MG** **S7004-500MG**
Sphingomyelin		**S0756-50MG** **S0756-100MG** **S0756-500MG**
D-Sphingosine		**S7049-5MG** **S7049-25MG**

Name	Structure	Cat. No.
L-*erythro*-Sphingosine		**S7174-5MG**
Sphingosine 1-phosphate		**S9666-1MG**
Sphingosylphosphoryl-choline		**S4257-10MG** **S4257-25MG**
Sulfatides from bovine brain	-	**S1006-5MG** **S1006-10MG** **S1006-50MG**
Trisialoganglioside-GT_{1b} from bovine brain		**G3767-1MG** **G3767-5MG**

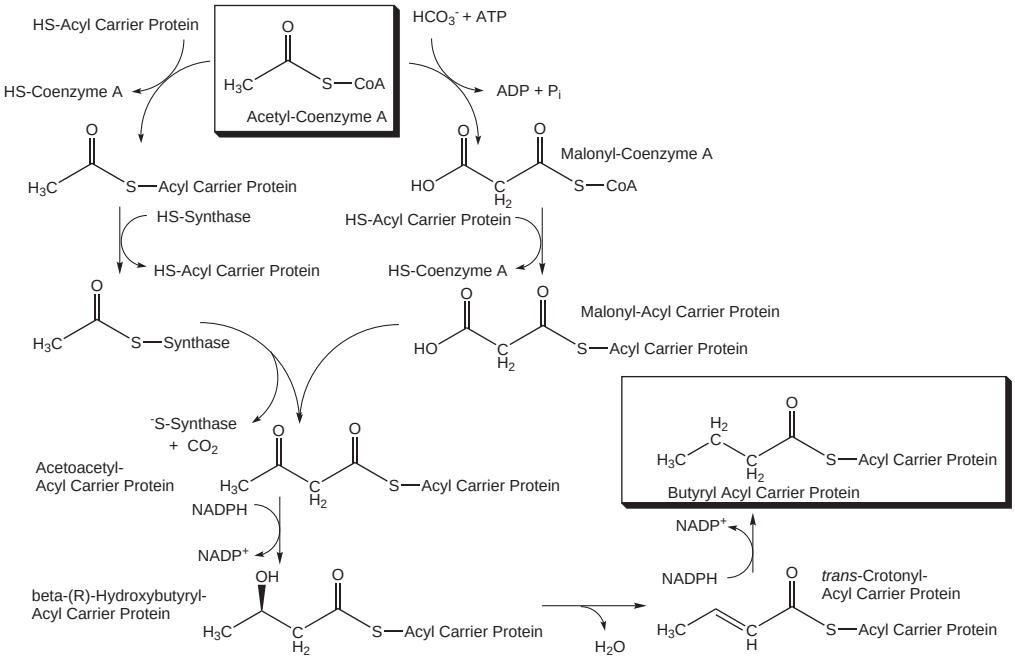
Fatty Acid Metabolism



Acetyl coenzyme A is a central metabolite for both the biosynthesis and catabolism of fatty acids. Although the steps in the biosynthetic and catabolic schemes are closely related, there are specific differences. The individual steps are also independent by their spatial separation in biological cells, as biosynthesis occurs in the cytosol while catabolism takes place in the mitochondria. The even-numbered ($[C_2]_n$) common fatty acids result from the sequential two-carbon elongation of acetyl CoA by a series of enzymatic reactions utilizing one or more molecules of acetyl CoA. The two-step elongation scheme of fatty acid biosynthesis is catalyzed by either discrete enzymes catalyzing specific steps or by a large multi-enzyme complex able to catalyze all steps in the pathway.

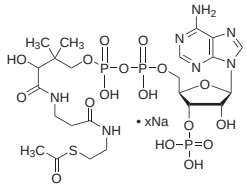
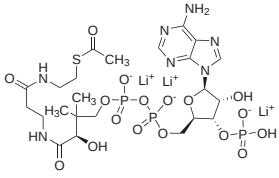
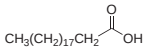
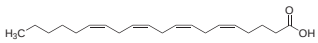
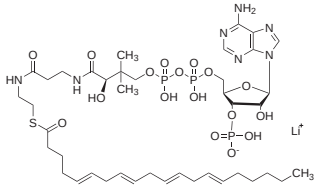
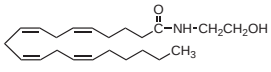
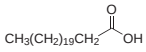
The first step of converting acetyl CoA into the more reactive acetyl-acyl carrier protein (Acetyl-ACP) is catalyzed by ACP transacylase. The acetyl group is then transferred from ACP to a cysteine residue of the synthase complex. In the third step, carboxylation of acetyl CoA is catalyzed by acetyl CoA carboxylase with bicarbonate and ATP to yield malonyl CoA and ADP. In this reaction, biotin acts as a carbon dioxide carrier which transfers carbon dioxide to acetyl CoA. The malonyl group is subsequently converted through a nucleophilic acyl substitution reaction into malonyl-ACP. Thus, both acetyl and malonyl groups are bound to an ACP arm of the synthase complex. The key fifth step consists of the Claisen condensation reaction between the bound acetyl and malonyl groups to give acetoacetyl-ACP. In the sixth step, an enantioselective reduction of the ketone carbonyl group catalyzed by β-ketothioester reductase yields β-hydroxybutyryl-ACP, with a new chiral center in the *R*-configuration. Enzymatic dehydration in step 7 yields *trans*-crotonyl-ACP, which is converted in step 8 by NADPH-dependent reduction of the carbon-carbon double bond to butyryl-ACP.

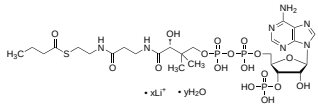
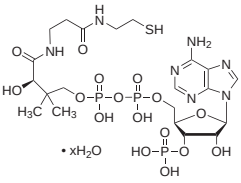
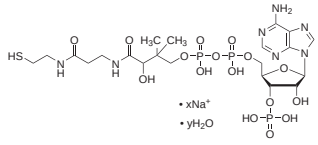
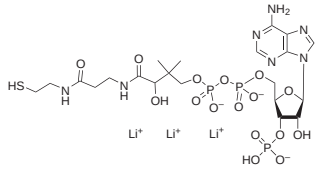
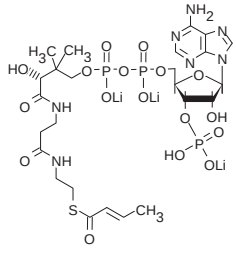
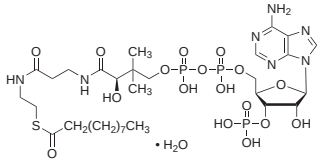
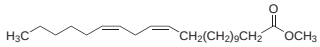
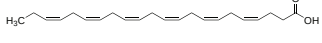
Fatty acid catabolism in the mitochondria of cells provides energy by the β-oxidation pathway and is composed of a repetitive sequence of four enzymatic reaction steps. The fatty acid chain is cleaved from the carboxy-terminus in a stepwise fashion. The first step of the β-oxidation pathway starts with an acyl CoA-dehydrogenase-catalyzed desaturation at C2-C3 using an FAD cofactor to yield an α,β-

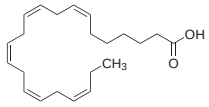
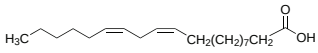
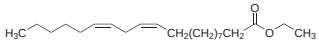
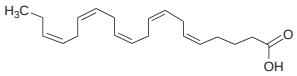
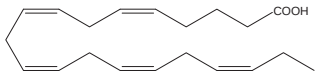
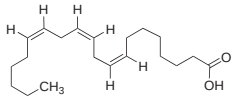
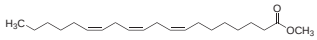
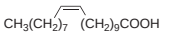
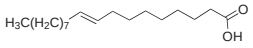
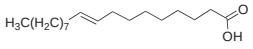
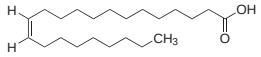
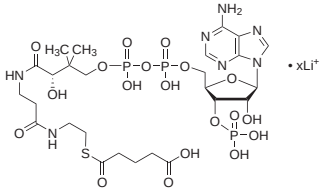
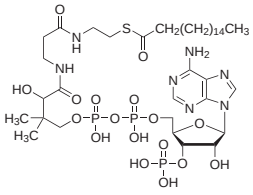


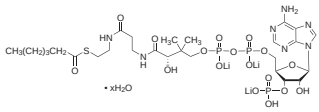
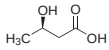
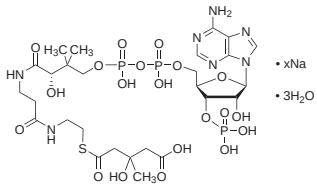
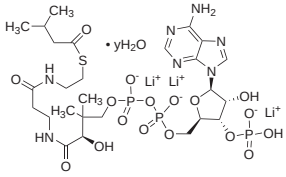
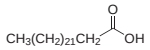
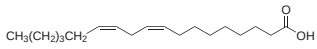
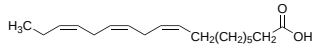
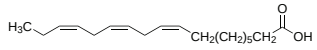
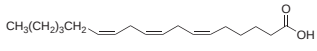
Caption Text?

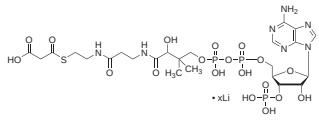
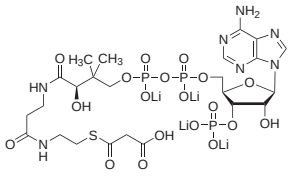
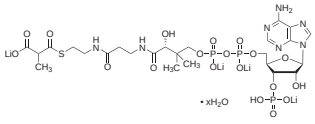
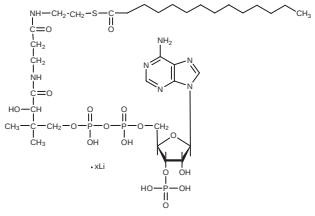
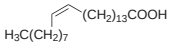
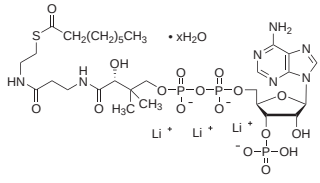
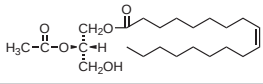
unsaturated acyl-CoA. An enoyl-CoA hydratase-catalyzed *syn*-addition of water to the α,β-unsaturated acyl-CoA in the second step yields 3*S*-hydroxyacyl-CoA. Next, 3*S*-hydroxyacyl-CoA is oxidized to the corresponding β-ketoacyl-CoA by NAD-dependent enantioselective 3-hydroxyacyl-CoA dehydrogenases. In the final step, the β-ketoester is cleaved to two CoA esters in a β-ketoacylthiolase-catalyzed retro-Claisen reaction. While the common fatty acids with an even number of carbon atoms produce two molecules of acetyl-CoA in the final passage, fatty acids with an odd number of carbon atoms lead to one molecule of acetyl-CoA and one molecule of propionyl-CoA.

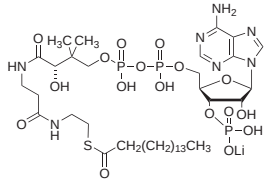
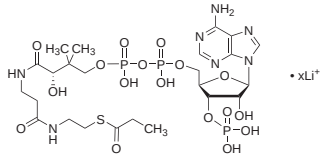
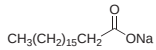
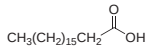
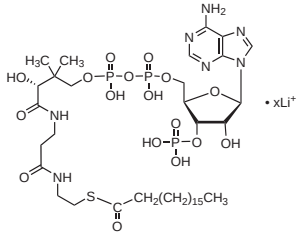
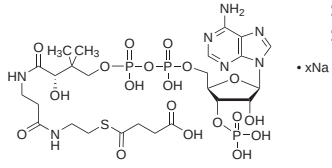
Name	Structure	Cat. No.
Acetoacetyl coenzyme A sodium salt hydrate	-	**A1625-5MG** **A1625-10MG** **A1625-25MG**
Acetyl coenzyme A sodium salt		**A2056-1MG** **A2056-5MG** **A2056-10MG** **A2056-25MG** **A2056-100MG**
Acetyl coenzyme A trilithium salt		**A2181-1MG** **A2181-5MG** **A2181-10MG** **A2181-25MG** **A2181-100MG**
Arachidic acid		**10930-1G** **10930-5G** **10930-25G**
Arachidonic acid		**10931-250MG** **10931-1G**
Arachidonoyl coenzyme A lithium salt		**A5837-5MG** **A5837-10MG**
Arachidonylethanolamide		**A0580-5MG** **A0580-25MG**
Behenic acid		**216941-5G**
2-Butenoyl coenzyme A lithium salt	-	**C6146-5MG** **C6146-10MG** **C6146-25MG**

Name	Structure	Cat. No.
Butyryl coenzyme A lithium salt hydrate		**B1508-5MG** **B1508-10MG** **B1508-25MG**
Coenzyme A hydrate		**C4282-10MG** **C4282-25MG** **C4282-100MG**
Coenzyme A sodium salt hydrate		**C3144-10MG** **C3144-25MG** **C3144-100MG** **C3144-500MG** **C3144-1G**
Coenzyme A trilithium salt		**C3019-10MG** **C3019-25MG** **C3019-100MG** **C3019-500MG** **C3019-1G**
Coenzyme A, oxidized lithium salt	-	**C2643-5MG** **C2643-10MG**
Crotonoyl coenzyme A trilithium salt		**28007-5MG** **28007-25MG**
Decanoyl coenzyme A monohydrate		**D5269-5MG** **D5269-25MG**
3′-Dephosphocoenzyme A	-	**D3385-5MG** **D3385-25MG**
cis-13,16-Docosadienoic acid methyl ester		**D4034-25MG**
cis-4,7,10,13,16,19-Docosahexaenoic acid		**D2534-25MG** **D2534-100MG** **D2534-1G**
cis-4,7,10,13,16,19-Docosahexaenoic acid sodium salt	-	**D8768-5MG** **D8768-25MG**

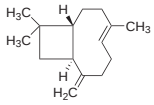
Name	Structure	Cat. No.
all-*cis*-7,10,13,16,19-Docosapentaenoic acid		**D1797-10MG**
cis-11,14-Eicosadienoic acid		**E3127-25MG** **E3127-100MG**
cis-11,14-Eicosadienoic acid ethyl ester		**E7752-25MG**
cis-11,14-Eicosadienoic acid methyl ester	-	**E7877-25MG** **E7877-100MG**
cis-5,8,11,14,17-Eicosapentaenoic acid		**E2011-10MG** **E2011-25MG** **E2011-50MG** **E2011-100MG**
cis-5,8,11,14,17-Eicosapentaenoic acid sodium salt		**E6627-5MG** **E6627-10MG** **E6627-25MG**
cis-5,8,11-Eicosatrienoic acid	-	**E5888-1MG** **E5888-10MG**
cis-8,11,14-Eicosatrienoic acid		**E4504-10MG** **E4504-100MG**
cis-5,8,11-Eicosatrienoic acid methyl ester	-	**E6013-1MG**
cis-8,11,14-Eicosatrienoic acid methyl ester		**E3511-50MG**
cis-11,14,17-Eicosatrienoic acid methyl ester	-	**E6001-100MG**
cis-11-Eicosenoic acid		**E3635-100MG** **E3635-1G**
Elaidic acid		**E4637-1G** **E4637-5G** **E4637-25G**
Elaidic acid		**45090-10G**
Erucic acid		**E3385-1G** **E3385-5G**
Glutaryl coenzyme A lithium salt, min. 90%		**G9510-5MG** **G9510-10MG**
n-Heptadecanoyl coenzyme A lithium salt		**H1385-5MG**

Name	Structure	Cat. No.
Hexanoyl coenzyme A trilithium salt hydrate		**H2012-5MG** **H2012-10MG**
(*R*)-3-Hydroxybutyric acid		**54920**
DL-β-Hydroxybutyryl coenzyme A lithium salt	-	**H0261-10MG** **H0261-25MG**
DL-3-Hydroxy-3-methylglutaryl coenzyme A sodium salt		**H6132-5MG** **H6132-10MG** **H6132-25MG**
Isobutyryl coenzyme A lithium salt	-	**I0383-5MG** **I0383-10MG**
Isovaleryl coenzyme A lithium salt hydrate		**I9381-10MG**
Lauroyl coenzyme A lithium salt	-	**L2659-5MG** **L2659-25MG**
Lignoceric acid		**L6641-100MG** **L6641-1G** **L6641-5G** **L6641-10G**
Linoleic acid		**L1376-10MG** **L1376-500MG** **L1376-1G** **L1376-5G** **L1376-10G** **L1376-25G**
Linolenic acid		**L2376-500MG** **L2376-5G** **L2376-10G**
Linolenic acid		**62170-10ML-F** **62170-50ML-F**
γ-Linolenic acid		**L2378-10MG** **L2378-100MG** **L2378-500MG** **L2378-1G**
Linoleoyl coenzyme A lithium salt, min. 85%	-	**L9754-10MG**

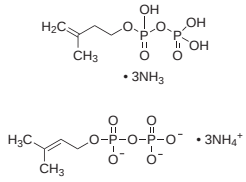
Name	Structure	Cat. No.
Malonyl coenzyme A lithium salt		**M4263-5MG** **M4263-10MG** **M4263-25MG** **M4263-100MG**
Malonyl coenzyme A tetralithium salt		**63410-10MG-F** **63410-50MG-F**
β-Methylcrotonyl coenzyme A lithium salt	-	**M3013-10MG** **M3013-25MG**
Methylmalonyl coenzyme A tetralithium salt hydrate		**M1762-1MG** **M1762-5MG** **M1762-25MG**
Myristoyl coenzyme A lithium salt, min. 80%		**M4414-5MG**
Nervonic acid		**N1514-100MG**
Octanoyl coenzyme A lithium salt hydrate		**O6877-5MG** **O6877-10MG** **O6877-25MG**
1-Oleoyl-2-acetyl-*sn*-glycerol		**O6754-5MG** **O6754-10MG** **O6754-25MG**

Name	Structure	Cat. No.
Oleoyl coenzyme A lithium salt	-	**O1012-5MG** **O1012-10MG**
2-Oleoylglycerol	-	**M2787-1MG** **M2787-5MG** **M2787-10MG**
Palmitoleoyl coenzyme A lithium salt	-	**P6775-5MG** **P6775-10MG**
Palmitoyl coenzyme A lithium salt		**P9716-5MG** **P9716-10MG** **P9716-25MG** **P9716-100MG**
n-Propionyl coenzyme A lithium salt		**P5397-5MG** **P5397-10MG** **P5397-25MG**
Sodium stearate		**S3381-1G** **S3381-5G** **S3381-25G**
Stearic acid		**S4751-1G** **S4751-5G** **S4751-10G** **S4751-25G** **S4751-100G**
Stearoyl coenzyme A lithium salt		**S0802-5MG** **S0802-10MG** **S0802-25MG**
Succinyl coenzyme A sodium salt, Minimum 85%		**S1129-5MG** **S1129-25MG**

Terpenoid Metabolism



The 20,000+ terpenoids found in animals, plants, bacteria, fungi, and archaea are all based on multiples of the 5-carbon isoprene subunit. This is due to biosynthetic pathways that utilize isopentenyl pyrophosphate (IPP) or its isomer dimethylallyl pyrophosphate (DMAPP) as isoprene building blocks for condensation reactions.

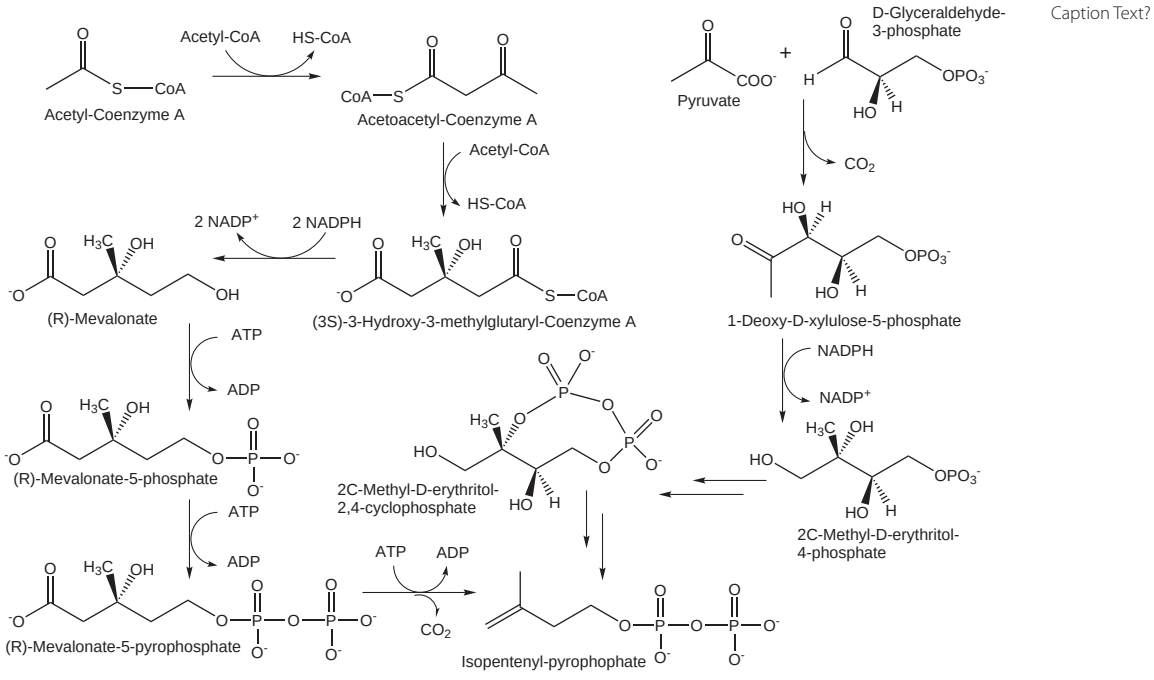


Depending on the biological organism and the terpenoid, two different metabolic pathways exist for the biosynthesis of isopentenyl pyrophosphate:

- the mevalonate pathway and
- the non-mevalonate or methyl D-erythritol 4-phosphate (MEP) pathway.

The mevalonate pathway starts with the formation of acetoacetyl CoA from two molecules of acetyl CoA via Claisen condensation by acetyl-CoA C-acetyltransferase. Acetoacetyl CoA is then condensed with a third molecule of acetyl CoA in an aldol-like reaction catalyzed by hydroxymethylglutaryl-CoA synthase, followed by hydrolysis, to give the metabolite 3-hydroxy-3-methylglutaryl-CoA. In the third step, NADPH-dependent reduction of the thioester group catalyzed by 3-hydroxy-3-methylglutaryl-CoA reductase yields mevalonate. Mevalonate is phosphorylated at the primary hydroxy group by mevalonate kinase to form mevalonate-5-phosphate, which undergoes a second kinase reaction to form mevalonate-5-pyrophosphate. A final phosphorylation at the tertiary hydroxyl group, catalyzed by mevalonate-5-diphosphate decarboxylase, with the simultaneous loss of carbon dioxide and phosphate results in 3-isopentenyl pyrophosphate.

In contrast to the extensively studied and historic mevalonate pathway, the MEP pathway was only discovered in the 1990's and is used by bacteria, algae, and chloroplasts.[1] The first step consists of the 1-deoxy-D-xylulose-5-phosphate synthase-catalyzed coupling of pyruvate with D-glyceraldehyde-3-phosphate to give 1-deoxy-D-xylulose-5-phosphate (DOXP) with concurrent loss of carbon dioxide. Next, an NADPH-dependent rearrangement and reduction reaction is catalyzed by deoxyxylulose-5-phosphate reductoisomerase to produce methyl-D-erythritol 4-phosphate (MEP). MEP is conjugated with cytidine triphosphate (CTP) to produce 4-diphosphocytidyl-2C-methyl-D-erythritol. This intermediate



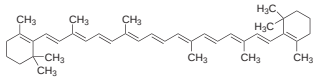
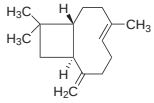
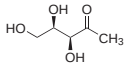
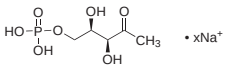
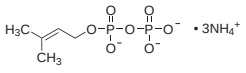
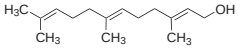
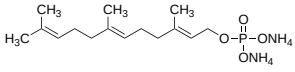
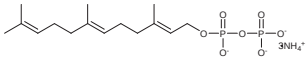
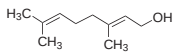
Caption Text?

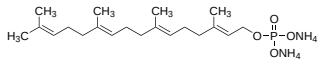
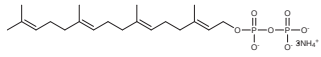
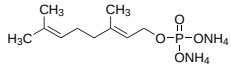
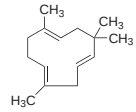
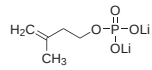
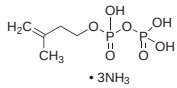
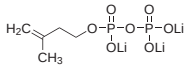
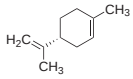
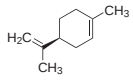
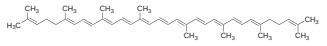
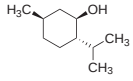
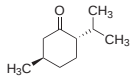
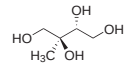
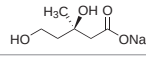
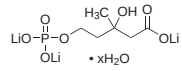
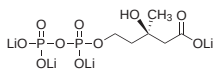
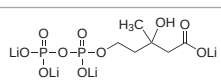
undergoes additional phosphorylation at the 2-position of the erythritol moiety (4-diphosphocytidyl-2C-methyl-D-erythritol 2-phosphate) with subsequent enzymatic cylization and loss of cytidine monophosphate. This metabolite is finally converted to isopentenyl pyrophosphate by the action of two enzymes that reduce the cyclodiphosphate intermediate to a diphosphate and subsequent pyrophosphate.

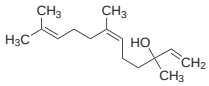
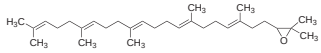
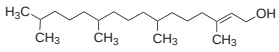
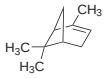
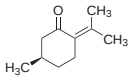
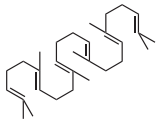
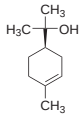
Another important step in the biosynthesis of terpenoids is the isomerization of isopentenyl pyrophosphate to dimethylallyl pyrophosphate catalyzed by isopentenyl pyrophosphate isomerase. These two fundamental metabolites are joined to form geranyl pyrophosphate (GPP). GPP can be elongated with another molecule of isopentenyl pyrophosphate to farnesyl pyrophosphate (FPP) through sequencial condensation by farnesyl pyrophosphate synthetase. Terpenoids with up to 5 isoprenoid units (25 carbons) can be synthesized in this manner, while structures with higher numbers of carbon atoms are formed by dimerization of the corresponding building blocks.

Reference:

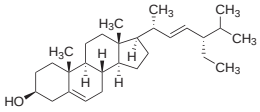
1. Hunger, W.N., et al., Structure and reactivity in the non-mevalonate pathway of isoprenoid biosynthesis. *Biochem. Soc., Trans.*, **31**, 537 (2003).

Name	Structure	Cat. No.
β-Carotene		**22040-1G-F** **22040-5G-F** **22040-25G-F**
(–)-*trans*-Caryophyllene		**22075-1ML-F** **22075-5ML-F** **22075-25ML-F**
1-Deoxy-D-xylulose		**14764-10MG**
1-Deoxy-D-xylulose-5-phosphate sodium salt		**13368-1MG** **13368-5MG**
γ,γ-Dimethylallyl pyrophosphate triammonium salt		**D4287-1VL** **D4287-5VL**
trans,trans-Farnesol		**277541-1G** **277541-10G**
Farnesyl monophosphate ammonium salt solution		**F1803-5VL**
Farnesyl pyrophosphate ammonium salt		**F6892-1VL** **F6892-5VL**
Geraniol		**163333-25G** **163333-100G**
Geranylgeraniol	-	**G3278-100MG**

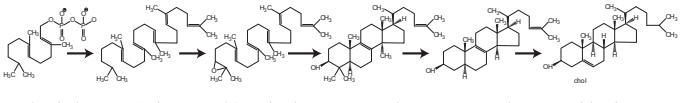
Name	Structure	Cat. No.
Geranylgeranyl monophosphate ammonium salt solution		**G2543-5VL**
Geranylgeranyl pyrophosphate ammonium salt		**G6025-1VL** **G6025-5VL**
Geranyl monophosphate ammonium salt solution		**G2293-1VL** **G2293-5VL**
Geranyl pyrophosphate ammonium salt	-	**G6772-1VL** **G6772-5VL**
α-Humulene		**53675-1ML** **53675-5ML**
Isopentenyl phosphate dilithium salt		**18629**
Isopentenyl pyrophosphate triammonium salt solution		**I0503-1VL** **I0503-5VL**
Isopentenyl pyrophosphate trilithium salt		**00297**
(R)-(+)-Limonene		**183164-5ML** **183164-100ML** **183164-500ML**
(S)-(–)-Limonene		**218367-50G** **218367-250G**
Lycopene		**L9879-1MG** **L9879-5MG** **L9879-10MG**
(–)-Menthol		**15785-100G** **15785-1KG**
(–)-Menthone		**218235-25G** **218235-100G**
2-C-Methyl-D-erythritol		**41707**
(R)-Mevalonic acid sodium salt		**41288-50MG** **41288-10MG**
(±)-Mevalonic acid 5-phosphate trilithium salt hydrate		**79849-10MG** **79849-50MG**
(R)-Mevalonic acid 5-pyrophosphate tetralithium salt		**77631-50MG** **77631-10MG**
(±)-Mevalonic acid 5-pyrophosphate tetralithium salt		**94259-10MG** **94259-50MG**
(R)-(–)-Mevalonolactone		**68519-100MG** **68519-500MG**

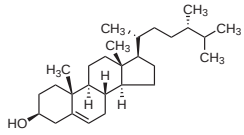
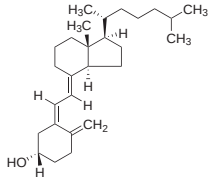
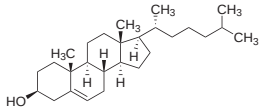
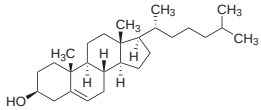
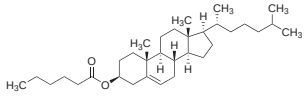
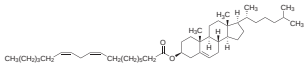
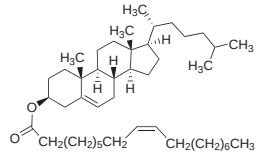
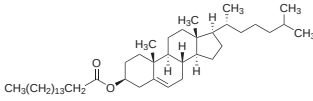
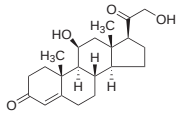
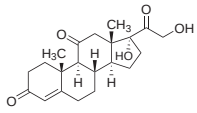
Name	Structure	Cat. No.
(±)-Mevalonolactone		**M4667-1G** **M4667-5G** **M4667-10G**
cis-Nerolidol		**72180-25ML**
2,3-Oxidosqualene		**41043-1MG** **41043-10MG** **41043-50MG**
Phytol, mixture of isomers (~2/1: trans/cis)		**80191-100ML**
(−)-α-Pinene		**P45702-5ML** **P45702-100ML** **P45702-500ML**
(*R*)-(+)-Pulegone		**376388-5G** **376388-100G**
Squalene		**S3626-10ML** **S3626-100ML** **S3626-500ML** **S3626-1L**
(+)-α-Terpineol		**83073-5ML-F**

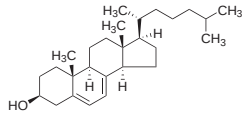
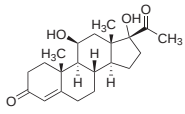
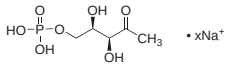
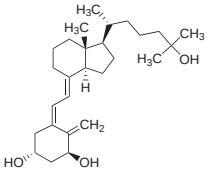
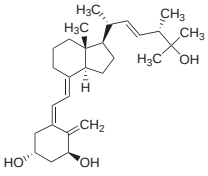
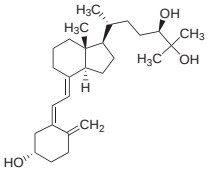
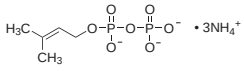
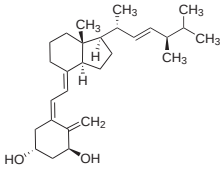
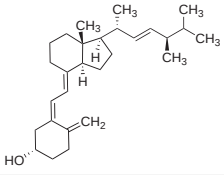
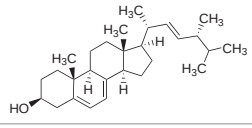
Steroid Metabolism

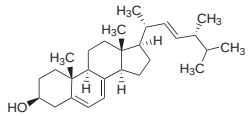
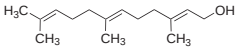
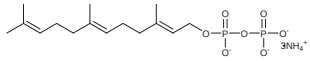
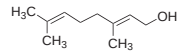
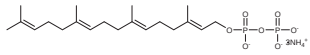
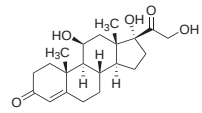
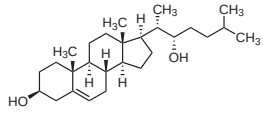
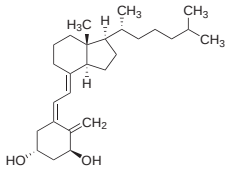
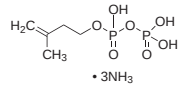
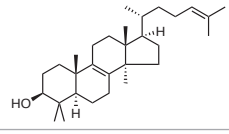
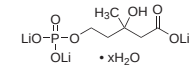
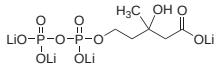
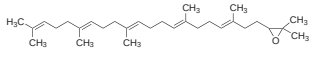
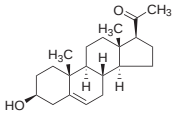


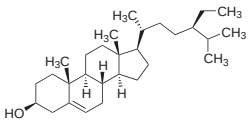
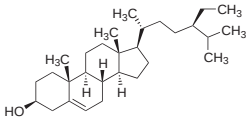
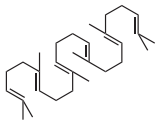
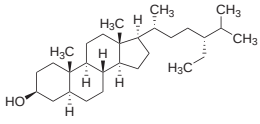
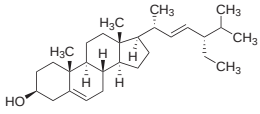
The biosynthesis of steroids originates with farnesyl pyrophosphate through reductive dimerization to squalene by squalene synthase and a subsequent enzymatic conversion of squalene to lanosterol. Enzymatic epoxidation of squalene by squalene epoxidase then yields (3S)-2,3-oxidosqualene. Subsequent catalysis by oxidosqualene-lanosterol cyclase generates four rings, six carbon-carbon bonds, and seven chiral centers in one enzymatic reaction and results in a tetracyclic triterpene steroid frame.



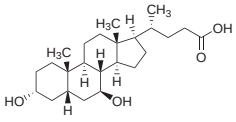
Name	Structure	Cat. No.
Brassicasterol	-	**B4936-5MG**
Campesterol		**C5157-1MG** **C5157-5MG** **C5157-10MG**
Cholecalciferol		**C9756-1G** **C9756-5G**
5α-Cholest-7-en-3β-ol	-	**C3652-25MG** **C3652-100MG**
Cholesterol		**C8667-500MG** **C8667-1G** **C8667-5G** **C8667-25G** **C8667-100G**
Cholesterol		**C8503-25G** **C8503-100G** **C8503-500G** **C8503-1KG** **C8503-5KG**
Cholesteryl arachidonate	-	**C8753-10MG** **C8753-25MG** **C8753-500MG**
Cholesteryl hexanoate		**C6524-25G** **C6524-100G**
Cholesteryl linoleate		**C0289-100MG** **C0289-250MG** **C0289-1G**
Cholesteryl oleate		**C9253-100MG** **C9253-250MG** **C9253-500MG** **C9253-1G**
Cholesteryl palmitate		**C6072-1G** **C6072-10G**
Corticosterone		**C2505-500MG**
Cortisone		**C2755-250MG** **C2755-1G** **C2755-5G**

Name	Structure	Cat. No.
7-Dehydrocholesterol		**D4429-1G** **D4429-5G**
21-Deoxycortisol		**P9521-25MG**
1-Deoxy-D-xylulose-5-phosphate sodium salt		**13368-1MG** **13368-5MG**
Desmosterol	-	**D6513-5MG** **D6513-10MG**
1α,25-Dihydroxyvitamin D_3		**17936-100UG-F** **17936-1MG-F**
1α,25-Dihydroxyvitamin D_2		**17944-1MG-F**
(24R)-24,25-Dihydroxyvitamin D_3		**17943-100UG** **17943-1MG**
γ,γ-Dimethylallyl pyrophosphate triammonium salt		**D4287-1VL** **D4287-5VL**
Doxercalciferol		**D0196-1MG** **D0196-5MG**
Ergocalciferol, activity: ~40000 units/mg		**95220-1G** **95220-5G**
Ergosta-5,7,9(11),22-tetraen-3β-ol	-	**E2634-5MG** **E2634-50MG**
Ergosterol		**E6510-5G** **E6510-10G** **E6510-25G**

Name	Structure	Cat. No.
Ergosterol		**45480-10G-F** **45480-50G-F**
trans,trans-Farnesol		**277541-1G** **277541-10G**
Farnesyl pyrophosphate ammonium salt		**F6892-1VL** **F6892-5VL**
Geraniol		**163333-25G** **163333-100G**
Geranylgeranyl pyrophosphate ammonium salt		**G6025-1VL** **G6025-5VL**
Geranyl pyrophosphate ammonium salt	-	**G6772-1VL** **G6772-5VL**
Hydrocortisone		**H0135-1MG**
22(R)-Hydroxycholesterol	-	**H9384-1MG** **H9384-5MG**
22(S)-Hydroxycholesterol		**H5884-5MG** **H5884-10MG**
17α-Hydroxypregnenolone	-	**H5002-5G**
1α-Hydroxyvitamin D_3		**17946-1MG**
Isopentenyl pyrophosphate triammonium salt solution		**I0503-1VL** **I0503-5VL**
Lanosterol		**L5768-1MG** **L5768-5MG**
(±)-Mevalonic acid 5-phosphate trilithium salt hydrate		**79849-10MG** **79849-50MG**
(±)-Mevalonic acid 5-pyrophosphate tetralithium salt		**94259-10MG** **94259-50MG**
2,3-Oxidosqualene		**41043-1MG** **41043-10MG** **41043-50MG**
5-Pregnen-3β-ol-20-one		**P9129-1G** **P9129-5G** **P9129-25G** **P9129-100G**

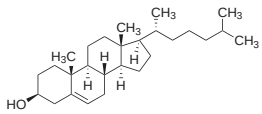
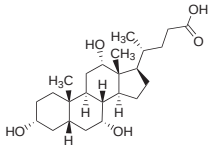
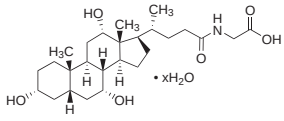
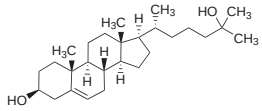
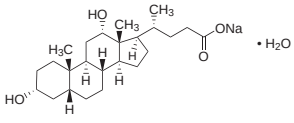
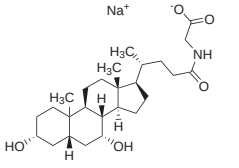
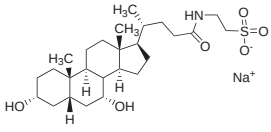
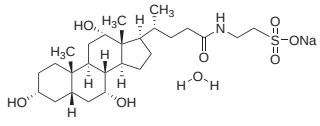
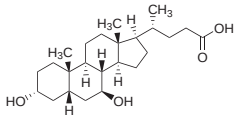
Name	Structure	Cat. No.
β-Sitosterol		**S1270-10MG** **S1270-25MG** **S1270-100MG**
β-Sitosterol		**S9889-1MG** **S9889-5MG** **S9889-10MG**
Squalene		**S3626-10ML** **S3626-100ML** **S3626-500ML** **S3626-1L**
Stigmastanol		**S4297-1G** **S4297-5G**
Stigmasterol		**S2424-1G** **S2424-5G** **S2424-10G** **S2424-25G**

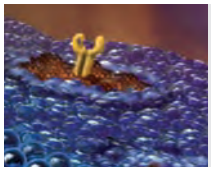
Bile Acid Metabolism



Mammalian cells use multiple biochemical pathways to break down cholesterol into more polar, water-soluble bile acids that can function as emulsifying agents. A series of enzymatic reaction steps involving 7α-hydroxylations, epimerization of the 3β-hydroxy group, saturation of the double bond, and side-chain cleavage or oxidation convert cholesterol into the bile acid chenodeoxycholic acid.

7-Deoxycholic acid is formed along a similar pathway, with an additional 12α-hydroxylation and removal of the 7-hydroxy group. The hydrophobic/hydrophilic balance of the various bile acids facilitate the solubilization of monoacylglycerols, fat-soluble vitamins, and other lipids. This helps digestion and absorption but is also required for solubilization and excretion of lipophilic metabolites such as bilirubin.

Name	Structure	Cat. No.
Cholesterol		**20808-100G-R** **20808-1KG-R**
Cholic acid		**C1129-25G** **C1129-100G** **C1129-500G** **C1129-1KG**
Glycocholic acid hydrate		**G2878-100MG** **G2878-500MG** **G2878-1G** **G2878-5G** **G2878-25G**
25-Hydroxycholesterol		**H1015-10MG** **H1015-25MG** **H1015-100MG**
Sodium deoxycholate monohydrate		**30968-25G**
Sodium glycochenode-oxycholate		**G0759-25MG** **G0759-100MG** **G0759-500MG** **G0759-1G** **G0759-10G** **G0759-25G**
Sodium taurochenodeoxy cholate		**T6260-100MG** **T6260-250MG** **T6260-1G** **T6260-5G**
Taurocholic acid sodium salt hydrate		**T9034-1G** **T9034-5G** **T9034-25G**
Ursodeoxycholic acid		**U5127-1G** **U5127-5G** **U5127-25G**



Isotopically Labeled Metabolites

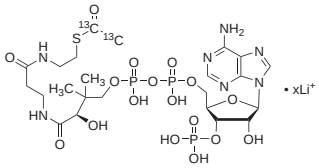
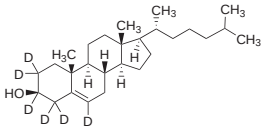
Isotopically Labeled Metabolites

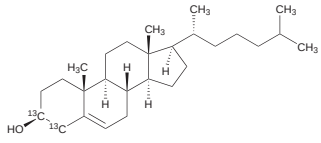
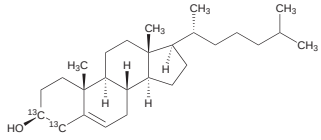
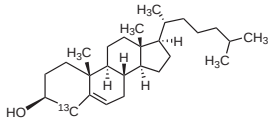
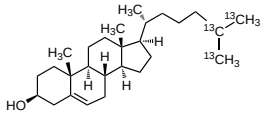
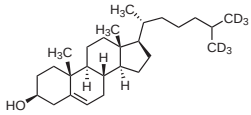
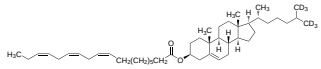
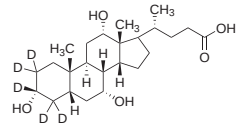
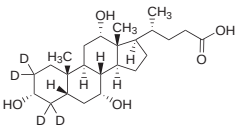
As the body's major source of fuel, the study of fat metabolism is an area of interest and importance. The increased availability of stable isotopically labeled fatty acids and related compounds has aided in the steady accumulation of information surrounding lipid metabolism. Labeled fatty acids have been used in numerous research areas including fatty acid oxidation[1], lipid kinetics[2], quantitative lipid analyses[3], lipid synthesis[4], and fat absorption.[1] Information gathered from stable isotope tracer studies has added to our understanding of the metabolic pathways and the metabolic fate of certain fatty acids.

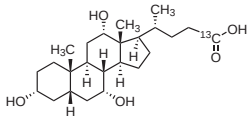
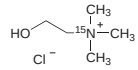
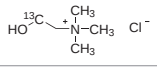
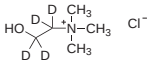
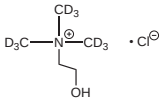
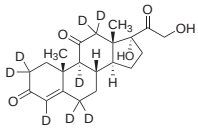
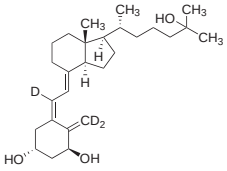
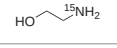
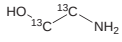
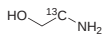
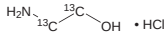
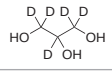
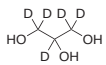
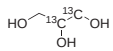
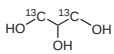
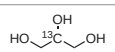
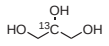
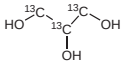
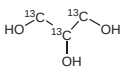
The safe labeling of lipids by non-radioactive isotopes has been crucial for advancements in the study of the structural biology of membranes, magnetic resonance imaging and spectroscopy, nutrition science, and metabolomics. The availability of ^{13}C- and ^{15}N-labeled lipids and lipid precursors has enabled selective isotope labeling of membranes by biosynthetic incorporation of a labeled lipid. Lipid metabolism can therefore be studied in several dimensions: at the whole organism level, at the level of individual membranes, or in the small molecule pathways of lipid conversions.

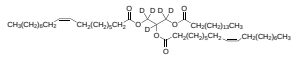
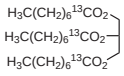
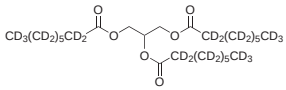
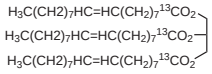
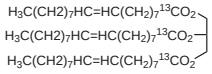
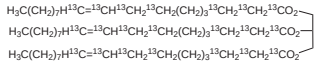
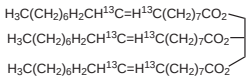
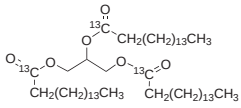
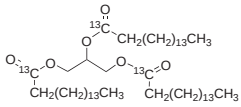
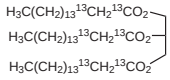
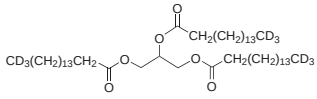
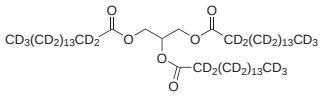
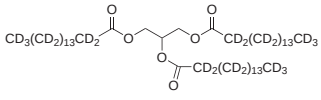
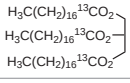
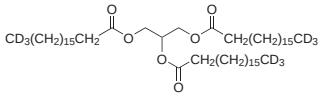
References:

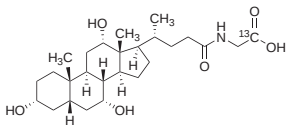
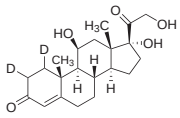
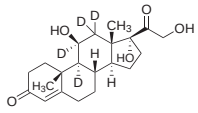
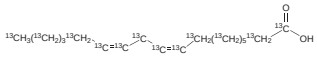
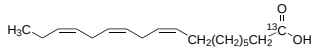
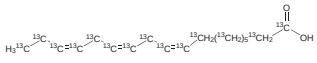
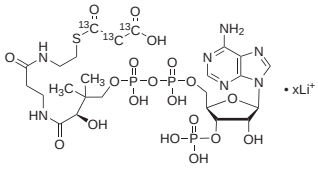
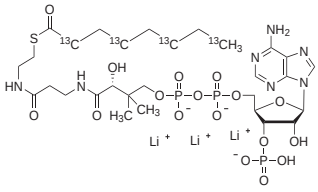
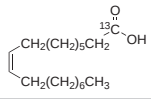
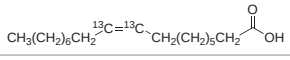
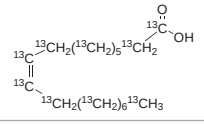
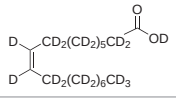
1. Wolfe, R.R. and Chinkes, D.L.; *Isotope Tracers in Metabolic Research, Principles and Practice of Kinetic Analysis*, 2nd ed.; John Wiley & Sons, Inc.: Hoboken, New Jersey, 2005; pp 259-298.
2. Adiels, M., Larsson, T., Sutton, P., Taskinen, M.-R., Borén, J., and Fielding, B.A.; *Rapid Commun. Mass Spectrom*. **2010**, *24*, 586-592.
3. Sun, D., Cree, M.G., and Wolfe, R.R.; *Anal. Biochem*. **2006**, *349*, 87-95.
4. Bergman, B.C., Perreault, L., Hunerdosse, D.M., Koehler, M.C., Samek, A.M., and Eckel, R.H.; *J. Appl. Physiol*. **2010**, *108*, 1134-1141.
5. Jauregui, R.C., Mattes, R.D., and Parks, E.J.; *Gastroenterology* **2010**, in press.

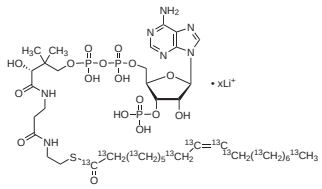
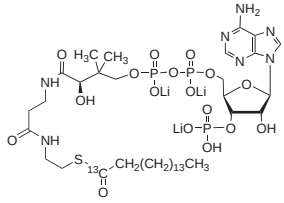
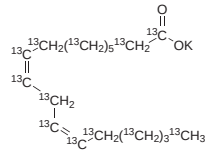
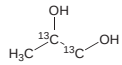
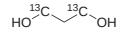
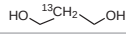
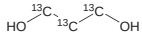
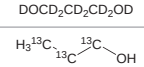
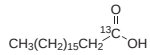
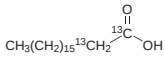
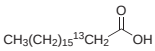
Name	Structure	Cat. No.
Acetyl-1,2-$^{13}C_2$ coenzyme A lithium salt		**658650**
Cholesterol-2,2,3,4,4,6-d_6		**488577-100MG**

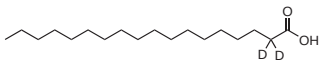
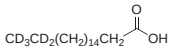
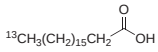
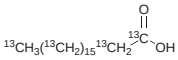
Name	Structure	Cat. No.
Cholesterol-3,4-$^{13}C_2$		**488585**
Cholesterol-3,4-$^{13}C_2$		**662291**
Cholesterol-4-^{13}C		**605875**
Cholesterol-25,26,27-$^{13}C_3$		**707678**
Cholesterol-26,26,26,27,27,27-d_6		**679046**
Cholesteryl-26,26,26,27,27,27-d_6 linolenate		**730238**
Cholic-2,2,3,4,4-d_5 acid		**614106**
Cholic acid-2,2,4,4-d_4		**614149-500MG**

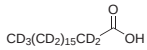
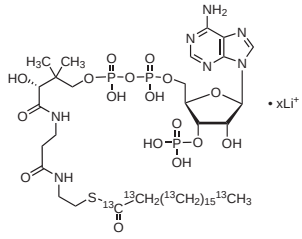
Name	Structure	Cat. No.
Cholic-24-^{13}C acid		**605883**
Choline chloride-^{15}N		**609269-1G**
Choline chloride-1-^{13}C		**605301**
Choline chloride-1,1,2,2-d_4		**615544**
Choline chloride-trimethyl-d_9		**492051-1G**
Cortisone-2,2,4,6,6,9,12,12-d_8		**705586-5MG**
1α,25-Dihydroxyvitamin D_3 (6,19,19-d_3)		**705942-1MG**
Ethanolamine-^{15}N		**609552**
Ethanolamine-$^{13}C_2$		**606294**
Ethanolamine-2-^{13}C		**606316**
Ethanolamine-$^{13}C_2$ hydrochloride		**606308-100MG**
Glycerol-1,1,2,3,3-d_5		**454524-1G** **454524-5G**
Glycerol-1,1,2,3,3-d_5		**661473**
Glycerol-1,2-$^{13}C_2$		**714895**
Glycerol-1,3-$^{13}C_2$		**492639-250MG**
Glycerol-2-^{13}C		**489484**
Glycerol-2-^{13}C		**661465**
Glycerol-$^{13}C_3$		**489476-500MG**
Glycerol-$^{13}C_3$		**660701**

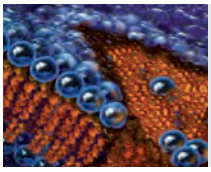
Name	Structure	Cat. No.
rac-Glyceryl-d_5-2,3-dioleate-1-palmitate		**730076**
Glyceryl tri(octanoate-1-^{13}C)		**425893**
Glyceryl tri(octanoate-d_{15})		**617121**
Glyceryl tri(oleate-1-^{13}C)		**489514-500MG**
Glyceryl tri(oleate-1-^{13}C)		**714771**
Glyceryl tri(oleate-1,2,3,7,8,9,10-$^{13}C_7$)		**646253**
Glyceryl tri(oleate-9,10-$^{13}C_2$)		**646245**
Glyceryl tri(palmitate-1-^{13}C)		**425907-1G**
Glyceryl tri(palmitate-1-^{13}C)		**680842**
Glyceryl tri(palmitate-1,2-$^{13}C_2$)		**605603**
Glyceryl tri(palmitate-16,16,16-d_3)		**615471**
Glyceryl tri(palmitate-d_{31})		**616966**
Glyceryl tri(palmitate-d_{31}), S&P tested		**660698**
Glyceryl tri(stearate-1-^{13}C)		**492663-250MG**
Glyceryl tri(stearate-18,18,18-d_3)		**616117**

Name	Structure	Cat. No.
Glycocholic acid-glycyl-1-^{13}C		**605891**
Hydrocortisone-1α,2α-d_2		**614157**
Hydrocortisone-9,11,12,12-d_4		**705594-5MG** **705594-10MG**
Linoleic acid-$^{13}C_{18}$		**605735-100MG**
Linolenic Acid-1-^{13}C		**694940**
Linolenic acid-$^{13}C_{18}$		**605743-100MG**
Malonyl-$^{13}C_3$ coenzyme A lithium salt		**655759**
Octanoyl-2,4,6,8-$^{13}C_4$ Coenzyme A, lithium salt		**703885**
Oleic acid-1-^{13}C		**661589**
Oleic acid-9,10-$^{13}C_2$		**646466**
Oleic acid-$^{13}C_{18}$		**490431-100MG**
Oleic acid-d_{34}		**683582**

Name	Structure	Cat. No.
Oleoyl-$^{13}C_{18}$ coenzyme A lithium salt		**675768**
Palmitoyl-1-^{13}C coenzyme A lithium salt		**658200**
Potassium linoleate-$^{13}C_{18}$		**605816**
1,2-Propanediol-1,2-$^{13}C_2$		**603678**
1,2-Propane-d_6-diol		**614416**
1,2-Propanediol-d_8		**486272-5G**
1,3-Propanediol-1,3-$^{13}C_2$		**603554**
1,3-Propanediol-2-^{13}C		**491101**
1,3-Propanediol-$^{13}C_3$		**603562**
1,3-Propane-d_6-diol	$HOCD_2CD_2CD_2OH$	**613525**
1,3-Propanediol-d_8	$DOCD_2CD_2CD_2OD$	**589535**
1-Propanol-$^{13}C_3$		**640689**
Propionaldehyde-1-^{13}C		**603813**
Propionaldehyde-2,2-d_2		**588113**
Propionaldehyde-2,2,3,3,3-D_5		**707201**
Stearic acid-1-^{13}C		**299162-1G**
Stearic acid-1,2-$^{13}C_2$		**591602**
Stearic acid-2-^{13}C		**591491**

Name	Structure	Cat. No.
Stearic acid-2,2-d_2		**493155-1G**
Stearic-17,17,18,18,18-d_5 acid		**615846**
Stearic acid-18-^{13}C		**605654**
Stearic acid-$^{13}C_{18}$		**605581-100MG**
Stearic acid-18,18,18-d_3	-	**490393-250MG**

Name	Structure	Cat. No.
Stearic-d_{35} acid		**448249-250MG** **448249-1G**
Stearoyl-$^{13}C_{18}$ coenzyme A lithium salt		**675776**



Characteristic Metabolites for Inborn Errors of Lipid Metabolism

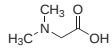
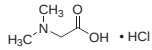
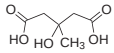
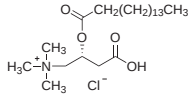
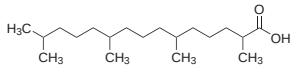
Hereditary disorders in lipid metabolism include Tay-Sachs disease, Gaucher disease, Niemann-Pick disease, metachromatic leucodystrophy, Fabry disease, Refsum disease, and Tangier disease. These lipidoses are characterized by dysfunctional lipid metabolism and result in abnormal metabolite accumulations. One of the first disorders recognized as an inborn error of lipid metabolism was Refsum disease, which produces toxic levels of phytanic acid if untreated.

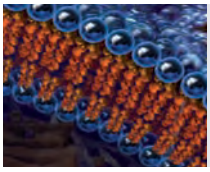
Gaucher disease is a progressive sphingolipid-degradation disease characterized by genetic mutations in the lysosomal enzyme glucocerebrosidase, which leads to decreased enzymatic activity. Measurements of the metabolites methylcholine, phosphatidylcholine, and sphingomyelin are important for studying the pathophysiology of Gaucher disease. The main therapy used to treat Gaucher disease is enzyme-replacement therapy in order to normalize sphingolipid degradation and to prevent tissue damage caused by sphingolipid accumulation. Another promising therapeutic approach to Gaucher disease is to decrease the tissue glucocerebrosidase level to a concentration which can be cleared by the existing glucocerebrosidase.

A deficiency of the lysosomal enzyme α-galactosidase A results in the progressive accumulation of the glycosphingolipids globotriaosylceramide Gb3 and digalactosyl-ceramide in Fabry disease, which can cause early death from cardiac, renal, and cerebrovascular events.

Dimethylglycine dehydrogenase (DMGDH) deficiency is an inborn error of choline metabolism caused by a mutation in the gene *hDMGDH* and results in increased N,N-dimethylglycine concentrations of 100-fold in serum and 20-fold in urine.

Nine inborn errors of bile acid metabolism have been identified that result in enzyme deficiencies and damaged bile acid biosynthesis in infants, children, and adults. Since bile acids have several important physiological functions, such as emulsifying fats and fat-soluble vitamins, and involvement in cholesterol, bilirubin, xenobiotics, and drug metabolites elimination, a failure in the multistep enzymatic conversion of cholesterol to bile acids will accumulate unusual bile acids and metabolic intermediates.

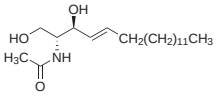
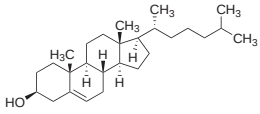
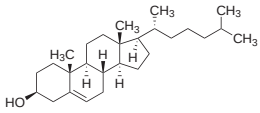
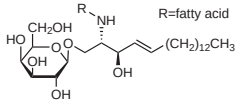
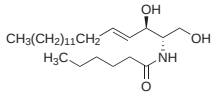
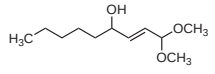
Name	Structure	Cat. No.
O-Acetyl-L-carnitine hydrochloride		**A6706-1G** **A6706-5G**
N,N-Dimethylglycine		**D1156-10MG** **D1156-5G** **D1156-10G** **D1156-25G**
N,N-Dimethylglycine hydrochloride		**D6382-5G** **D6382-25G**
Globotriaosylsphingosine from porcine blood	-	**G9534-1MG**
DL-Hexanoylcarnitine chloride	-	**H2132-25MG**
3-Hydroxy-3-methylglutaric acid		**H4392-100MG** **H4392-1G**
Palmitoyl-L-carnitine chloride		**P1645-5MG** **P1645-10MG** **P1645-25MG**
Palmitoyl-DL-carnitine chloride		**P4509-100MG** **P4509-1G**
Phytanic acid, mixture of isomers	-	**P4060-5MG** **P4060-25MG**
Pristanic acid solution, mixture of isomers		**P6617-5MG**

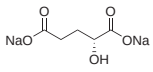
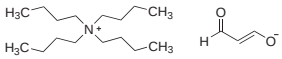
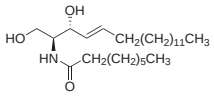


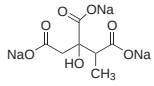
Lipid Metabolites as Biomarkers for the Differentiation of Diseased and Healthy Cells

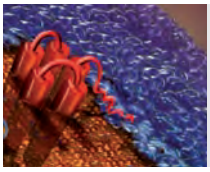
The human body regulates cellular lipid concentrations by location and time, and deregulation is associated with a variety of human diseases. In addition to disorders due to inborn errors of lipid metabolism, diseases like cardiovascular disease, diabetes, cancer, infections, and neurodegenerative diseases are frequently lipid related. A key feature of diabetes, obesity, and atherosclerosis is excessive lipid accumulation in cells. Excess energy is stored as triacylglycerols for later use when nutrients are scarce. These triacylglycerols, along with the precursors to membrane lipids, are stored in cytoplasmic lipid droplets in eukaryotic cells. Host-pathogen interactions in lipid metabolism are also of interest in infectious disease research since pathogenic microorganisms can use the host's lipids as a carbon and energy source, which provides an advantage to the pathogen in persistence, virulence, and overcoming host immune responses. Major drug classes like the statins and cyclooxygenase (COX) inhibitors target enzymes involved in lipid metabolism. Increased concentrations of lysophosphatidylcholines and decreased concentrations of antioxidative ether phospholipids in serum have been associated with acquired obesity. Detailed analysis of the local concentrations of lipids, their precursors, and metabolites as a function of time will aid the understanding of their roles in the vital functions of cells.

Next to adipose tissue, the central nervous system has the highest cellular lipid concentration. Injuries and disorders of the CNS may be influenced by changes in lipid metabolism. The accumulation of LDL-derived lipids in the arterial wall results in atherosclerosis and is a risk factor for stroke. Lipid metabolism is altered by tumor necrosis factor-α (TNF-α) and interleukin-1 (IL-1), which stimulate production of eicosanoids, ceramide, and reactive oxygen species. Reactive oxygen species that exceed the cell's capability for detoxification result in oxidative stress yielding oxidized phospholipids that are metabolized to 4-hydroxynonenal, 4-oxo-2-nonenal, and acrolein. Neurodegenerative diseases, CNS injuries, and brain traumas can be influenced by lipid oxidation because of the high lipid content and oxygen consumption of the brain. Sphingomyelin accumulation results from acidic sphingomyelinase deficiency in Niemann-Pick disease A and B, while cholesterol accumulation occurs in Niemann-Pick disease C due to mutations in either the *NPC1* or *NPC2* genes. Cholesterol is an important regulator of lipid organization and a precursor for neurosteroid biosynthesis. The gene encoding the apolipoprotein E4 variant of the principal cholesterol carrier protein in the brain (the E4 allele of *APOE*) is a significant risk factor for Alzheimer's disease. Lipid peroxidation due to phospholipase activation may contribute in part to Parkinson's disease.

Name	Structure	Cat. No.
N-Acetyl-D-sphingosine		**A7191-1MG** **A7191-5MG**
Acrolein		**01679-10ML**
Cholesterol		**C8667-500MG** **C8667-1G** **C8667-5G** **C8667-25G** **C8667-100G**
Cholesterol		**20808-100G-R** **20808-1KG-R**
Galactocerebrosides from bovine brain		**C4905-10MG** **C4905-25MG**
L-α-Glycerophosphoryl-choline	-	**G5291-10MG** **G5291-50MG** **G5291-100MG**
N-Hexanoyl-D-sphingosine		**H6524-1MG** **H6524-5MG**
HNE-DMA		**H9538-2MG** **H9538-5MG**

Name	Structure	Cat. No.
D-α-Hydroxyglutaric acid disodium salt		**H8378-25MG** **H8378-100MG** **H8378-250MG**
Malondialdehyde tetrabutylammonium salt		**63287-1G-F** **63287-5G-F**
N-Palmitoyl-D-sphingomyelin semisynthetic from bovine brain sphingomyelin	-	**P6778-1MG** **P6778-10MG**
N-Octanoyl-D-sphingosine		**O1882-5MG**

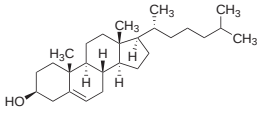
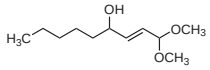
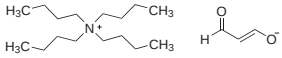
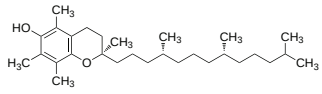
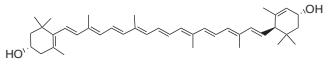
Name	Structure	Cat. No.
Sphingomyelin		**S7004-5MG** **S7004-10MG** **S7004-50MG** **S7004-100MG** **S7004-500MG**
Sphingomyelin		**S0756-50MG** **S0756-100MG** **S0756-500MG**
Trisodium (*2RS,3RS*)-2-methylcitrate		**59464-10MG** **59464-50MG**

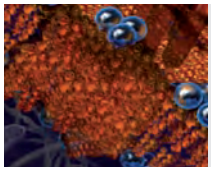


Altered Lipid Metabolites in Aging

The development of cognitive and neurodegenerative disorders, cardiovascular diseases, metabolic disorders, bone diseases, certain forms of cancer, and autoimmune diseases with increasing age has been associated with the stability of the cell and biochemical reactions within it. Like DNA and proteins, lipids are sensitive to reactive oxygen species that produce oxidative stress. Endogenous aldehydes, such as malonic dialdehyde and methylglyoxal, are the major initiators of metabolic disorders. Age-related diseases develop when cells cannot control aldehyde formation or abolish the negative methylglyoxal effect on their metabolism. Toxic aldehydes cause cumulative damage over a lifetime if not counteracted by the cell's ability to avoid the formation of endogenous aldehydes or to neutralize their negative effects without damaging vital cellular components. The aging process and the individual's life span is influenced by the balance of the two opposing processes of anti-aging effects and the aging effects of toxic aldehydes.

Cholesterol levels in human serum above 6.5 mmol/L are known to be associated with a higher risk of developing Alzheimer's disease, while a reduction of cholesterol in the serum in midlife lowers the risk of dementia. Bile acids act as regulators of aging that benefit health and longevity and modulate housekeeping longevity assurance pathways. It is likely that the mechanisms for the positive effects of bile acids are evolutionarily conserved. The time-dependent accumulation of age pigments like lipofuscin occurs in all cells, but it is more prominent in cells which are not active in cell division. These age pigments appear together with lipid droplets in the cytoplasm.

Name	Structure	Cat. No.
Cholesterol		**C8667-500MG** **C8667-1G** **C8667-5G** **C8667-25G** **C8667-100G**
HNE-DMA		**H9538-2MG** **H9538-5MG**
Malondialdehyde tetrabutylammonium salt		**63287-1G-F** **63287-5G-F**
Methylglyoxal solution		**M0252-25ML** **M0252-100ML** **M0252-250ML** **M0252-500ML** **M0252-1L**
(+)-α-Tocopherol, activity: ≥1000 IU/g		**T1539-25G** **T1539-100G**
Xanthophyll		**X6250-1MG** **X6250-5MG**



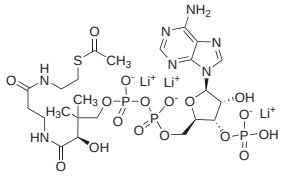
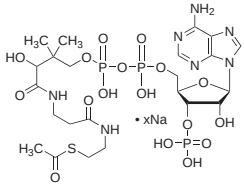
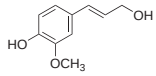
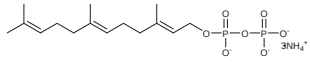
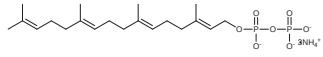
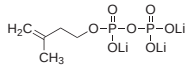
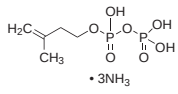
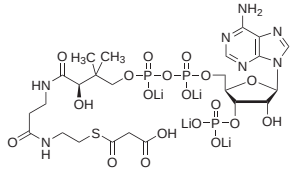
Lipid Metabolites in Natural Product Biosynthesis

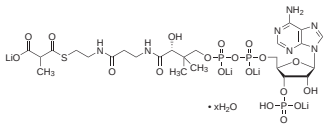
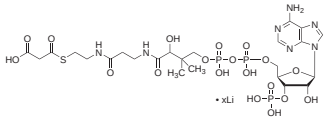
Lipid Metabolites in Natural Product Biosynthesis

Many natural compounds contain tailor-made lipid anchors or lipid-like functional groups intended to localize them on the cellular membrane. Natural products with lipid anchors are of interest for a number of cell migration processes of healthy and diseased cells like wound healing, blood vessel formation, immune system function, and tumor metastasis. Certain lipid components of the cell membrane itself, such as phosphatidylglycerol, cardiolipin, or glycosylphosphatidylinositol, can also serve directly as anchors. These phospholipids are listed in the section on natural abundance lipid metabolites.

Lipids in the cell walls and membranes of pathogenic microorganisms and their related pathways are of particular interest for the development of novel bioactive compounds, especially if they have no eukaryotic counterparts. Antibiotics like the phosphoglycolipids are the only known active site inhibitors of the peptidoglycan glycosyltransferases, which are involved in the biosynthesis of the bacterial cell wall. The lipoteichoic acids of the cell wall of Gram-positive bacteria, anchored by their diacylglycerol moiety, are recognized by the innate immune system, making them an interesting scaffold for new approaches to natural therapeutic products. In Gram-positive bacteria, lipid A is of interest for the development of immunostimulating compounds and vaccine adjuvants.

The biosynthesis of eicosanoids such as prostaglandins, thromboxanes, and leukotrienes begins with arachidonic acid and involves a series of enzymatic reactions including radical formation, reaction with oxygen and cyclization, and reduction. Polyacetylenic natural products contain a unique carbon-carbon triple bond and have a wide variety of biochemical and ecological functions. Initial departure points from primary metabolism include the three fatty acids crepenynic acid, stearolic acid, and tariric acid.

Name	Structure	Cat. No.
Acetyl coenzyme A trilithium salt		**A2181-1MG** **A2181-5MG** **A2181-10MG** **A2181-25MG** **A2181-100MG**
Acetyl coenzyme A sodium salt		**A2056-1MG** **A2056-5MG** **A2056-10MG** **A2056-25MG** **A2056-100MG**
Coniferyl alcohol		**223735-100MG** **223735-1G**
Farnesyl pyrophosphate ammonium salt		**F6892-1VL** **F6892-5VL**
Geranylgeranyl pyrophosphate ammonium salt		**G6025-1VL** **G6025-5VL**
Geranyl pyrophosphate ammonium salt	-	**G6772-1VL** **G6772-5VL**
Isopentenyl pyrophosphate trilithium salt		**00297**
Isopentenyl pyrophosphate triammonium salt solution		**I0503-1VL** **I0503-5VL**
Malonyl coenzyme A tetralithium salt		**63410-10MG-F** **63410-50MG-F**

Name	Structure	Cat. No.
Methylmalonyl coenzyme A tetralithium salt hydrate		**M1762-1MG** **M1762-5MG** **M1762-25MG**
Malonyl coenzyme A lithium salt		**M4263-5MG** **M4263-10MG** **M4263-25MG** **M4263-100MG**
Lipoteichoic acid from *Streptococcus pyogenes*	-	**L3140-5MG** **L3140-10MG** **L3140-25MG**
Lipoteichoic acid from *Streptococcus faecalis*	-	**L4015-5MG** **L4015-25MG**

Name	Structure	Cat. No.
Lipoteichoic acid from *Staphylococcus aureus*	-	**L2515-5MG** **L2515-10MG** **L2515-25MG**
Lipoteichoic acid from *Bacillus subtilis*	-	**L3265-5MG** **L3265-25MG**
Lipid A, monophosphoryl from *Salmonella enterica* serotype minnesota Re 595 (Re mutant)	-	**L6895-1MG** **L6895-5MG**
Lipid A, monophosphoryl from *Escherichia coli* F583 (Rd mutant)	-	**L6638-1MG** **L6638-5MG**
Lipid A, diphosphoryl from *Salmonella enterica* serotype minnesota Re 595 (Re mutant)	-	**L0774-1MG** **L0774-5MG**
Lipid A, diphosphoryl from *Escherichia coli* F583 (Rd mutant)	-	**L5399-1MG** **L5399-5MG**
L-NASPA	-	**P0247-1MG** **P0247-5MG**

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