

Ceramide turnover (version 2019.4) in the IUPHAR/BPS Guide to Pharmacology Database

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Abstract

Ceramides are a family of sphingophospholipids synthesized in the endoplasmic reticulum, which mediate cell stress responses, including apoptosis, autophagy and senescence, Serine palmitoyltransferase generates 3-ketosphinganine, which is reduced to sphinganine (dihydrosphingosine). N-Acylation allows the formation of dihydroceramides, which are subsequently reduced to form ceramides. Once synthesized, ceramides are trafficked from the ER to the Golgi bound to the ceramide transfer protein, CERT (*COL4A3BP*, *Q9Y5P4*). Ceramide can be metabolized via multiple routes, ensuring tight regulation of its cellular levels. Addition of phosphocholine generates sphingomyelin while carbohydrate is added to form glucosyl- or galactosylceramides. Ceramidase re-forms sphingosine or sphinganine from ceramide or dihydroceramide. Phosphorylation of ceramide generates ceramide phosphate. The determination of accurate kinetic parameters for many of the enzymes in the sphingolipid metabolic pathway is complicated by the lipophilic nature of the substrates.

Contents


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[Ceramide turnover](#)

<http://www.guidetopharmacology.org/GRAC/FamilyDisplayForward?familyId=767>

[Serine palmitoyltransferase](#)

<http://www.guidetopharmacology.org/GRAC/FamilyDisplayForward?familyId=788>

Enzymes

SPT1(serine palmitoyltransferase long chain base subunit 1)

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2509>

SPT2(serine palmitoyltransferase long chain base subunit 2)

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2510>

SPT3(serine palmitoyltransferase long chain base subunit 3)

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2511>

SPTSSA(serine palmitoyltransferase small subunit A)

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2512>

SPTSSB(serine palmitoyltransferase small subunit B)

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2513>

3-ketodihydrosphingosine reductase

<http://www.guidetopharmacology.org/GRAC/FamilyDisplayForward?familyId=791>

Enzymes

3-ketodihydrosphingosine reductase

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2463>

Ceramide synthase

<http://www.guidetopharmacology.org/GRAC/FamilyDisplayForward?familyId=789>

Enzymes

CERS1(ceramide synthase 1)

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2474>

CERS2(ceramide synthase 2)

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2475>

CERS3(ceramide synthase 3)

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2476>

CERS4(ceramide synthase 4)

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2477>

CERS5(ceramide synthase 5)

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2478>

CERS6(ceramide synthase 6)

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2479>

Sphingolipid Δ^4 -desaturase

<http://www.guidetopharmacology.org/GRAC/FamilyDisplayForward?familyId=790>

Enzymes

delta 4-desaturase, sphingolipid 1

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2484>

delta 4-desaturase, sphingolipid 2

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2485>

Sphingomyelin synthase

<http://www.guidetopharmacology.org/GRAC/FamilyDisplayForward?familyId=774>

Enzymes

sphingomyelin synthase 1

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2520>

sphingomyelin synthase 2

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2521>

sterile alpha motif domain containing 8

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2525>

Sphingomyelin phosphodiesterase

<http://www.guidetopharmacology.org/GRAC/FamilyDisplayForward?familyId=773>

Enzymes

sphingomyelin phosphodiesterase 1

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2514>

sphingomyelin phosphodiesterase 2

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2515>

sphingomyelin phosphodiesterase 3

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2516>

sphingomyelin phosphodiesterase 4

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2517>

sphingomyelin phosphodiesterase acid-like 3A

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2518>

sphingomyelin phosphodiesterase acid-like 3B

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2519>

Neutral sphingomyelinase coupling factors

<http://www.guidetopharmacology.org/GRAC/FamilyDisplayForward?familyId=772>

Enzymes

embryonic ectoderm development

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2487>

neutral sphingomyelinase activation associated factor

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2495>

Ceramide glucosyltransferase

<http://www.guidetopharmacology.org/GRAC/FamilyDisplayForward?familyId=775>

Enzymes

UDP-glucose ceramide glucosyltransferase

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2528>

Acid ceramidase

<http://www.guidetopharmacology.org/GRAC/FamilyDisplayForward?familyId=769>

Enzymes

N-acylsphingosine amidohydrolase 1

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2491>

Neutral ceramidases

<http://www.guidetopharmacology.org/GRAC/FamilyDisplayForward?familyId=770>

Enzymes

N-acylsphingosine amidohydrolase 2

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2492>

N-acylsphingosine amidohydrolase 2B

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2493>

Alkaline ceramidases

<http://www.guidetopharmacology.org/GRAC/FamilyDisplayForward?familyId=768>

Enzymes

alkaline ceramidase 1

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2468>

alkaline ceramidase 2

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2469>

alkaline ceramidase 3

<http://www.guidetopharmacology.org/GRAC/ObjectDisplayForward?objectId=2470>

Ceramide kinase

<http://www.guidetopharmacology.org/GRAC/FamilyDisplayForward?familyId=771>

Enzymes

ceramide kinase

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