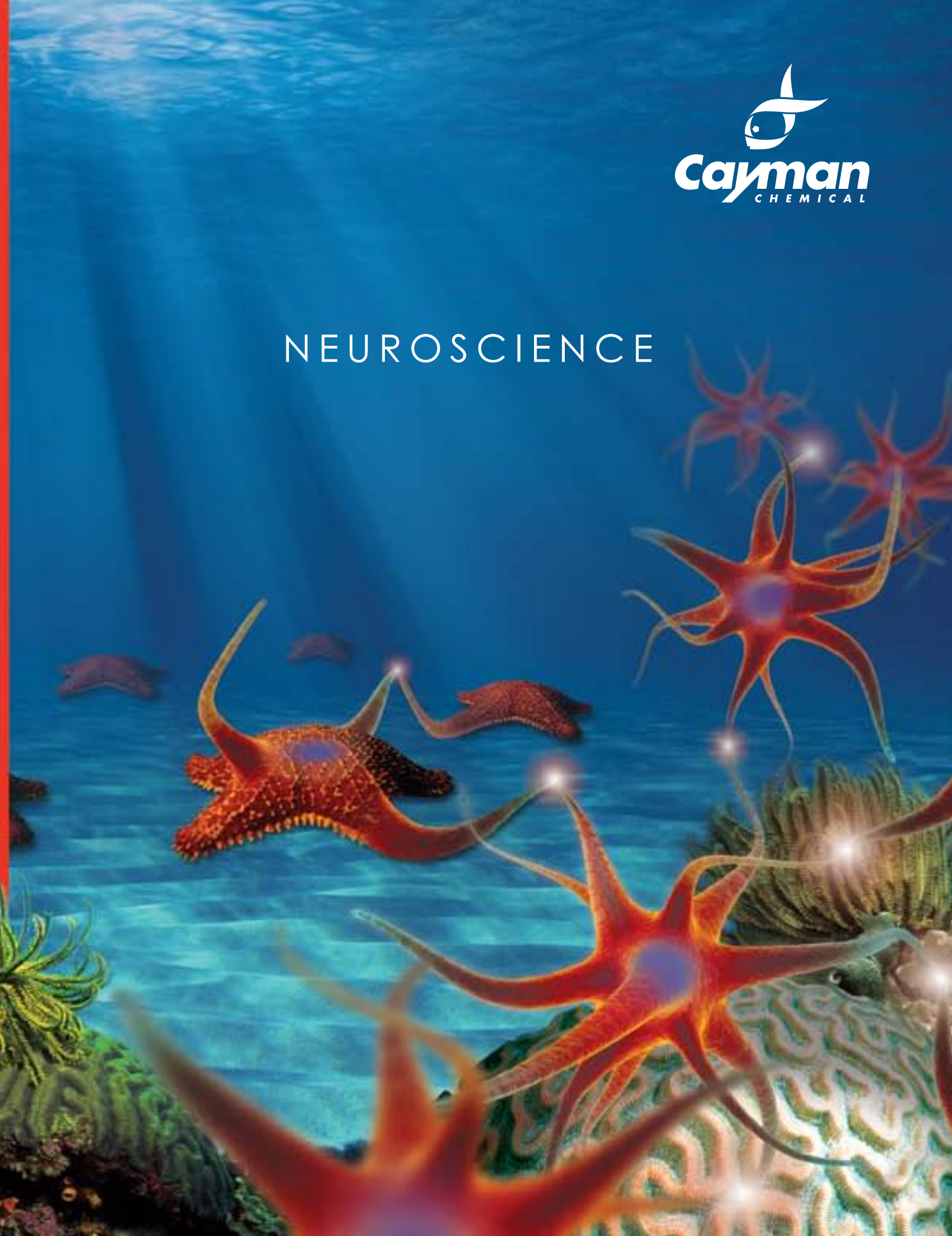
Cayman CHEMICAL

NEUROSCIENCE



Thomas G. Brock, Ph.D.

Introduction to Neuroscience

In our first Biology classes, we learned that lipids form the membranes around cells. For many students, interests quickly moved to the intracellular constituents 'that really matter', or to how cells or systems work in health and disease. If there was further thought about lipids, it might have been limited to more personal issues, like an expanding waistline. It was easy to forget about lipids in the complexities of, say, Alzheimer's Disease, where tau protein is hyperphosphorylated by a host of kinases before forming neurofibrillary tangles and amyloid precursor protein is processed by assorted secretases, ultimately aggregating to form neurodegenerating plaques. What possible role could lipids have in all this? After all, lipids just form the membranes around cells.

Fortunately, neuroscientists study complex systems. Whether working at the molecular, cellular, or organismal level, the research focus always returns to the intricately interconnected bigger picture. Perhaps surprisingly, lipids keep emerging as part of the bigger picture. At least, the smaller lipids do. Many of the smaller lipids, including the cannabinoids and eicosanoids, act as paracrine hormones, modulating cell functions in a receptor-mediated fashion. In this sense, they are rather like the peptide hormones in their diversity and actions. In the neurosystem, this means that these signaling lipids determine if synapses fire or not, when cells differentiate or die, and whether tissues remain healthy or become inflamed. Returning to the question posed above about lipids in Alzheimer's, these mediators have roles at many levels in the course of the disease, as presented in an article on page 42 of this catalog. For those interested in a less complex system, consider the role of lipids in brain injury (page 4).

Cayman Chemical is the world leader in supplying bioactive lipids for research purposes. In addition to lipids, we stock assays for measuring lipids, recombinant enzymes that synthesize and metabolize lipids, antibodies for detecting those proteins and receptors for lipid mediators, and agonists and inhibitors for related pathways. Moreover, Cayman recognizes the interconnectivity of biological systems. This is why you'll find an assortment of additional research chemicals, assays, antibodies, and proteins in the pages of this catalog. And, if you can't find something here, give us a call. Let our experts help you with your research.

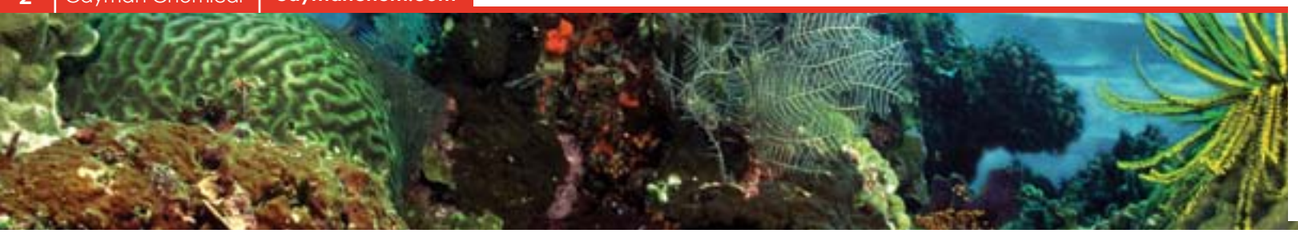


table of contents

vol. 10
Ne
NEUROSCIENCE

warranty and limitation of remedy

ordering information

Ordering Information
Orders are accepted by telephone, fax, mail, e-mail, or *via* the Cayman Chemical website. We will accept telephone orders Monday through Friday from 8 AM to 6 PM EST. All orders received by 1 PM EST will be shipped the same day if stock is available (Monday through Thursday only). Confirming purchase orders must be clearly marked as such to avoid possibility of duplication.

Domestic Shipments
In most instances we ship FedEx Standard Overnight Delivery (not available to all locations), with delivery by 3:30 PM of the next business day. Product availability may vary. Local delivery is available for the Ann Arbor area only. Other shipping options will be considered upon request, but can be granted only under conditions that will ensure the quality of the product. Freight is prepaid and added to the invoice. Please inquire at the time of order for an estimate of the freight charges. If you wish us to ship collect, please supply a valid account number when ordering. Please address all orders to:

Cayman Chemical Company
1180 E. Ellsworth Road
Ann Arbor, MI 48108 USA
Phone: (734) 971-3335

Toll-free Phone: (800) 364-9897
Fax: (734) 971-3640
E-mail: custserv@caymanchem.com
www.caymanchem.com

Include the following information with your order:
1. Item number, description, size, and quantity desired.
2. Complete shipping address. (Delivery is not available to post office box numbers.)
3. A complete billing address.
4. A purchase order number or major credit card (Visa, MasterCard, or American Express), account number, and expiration date.
5. Name of the end user.

Terms
1. U.S. funds only, drawn on a U.S. bank.
2. Net 30 days.
3. F.O.B. Ann Arbor, Michigan, U.S.A.
4. Bank fees and wire transfer fees are not to be deducted from the invoice amount.

Prices
All prices listed are in U.S. dollars. The prices in this catalog are effective as of September 1, 2010. Prices are subject to change without notice.

Returns
Products cannot be returned without prior authorization from Cayman Chemical Company. Please contact our Customer Service Department for return shipping instructions. Custom orders and radioactive material cannot be accepted for return credit if due to a customer's error.

Technical Assistance
Technical assistance is available from 8 AM to 5:30 PM EST. If inquiring about a purchased product, please provide the catalog number, lot number, and date of purchase to our technical staff so they may answer your questions quickly. Technical assistance may be reached toll free at 888-526-5351, *via* e-mail at techserv@caymanchem.com, or on the web at www.caymanchem.com/techserv.

Use of Research Products
The products in this catalog are not for human or veterinary disease diagnosis or therapeutic drug use. They should be used only by technically qualified individuals or those under their direct supervision. Any individual working directly with these products should have free access to the applicable Material Safety Data Sheet (MSDS) and should read and understand it completely prior to use. Please contact our Customer Service Department or visit the specific product page on our website if you require additional copies of any MSDS.

Patent Disclaimer
The end-user assumes full responsibility for appropriate licensing and/or non-infringement for any proprietary claim or patent.

NOTE: For Laboratory Research Use Only. Not for human or veterinary diagnostic or therapeutic use.

abbreviations

Abn-CBD	Abnormal Cannabidiol
AChE	Acetylcholinesterase
AEA	Arachidonoyl Ethanolamide; Anandamide
AG	Arachidonoyl Glycerol
cAMP	Adenosine 3′, 5′-cyclic monophosphate
ATP	Adenosine Triphosphate
CB	Cannabinoid
CNS	Central Nervous System
COX	Cyclooxygenase
CSF	Cerebral Spinal Fluid
CYP450	Cytochrome P450
DTNB	5,5′-Dithio-bis-(2-nitrobenzoic acid); Ellmans Reagent
DHA	Docosahexaenoic Acid
endoCB	Endocannabinoid
EIA	Enzyme Immunoassay
EP	Prostaglandin E Receptor
FAAH	Fatty Acid Amide Hydrolase
FABP	Fatty Acid Binding Protein
FW	Formula Weight
GC	Gas Chromatography
GPCR	G Protein-Coupled Receptor
cGMP	Guanosine 3′, 5′-cyclic monophosphate
GTP	Guanosine-5′-triphosphate
MCF-7	Human Breast Adenacarcinoma Cell Line
HIV	Human Immunodeficiency Virus
HUVEC	Human Umbilical Vein Endothelial Cells
HPLC	High Pressure Liquid Chromatography
5-HT	5-hydroxy Tryptamine
ICC	Immunocytochemistry
IF	Immunofluorescence
IHC	Immunohistochemistry
IP	Immunoprecipitation
IL	Interleukin
IOP	Intraocular Pressure
IP	Immunoprecipitation
LT	Leukotriene
LC	Liquid Chromatography
LO	Lipoxygenase
LPA	Lysophosphatidic Acid
NMDA	N-Methyl-D-aspartate
MAPK	Mitogen-activated Protein Kinase
MF	Molecular Formula
MAGL	Monoacylglycerol Lipase
MS	Mass Spectrometry
NO	Nitric Oxide
eNOS	Endothelial Nitric Oxide Synthase
iNOS	Inducible Nitric Oxide Synthase
nNOS	Neuronal Nitric Oxide Synthase
OEA	Oleoyl Ethanolomide
PPAR	Peroxisome Proliferator activated Receptor
PEA	Palmitoyl Ethanolamide
$cPLA_2$	Calcium-dependent Cytosolic Phospholipase A_2
$iPLA_2$	Calcium-independent Phospholipase A_2
$sPLA_2$	Secretory Phospholipase A_2
PG	Prostaglandin
PKC	Protein Kinase C
PLD	Phospholipase D
PrP	Prion Protein
PrP^c	Cellular Prion Protein
PUFA	Polyunsaturated Fatty Acid
SAF	Scrapie Associated Fibrils
Ser	Serine
SOD	Superoxide Dismutase
THC	Tetrahydrocannabinol
Thr	Threonine
TRPV	Transient Receptor Potential Vanilloid
TNF	Tumor Necrosis Factor
VR	Vanilloid Receptor
WB	Western Blot

Thomas G. Brock, Ph.D.

Leukotrienes on the Brain

vol. 10
Ne

It's a sure bet that, if you've picked up this catalog and are reading this article, you treasure brain function. Most likely, you wear a helmet when you ski or ride a bike. Perhaps you avoid sports with the potential for concussions, like boxing, football, or hockey. Remarkably, the Center for Disease Control and Prevention reports that the leading cause of traumatic brain injury (TBI) is falls, causing half of all TBIs in children and 61% in the elderly.[1] This means that, in the United States, simply falling and hitting one's head leads to TBI much more often than the second leading cause, motor vehicle accidents (17.3%). Falling, from a bike or a ladder or a step, happens. As preventing TBI is impossible, let's turn our interest to treatments that might limit the damaging consequences of the injury. This article touches on a potential breakthrough in the treatment of TBI.

The Problem

A pattern has been emerging over recent years. A laceration can be bad, but with early treatment, the consequences of the initial trauma can be limited. Similarly, early intervention is important in minimizing the morbidity and mortality associated with stroke, heart attack, and cancer. So it is with TBI, where even mild injuries initiate a chain of events which expand beyond the initial site of damage, leading to secondary injury consequent to cerebral edema, local ischemia, and disruption of cerebrovascular autoregulation.[2] Of course, secondary injury can increase the loss of cognitive and motor function, augment emotional and behavioral changes, and potentially determine if the victim lives. Immediate treatment following TBI is so important that **pre**-hospital care has been called the 'first link in the chain of survival'.[3]

An experimental model helps illustrate the problem. Lateral fluid percussion injury (LFPI) is currently the most commonly used experimental model of TBI.[4] Fluid percussion produces brain injury by creating pressure transients that are applied to an intact dural surface through a small craniotomy, resulting in both focal and diffuse cerebral injury.[4] Specifically, after precisely fitting a Luer-Loc hub to a 3 mm cranial opening in the anesthetized rat and allowing for recovery (15-20 hours), the LFPI apparatus is connected, again to the anesthetized animal, and a 20 ms pulse of pressurized fluid is delivered at 2.5 to 3.0 atm to simulate a moderate to severe impact. MRI analysis at 48-72 hours post injury demonstrates the presence of injury-related tissue edema, blood-brain barrier disruption and subdural, intra-parenchymal, and intraventricular hemorrhage (Figure 1).[4] Consequent effects include hippocampal cell loss and persistent neurological dysfunction. The problem becomes recognizing the signaling pathways that are triggered by the injury and developing ways to minimize those with deleterious consequences.

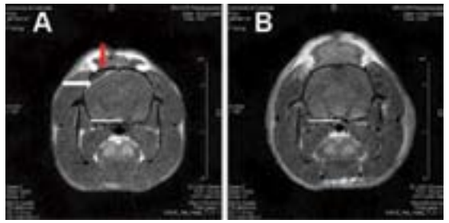


Figure 1. MRI of TBI
Sample MRI images 48 hours after moderate to severe FPI (A) and sham injury (B). Representative gadolinium-enhanced T1-weighted images are from a single animal 48 hours after FPI. The approximate injury site and trajectory is marked by the red arrow. In A, the injured hemisphere (as outlined by the white bar) is larger and more distorted in comparison to the contralateral hemisphere in the same image and to the homologous hemisphere in the sham-injured animal (white bar, image B), evidence of injury-related brain edema. Evidence of injury-related blood-brain barrier breakdown and extravasation of intravenous contrast dye can also be seen in image A (white arrow). All images oriented with superior up and left side to the left as viewed. *Images courtesy of Lauren Frey, MD.*

Signaling Pathways

Leukotrienes (LT) are chemical messengers that signal from cells of the immune system to essentially all other types of cells in the surrounding tissue. They are produced quickly by activated leukocytes and have very powerful effects over short distances within the body. LTs are biosynthesized from a PUFA, arachidonic acid (AA). Since AA is present in membrane phospholipids, the synthesis of LTs is typically initiated by the release of AA by phospholipases, primarily cytosolic phospholipase A_2 ($cPLA_2$) acting at perinuclear membranes (Figure 2). AA is oxygenated by the enzyme 5-lipoxygenase (5-LO) in cooperation with the 5-LO activating protein (FLAP), leading to the production of the intermediate, LTA_4. LT synthesis is completed by the downstream enzymes LTA_4 hydrolase (LTA_4H) and LTC_4 synthase (LTC_4S), which produce LTB_4 and LTC_4, respectively. LTC_4 is produced by the attachment of glutathione to LTA_4, by a sulfide linkage involving the central cysteine residue of glutathione. Both LTs appear to be actively exported from cells through ATP-binding cassette (ABC) transporters. Following the export of LTC_4 from the cell, glutamate may be removed by γ-glutamyl transferase (γ-GT) to produce LTD_4, which in turn may lose glycine, through dipeptidase (DiP) action, to yield LTE_4. LTC_4, LTD_4, and LTE_4 are known collectively as 'cysteinyl LTs', as they, but not LTB_4, have cysteine linked to AA. As no new gene expression or protein translation is necessary, LT generation occurs in a matter of minutes following appropriate stimulation.

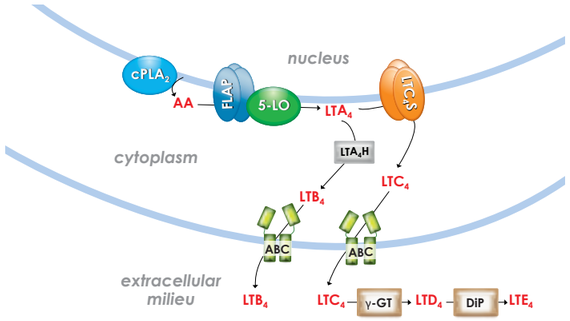


Figure 2. Synthesis of LTs. The synthesis of LTs begins by the release of AA from perinuclear membranes by $cPLA_2$. Both LTB_4 and LTC_4 are secreted from the cell, where LTC_4 is further metabolized to produce LTD_4 and LTE_4.

LTB_4 is a potent chemoattractant and activator of leukocytes. As it is produced by leukocytes activated at a point of conflict in the body *and* recruits and activates additional leukocytes (which, in turn, produce more LTB_4), it rapidly amplifies the inflammatory response. The cysteinyl LTs, on the other hand, primarily promote smooth muscle constriction and alter endothelial cells to produce vascular leak of plasma into tissues, resulting in edema. There have been few studies clarifying the roles of LTB_4 and the cysteinyl LTs in the brain. Interestingly, receptors for cysteinyl LTs are abundant in the human brain.[5]

An important process in LT production is cooperative synthesis between neighboring cells. As examples, one cell may donate the substrate AA or the intermediate LTA_4 to another cell, which then continues synthesis with resident enzymes. By this 'transcellular synthesis', numerous cells can provide AA to the leukocytes, which have a virtual monopoly on the key enzyme, 5-LO. Furthermore, leukocytes can disperse LTA_4 to neighboring cells, which might preferably express one of the downstream enzymes (*e.g.*, LTC_4 synthase), leading to the skewed production of one type of LT. For example, astrocytes, glia and neuronal cells in general produce, by themselves, little LT, since they lack 5-LO.[6,7] Neutrophils, alone, synthesize primarily LTB_4. However, when neutrophils are co-cultured with either glia or neurons, LTC_4 and LTD_4, as well as LTB_4, are generated (Figure 3).[6] In these situations, neutrophils pass LTA_4 to the glia and neurons, which express both LTC_4 synthase and γ-GT, and can thus continue the processing of LTA_4 to cysteinyl LTs. This presents the possibility that neutrophils that have breached the blood-brain barrier can lead to the immediate synthesis of LTB_4 and cysteinyl LTs in their immediate vicinity.

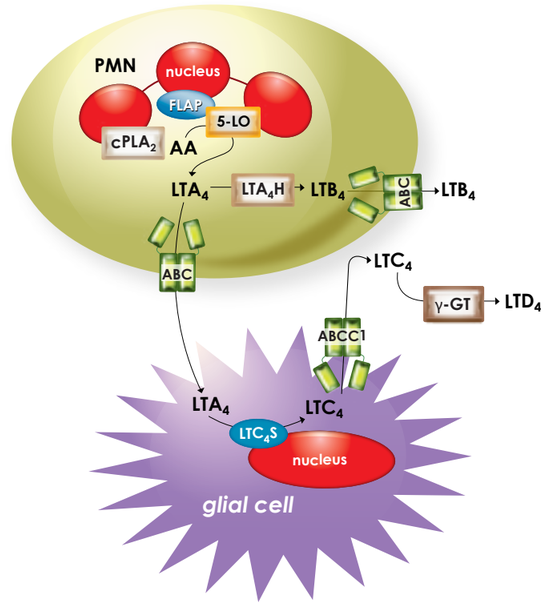


Figure 3. Transcellular LT synthesis. Polymorphonuclear (PMN) cells, or neutrophils, can synthesize LTA_4 and donate it to glial cells and neurons, which can then use it to produce LTC_4. Such 'transcellular metabolism' of LTs becomes possible when PMNs move from the circulation into the brain following TBI.

The Solution

The synthesis of LTs begins shortly after TBI. Whereas LTs are not detectable in brain tissue of naïve rats, significantly increased levels of LTC_4 and LTD_4 are detected 10 minutes after LFPI and continue to rise until an hour after injury.[8,9] A similar time course of increase in cysteinyl LT levels is found in cerebral spinal fluid after controlled cortical impact injury in rats.[10] Following LFPI, a subtle increase in LTC_4 levels is also observed in the contralateral hemisphere 30 minutes after injury. Pretreatment of animals with the neutropenic agent vinblastine results in a profound decrease in circulating neutrophils and a significant drop in LT levels following LFPI,[9] implicating a role for injury-related extravasation of circulating neutrophils in LT generation, presumably by transcellular synthesis as described above. The rise in LTs precedes a pronounced edema in the ipsilateral cortex and a smaller but significant vascular leak in the contralateral cortex.[8]

Brain edema leading to an expansion of brain volume has a crucial impact on morbidity and mortality following TBI, as it increases intracranial pressure, impairs cerebral perfusion and oxygenation, and contributes to additional ischemic injuries.[11] As cysteinyl LTs are known to cause edema, the direct inhibition of their synthesis might be expected to reduce edema and prevent damage that is secondary to TBI. MK-886 is an inhibitor of FLAP that potently prevents the synthesis of all LTs at the first step of AA metabolism. Importantly, FLAP inhibitors have recently undergone Phase 1 trials in healthy volunteers and were demonstrated as safe and well-tolerated at doses that block LT production. In the LFPI model, MK-886 pretreatment inhibits LTC_4 synthesis in both hemispheres.[9] Furthermore, MK-886 significantly reduces the volume of damaged tissue, as assessed by staining with 2,3,5-triphenyltetrazolium chloride 72 hours after injury.[9] Also, pretreatment with MK-886 showed a trend toward mitigating neurological deficits, as assessed by the cylinder test for forelimb use.[9] These results strongly suggest that FLAP inhibitors may be useful in reducing edema, as well as secondary damage, following TBI.

As described above, the cysteinyl LTs, but not LTB_4, promote vascular leak, suggesting that the specific blockade of the cysteinyl LTs might be a more direct way to block edema following TBI. Montelukast, a cysteinyl LT receptor-1 antagonist, significantly reduces edema after focal cerebral ischemia,[12] but is less effective in preventing edema following TBI.[13] This might reflect the importance of LTB_4 in TBI at the site of injury: LTB_4 promotes the recruitment and activation of neutrophils, which in turn augment the production of cysteinyl LTs by providing LTA_4 to glia and neurons. By preventing LTB_4 synthesis as well as the production of cysteinyl LTs, FLAP inhibitors provide a benefit that is lacking in cysteinyl LT blockers.

Applications

Some causes of trauma, including falling and motor vehicle incidents, cannot be anticipated, so FLAP blockers can only be provided following injury. The lead scientist on the MK-886 study, Dr. Kim Heidenreich of the University of Colorado, suggests that the effectiveness of FLAP inhibitors after TBI will be a critical question. "If FLAP inhibitors can be given 15 to 30 minutes after injury and still block edema in the brain, then perhaps these compounds will be very useful in a variety of settings", says Dr. Heidenreich. Importantly, montelukast reduces edema when given either 30 minutes before or 30 minutes after focal cerebral ischemia.[11] Certainly, FLAP inhibitors may be used prophylactically in sports where concussions may be expected. Intriguingly, mild TBI is common in war: recent studies found that more than 12-15% of U.S. soldiers serving in Iraq reported injuries with loss of consciousness or altered mental status ("dazed, confused, or seeing stars").[14,15] Causes included blasts, commonly from improvised explosive devices, vehicle crashes, and falls. Combat TBI is strongly correlated with persistent post-concussive symptoms, post-traumatic stress disorder, and physical health problems.[14,15] Perhaps FLAP inhibitors, taken daily, can minimize some of the consequences of TBI associated with war. In short, whether brain injury is initiated by a slip on the ice, a devastating RPG blast, or a thunderous hit from Junior Seau, a single treatment may limit the damage: FLAP blockers.

References

1. www.cdc.gov/traumaticbraininjury/causes.html
2. Moppett, I.K. *Br. J. Anaesth.* **99(1)**, 18-31 (2007).
3. Minardi, J. and Crocco, T.J. *Mt. Sinai J. Med.* **76**, 138-144 (2009).
4. Frey, L.C., Hellier, J., Unkart, C., *et al. J. Neurosci. Methods* **177**, 267-272 (2009).
5. Singh, R.K., Gupta, S., Dastidar, S., *et al. Pharmacology* **85**, 336-349 (2010).
6. Farias, S.E., Zarini, S., Precht, T., *et al. J. Neurochem.* **103**, 1310-1318 (2007).
7. Kim, D.Y., Jeoung, D., and Ro, J.Y. *J. Immunol.* **185**, 273-283 (2010).
8. Dhillon, H.S., Dose, J.M., and Prasad, M.R. *J. Neurotrauma* **13(12)**, 781-789 (1996).
9. Farias, S., Frey, L.C., Murphy, R.C., *et al. J. Neurotrauma* **26**, 1977-1986 (2009).
10. Schuhmann, M.U., Mokhtarzadeh, M., Stichtenoth, D.O., *et al. Neurol. Res.* **25**, 481-491 (2003).
11. Unterberg, A.W., Stover, J., Kress, B., *et al. Neuroscience* **129**, 1021-1029 (2004).
12. Yu, G.-L., Wei, E.-Q., Zhang, S.-H., *et al. Pharmacology* **73**, 31-40 (2005).
13. Biber, N., Toklu, H.Z., Solakoglu, S., *et al. Brain Inj.* **23(6)**, 577-584 (2009).
14. Hoge, C.W., McGurk, D., Thomas, J.L., *et al. N. Engl. J. Med.* **358(5)**, 453-463 (2008).
15. Schneiderman, A.I., Braver, E.R., and Kang, H.K. *Am. J. Epidemiol.* **167**, 1446-1452 (2008).

A-803467 10012588

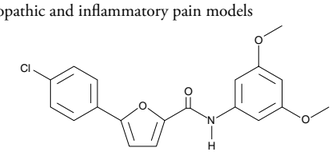
[944261-79-4]

MF: $C_{19}H_{16}ClNO_4$ **FW:** 357.8 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A sodium channel blocker with high-affinity and selectivity for inhibiting human $Na_v1.8$ sodium channels (IC_{50} = 8 nM when stimulated at half-maximal inactivation and IC_{50} = 79 nM at a resting state); dose dependently reduces behavioral responses in a variety of neuropathic and inflammatory pain models

5 mg
10 mg
50 mg
100 mg



5-(4-chlorophenyl)-N-(3,5-dimethoxyphenyl)-2-furancarboxamide

N-Ac-Tyr-Val-Ala-Asp-CMK 10014

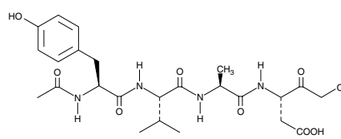
[178603-78-6] Ac-YVAD-CMK

MF: $C_{24}H_{33}ClN_4O_8$ **FW:** 541.0 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A selective, irreversible inhibitor of IL-1β converting enzyme (ICE; Caspase-1); neuroprotective in a rat model of cerebral ischemia

1 mg
5 mg
10 mg
25 mg



N-acetyl-L-tyrosyl-L-valyl-N-[(1S)-1-(carboxymethyl)-3-chloro-2-oxo-propyl]-L-alaninamide

AFMK 10005254

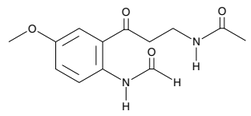
[52450-38-1]

MF: $C_{13}H_{16}N_2O_4$ **FW:** 264.3 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A melatonin metabolite first identified in rat brain that has antioxidant and free radical scavenging activities in several experimental models; may be measured in plasma as an index of melatonin synthesis and metabolism

1 mg
5 mg
10 mg
50 mg



N-[3-[2-(formylamino)-5-methoxyphenyl]-3-oxypropyl]-acetamide

Agomelatine 13203

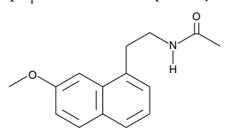
[138112-76-2] Valdoxan®

MF: $C_{15}H_{17}NO_2$ **FW:** 243.3 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A melatonin receptor MT_1 and MT_2 agonist and competitive antagonist of human and porcine 5-HT_{2C} receptors (pK_i = 6.2 and 6.4, respectively) as well as human 5-HT_{2B} receptors (pK_i = 6.6)

5 mg
10 mg
50 mg
100 mg



N-[2-(7-methoxy-1-naphthalenyl)ethyl]-acetamide

AL 34662 10011546

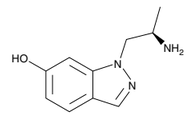
[210580-75-9] AL 34497

MF: $C_{10}H_{13}N_3O$ **FW:** 191.2 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A potent 5-HT_2 receptor agonist with ocular hypotensive activity; binds to the human and rat 5-HT_2 receptors in cerebral cortex homogenates with IC_{50} values of 1.5 and 0.77 nM, respectively; lowers IOP 25% at a dose of 100 µg and 33% at 300 µg at six hours post dose

1 mg
5 mg
10 mg
50 mg



1-[(2S)-2-aminopropyl]-1H-indazol-6-ol

AM251 71670

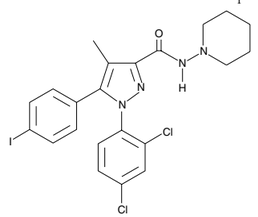
[183232-66-8]

MF: $C_{22}H_{21}Cl_2IN_4O$ **FW:** 555.2 **Purity:** ≥98%

A crystalline solid **Stability:** ≥1 year at -20°C

Summary: An analog of SR141716A wherein the *p*-chloro group attached to the phenyl substituent at C-5 of the pyrazole ring is replaced with a *p*-iodo group; exhibits slightly better binding affinity for the CB_1 receptor (K_i = 7.5 nM) compared to SR141716A (K_i = 11.5 nM) and is two-fold more selective for the CB_1 receptor than SR141716A

5 mg
10 mg
50 mg
100 mg



1-(2,4-dichlorophenyl)-5-(4-iodophenyl)-4-methyl-N-1-piperidinyl-1H-pyrazole-3-carboxamide

AM404 90060

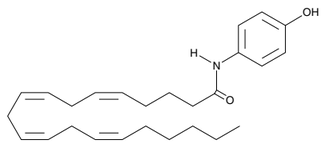
[183718-77-6] 4-HPA, N-(4-hydroxyphenyl)-Arachidonoyl Amide

MF: $C_{26}H_{37}NO_2$ **FW:** 395.6 **Purity:** ≥98%

A solution in ethanol **Stability:** ≥1 year at -20°C

Summary: An analog of AEA that potentiates the activity of endogenous AEA by blocking its re-uptake into presynaptic neurons; selectively inhibits the carrier-mediated transport of AEA without affecting anandamide hydrolysis; inhibits the transport of AEA with an IC_{50} value of 1 µM in rat neurons and 5 µM in rat astrocytes; enhances and prolongs exogenous AEA-induced analgesia at a dose of 10 mg/kg in *in vivo* models

5 mg
10 mg
50 mg
100 mg



N-(4-hydroxyphenyl)-5Z,8Z,11Z,14Z-eicosatetrenamide

AM630 10006974

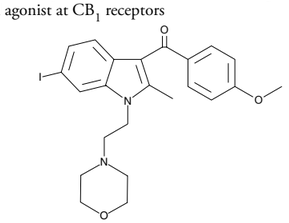
[164178-33-0] Iodopravadoline

MF: $C_{23}H_{25}IN_2O_3$ **FW:** 504.4 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A selective CB_2 receptor antagonist that binds to CB_1 and CB_2 receptors with K_i values of 5.2 µM and 31.2 nM, respectively; behaves as an inverse agonist at CB_2 receptors and as a weak partial agonist at CB_1 receptors

5 mg
10 mg
50 mg
100 mg



[6-iodo-2-methyl-1-[2-(4-morpholinyl)ethyl]-1H-indol-3-yl](4-methoxyphenyl)-methanone

AM1172 10005223

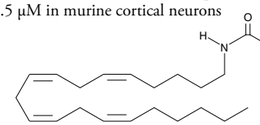
[251908-92-6]

MF: $C_{27}H_{39}NO_2$ **FW:** 409.6 **Purity:** ≥98%

A solution in ethanol **Stability:** ≥1 year at -20°C

Summary: A selective inhibitor of AEA uptake that is resistant to FAAH hydrolysis; is the structurally 'reversed' isomer of AM404; blocks the uptake of tritiated AEA with an EC_{50} value of about 1.5 µM in murine cortical neurons

1 mg
5 mg
10 mg
50 mg



N-5Z,8Z,11Z,14Z-eicosatetraenyl-4-hydroxy-benzamide

AM1241 10010118

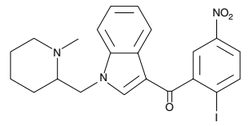
[444912-48-5]

MF: $C_{22}H_{22}IN_3O_3$ **FW:** 503.3 **Purity:** ≥97%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A CB_2 receptor agonist with a K_i value of 2 nM and greater than 100-fold selectivity for the CB_2 receptor *in vitro*; produces antinociception to thermal stimuli in the rat hindpaw

1 mg
5 mg
10 mg
25 mg



(2-iodo-5-nitrophenyl)-(1-(1-methylpiperidin-2-ylmethyl)-1H-indol-3-yl)methanone

NEW (R)-AM1241 10491

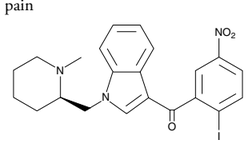
[444912-51-0] (+)-AM1241

MF: $C_{22}H_{22}IN_3O_3$ **FW:** 503.3 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: Avidly, selectively binds the CB_2 receptor (K_i = 15 nM); is an agonist of human CB_2, but an inverse agonist of rat and murine CB_2; produces antinociception in rats to thermal, but not mechanical, pain

1 mg
5 mg
10 mg
25 mg



(2-iodo-5-nitrophenyl)[1-[[(2R)-1-methyl-2-piperidinyl]methyl]-1H-indol-3-yl] methanone

NEW (S)-AM1241 10490

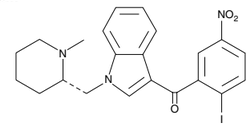
[444912-53-2] (-)-AM1241

MF: $C_{22}H_{22}IN_3O_3$ **FW:** 503.3 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: Selectively binds the CB_2 receptor from human, rat, and mouse (K_i = 658, 893, and 577 nM, respectively); acts as an agonist for CB_2 for all three species, but shows greater activity at human CB_2 (EC_{50} = 131 nM) than for either rat or murine CB_2 (EC_{50} = 785, and 2000 nM, respectively); produces antinociception in rats to thermal, but not mechanical, pain

1 mg
5 mg
10 mg
25 mg



(2-iodo-5-nitrophenyl)[1-[[(2S)-1-methyl-2-piperidinyl]methyl]-1H-indol-3-yl]-methanone

AM3102 13452

[213182-22-0] KDS-5104

MF: $C_{21}H_{41}NO_2$ **FW:** 339.6 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: An OEA analog that stimulates PPARα transcriptional activity (EC_{50} = 100 nM) and prolongs feeding latency in rodents (ED_{50} = 2.4 mg/kg); as potent as OEA yet resistant to enzymatic hydrolysis; demonstrates weak affinity for the CB_1 and CB_2 receptors (K_i = 33 and 26 µM, respectively)

5 mg
10 mg
25 mg
50 mg

N-[(1R)-2-hydroxy-1-methylethyl-9Z-octadecenamide

N-Arachidonoyl-L-Alanine 90065

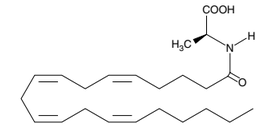
[401941-73-9] NALA

MF: $C_{23}H_{37}NO_3$ **FW:** 375.6 **Purity:** ≥98%

A solution in ethanol **Stability:** ≥1 year at -20°C

Summary: An arachidonoyl amino acid that has been isolated and characterized from bovine brain; may have activity at CB receptors and/or VR_1, but has not been fully characterized to date

5 mg
10 mg
25 mg
50 mg



N-(1-oxo-5Z,8Z,11Z,14Z-eicosatetraenyl)-L-alanine

Arachidonoyl Amide 10007295

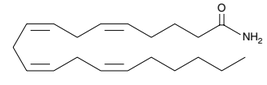
[85146-53-8] Arachidonamide, Arachidonic Acid amide

MF: $C_{20}H_{33}NO$ **FW:** 303.5 **Purity:** ≥98%

A solution in methyl acetate **Stability:** ≥1 year at -20°C

Summary: An analog of AEA that lacks the hydroxyethyl moiety; hydrolyzed by FAAH more effectively than AEA but exhibits significantly weaker binding to the human CB_1 receptor with a K_i value of 9.6 µM; inhibits [^{3}H]-AEA uptake into human astrocytoma cells with an IC_{50} value of 9 µM and inhibits rat glial gap junction cell-cell communication by 90% at a concentration of 20 µM

5 mg
10 mg
25 mg
50 mg

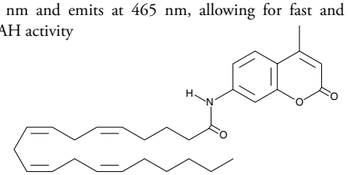


5Z,8Z,11Z,14Z-eicosatetraenamide

AMC Arachidonoyl Amide 10005098

AMC-AA, 7-amino-4-methyl Coumarin-Arachidonamide
MF: $C_{30}H_{39}NO_3$ **FW:** 461.6 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥2 years at -20°C
Summary: One of several fatty acid amides which can be used to measure FAAH activity; FAAH hydrolysis results in the release of the fluorescent aminomethyl coumarin that absorbs at 360 nm and emits at 465 nm, allowing for fast and convenient measurement of FAAH activity

5 mg
10 mg
25 mg
50 mg

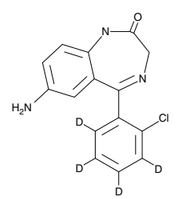


7-amino-4-methyl-2H-1-benzopyran-2-one-5Z,8Z,11Z,14Z-eicosatetraenamide

7-Aminoclonazepam-d_4* 10010670

MF: $C_{15}H_8D_4ClN_3O$ **FW:** 289.8 **Chemical Purity:** ≥95%
Deuterium Incorporation: ≤1% d_0
A crystalline solid **Stability:** ≥1 year at 4°C
Summary: An internal standard for the quantification of 7-aminoclonazepam by GC- or LC-MS

1 mg
5 mg
10 mg



7-amino-5-(2-chlorophenyl)-1,3-dihydro-2H-1,4-benzodiazepin-2-one-d_4

β-Amyloid (1-8) Peptide 10241

Aβ
FW: 976.0 **Stability:** ≥1 year at -20°C
Supplied as: 1 mg of lyophilized peptide
Summary: A control peptide for tests that use Cayman's β-Amyloid (1-8, A2V) Peptide (Item No. 10229)

1 ea

β-Amyloid (1-8, A2V) Peptide 10229

Aβ, Aβ 1-8 mutant, β-amyloid (1-8) dominant negative
FW: 1,004.0 **Stability:** ≥1 year at -20°C
Supplied as: 1 mg of lyophilized peptide
Summary: A truncated β-amyloid peptide with valine at amino acid position number 2, a mutation found in the amyloid precursor protein (APP) resulting from Ala673Val that leads to disease progression for homozygous carriers but not heterozygous carriers

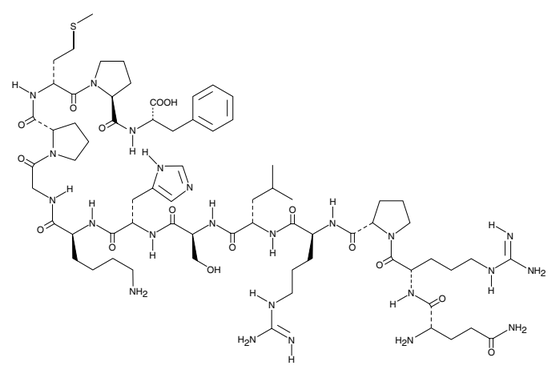
1 ea

*SPI-BIO Assays are available through Cayman Chemical only within North & South America and Asia; elsewhere contact SPI-BIO.

NEW Apelin-13 13523

[217082-58-1]
MF: $C_{69}H_{111}N_{23}O_{16}S$ **FW:** 1,550.8 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: Endogenous ligand of the APJ receptor, with an EC_{50} value of 0.37 nM; acts primarily in the periphery and CNS, playing important roles in regulating cardiovascular function, fluid homeostasis, hypertension, and insulin sensitivity

1 mg
5 mg
10 mg
25 mg

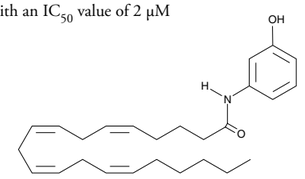


L-glutaminyl-L-arginyl-L-prolyl-L-arginyl-L-leucyl-L-seryl-L-histidyl-L-lysyl-L-glycyl-L-prolyl-L-methionyl-L-prolyl-L-phenylalanine

N-(3-hydroxyphenyl)-Arachidonoyl Amide 10007704

[183718-75-4] 3-HPA
MF: $C_{26}H_{37}NO_2$ **FW:** 395.6 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: An analog of AM404, which is a selective inhibitor of carrier-mediated transport of AEA; is metabolized by both COX-1 and COX-2 and also selectively and irreversibly inhibits COX-2 with an IC_{50} value of 2 µM

5 mg
10 mg
50 mg
100 mg

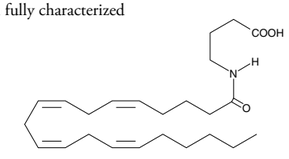


N-(3-hydroxyphenyl)-5Z,8Z,11Z,14Z-eicosatetraenamide

N-Arachidonoyl-γ-Aminobutyric Acid 90067

[128201-89-8] NAGABA
MF: $C_{24}H_{39}NO_3$ **FW:** 389.6 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: One of several amino acid-containing derivatives of arachidonic acid which have been isolated and characterized from bovine brain; suppresses normal responses to pain, but has not been fully characterized

5 mg
10 mg
25 mg
50 mg

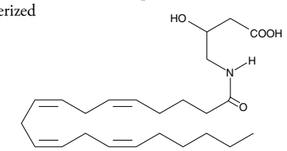


4-[(1-oxo-5Z,8Z,11Z,14Z-eicosatetraenyl)amino]-butanoic acid

N-Arachidonoyl-3-hydroxy-γ-Aminobutyric Acid 10158

NAG-3H-ABA
MF: $C_{24}H_{39}NO_4$ **FW:** 405.6 **Purity:** ≥98%
A solution in methyl acetate **Stability:** ≥1 year at -20°C
Summary: An arachidonoyl amino acid isolated from both rat and bovine brain; the glycine congener (NAGly) suppresses formalin-induced pain in rats, but NAG-3H-ABA has not yet been fully characterized

1 mg
5 mg
10 mg
50 mg

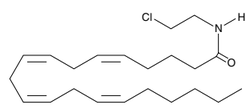


4-[[(3-hydroxy)-1-oxo-5Z,8Z,11Z,14Z-eicosatetraenyl]amino]-butanoic acid

Arachidonoyl 2'-Chloroethylamide 91054

[220556-69-4] ACEA, 2'-chloro-AEA
MF: $C_{22}H_{36}ClNO$ **FW:** 366.0 **Purity:** ≥98%
A solution in methyl acetate **Stability:** ≥1 year at -80°C
Summary: A potent, stable, and selective agonist analog of AEA with a K_i value of 1.4 nM at the isolated rat CB_1 receptor; 1,400 times more potent at the CB_1 compared with the CB_2 receptor; induces hypothermia in mice with the same efficacy as AEA, in spite of its much higher affinity for the CB_1 receptor and thus is a possible substrate for FAAH

5 mg
10 mg
25 mg
50 mg

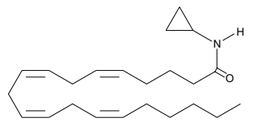


N-(2-chloroethyl)-5Z,8Z,11Z,14Z-eicosatetraenamide

Arachidonoyl Cyclopropylamide 91053

[229021-64-1] ACPA
MF: $C_{23}H_{37}NO$ **FW:** 343.6 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: A potent, stable, and selective agonist analog of AEA with a K_i value of 2.2 nM at the isolated rat CB_1 receptor; 325 times more potent at the CB_1 receptor compared with the CB_2 receptor; induces hypothermia in mice with the same efficacy as AEA, in spite of its much higher affinity for the CB_1 receptor and thus is a possible substrate for FAAH

5 mg
10 mg
50 mg
100 mg

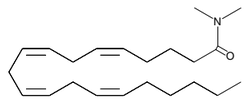


N-cyclopropyl-5Z,8Z,11Z,14Z-eicosatetraenamide

Arachidonoyl-N,N-dimethyl amide 10007293

[45280-17-9]
MF: $C_{22}H_{37}NO$ **FW:** 331.2 **Purity:** ≥98%
A solution in methyl acetate **Stability:** ≥1 year at -20°C
Summary: An analog of AEA that exhibits weak or no binding to the human CB_1 receptor (K_i >1 µM); inhibits rat glial gap junction cell-cell communication at a concentration of 50 µM

5 mg
10 mg
50 mg
100 mg

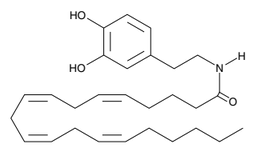


N,N-dimethyl-5Z,8Z,11Z,14Z-eicosatetraenamide

N-Arachidonoyl Dopamine 90057

[199875-69-9] NADA
MF: $C_{28}H_{41}NO_3$ **FW:** 439.6 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: The amide of the neurotransmitter dopamine and arachidonic acid; a CB_1-selective agonist that induces hypothermia, analgesia, catalepsy, and hypomotility in rats; a full agonist at TRPV1, but inactive at the dopaminergic D1 and D2 receptors; a potent inhibitor (IC_{50} = 0.25 µM) of the proliferation of MCF-7 breast carcinoma cells

5 mg
10 mg
50 mg
100 mg



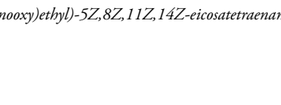
N-[2-(3,4-dihydroxyphenyl)ethyl]-5Z,8Z,11Z,14Z-eicosatetraenamide

- Also Available: **N-Arachidonoyl Dopamine-d_8** (10007431)

Arachidonoyl Ethanolamide 90050

[94421-68-8] AEA, Anandamide
MF: $C_{22}H_{37}NO_2$ **FW:** 347.5 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: An endogenous CB neurotransmitter that binds to both CB_1 and CB_2 receptors

5 mg
10 mg
50 mg
100 mg



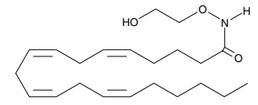
N-(2-hydroxyethyl)-5Z,8Z,11Z,14Z-eicosatetraenamide

- Also Available: **Arachidonoyl Ethanolamide Lipid Maps MS Standard** (10007270)
- Also Available: **Arachidonoyl Ethanolamide-d_4** (10011178)
- Also Available: **Arachidonoyl Ethanolamide-d_8** (390050)

oxy-Arachidonoyl Ethanolamide 10008642

oxy-Anandamide
MF: $C_{22}H_{37}NO_3$ **FW:** 363.5 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: A selective CB_2 receptor ligand with K_i values of 0.47 and 0.081 µM for human CB_1 and CB_2, respectively

5 mg
10 mg
25 mg
50 mg

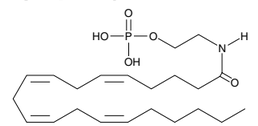


N-(2-hydroxyethoxy)-5Z,8Z,11Z,14Z-eicosatetraenamide

Arachidonoyl Ethanolamide Phosphate 10180

[183323-26-4] Anandamide Phosphate
MF: $C_{22}H_{38}NO_5P$ **FW:** 427.5 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: The phosphate ester (and water-soluble prodrug) of AEA; acts with equal potency as AEA in the treatment of C6 glioma cells *in vivo*; 5-fold less potent than AEA as an agonist of isolated rat brain CB_1 receptors (K_i = 200 nM); also a structural variant of LPA

250 µg
500 µg
1 mg
5 mg



N-(2-(phosphonooxy)ethyl)-5Z,8Z,11Z,14Z-eicosatetraenamide

O-Arachidonoyl Ethanolamine (hydrochloride) 91050

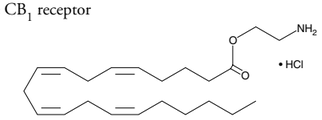
[443129-35-9] Arachidonic Acid-(2-aminoethyl)-ester hydrochloride, Virodhamine hydrochloride

MF: $C_{22}H_{37}NO_2$ • HCl **FW:** 384.0 **Purity:** ≥98%

A neat oil **Stability:** ≥6 months at -80°C

Summary: A constituent of human and rat brain in which the ethanolamine moiety is attached 'backwards', as an ester rather than as an amide as in AEA; has mixed agonist/antagonist activity at the CB_1 receptor

1 mg
5 mg
10 mg
25 mg



O-(2-aminoethyl)-5Z,8Z,11Z,14Z-eicosatetraenester, monohydrochloride

Arachidonoyl 2'-Fluoroethylamide 90054

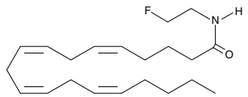
[166100-37-4] 2'-fluoro Anandamide

MF: $C_{22}H_{36}FNO$ **FW:** 349.5 **Purity:** ≥98%

A solution in ethanol **Stability:** ≥1 year at -20°C

Summary: An analog of AEA in which the alcohol of the ethanolamide group has been replaced with a fluorine atom, which increases the binding affinity and selectivity for the CB_1 receptor; *in vivo* activity is enhanced much less than the binding affinity, because it is rapidly hydrolyzed by FAAH

5 mg
10 mg
50 mg
100 mg



N-(2-fluoroethyl)-5Z,8Z,11Z,14Z-eicosatetraenamide

(±)-2-Methyl Arachidonoyl-2'-Fluoroethylamide 90055

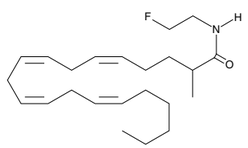
[166100-39-6] Fluoromethanandamide, O-689

MF: $C_{23}H_{38}FNO$ **FW:** 363.6 **Purity:** ≥95%

A solution in ethanol **Stability:** ≥2 years at -20°C

Summary: An analog of AEA in which the alcohol of the ethanolamide group has been replaced with a fluorine atom, which increases the binding affinity and selectivity for the CB_1 receptor; *in vivo* activity is enhanced much less than the binding affinity, because the analog is rapidly hydrolyzed by FAAH; the addition of an α-methyl group at the C-2 position of arachidonic acid confers enhanced metabolic stability; can fully substitute for Δ^9-THC in animal self-administration tests, whereas AEA and 2-fluoro AEA cannot

1 mg
5 mg
10 mg
50 mg



(±)-N-(2-fluoroethyl)-2-methyl-5Z,8Z,11Z,14Z-eicosatetraenamide

Methyl Arachidonyl Fluorophosphonate 70660

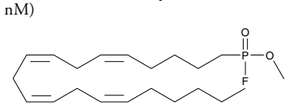
MAFP

MF: $C_{21}H_{36}FO_2P$ **FW:** 370.5 **Purity:** ≥98%

A solution in methyl acetate **Stability:** ≥1 year at -80°C

Summary: A selective, active-site directed, irreversible inhibitor of $cPLA_2$ and $iPLA_2$; inhibits A23187-induced arachidonic acid release from human platelets (IC_{50} = 0.6 µM) and $iPLA_2$ release from P388D1 cells (IC_{50} = 0.5 µM); a potent inhibitor of FAAH (IC_{50} = 2.5 nM); binds to the CB_1 receptor in rat brain membrane preparations (IC_{50} = 20 nM)

1 mg
5 mg
10 mg
50 mg



5Z,8Z,11Z,14Z-eicosatetraenyl-phosphonofluoridic acid, methyl ester

Arachidonoyl-1-thio-Glycerol 10007904

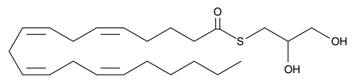
1-S-Arachidonoyl-1-mercapto-2,3-propanediol

MF: $C_{23}H_{38}O_3S$ **FW:** 394.6 **Purity:** ≥98%

A solution in acetonitrile **Stability:** ≥6 months at -80°C

Summary: A thioester substrate analog of 2-AG that can be utilized for the measurement of MAGL activity; hydrolysis of the thioester bond by MAGL generates a free thiol that reacts rapidly with the chromogenic reagent DTNB resulting in a yellow product with an absorbance maximum at 412 nm

1 mg
5 mg
10 mg
25 mg



5Z,8Z,11Z,14Z-eicosatetraenyl,1-thio glycerol

1-Arachidonoyl Glycerol 62150

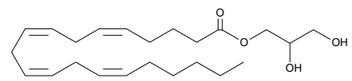
[35474-99-8]

MF: $C_{23}H_{38}O_4$ **FW:** 378.6 **Purity:** ≥95% (as a 9:1 mixture of the 1-AG and 2-AG)

A solution in acetonitrile **Stability:** ≥6 months at -80°C

Summary: An endogenous CB receptor ligand that is 10-100 times less potent than 2-AG in ligand binding affinity and agonist activity at the CB_1 receptor; 2-AG undergoes rapid isomerization to 1-AG, which makes it a frequent contaminant in synthetic 2-AG preparations, markedly reducing their cannabinergic potency

1 mg
5 mg
10 mg
25 mg



5Z,8Z,11Z,14Z-eicosatetraenoic acid, 1-glyceryl ester

1-Arachidonoyl Glycerol-d$_5$ 362152

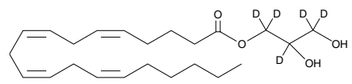
MF: $C_{23}H_{33}D_5O_4$ **FW:** 383.6 **Chemical Purity:** ≥95% (as a 9:1 mixture of the 1-AG and 2-AG)

Deuterium Incorporation: ≤1% d_0

A solution in acetonitrile **Stability:** ≥6 months at -80°C

Summary: An internal standard for the quantification of 1-AG by GC- or LC-MS

100 µg
500 µg
1 mg
5 mg



5Z,8Z,11Z,14Z-eicosatetraenoic acid, 1-glycerol-1,1,2,3,3-d$_5$ ester

2-Arachidonoyl Glycerol 62160

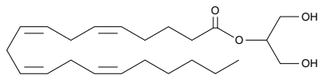
[53847-30-6]

MF: $C_{23}H_{38}O_4$ **FW:** 378.6 **Purity:** ≥95% (as a 9:1 mixture of 2-AG and 1-AG)

A solution in acetonitrile **Stability:** ≥6 months at -80°C

Summary: An endogenous agonist of the CB_1 receptor that acts as a full agonist at the CB_1 receptor; induces a rapid, transient increase in intracellular free calcium in NG108-15 neuroblastoma X glioma cells at a concentration of 0.3 nM

1 mg
5 mg
10 mg
25 mg



5Z,8Z,11Z,14Z-eicosatetraenoic acid, 2-glyceryl ester

2-Arachidonoyl Glycerol-d$_5$ 362162

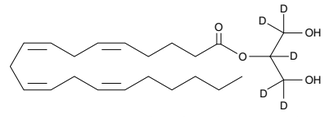
MF: $C_{23}H_{33}D_5O_4$ **FW:** 383.6 **Chemical Purity:** ≥95% (as a 9:1 mixture of 2-AG and 1-AG)

Deuterium Incorporation: ≤1% d_0

A solution in acetonitrile **Stability:** ≥6 months at -80°C

Summary: An internal standard for the quantification of 2-AG by GC- or LC-MS

50 µg
100 µg
500 µg
1 mg



5Z,8Z,11Z,14Z-eicosatetraenoic acid, 2-glycerol-1,1,2,3,3-d$_5$ ester

2-Arachidonoyl Glycerol-d$_8$ 362160

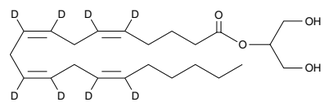
2-AG-d$_8$

MF: $C_{23}H_{30}D_8O_4$ **FW:** 386.6 **Chemical Purity:** ≥95% (as a 9:1 mixture of the 2-AG and 1-AG) **Deuterium Incorporation:** ≤1% d_0

A solution in acetonitrile **Stability:** ≥6 months at -80°C

Summary: An internal standard for the quantification of 2-AG by GC- or LC-MS

25 µg
50 µg
100 µg
500 µg



5Z,8Z,11Z,14Z-eicosatetraenoic-5,6,8,9,11,12,14,15-d$_8$ acid, 2-glyceryl ester

O-Arachidonoyl Glycidol 10010547

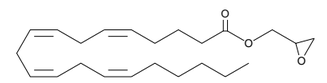
[439146-24-4]

MF: $C_{23}H_{36}O_3$ **FW:** 360.5 **Purity:** ≥98%

A solution in methyl acetate **Stability:** ≥1 year at -20°C

Summary: Selective inhibitor of monoacylglycerol hydrolysis; blocks 2-oleoyl glycerol hydrolysis in the cytosolic (IC_{50} = 4.5 µM) and membrane (IC_{50} = 19 µM) fractions of rat cerebella

5 mg
10 mg
50 mg
100 mg



5Z,8Z,11Z,14Z-eicosatetraenoic acid, oxiranylmethyl

Arachidonoyl Glycine 90051

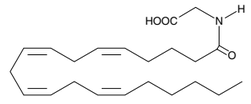
[179113-91-8] NAGly, N-Arachidonyl Glycine

MF: $C_{22}H_{35}NO_3$ **FW:** 361.5 **Purity:** ≥98%

A solution in ethanol **Stability:** ≥2 years at -20°C

Summary: Produced endogenously *via* oxidation of AEA, or by transacylation of arachidonoyl CoA; has analgesic activities in whole animal experiments, yet is a very poor ligand for the CB_1 receptor

5 mg
10 mg
50 mg
100 mg



N-[1-oxo-5Z,8Z,11Z,14Z-eicosatetraenyl]-glycine

• Also Available: **Arachidonoyl Glycine-d$_8$** (10007531)

Arachidonoyl-N-methyl amide 10007294

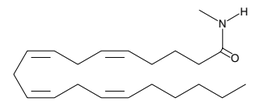
[156910-29-1]

MF: $C_{21}H_{35}NO$ **FW:** 317.5 **Purity:** ≥98%

A solution in methyl acetate **Stability:** ≥1 year at -20°C

Summary: An analog of AEA that binds to the human CB_1 receptor with a K_i value of 60 nM; inhibits rat glial gap junction cell-cell communication at a concentration of 50 µM

5 mg
10 mg
50 mg
100 mg



N-methyl-5Z,8Z,11Z,14Z-eicosatetraenamide

Arachidonoyl *m*-Nitroaniline 90059

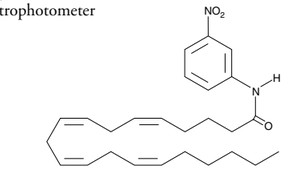
AmNA

MF: $C_{26}H_{36}N_2O_3$ **FW:** 424.6 **Purity:** ≥98%

A solution in methyl acetate **Stability:** ≥2 years at -20°C

Summary: A nitroaniline fatty acid amide used to measure FAAH activity; exposure to FAAH activity results in the release of the yellow colorimetric dye *m*-nitroaniline (ε = 13,500 at 410 nm) allowing the fast and convenient measurement of FAAH activity using a 96-well plate spectrophotometer

5 mg
10 mg
25 mg
50 mg



N-(3-nitrophenyl)-5Z,8Z,11Z,14Z-eicosatetraenamide

• Also Available: **Arachidonoyl p-Nitroaniline** (10168)

N-Arachidonoyl L-Serine 10005455

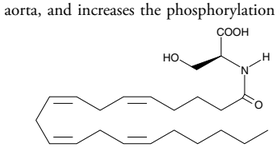
[187224-29-9] ARA-S

MF: $C_{23}H_{37}NO_4$ **FW:** 391.5 **Purity:** ≥98%

A solution in ethanol **Stability:** ≥1 year at -20°C

Summary: An endoCB analog that does not bind to CB_1, CB_2, or TRPV1; at 5 mg/kg antagonizes the hypotensive effects of a 10 mg/kg IV bolus of abnormal cannabidiol in an anesthetized rat blood pressure model; relaxes isolated rat mesenteric arteries and abdominal aorta, and increases the phosphorylation of Akt and MAPK in HUVEC

1 mg
5 mg
10 mg
25 mg



N-[1-oxo-5Z,8Z,11Z,14Z-eicosatetraenyl]-L-Ser

Arachidonoyl Serinol 62170

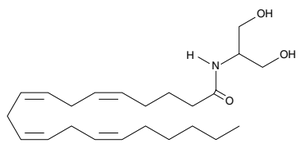
[183718-70-9]

MF: $C_{23}H_{39}NO_3$ **FW:** 377.6 **Purity:** ≥98%

A solution in ethanol **Stability:** ≥1 year at -20°C

Summary: A 2-AG analog with increased stability; approximately a log less potent as a CB_1 receptor agonist than 2-AG

5 mg
10 mg
50 mg
100 mg



N-[(2-hydroxy-1-hydroxymethyl)ethyl]-5Z,8Z,11Z,14Z-eicosatetraenamide

Olivia May, Ph.D.

Nitric Oxide Contribution in the CNS: a NO brain-

vol. 10
Ne

A rapidly expanding body of literature has pointed to the importance of nitric oxide (NO), a gasotransmitter, in the physiology of the central nervous system (CNS). Three distinct isoforms of nitric oxide synthase (NOS) account for the production of NO in the body. The form predominantly found constitutively expressed in the brain is neuronal nitric oxide synthase (nNOS or Type I). Inducible nitric oxide synthase (iNOS or Type II) is synthesized throughout the body primarily when induced by pro-inflammatory cytokines or endotoxins. Endothelial nitric oxide synthase (eNOS or Type III) is constitutively expressed in endothelial cells. All forms are calcium-dependent.

Structure and Localization

nNOS, only active in its dimerized state, generates citrulline and NO by catalyzing the oxidation of L-arginine (Figure 1). A head-to-tail dimerized conformation requires the binding of tetrahydrobiopterin (BH_4), heme, and L-arginine. Each nNOS monomer consists of an oxygenase domain (N-terminal) and a reductase domain (C-terminal) that is separated by a calmodulin-binding motif. The oxygenase domain, which binds L-arginine, contains a BH_4 binding site and a CYP450-type heme active site. Heat Shock Protein 90 (Hsp90) facilitates heme insertion for dimer formation. There is also a binding site for zinc, which enables dimerization, and a PDZ (**P**SD/**D**isc-large/**Z**O-1) domain, which allows nNOS to interact with other PDZ domain-containing proteins. The reductase domain binds NADPH. It contains a binding site for FAD and FMN through which electrons, donated by NADPH, transfer from the reductase domain of one monomer to the oxygenase domain of its dimer partner through calcium/calmodulin binding. There are four splice variants of nNOS (α, β, γ, and μ). The dominant splice variant in the brain appears to be nNOSα, the full length form of nNOS. nNOSβ lacks a PDZ domain, nNOSγ has little enzymatic activity, and nNOSμ is predominantly expressed in skeletal muscle.

nNOS localizes to synaptic spines contributing to NO signaling of neurons and is also present in astrocytes and the loose connective tissue surrounding blood vessels in the brain. Also, it is present in skeletal muscle, cardiac muscle and smooth muscle where it regulates blood flow and muscle contractions. Due to its reactive nature, NO cannot be stored in reserve, and so to be functional it must be newly synthesized to traverse the relatively short distance needed to react with proteins and various small molecules. As NO is highly diffusible, its production must be tightly regulated. Both particulate and soluble forms of nNOS have been identified. Depending on cell-type, nNOS is found either in the cytoplasm or nucleus and inactive monomers tend to cluster into distinct somal aggregations.[1] The function of these nNOS aggregates is thought to limit excessive NO production. Association with Hsp90 reduces aggregation, chaperoning nNOS to its targeted destination.[1] This suggests a role for Hsp90 in regulating subcellular localization of nNOS. To further control signaling, adaptor proteins, including PSD95 (Postsynaptic Density Protein 95), CAPON (C-Terminal PDZ Domain Ligand of Neuronal NO Synthase), PFK-M (6-phosphofructokinase-muscle type), and syntrophins (Dystrophin-associated proteins) can bind to the nNOS PDZ domain to deliver nNOS to highly specific targets.

Physiologies and Pathologies: too much of a good thing?

Originally, NO was identified as mediating relaxation of blood vessels and consequently named endothelium-derived relaxing factor (EDRF). It mediates nonadrenergic, noncholinergic inhibitory responses. Additionally, NO is released from peripheral efferent nerves in the corpus cavernosum, the gastrointestinal tract, and cerebral arteries where it increases local blood flow and decreases vascular resistance in cerebral circulation. At low concentrations, NO can be neuroprotective. It inhibits proliferation and promotes differentiation of developing neurons and the continually generating neurons in the subventricular zone and olfactory bulb of the mature brain, facilitates neurotransmission, and regulates long-term potentiation (LTP) and long-term depression (LTD).

In the CNS, NOS is tightly coupled to the influx of calcium through NMDA receptors (NMDAR) following postsynaptic stimulation of glutamate (Figure 2). At the postsynaptic terminal, PSD-95 links nNOS to NMDAR through their mutual PDZ binding motifs. Following its synthesis at postsynaptic sites, NO diffuses back to the presynaptic terminal and increases cGMP levels through the activation of soluble guanylate cyclase (sGC). NO also signals through ion channels including sodium, voltage-gated calcium, calcium-activated and ATP-sensitive potassium, and cyclic nucleotide-gated channels, as well as AMPA receptors (AMPAR) to modulate synaptic strength and intrinsic postsynaptic neuronal excitability.[2] CAPON binding to nNOS associates an NO-driven cytoplasmic signal transduction pathway (*via* DexRas 1) with activation of a downstream MAP kinase cascade and the modulation of nuclear transcription.[3] NO has a profound effect on gene expression, directly modifying nuclear transcription factors including CREB, N-Myc, NF-κB, and p53.[4] HDAC2 has also been identified as a key nuclear target of NO.[4] Post-translation, cysteine thiol groups couple NO to form S-nitrosylated proteins, a modification that regulates protein function by affecting catalytic activity, protein-protein interaction, and subcellular localization.

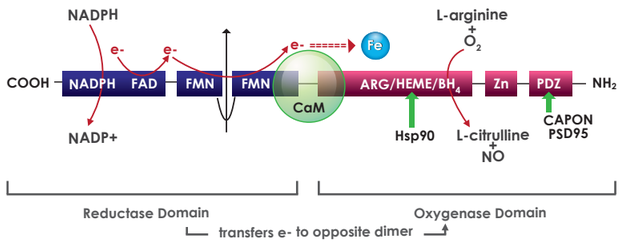
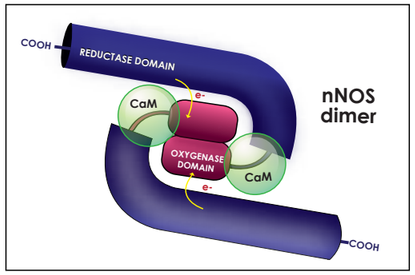


Figure 1. nNOSd Protein Structure. nNOS contains a reductase domain (C-terminal) and an oxygenase domain (N-terminal) which are separated by a calmodulin (CaM) binding motif. *[inset to right]* nNOS is active in dimeric form. An extensive interface between the two oxygenase domains allows electrons (e^-) to transfer from the reductase domain of one monomer to the oxygenase domain of the opposite monomer.



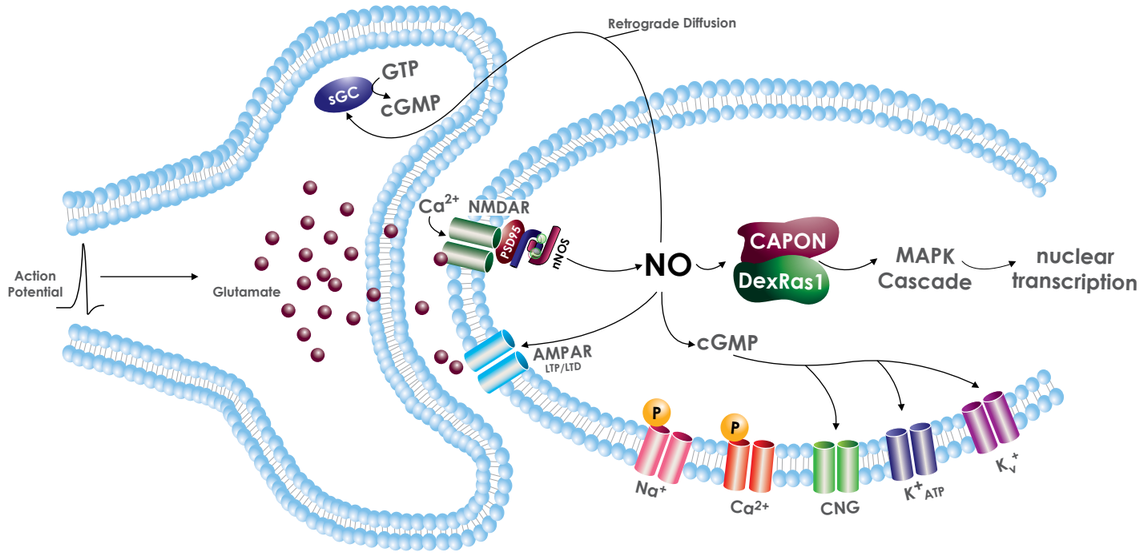


Figure 2. NO Signaling at a Neuronal Synapse. Synaptic glutamate release activates postsynaptic NMDA and AMPA receptors (NMDAR, AMPAR) leading to Ca^{2+}-induced nNOS activation. NO will diffuse to activate sGC to produce cGMP, which has many signaling roles including affecting presynaptic neurotransmitter release and targeting several ion channels. nNOS also associates with CAPON to activate a downstream MAP kinase cascade.

Excitotoxicity can result from overstimulation of NMDAR leading to overactivation of calcium-activated enzymes such as nNOS. nNOS-derived NO is a major source of neurotoxicity in neurons and is linked to neural damage resulting from ischemia. Other pathological effects of NO are linked to Alzheimer's disease, Parkinson's disease, multiple sclerosis, amyotrophic lateral sclerosis, Huntington's disease, and depression.[2,5,6]

Targeted Inhibitors: NO less or more

Given that increased nNOS expression/activity is linked to so many different neurological disorders, inhibiting nNOS should have therapeutic effects. Cayman carries an assortment of selective nNOS inhibitors with varying potencies (see Table 1) and more selective inhibitors continue to be designed.[7] Direct inhibition of nNOS, though, has the potential to disrupt physiological functions and so must be used with caution. Other means of interfering with nNOS signaling might include targeting downstream interactions such as the coupling of nNOS to PSD95 or CAPON or to intervene in Hsp90 chaperone activity to encourage nNOS monomerization and aggregation. Further understanding of nNOS-mediated signaling pathways is needed in order to appropriately target nNOS for treating diseases in the CNS. Cayman is committed to offering the tools needed to carry this important line of research forward.

References

1. Corso-Díaz, X. and Krukoff, T.L. *J. Neurochem.* **114**, 864-872 (2010).
2. Steinert, J.R., Chernova, T., and Forsythe, I.D. *Neuroscientist* **16(4)**, 435-452 (2010).
3. Mungrue, I.N. and Bredt, D.S. *J. Cell Sci.* **117**, 2627-2629 (2004).
4. Nott, A. and Riccio, A. *Cell Cycle* **8(5)**, 725-730 (2009).
5. Zhou, L. and Zhu, D. *Nitric Oxide* **20**, 223-230 (2009).
6. Toda, N., Ayajiki, K., and Okamura, T. *Can. J. Physiol. Pharmacol.* **87**, 581-594 (2009).
7. Silverman, R.B. *Acc. Chem. Res.* **42(3)**, 439-451 (2009).

Product No.	nNOS Inhibitors	Potency
80330	Vinyl-L-NIO (hydrochloride)	K_i = 100 nM
80587	N^{ω}-propyl-L-Arginine	K_i = 57 nM
10010252	Methyl-L-NIO (hydrochloride)	K_i= 3 μM
10005031	L-NMMA (acetate)	K_i= 0.18 μM
10012088	Ethyl-L-NIO (hydrochloride)	K_i = 5.3 μM
81340	7-Nitroindazole	IC_{50} = 0.71 μM
81310	TRIM	IC_{50} = 28.2 μM
80340	α-Guanidinoglutaric Acid	K_i = 2.69 μM
80585	S-methyl-L-Thiocitrulline (hydrochloride)	K_i = 1.2 nM
81015	2-Imino-4-methylpiperidine (acetate)	IC_{50} = 0.2 μM
81290	S-isopropyl Isothiourea (hydrobromide)	K_i= 37 nM
81005	S-(2-aminoethyl) Isothiourea (dihydrobromide)	K_i = 1.8 μM
80310	L-NIL (hydrochloride)	IC_{50} = 92 μM
81020	MEG (sulfate)	EC_{50} = 60 μM
81510	1,4-PBIT (dihydrobromide)	K_i = 16 nM
80210	L-NAME (hydrochloride)	K_i= 15 nM
81280	S-ethyl N-[4-(trifluoromethyl)phenyl] Isothiourea (hydrochloride)	K_i = 0.32 μM
81500	1,3-PBIT (dihydrobromide)	K_i= 0.25 μM
81530	Aminoguanidine (hydrochloride)	IC_{50} = 150 μM
80200	L-NMMA (citrate)	K_i = 0.18 μM
10011724	Propenyl-L-NIO (hydrochloride)	K_i = 10.3 μM
81300	S-methyl Isothiourea (hemisulfate)	K_i = 160 nM
80220	L-NNA	K_i = 15 nM
81345	3-bromo-7-Nitroindazole	IC_{50} = 0.17 μM
81010	AMT (hydrochloride)	IC_{50} = 34 nM
80320	L-NIO (hydrochloride)	K_i = 1.7 μM
81275	S-ethyl Isothiourea (hydrobromide)	K_i = 29 nM

Table 1. nNOS inhibitors available from Cayman Chemical. Selective nNOS inhibitors are shaded

Arachidonoyl Serotonin 70665

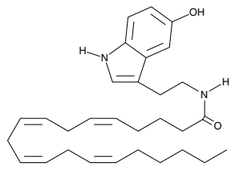
[187947-37-1] AA-5HT

MF: $C_{30}H_{42}N_2O_2$ **FW:** 462.7 **Purity:** ≥98%

A solution in methyl acetate **Stability:** ≥1 year at -20°C

Summary: An inhibitor of FAAH attenuating the FAAH activity from murine neuroblastoma cells with an IC_{50} value of 12 µM; alters both the K_m and the V_{max} of FAAH, indicating that it is a very tight binding, competitive inhibitor; does not inhibit $cPLA_2$ and is essentially devoid of cannabimimetic activity

5 mg
10 mg
50 mg
100 mg



N-[2-(5-hydroxy-1H-indol-3-yl)ethyl]-5Z,8Z,11Z,14Z-eicosatetraenamide

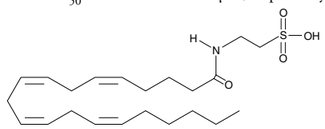
N-Arachidonoyl Taurine 10005537

MF: $C_{22}H_{37}NO_4S$ **FW:** 411.6 **Purity:** ≥98%

A solution in methanol **Stability:** ≥1 year at -20°C

Summary: A prominent member of the N-arachidonoyl amino acyl amide family that activates both TRPV1 and TRPV4 with EC_{50} values of 28 and 21 µM, respectively

500 µg
1 mg
5 mg
10 mg



2-[(1-oxo-5Z,8Z,11Z,14Z-eicosatetraenyl)amino]-ethane sulfonic acid

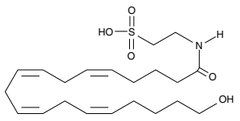
20-hydroxy N-Arachidonoyl Taurine 10009501

MF: $C_{22}H_{37}NO_4S$ **FW:** 427.6 **Purity:** ≥95%

A solution in ethanol **Stability:** ≥1 year at -20°C

Summary: A potential CYP450 metabolite of N-arachidonoyl taurine that may activate TRPV1 and TRPV4

25 µg
50 µg
100 µg
500 µg



20-hydroxy-2-[(1-oxo-5Z,8Z,11Z,14Z-eicosatetraenyl)amino]-ethane sulfonic acid

2-Arachidonyl Glycerol ether 62165

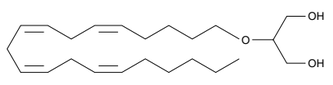
[222723-55-9] 2-AG ether, Noladin

MF: $C_{23}H_{40}O_3$ **FW:** 364.6 **Purity:** ≥98%

A solution in ethanol **Stability:** ≥6 months at -80°C

Summary: A selective CB_1 receptor agonist exhibiting K_i values of 21.2 nM and >3 µM at the CB_1 and CB_2 receptors, respectively; more chemically stable than 2-AG, with an endogenous half-life of hours rather than minutes but 10-fold less potent than 2-AG in eliciting typical CB_1-mediated responses; elicits modest reductions in IOP in rabbits when administered at doses exceeding 50 µg per eye and increases aqueous humor outflow *via* the CB_1 receptor in the trabecular meshwork

1 mg
5 mg
10 mg
25 mg



5Z,8Z,11Z,14Z-eicosatetraen-2-glyceryl ether

N-Arachidonyl Maleimide 10007517

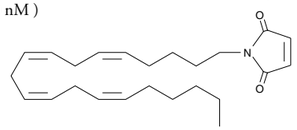
NAM

MF: $C_{24}H_{35}NO_2$ **FW:** 369.5 **Purity:** ≥98%

A solution in ethanol **Stability:** ≥1 year at -80°C

Summary: Potent, irreversible inhibitor of MAGL or MAGL-like activity in rat cerebellar membranes, (IC_{50} = 140 nM)

5 mg
10 mg
50 mg
100 mg



eicosa-5Z,8Z,11Z,14Z-tetraenyl-1-pyrrole-2,5-dione

Arachidonyl Trifluoromethyl Ketone 62120

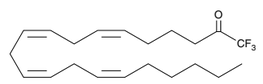
[149301-79-1] AATFMK, ATK

MF: $C_{21}H_{31}F_3O$ **FW:** 378.6 **Purity:** ≥98%

A solution in ethanol **Stability:** ≥1 year at -20°C

Summary: An analog of arachidonic acid in which the carboxyl group is replaced by a trifluoromethyl ketone group; inhibits the activity of the 85 kDa $cPLA_2$ and the 80 kDa macrophage $iPLA_2$ without altering the activity of the 14 kDa $sPLA_2$s; at a concentration of 7.5 µM, almost completely inhibits hydrolysis of AEA in a rat brain homogenate

1 mg
5 mg
10 mg
50 mg



1,1,1-trifluoro-6Z,9Z,12Z,15Z-heneicosatetraen-2-one

Arachidoyl Ethanolamide 10005765

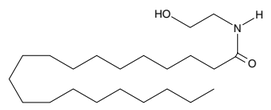
[94421-69-9] N-Arachidoylethanolamine

MF: $C_{22}H_{45}NO_2$ **FW:** 355.6 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A saturated fatty acyl ethanolamide devoid of classical (CB_1/CB_2) activity; does not bind to the murine CB_1 receptor and does not compete with AEA as a substrate for FAAH; a non-CB receptor-mediated pharmacology is still being elucidated

5 mg
10 mg
25 mg
50 mg



N-(2-hydroxyethyl)-eicosanamide

Arachidoyl Glycine 9000325

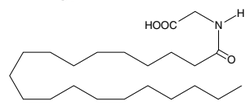
[617703-96-5]

MF: $C_{22}H_{43}NO_3$ **FW:** 369.5 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: Consists of arachidic acid with glycine attached at its carboxy terminus

5 mg
10 mg
50 mg
100 mg



N-(1-oxoeicosyl)-glycine

NEW Arecoline (hydrobromide) 13662

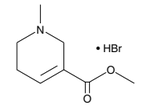
[300-08-3]

MF: $C_8H_{13}NO_2$ • Hbr **FW:** 236.1 **Purity:** ≥95%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A natural alkaloid in the betel nut; an agonist of the muscarinic acetylcholine receptors M1, M2, and M3; causes smooth muscle contraction; has been shown to improve learning and memory and may prove to be useful in treating dementia

100 mg
250 mg
500 mg



1,2,5,6-tetrahydro-1-methyl-3-pyridinecarboxylic acid methyl ester, monohydrobromide

N^{ω}-propyl-L-Arginine 80587

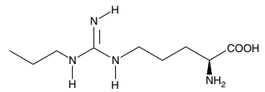
[137361-05-8]

MF: $C_9H_{20}N_4O_2$ **FW:** 216.3 **Purity:** ≥98%

A crystalline solid **Stability:** ≥1 year at -20°C

Summary: A potent and selective competitive inhibitor of nNOS (K_i = 57 nM; bovine); exhibits 3,000-fold and 150-fold selectivity for the neuronal isoform *versus* the inducible (murine; K_i = 180 µM) and endothelial (bovine; K_i = 8.5 µM) isoforms of NOS, respectively

5 mg
10 mg
50 mg
100 mg



N^5-[imino(propylamino)methyl]-L-ornithine

Arvanil 90052

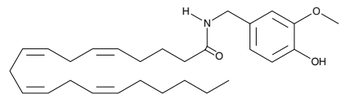
[128007-31-8] N-Vanillylarachidonamide

MF: $C_{28}H_{41}NO_3$ **FW:** 439.6 **Purity:** ≥98%

A solution in ethanol **Stability:** ≥1 year at -20°C

Summary: A structural analog of capsaicin with complex interactions in the CB system; inhibits the reuptake of AEA, acts as CB_1 receptor agonist and is resistant to FAAH hydrolysis; exhibits vasodilator, analgesic, and anti-inflammatory properties

5 mg
10 mg
50 mg
100 mg



N-[(4-hydroxy-3-methoxyphenyl)methyl]-5Z,8Z,11Z,14Z-eicosatetraenamide

Aspalatone 13644

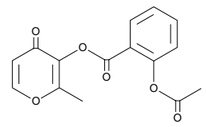
[147249-33-0] Acetylsalicylic Acid Matol ester

MF: $C_{15}H_{12}O_6$ **FW:** 288.3 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: An anti-platelet aggregator (IC_{50} = 180 µM, *in vitro*) that prolongs bleeding time significantly in a rodent model of thromboembolism; at 24 mg/kg, generates antioxidant and neuroprotective effects against kainic acid-induced epilepsy in rat hippocampus

5 mg
10 mg
50 mg
100 mg



2-(acetyloxy)-2-methyl-4-oxo-4H-pyran-3-yl-benzoic acid ester

NEW AT-56 13160

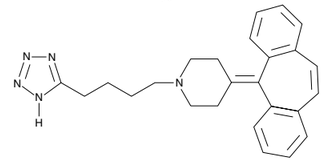
[162640-98-4]

MF: $C_{25}H_{27}N_5$ **FW:** 397.5 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A selective, competitive, and highly bioavailable inhibitor of L-PGDS (K_i = 75 µM); inhibits the production of PGD_2 by L-PGDS-expressing cells purified from human CSF and recombinant murine with an IC_{50} value of 95 µM

1 mg
5 mg
10 mg
50 mg



4-(5H-dibenzo[a,d]cyclohepten-5-ylidene)-1-[4-(2H-tetrazol-5-yl)butyl]-piperidine

ATF2 (Phospho-Ser^{490,498}) Polyclonal Antibody 10009410

Activating Transcription Factor 2

Supplied as: affinity-purified antibody **Stability:** ≥1 year at -20°C

Summary: Antigen: synthetic phosphopeptide corresponding to amino acid residues surrounding phospho-Ser^{490,498} of human ATF2 • Host: rabbit • Cross Reactivity: (+) human ATF2; expected to react with rat ATF2 • Application(s): IHC (frozen sections) and WB • ATF binds to both AP-1 and CRE DNA response elements and is a member of the ATF/CREB family of leucine zipper proteins. ATF2 is particularly abundant in the brain and the ATF2 family of transcription factors is considered an important substrate of signals upstream of genes associated with neuronal growth and differentiation. ATF expression has also been linked to depression in humans.

100 µl

AVE-1625 10009021

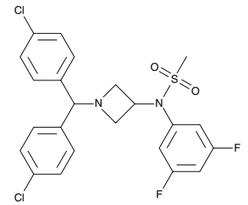
[358970-97-5]

MF: $C_{23}H_{20}Cl_2F_2N_2O_2S$ **FW:** 497.4 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: Potent and selective antagonist for the CB_1 receptor (K_i = 0.16-0.44 nM); a dose of 1-3 mg/kg improves the performance of rodents in working memory tasks; a dose of 30 mg/kg reduces caloric intake, increases lipolysis from fat tissues and reduces hepatic glycogen levels in rodents

1 mg
5 mg
10 mg
50 mg



N-[1-[bis(4-chlorophenyl)methyl]-3-azetidinyl]-N-(3,5-difluorophenyl)-methanesulfonamide

BACE (human recombinant) 10227

ASP-1, BACE-1, Memapsin-2, Membrane-bound Aspartic Protease, β-Secretase, β-site of APP Cleaving Enzyme

M_r: 48 kDa **Purity:** ≥95% **Stability:** ≥*6 months at -80°C*

Supplied in: 100 mM sodium borate, pH 8.5, containing 200 mM sodium chloride

Source: Human recombinant C-terminal His-tag protein expressed in *E. coli*

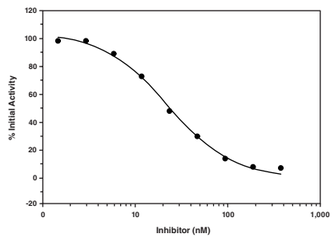
Summary: A membrane-anchored aspartic protease that initiates the first step in Aβ production; cleaves amyloid precursor protein (APP) to generate a soluble N-terminal fragment and a membrane-associated C-terminal fragment; proteolysis of the C-terminal fragment by γ-secretase generates the Aβ peptide

10 µg
25 µg
50 µg

BACE Inhibitor Screening Assay Kit 600070

β-Secretase Inhibitor Screening Assay Kit
Stability: ≥6 months at -80°C
Summary: BACE is a promising therapeutic target as this protease initiates the first step in Aβ production. Cayman's BACE Inhibitor Screening Assay Kit provides a method for screening human BACE inhibitors. The assay utilizes a synthetic Swedish mutant APP peptide (EVNLDAEF) that has been linked to a fluorophore (EDANS) at one end and to a quenching agent (Dabcyl) at the other. After cleavage by BACE, the product (peptide-EDANS) is brightly fluorescent.

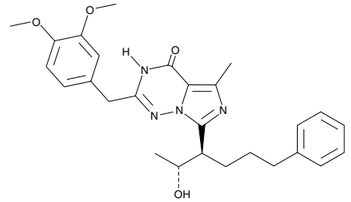
96 wells



BAY-60-7550 10011135

[439083-90-6]
MF: $C_{27}H_{32}N_4O_4$ **FW:** 476.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A potent and selective PDE2 inhibitor with IC_{50} values of 2.0 nM (bovine) and 4.7 nM (human); at 3 mg/kg, increases cGMP signaling which antagonizes oxidative stress-induced anxiety-like behavioral effects in mice; at 1 mg/kg enhances cAMP/cGMP-mediated object and spatial memory consolidation in rats

500 µg
1 mg
5 mg
10 mg

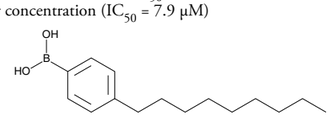


2-[(3,4-dimethoxyphenyl)methyl]-7-[(1R)-1-hydroxyethyl]-4-phenylbutyl]-5-methyl-imidazo[5,1-f][1,2,4]triazin-4(1H)-one

4-(n-nonyl) Benzeneboronic Acid 13140

[256383-45-6]
MF: $C_{15}H_{25}BO_2$ **FW:** 248.2 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A potent inhibitor of FAAH, with an IC_{50} value of 9.1 nM; also inhibits MAGL at ~1,000-fold higher concentration (IC_{50} = 7.9 µM)

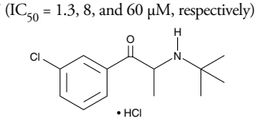
100 mg
250 mg
500 mg
1 g



Bupropion (hydrochloride) 10488

[31677-93-7] NSC 315851
MF: $C_{13}H_{18}ClNO$ • HCl **FW:** 276.2 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: An inhibitor of the reuptake of dopamine and norepinephrine (IC_{50} = 6.5 and 3.4 µM, respectively); also an antagonist of neuronal acetylcholine nicotinic receptors, blocking α3β2 better than α4β2 and α7 (IC_{50} = 1.3, 8, and 60 µM, respectively)

100 mg
250 mg
500 mg
1 g



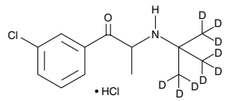
1-(3-chlorophenyl)-2-[(1,1-dimethylethyl)amino]-1-propane, monohydrochloride

**SPI-BIO Assays are available through Cayman Chemical only within North & South America and Asia; elsewhere contact SPI-BIO.*

NEW Bupropion-d_9 (hydrochloride)* 10010679

MF: $C_{13}H_9ClD_9NO$ • HCl **FW:** 285.3 **Chemical Purity:** ≥95%
Deuterium Incorporation: ≤1% d_0
A crystalline solid **Stability:** ≥1 year at 4°C
Summary: An internal standard for the quantification of bupropion by GC- or LC-MS

1 mg
5 mg
10 mg

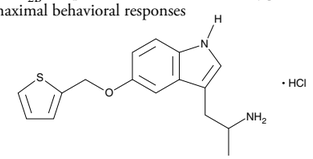


1-(3-chlorophenyl)-2-[(1,1-dimethylethyl)amino]-1-propanone-d_9, monohydrochloride

BW 723C86 70090

[160521-72-2]
MF: $C_{16}H_{18}N_2OS$ • HCl **FW:** 322.9 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: An anxiolytic compound that causes hyperphagia, which is likely due to its 10-fold selectivity for the $5\text{-}HT_{2B}$ receptor; direct infusion of 1-3 µg into the cerebral ventricles of rats evokes maximal behavioral responses

1 mg
5 mg
10 mg
50 mg



α-methyl-5-(2-thienylmethoxy)-1H-indole-3-ethanamine, monohydrochloride

CaMKII Monoclonal Antibody (Clone 6G9) 10011437

Calcium/Calmodulin-dependent Protein Kinase II
Supplied as: protein G-purified IgG at a concentration of 1 mg/ml in PBS, pH. 7.4, containing 50% glycerol and 0.09% sodium azide
Stability: ≥1 year at -20°C
Summary: Antigen: rat recombinant CaMKII • Host: mouse, clone 6G9 • Isotype: IgG_1 • Cross Reactivity: (+) murine, rat, and bovine CaMKII • Application(s): EIA, IF, IHC, IP, and WB • CaMKII is an important member of the calcium/calmodulin-activated protein kinase family, functioning in neural synaptic stimulation and T-cell receptor signaling. CaMKII is expressed in many different tissues but is specifically found in neurons of the forebrain and its mRNA is found within the dendrites and the soma of the neuron.

25 µg
100 µg

CaMKII (phospho-Thr^{286}/Thr^{287}) Monoclonal Antibody (Clone 22B1) 10011438

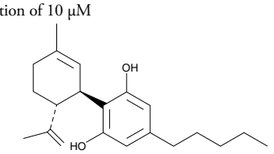
Calcium/Calmodulin-dependent Protein Kinase II
Supplied as: protein G-purified IgG at a concentration of 1 mg/ml in PBS, pH. 7.4, containing 50% glycerol and 0.09% sodium azide
Stability: ≥1 year at -20°C
Summary: Antigen: synthetic peptide • Host: mouse, clone 22B1 • Isotype: IgG_1 • Cross Reactivity: (+) rat CaMKII • Application(s): EIA, IF, IP, and WB • CaMKII is an important member of the calcium/calmodulin-activated protein kinase family, functioning in neural synaptic stimulation and T-cell receptor signaling. CaMKII is expressed in many different tissues but is specifically found in the neurons of the forebrain and its mRNA is found within the dendrites and the soma of the neuron. The binding of calcium/calmodulin to its regulatory domain releases its autoinhibitory effect and activates the kinase domain resulting in autophosphorylation at Thr^{286}.

25 µg
100 µg

Cannabidiol
(DEA Schedule I Regulated Compound) 90080

[13956-29-1] CBD
MF: $C_{21}H_{30}O_2$ **FW:** 314.5 **Purity:** ≥99%
A crystalline solid **Stability:** ≥1 year at -20°C
Summary: Displays antioxidant activity when administered at relatively high doses without undesired toxic or psychological effects seen with Δ^9-THC; is neuroprotective against both excitatory neurotransmitter (glutamate) and oxidant (hydroperoxide) induced neurotoxicity at a concentration of 10 µM

1 mg
5 mg
10 mg
50 mg

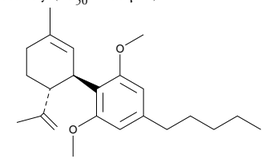


2-[1R-3-methyl-6R-(1-methylethenyl)-2-cyclohexen-1-yl]-5-pentyl-1,3-benzenediol

Cannabidiol dimethyl ether 13285

[1242-67-7] CBDD, Cannabidiol-2',6'-Dimethyl Ether
MF: $C_{23}H_{34}O_2$ **FW:** 342.5 **Purity:** ≥98%
A solution in methyl acetate **Stability:** ≥1 year at -20°C
Summary: a cannabidiol derivative that potently and selectively inhibit 15-LO (IC_{50} = 0.28 µM); does not inhibit 5-LO effectively (IC_{50} >200 µM)

1 mg
5 mg
10 mg
50 mg

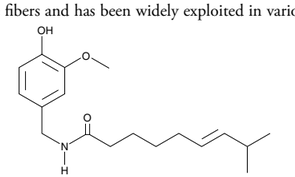


1,3-dimethoxy-2-[(1R,6R)-3-methyl-6-(1-methylethenyl)-2-cyclohexen-1-yl]-5-pentyl-benzene

Capsaicin 92350

[404-86-4]
MF: $C_{18}H_{27}NO_3$ **FW:** 305.4 **Purity:** ≥95%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: The primary active component of the heat and pain-eliciting lipid-soluble fraction of the *capsicum* pepper and present in natural hot pepper extracts; elicits a sensation of burning pain by activation of TRPV1 on small, non-myelinated polymodal C-type nociceptive nerve fibers and has been widely exploited in various non-prescription pain remedies

50 mg
100 mg
250 mg
1 g



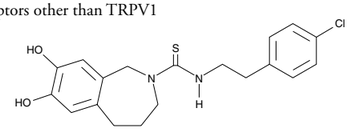
N-[(4-hydroxy-3-methoxyphenyl)methyl]-6E-8-methyl-nonenamide

• Also Available: **Capsaicin (technical grade)** (10010743)

Capsazepine 10007518

[138977-28-3]
MF: $C_{19}H_{21}ClN_2O_2S$ **FW:** 376.9 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A competitive antagonist of TRPV1 which blocks the capsaicin-induced uptake of Ca^{2+} in neonatal rat dorsal root ganglia (IC_{50} = 0.42 µM) and Chinese hamster ovary cells (IC_{50} = 17 nM); does not block acid- or heat-induced activation of TRPV1 and may block receptors other than TRPV1

1 mg
5 mg
10 mg
50 mg

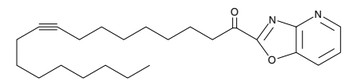


N-[2-(4-chlorophenyl)ethyl]-1,3,4,5-tetrahydro-7,8-dihydroxy-2H-2-benzazepine-2-carbothioamide

CAY10401 71652

[288862-89-5]
MF: $C_{24}H_{34}N_2O_2$ **FW:** 382.5 **Purity:** ≥98%
A solution in methyl acetate **Stability:** ≥1 year at -20°C
Summary: A selective, potent inhibitor of rat FAAH exhibiting a K_i value of 0.14 nM; approximately 580-fold more potent than oleyl trifluoromethyl ketone when assayed under the same conditions

100 µg
500 µg
1 mg
5 mg

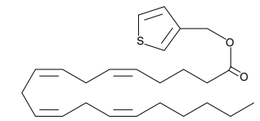


1-oxazolo[4,5-b]pyridin-2-yl-9-octadecyn-1-one

CAY10412 72620

[390824-17-6]
MF: $C_{25}H_{36}O_2S$ **FW:** 400.6 **Purity:** ≥98%
A solution in methyl acetate **Stability:** ≥1 year at -20°C
Summary: An analog of AEA with no intrinsic binding affinity for either CB_1 or CB_2 receptors; potently inhibits AEA reuptake in U937 lymphoma cells (IC_{50} = 3 µM); may enhance endoCB signaling by augmenting endoCB concentrations

5 mg
10 mg
50 mg
100 mg

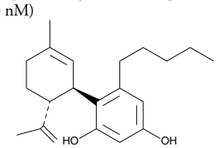


5Z,8Z,11Z,14Z-eicosatetraenoic acid, 3-theinylmethyl ester

CAY10429 10004259

[22972-55-0] Abn-CBD, Abnormal Cannabidiol
MF: $C_{21}H_{30}O_2$ **FW:** 314.5 **Purity:** ≥98%
A solution in methyl acetate **Stability:** ≥2 years at -20°C
Summary: A synthetic regioisomer of cannabidiol that fails to elicit either CB_1 or CB_2 responsiveness and is without psychotropic activity; induces endothelium-dependent vasodilation *via* a CB_1/CB_2/NO-independent mechanism; shows hypotensive activity that cannot be antagonized by cannabidiol or SR141716A at a dose of 20 mg/kg in rats; may activate a third type of CB receptor to regulate the migratory activity of murine BV-2 microglial cells (EC_{50} = 600 nM)

1 mg
5 mg
10 mg
50 mg



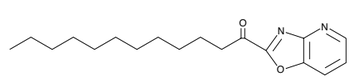
4-[3-methyl-6R-(1-methylethenyl)-2-cyclohexen-1-yl]-5-pentyl-1,3-benzenediol

• Also Available: **CAY10429-d3** (10009523)

CAY10435 10005102

[288862-73-7]
MF: $C_{18}H_{26}N_2O_2$ **FW:** 302.4 **Purity:** ≥98%
A solution in methyl acetate **Stability:** ≥1 year at -20°C
Summary: A selective, potent inhibitor of rat FAAH (K_i = 0.57 nM); exhibited IC_{50} values of 0.81 nM, 83 nM, and 50 µM for FAAH, triacylglycerol hydrolase (TGH), and an uncharacterized hydrolase (KIAA1363), respectively, when screened against the Ser hydrolase family of enzymes

500 µg
1 mg
5 mg
10 mg



1-oxaxolo[4,5-b]pyridin-2-yl-1-dodecanone

CAY10441 10005186

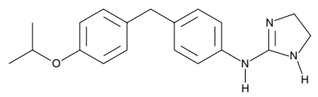
[221529-58-4] RO1138452

MF: $C_{19}H_{23}N_3O$ **FW:** 309.4 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A potent antagonist for the human IP (prostacyclin) receptor that antagonizes the carbaprostacyclin-induced activation of human neuroblastoma adenylate cyclase, blocking cAMP accumulation in a dose-dependent manner; inhibits the binding of tritiated iloprost to rodent neuroblastoma cells (K_i = ~1.5 nM); shows significant analgesic activity in standard antinociceptive assays at levels between 2-20 mg/kg

1 mg
5 mg
10 mg
25 mg



4,5-dihydro-N-[4-[[4-(1-methylethoxy)phenyl]methyl]phenyl]-1H-imadazol-2-amine

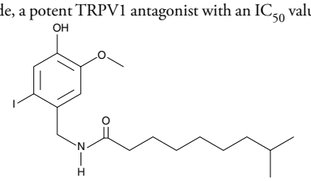
CAY10448 10005633

MF: $C_{18}H_{28}INO_3$ **FW:** 433.3 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: An iodinated nonivamide, a potent TRPV1 antagonist with an IC_{50} value of approximately 10 nM

1 mg
5 mg
10 mg
50 mg



N-[(4-hydroxy-2-iodo-3-methoxyphenyl)methyl]-8-methyl-nonanamide

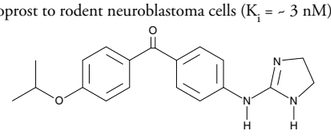
CAY10449 10005913

MF: $C_{19}H_{21}N_3O_2$ **FW:** 323.4 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A potent antagonist for the human IP (prostacyclin) receptor that antagonizes the carbaprostacyclin-induced activation of human neuroblastoma adenylate cyclase, blocking cAMP accumulation in a dose-dependent manner; inhibits the binding of tritiated iloprost to rodent neuroblastoma cells (K_i = ~ 3 nM)

1 mg
5 mg
10 mg
25 mg



4,5-dihydro-N-[4-[[4-(1-methylethoxy)phenyl]carbonyl]phenyl]-1H-imadazol-2-amine

CAY10455 10005072

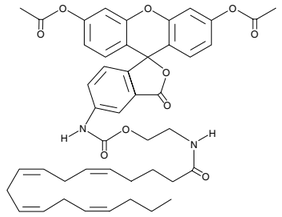
[290374-09-3] SKM 4-45-1

MF: $C_{47}H_{52}N_2O_{10}$ **FW:** 804.9 **Purity:** ≥98%

A solution in methyl acetate **Stability:** ≥1 year at -20°C

Summary: A labeled analog of AEA that is non-fluorescent when outside the cell but upon transport into the cell, is cleaved by esterases to give a bright fluorescence at 530 nm; uptake into C6 glioma cells is inhibited by AEA and its analogs, and conversely CAY10455 inhibits the uptake of tritiated AEA, indicating that they compete for the AEA transporter

100 µg
500 µg
1 mg
5 mg



[3',6'-bis(acetyloxy)-3-oxospiro[isobenzofuran-1(3H),9'-[9H]xanthen]-5-yl]-2-[[1-oxo-5Z,8Z,11Z,14Z-eicosatetraenyl]amino]ethyl ester carbamic acid

CAY10508 10008669

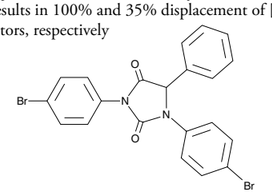
[878533-35-8]

MF: $C_{21}H_{14}Br_2N_2O_2$ **FW:** 486.2 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A potent and selective CB_1 receptor inverse agonist (K_i = 243 nM; EC_{50} = 195 nM); a 10 µM concentration results in 100% and 35% displacement of [^{3}H]-CP-55,940 at the CB_1 and CB_2 receptors, respectively

5 mg
10 mg
25 mg
50 mg



1,3-bis(4-bromophenyl)-5-phenyl-2,4-imidazolidinedione

CAY10550 10010740

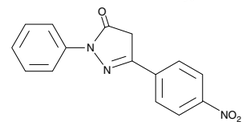
[34320-83-7] 3-(4-Nitrophenyl)-1-phenyl-2-pyrazolin-5-one

MF: $C_{15}H_{11}N_3O_3$ **FW:** 281.3 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A potent antiprion compound that inhibits the accumulation of PrP^{Sc} with an IC_{50} value of 3 nM in both ScN2a and F3 prion-infected murine neuroblastoma cell lines; also inhibits the formation of hydroxyl radicals *in vitro* with an IC_{50} value of 90 µM

1 mg
5 mg
10 mg
25 mg



2,4-dihydro-5-(4-nitrophenyl)-2-phenyl-3H-pyrazol-3-one

CAY10568 10012565

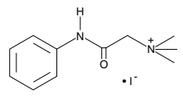
[22913-17-3] Santinamide

MF: $C_{11}H_{17}N_2O \bullet I$ **FW:** 320.2 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A physically smaller, less hydrophobic version of the lidocaine derivative QX314 designed to be more permeable to the TRPV1 ion channel for selective analgesia through TRPV1

5 mg
10 mg
50 mg
100 mg



trimethyl[(phenylcarbamoyl)methyl]-ammonium iodide

CAY10570 10010032

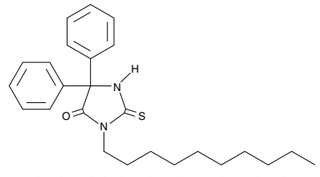
[875014-22-5]

MF: $C_{25}H_{32}N_2OS$ **FW:** 408.6 **Purity:** ≥98%

A solution in methyl acetate **Stability:** ≥1 year at -20°C

Summary: A reversible inhibitor of FAAH activity exhibiting an IC_{50} value of 1.3 µM

500 µg
1 mg
5 mg
10 mg



3-decyl-5,5'-diphenyl-2-thioxo-4-imidazolidinone

NEW CAY10608 13358

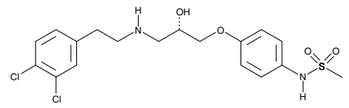
[457897-92-6]

MF: $C_{18}H_{22}Cl_2N_2O_4S$ **FW:** 433.4 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A propanolamine that potently, selectively, and non-competitively antagonizes the NR2B subunit of NMDA receptors (IC_{50} = 50 nM); does not inhibit other NMDA subunits, α-amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid (AMPA) receptors, or kainate receptors; has neuroprotective effects *in vitro* and *in vivo*

1 mg
5 mg
10 mg
25 mg



N-[4-[(2S)-3-[[2-(3,4-dichlorophenyl)ethyl]amino]-2-hydroxypropoxy]phenyl]-methanesulfonamide

CB-13 10010398

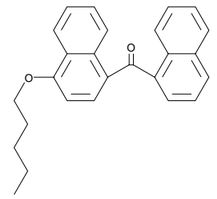
[432047-72-8]

MF: $C_{26}H_{24}O_2$ **FW:** 368.5 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A dual agonist of the CB_1 (IC_{50} = 15 nM) and CB_2 (IC_{50} = 98 nM) receptors; potently blocks CB_1-dependent neuropathic mechanical hyperalgesia in rats, shows limited brain penetration, and exhibits good oral bioavailability

5 mg
10 mg
25 mg
50 mg



1-naphthalenyl[4-(pentylox)-1-naphthalenyl]-methanone

CB-25 10010116

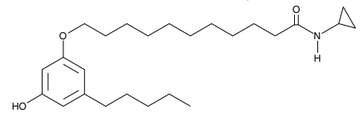
[869376-63-6]

MF: $C_{25}H_{41}FNO_3$ **FW:** 403.6 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A stable analog of Δ^9-THC; exhibits high affinity for the CB_1 and CB_2 receptors with K_i values of 5.2 and 13 nM, respectively, also behaves as an inverse agonist for the CB_1 receptor as assessed in a cAMP functional assay

1 mg
5 mg
10 mg
50 mg



N-cyclopropyl-11-(3-hydroxy-5-pentylphenoxy)-undecanamide

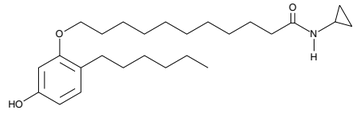
CB-52 10010117

MF: $C_{26}H_{43}N_2O_3$ **FW:** 417.6 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A stable analog of Δ^9-THC and AEA; exhibits high-affinity for the CB_1 and CB_2 receptors (K_i = 210 and 30 nM, respectively); behaves primarily as a CB_1 receptor partial agonist and a CB_2 receptor neutral antagonist *in vitro*

1 mg
5 mg
10 mg
50 mg



N-cyclopropyl-11-(2-hydroxy-5-pentylphenoxy)-undecanamide

NEW CB-86 13289

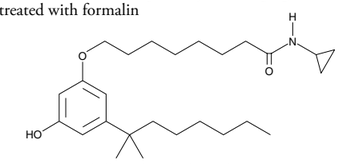
[1150586-64-3]

MF: $C_{26}H_{43}NO_3$ **FW:** 417.6 **Purity:** ≥98%

A solution in ethanol **Stability:** ≥1 year at -20°C

Summary: A partial agonist for the CB_1 receptor and a neutral antagonist for the CB_2 receptor with K_i values of 5.6 and 7.9 nM, respectively; at 1 mg/kg, exhibits antinociceptive effects in mice treated with formalin

1 mg
5 mg
10 mg
50 mg



N-cyclopropyl-8-[3-(1,1-dimethylheptyl)-5-hydroxyphenoxy]-octanamide

CB_1 Receptor (C-Term) Polyclonal Antibody 10006590

Supplied as: peptide affinity-purified IgG **Stability:** ≥1 year at -20°C

Summary: Antigen: human CB_1 receptor amino acids 461-472 • Host: rabbit • Cross Reactivity: (+) human, rat, and murine CB_1 receptor • Application(s): IHC (paraffin-embedded sections) and WB • The CB_1 receptor is a GPCR that binds the active component of cannabis, Δ^9-THC. This antibody has been raised against the C-terminal (amino acids 461-472) intracellular region of the human CB_1 receptor.

1 ea

CB_1 Receptor (N-Term) Polyclonal Antibody 101500

Supplied as: peptide affinity-purified IgG **Stability:** ≥1 year at -20°C

Summary: Antigen: human, rat, and murine CB_1 receptor amino acids 1-14 • Host: rabbit • Cross reactivity: (+) human, rat, and murine CB_1 receptor • Application(s): WB • The CB_1 receptor is a GPCR that binds the active component of cannabis, Δ^9-THC. This antisera has been raised against the N-terminal (amino acids 1-14) extracellular region of the CB_1 receptor.

1 ea

CB_2 Receptor Polyclonal Antibody 101550

Supplied as: peptide affinity-purified IgG **Stability:** ≥1 year at -20°C

Summary: Antigen: human CB_2 receptor amino acids 20-33 • Host: rabbit • Cross Reactivity: (+) human and murine CB_2 receptor • Application(s): IHC and WB • The CB_2 receptor is localized predominantly in peripheral tissues, including the spleen and hematopoietic cells. This antibody has been raised against a sequence between the N-terminus and the first transmembrane domain of the human CB_2 receptor.

1 ea

CB_2 Receptor Polyclonal FITC Antibody 10010712

Supplied as: affinity-purified IgG **Stability:** ≥1 year at -20°C

Summary: Antigen: human CB_2 receptor amino acids 20-33 • Host: rabbit • Cross Reactivity: (+) human and murine CB_2 receptor • Application(s): FC, IF, and WB • The CB_1 and CB_2 receptors are GPCRs that bind the active component of cannabis, Δ^9-THC, as well as AEA which is an endogenous CB receptor ligand. The CB_2 receptor is localized predominantly in peripheral tissues, including the spleen and hematopoietic cells.

1 ea

Thomas G. Brock, Ph.D.

Modulating the Magic of Natural Cannabinoids

The bioactive agent from *Cannabis sativa*, Δ^9-THC, produces a variety of well-known effects on mood, appetite, memory, immunity, and pain perception. There is great interest in learning how certain of these effects can be isolated from the others so that, for example, one might reduce pain or stimulate appetite without altering mood or diminishing memory. Toward this end, a variety of synthetic CBs have been created, with some being much more potent than Δ^9-THC. Unfortunately, this has led to their use for evil instead of good, with creative entrepreneurs adding these compounds to herbs and selling them as 'legal highs' (see related story, page 52). Another problem with trying to use synthetic CBs for therapy can be visualized graphically (Figure 1). Many compounds, when tested in biochemical assays in simplified *in vitro* experiments, generate nice sigmoid curves, giving a maximal effect at a range of increasing concentrations. However, when tested in complex biological systems, the same agents may produce very different curves, with one common possibility being the occurrence of 'supraoptimal' effects. The extreme manifestation of this phenomenon is toxicity associated with overdosing. Alternatively, the drug may activate high affinity receptors and produce one effect at lower doses, but activate a second, lower affinity receptor to produce additional effects at higher doses. This can be particularly problematic if the receptors are on different cell types or in different tissues and the results at higher doses are less desirable than those obtained at lower doses. This article presents an approach to harnessing the medically-interesting positive attributes of Δ^9-THC.

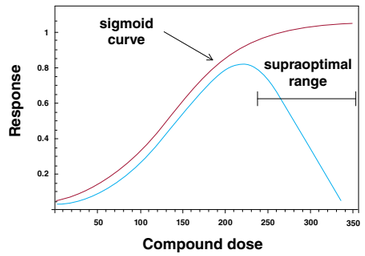


Figure 1. Compounds that give a sigmoid dose-response curve in simple systems may reveal a supraoptimal range when assayed in more complex biological systems.

Endocannabinoid Synthesis and Retrograde Signaling

Δ^9-THC evokes its effects by activating distinct CB receptors, CB_1, CB_2, and GPR55. All are activated by several natural agonists, or endocannabinoids (endoCB), including 2-arachidonoyl glycerol (2-AG), arachidonoyl ethanolamide (AEA, anandamide), and oleamide. These are small, lipophilic molecules secreted by cells in the brain and immune system. These intercellular messengers are not stored in vesicles but are rapidly synthesized *via* regulated enzymatic pathways. For example, the synthesis of 2-AG is initiated by the activation of a $G\alpha_q$-coupled receptor, such as the glutamate receptor mGluR5 (Figure 2). Signaling through $G\alpha$ leads to PLC C-mediated release of diacylglycerol (DAG) from arachidonate-containing membrane phospholipids. A specific DAG lipase then converts DAG to 2-AG, which is secreted from the source cell to activate CB_1 or CB_2 receptors on nearby target cells. These are $G\alpha_i$-coupled receptors that commonly inhibit many processes. At the synapse, for example, activation of CB_1 inhibits release of neurotransmitters like glutamate and GABA. In this case, signaling is termed 'retrograde' since the mediator, 2-AG, feeds back from the post-synaptic dendrite to regulate the action of axon terminals. In general, lipid mediators commonly have actions that are paracrine (acting on nearby target cells) or autocrine (modulating the source cell itself).

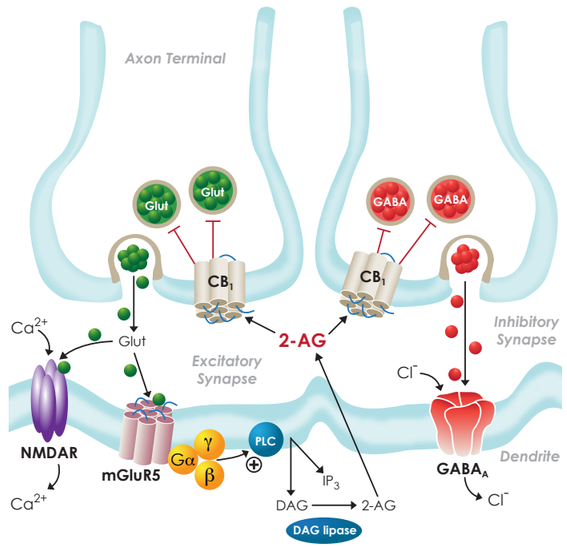


Figure 2. Synthesis and retrograde action of endoCBs. Produced in stimulated neurons, endoCBs are secreted and activate specific receptors on presynaptic axons. The effects of endoCBs, like 2-AG, are suppressive, including the inhibition of neurotransmitter release.

A potential point of intervention in CB signaling might be at one of the stages of synthesis. The first step for synthesis typically involves phospholipases (C or D), which are used by many pathways in many cell types. This makes selective targeting difficult. On the other hand, the *sn*-1-DAG lipase that converts DAG to 2-AG seems relatively unique. *Sn*-1-DAG lipases have only recently been described, so there are few good inhibitors available. Tetrahydrolipstatin (THL) has been described as such an inhibitor.[1] On the upside, THL is used, under a variety of names, to support weight loss, which is one of the same effects of CB_1 blocking drugs, suggesting similarity in action. On the downside, THL is thought to act primarily as a pancreatic lipase inhibitor. Clearly, there is room for new, selective *sn*-1-DAG lipase inhibitors.

Cannabinoid Receptors

While other receptors may respond to endoCBs, let's focus on CB_1 and CB_2. CB_1 is primarily neuronal and located at various sites within the brain. CB_2 is more diffusely distributed and is present on leukocytes (including glia), peripheral and enteric neurons, and possibly other cell types. Both CB_1 and CB_2 are 7-transmembrane G-coupled receptors; interestingly, the binding domain for lipophilic ligands involves membrane-spanning residues forming a pocket within the hydrophobic layer of the membrane.

CB_1 has been targeted for appetite suppression with an antagonist (rimonabant) and, more recently, an inverse agonist (taranabant). Rimonabant was marketed as Acomplia™ for weight loss, but was discontinued in 2008 because of side effects (for more info: www.acompliareport.com). Cayman offers, for research purposes, URB447, a CB_1 antagonist/CB_2 agonist which does not cross the blood/brain barrier, as well as selective CB_1 antagonists (NESS 0327, AVE-1625, SLV 319) and an inverse agonist (CAY10508). Activation of CB_1 can reduce neuropathic pain, nausea and AIDs-related anorexia. Cayman offers a variety of selective CB_1 agonists, including methanandamide, 2-AG ether, and WIN 55212-2. Activation of CB_2 can reduce bone loss in ovariectomized mice,[2] suggesting that CB_2 agonists could reduce osteoporosis in menopausal women. N-Oleoyl-L-serine (Item No. 13058) has been reported to stimulate bone formation and to inhibit bone resorption. Selective CB_2 agonists also reduce inflammatory and neuropathic pain,[3] alter leukocyte adhesion and migration,[4] and reduce intestinal inflammation.[5] These studies used CB_2 agonists which are available from Cayman, including GW 842166X, AM1241, and JWH 015.

Metabolism of Endocannabinoids

EndoCBs are intercellular mediators that act in a broadly paracrine fashion, modulating the action of numerous different neighboring cells (Figure 3). Like neurotransmitters, endoCBs are rapidly removed by enzymatic metabolism, which is important in limiting signal duration. The enzyme fatty acid amide hydrolase (FAAH) hydrolyzes a number of primary and secondary fatty acid amides; endoCBs with amide bonds, including AEA, are inactivated by FAAH. EndoCBs lacking amide bonds, such as 2-AG, are metabolized by other enzymes, the most important of which is monoacylglycerol lipase (MAGL). In theory, the inhibition of endoCB metabolism should extend endoCB activity at the site of their endogenous biosynthesis, producing a tissue-selective activation of CB receptors.[6] By using only natural levels of endoCBs, potential supraoptimal or toxic effects, as mentioned above, might be avoided.

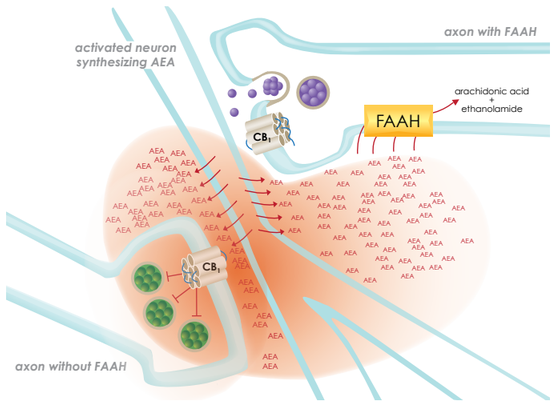


Figure 3. Metabolism of endoCBs. Unlike neurotransmitters, endoCBs signal well beyond the synapse. Axons with endoCB metabolizing enzymes, like FAAH, will reduce the suppressive effect of endoCB signaling on intracellular events, such as neurotransmitter release.

The development of FAAH knockout mice allowed an evaluation of the pros and cons of inhibiting FAAH. Initial studies found that $FAAH^{-/-}$ mice possess increased brain levels of AEA as well as reduced pain sensation that could be reversed by blocking CB_1.[7,8] Interestingly, FAAH knockouts show neuroprotection in a mouse model of amyotrophic lateral sclerosis[9] as well as enhanced learning in an aversive maze task.[10] FAAH knockout mice also show enhanced hematopoiesis[11] and reduced inflammation.[12,13] On the down side, $FAAH^{-/-}$ mice show compromised male fertility[14] and increased alcohol preference and consumption.[15] Taken together, these results suggest that increasing AEA levels through the use of FAAH inhibitors should produce a variety of positive effects. Additional control over AEA levels may be possible through the use of reversible inhibitors for some effects and irreversible inhibitors for others. A selection of reversible and irreversible FAAH inhibitors available from Cayman is listed in Table 1. We also offer human recombinant FAAH, a FAAH Inhibitor Screening Assay, and a FAAH polyclonal antibody.

MAGL, also known as monoglycerol lipase (MGL), hydrolyzes the ester bond of 2-AG to produce arachidonate and glycerol. Selective inhibitors of MAGL have only recently been developed[16] and their therapeutic potential is currently being explored. Inhibition of MAGL reduces acute, inflammatory, and neuropathic pain.[6,16] However, a recent study found that chronic MAGL blockade led to only transitory pain suppression, physical dependence and desensitized brain CB_1 receptors.[17] Further studies will be needed to determine the value of MAGL inhibition, alone or in combination with other therapeutics, in the treatment of pain. Potent and selective MAGL inhibitors are available from Cayman (Table 1), as is a MAGL Inhibitor Screening Assay.

Dual inhibitors of both FAAH and MAGL produce increases in both AEA and 2-AG.[18,19] As a result, they produce responses, in mice, that are more like those produced by Δ^9-THC.[19] Moreover, experiments using these dual inhibitors suggest that the AEA and 2-AG signaling pathways interact *in vivo*, producing effects that cannot be achieved by either endoCB, or selective inhibitors, alone.

References

1. Bisogno, T., Cascio, M.G., Saha, B., *et al. Biochem. Biophys. Acta* **1761**, 205-212 (2006).
2. Bab, I. and Zimmer, A. *Br. J. Pharmacol.* **153**, 182-188 (2008).
3. Guindon, J. and Hohmann, A.G. *Br. J. Pharmacol.* **153**, 319-334 (2008).
4. Montecucco, F., Burger, F., Mach, F., *et al. Am. J. Physiol. Heart Circ. Physiol.* **294**, H1145-H1155 (2008).
5. Wright, K.L., Duncan, M., and Sharkey, K.A. *Br. J. Pharmacol.* **153**, 263-270 (2008).
6. Petrosino, S., and Di Marzo, V. *Curr. Opin. Investig. Drugs* **11**, 51-62 (2010).
7. Cravatt, B.F., Demarest, K., Patricelli, M.P., *et al. Proc. Natl. Acad. Sci. USA* **98(16)**, 9371-9376 (2001).
8. Naidu, P.S., Kinsey, S.G., Guo, T.L., *et al. J. Pharmacol. Exp. Ther.* **334(1)**, 182-190 (2010).
9. Bilsland, L.G., Dick, J.R.T., Pryce, G., *et al. FASEB J.* **20(7)**, 1003-1005 (2006).
10. Wise, L.E., Harloe, J.P., and Lichtman, A.H. *Neurobiol. Learn. Mem.* **92**, 597-601 (2009).
11. Jiang, S., Zagozdzon, R., Jorda, M.A., *et al. J. Biol. Chem.* (2010).
12. Karsak, M., Gaffal, E., Date, R., *et al. Science* **316**, 1494-1497 (2007).
13. Schlosburg, J.E., Kinsey, S.G., and Lichtman, A.H. *AAPS J.* **11(1)**, 39-44 (2009).
14. Sun, X., Wang, H., Okabe, M., *et al. Biol. Reprod.* **80**, 235-242 (2009).
15. Blednov, Y.A., Cravatt, B.F., Boehm, S.L., II, *et al. Neuropsychopharmacology* **32**, 1570-1582 (2007).
16. Kinsey, S.G., Long, J.Z., Cravatt, B.F., *et al. J. Pain* (2010).
17. Schlosburg, J.E., Blankman, J.L., Long, J.Z., *et al. Nat. Neurosci.* **13(9)**, 1113-1119 (2010).
18. Nomura, D.K., Blankman, J.L., Simon, G.M., *et al. Nat. Chem. Biol.* **4(6)**, 373-378 (2008).
19. Long, J.Z., Nomura, D.K., and Cravatt, B.F. *Chem. Biol.* **16**, 744-753 (2009).

Inhibitor	Target	Properties
URB597	FAAH	IC_{50} values of 4.6 nM in brain membranes, 0.5 nM in intact neurons
PF-622	FAAH	Time-dependent, irreversible; IC_{50} value of 0.033 µM
PF-750	FAAH	Time-dependent, irreversible; IC_{50} value of 0.016 µM
PF-6845	FAAH	Irreversible; K_i value of 0.23 µM
Oleoyl oxazolopyridine	FAAH	K_i value of 1.3 nM for human FAAH
CAY10401	FAAH	K_i value of 0.14 nM
CAY10435	FAAH	K_i value of 0.57 nM; IC_{50} values of 0.81 nM
CAY10570	FAAH	Reversible; IC_{50} value of 1.3 µM
PHOP	FAAH	IC_{50} value of 1.1 nM
JP83	FAAH	Irreversible; IC_{50} value of 14 nM for the human recombinant enzyme
JP 104	FAAH	Irreversible; IC_{50} value of 7.3 nM for the human recombinant enzyme
Pristimerin	MAGL	Reversible; IC_{50} value of 93 nM
URB602	MAGL	IC_{50} value of 28 µM for the rat brain enzyme
JZL 184	MAGL	IC_{50} value of 8 nM *versus* 4 for µM FAAH
JZL 195	Dual	IC_{50} values of 2 nM and 4 nM for FAAH, MAGL
IDFP	Dual	IC_{50} values of 3 nM and 0.8 nM for FAAH, MAGL

Table 1. Inhibitors of FAAH and MAGL available from Cayman.

CB_1/CB_2 Receptor Antagonists and Inverse Agonists				
Item Number	**Item Name**	**CB_1**	**CB_2**	**Comments**
71670	AM251	Antagonist K_i = 7.5 nM	Antagonist K_i = 2.3 µM	
10006974	AM630	Agonist K_i = 5.2 µM	Inverse Agonist K_i = 31.2 pM	Behaves as an inverse agonist at CB_2 receptors and as a weak partial agonist at CB_1 receptors
10009021	AVE-1625	Antagonist K_i = 0.16 - 0.44 nM		
10008669	CAY10508	Inverse Agonist K_i = 243 nM		
10010117	CB-52	Partial Agonist K_i = 210 nM	Neutral Antagonist K_i = 30 nM	
13289	CB-86	Agonist K_i = 5.6 nM	Antagonist K_i = 7.9 nM	
10004184	NESS 0327	Antagonist K_i = 0.35 nM	Antagonist K_i = 21 nM	More potent antagonist and more selective for the CB_1 receptor compared to Rimonabant (Item No. 9000484); does not act as a CB_1 receptor inverse agonist and does not produce any physiological effect of its own
9000484	Rimonabant	Inverse Agonist K_i = 1.8 nM		Also known as SR141716A
10009022	(S)-SLV 319	Antagonist K_i = 7.8 nM	Antagonist K_i = 7,943 nM	Less lipophilic (log P = 5.1) and therefore more water soluble than other known CB_1 receptor ligands
9000491	SR144528		Inverse Agonist K_i = 0.6 nM	
13261	URB447	Antagonist IC_{50} = 313 nM	Agonist IC_{50} = 41 nM	Does not penetrate the blood-brain barrier as observed with Rimonabant (Item No. 9000484)

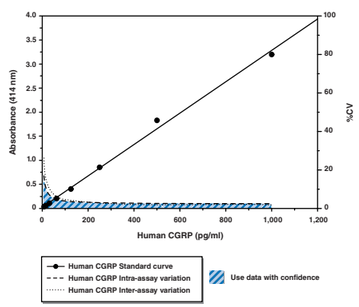
CGRP (human) EIA Kit* 589101

CGRP

Stability: ≥6 months at -20°C

Summary: CGRP is a 37 amino acid peptide synthesized in the central and peripheral nervous system from a calcitonin/CGRP gene complex. Two isoforms have been described which differ by three amino acids and display similar biological activities: CGRP-α, which is produced by alternative splicing of a calcitonin gene transcript, and CGRP-β, the product of a separate gene. In the CNS, CGRP acts as a neurotransmitter that is released from a subset of small sensory neurons that transmit pain information. In the circulation, CGRP is one of the most potent vasodilators known and may function as a regulator of blood flow. When administered systemically, CGRP causes hypotension in several species, including humans. Intradermal administration of CGRP at femtomole doses produces increased blood flow and persistent reddening. This EIA is based on a double-antibody sandwich technique providing a method for the sensitive, specific analysis of CGRP in a variety of samples including plasma, serum, nervous tissue, CSF, and culture media.

1 ea



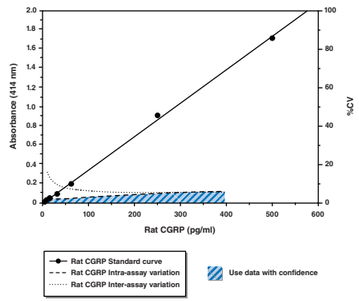
CGRP (rat) EIA Kit* 589001

CGRP

Stability: ≥6 months at -20°C

Summary: CGRP is a 37 amino acid peptide synthesized in the central and peripheral nervous system from a calcitonin/CGRP gene complex. Two isoforms have been described which differ by three amino acids and display similar biological activities: CGRP-α, which is produced by alternative splicing of a calcitonin gene transcript, and CGRP-β, the product of a separate gene. In the CNS, CGRP acts as a neurotransmitter that is released from a subset of small sensory neurons that transmit pain information. In the circulation, CGRP is one of the most potent vasodilators known and may function as a regulator of blood flow. When administered systemically, CGRP causes hypotension in several species, including humans. Intradermal administration of CGRP at femtomole doses produces increased blood flow and persistent reddening. This EIA is based on a double-antibody sandwich technique providing a method for the sensitive, specific analysis of CGRP in a variety of samples including plasma, serum, nervous tissue, CSF, and culture media.

1 ea



**SPI-BIO Assays are available through Cayman Chemical only within North & South America and Asia; elsewhere contact SPI-BIO.*

Clobenpropit (hydrobromide) 10011126

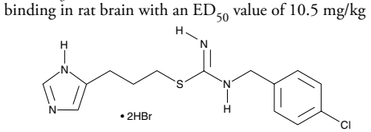
[145231-35-2] Carbamimidothioic Acid, VUF-9153

MF: $C_{14}H_{17}ClN_4S$ • 2HBr **FW:** 470.7 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A selective histamine H_3 receptor antagonist that crosses the blood-brain barrier; inhibits histamine binding in rat brain with an ED_{50} value of 10.5 mg/kg

1 mg
5 mg
10 mg
25 mg



N-[(4-chlorophenyl)methyl]-3-(1H-imidazol-5-yl)propyl ester, carbamimidothioic acid, dihydrobromide

(±)-CP 47,497 16851

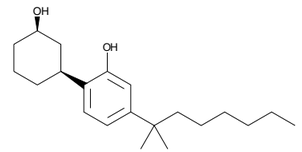
[70434-82-1]

MF: $C_{21}H_{34}O_2$ **FW:** 318.5 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A cannabimimetic compound that binds the CB_1 receptor with a K_i value of 2.2 nM

5 mg
10 mg
25 mg
50 mg



rel-2[(1S,3R)-3-hydroxycyclohexyl]-5-(2-methyloctan-2-yl)phenol

(+)-CP 47,497 13219

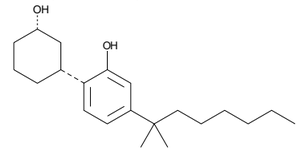
[134308-14-8]

MF: $C_{21}H_{34}O_2$ **FW:** 318.5 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A bicyclic CB analog with potent analgesic activity; comparable or more potent than Δ^9-THC in analgesic motor depressant, anticonvulsant, and hypothermic effects; avidly binds the CB_1 receptor (K_i = 4.15 nM)

1 mg
5 mg
10 mg
25 mg



2[(1R,3S)-3-hydroxycyclohexyl]-5-(2-methyloctan-2-yl)phenol

(-)-CP 47,497 13218

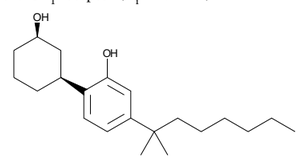
[114753-51-4]

MF: $C_{21}H_{34}O_2$ **FW:** 318.5 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A bicyclic CB analog with potent analgesic activity; comparable or more potent than Δ^9-THC in analgesic motor depressant, anticonvulsant, and hypothermic effects; avidly binds the CB_1 receptor (K_i = 2.1 nM)

5 mg
10 mg
25 mg
50 mg



2[(1S,3R)-3-hydroxycyclohexyl]-5-(2-methyloctan-2-yl)phenol

(±)-CP 47,497-C8-homolog 13216

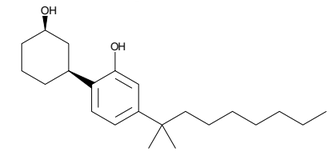
[70434-92-3] CAY10596

MF: $C_{22}H_{36}O_2$ **FW:** 332.5 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A bicyclic CB analog that avidly binds the CB_2 receptor (K_i = 0.83 nM) and shows high antinociceptive activity; ten-fold more potent than Δ^9-THC in analgesic, motor depressant, anticonvulsant, and hypothermic effects in mice

5 mg
10 mg
25 mg
50 mg



rel-2-[(1S,3R)-3-hydroxycyclohexyl]-5-(2-methylnonan-2-yl)phenol

(±)-CP 55,940 13241

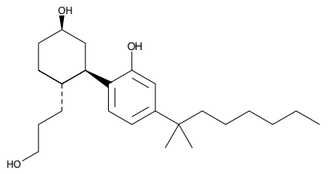
[83003-12-7]

MF: $C_{24}H_{40}O_3$ **FW:** 376.6 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: One of the first bicyclic mimetics of Δ^9-THC found to have superior analgesic properties; 20- to 100-fold more effective than Δ^9-THC in altering the reactions to thermal, mechanical, and chemical pain in mice; used to characterize the capacity of novel cannabimimetics to bind the CB_1 receptor in rat brain preparations

5 mg
10 mg
25 mg
50 mg



rel-2-((1R,2R,5R)-5-hydroxy-2-(3-hydroxypropyl)cyclohexyl)-5-(2-methyloctan-2-yl)phenol

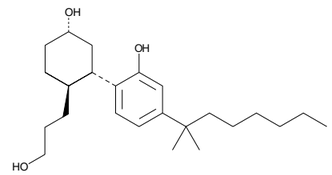
NEW (+)-CP 55,940 13608

MF: $C_{24}H_{40}O_3$ **FW:** 376.6 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: An enantiomer purified from the (±)-CP 55,940 racemic mixture; the functional characteristics of this isomer have not been studied

1 mg
5 mg
10 mg
25 mg



2-((1S,2S,5S)-5-hydroxy-2-(3-hydroxypropyl)cyclohexyl)-5-(2-methyloctan-2-yl)phenol

(-)-CP 55,940 90084

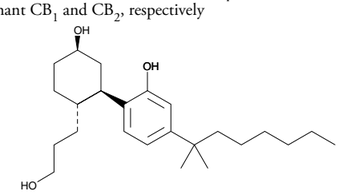
[83002-04-4]

MF: $C_{24}H_{40}O_3$ **FW:** 376.6 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A potent, non-selective CB receptor agonist with K_i values of 0.58 and 0.69 nM for human recombinant CB_1 and CB_2, respectively

5 mg
10 mg
25 mg
50 mg



5-(1,1-dimethylheptyl)-2-[(1R,2R,5R)-5-hydroxy-2-(3-hydroxypropyl)cyclohexyl]-phenol

Cu/Zn SOD (human) Polyclonal Antibody 10011388

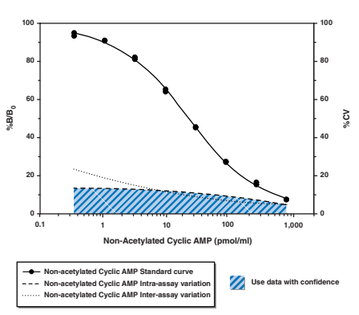
Cu/Zn Superoxide Dimutase, SOD1
Supplied as: affinity-purified antibody **Stability:** ≥1 year at -20°C
Summary: Antigen: human Cu/Zn SOD • Host: rabbit • Cross Reactivity: (+) human, murine, bovine, monkey, coral, canine, hamster, porcine, rabbit, ovine, and rat Cu/Zn SOD • Application(s): EIA, IHC, IP, and WB • SOD is an endogenously produced intracellular enzyme present in almost every cell in the body. It catalyzes the dismutation of the superoxide radical O_2^- to O_2 and H_2O_2. The Cu/Zn SOD, contains Cu and Zn ions as a homodimer and exists in the cytoplasm.

25 µl
100 µl

Cyclic AMP EIA Kit 581001

Adenosine 3',5'-cyclic mononucleotide, Adenosine 3',5'-cyclic monophosphate
Stability: ≥1 year at -20°C
Sensitivity: 50% B/B_0: 20 pmol/ml (non-acetylated)
3.0 pmol/ml (acetylated)
80% B/B_0: 0.5 pmol/ml (non-acetylated)
0.01 pmol/ml (acetylated)
Summary: cAMP is a ubiquitous cellular second messenger that is a critical component of a signal transduction pathway linking membrane receptors and their ligands to the activation of internal cellular enzymatic activity and gene expression. cAMP is synthesized from ATP by membrane-bound adenylate cyclase. Binding of certain ligands or hormones to their specific GPCRs activate GTP binding proteins (G_s or G_i) which either stimulate or inhibit adenylate cyclase. cAMP activates or inhibits various enzymes or cascade of enzymes by promoting their phosphorylation or dephosphorylation. The cAMP signal is neutralized by hydrolysis of cAMP to AMP by phosphodiesterases. Therefore, the concentration of cAMP in a cell is a function of the ratio of the rate of synthesis from ATP by adenylate cyclase and its rate of breakdown to AMP by specific phosphodiesterases.

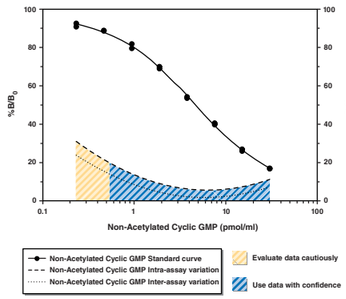
96 strip/solid wells
480 strip/solid wells



Cyclic GMP EIA Kit 581021

Guanosine 3',5'-cyclic mononucleotide, Guanosine 3',5'-cyclic monophosphate
Stability: ≥1 year at -20°C
Sensitivity: 50% B/B_0: 5.2 pmol/ml (non-acetylated)
0.46 pmol/ml (acetylated)
80% B/B_0: 1 pmol/ml (non-acetylated)
0.1 pmol/ml (acetylated)
Summary: cGMP is a key intracellular second messenger which transduces cellular signalling events in response to a variety of hormones, autacoids and drugs. cGMP is synthesized from GTP by both membrane-bound and soluble guanylate cyclase. The downstream mediators of cGMP-controlled events include cGMP-gated channels, cGMP-dependent kinases and cGMP-regulated phosphodiesterases. The relative abundance of cGMP within a cell can serve as a marker of activation of particulate guanylate cyclase at the cell surface, or activation of intracellular soluble guanylate cyclase by NO. Cayman's cGMP assay is a competitive EIA that can be used for quantification of cGMP directly obtained from cell lysates, tissue homogenates, plasma or urine.

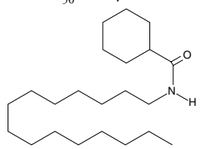
96 strip/solid wells
480 strip/solid wells



N-Cyclohexanecarbonyl-pentadecylamine 10007739

[702638-84-4]
MF: $C_{22}H_{43}NO$ **FW:** 337.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A selective inhibitor of acidic PEAase (IC_{50} = 4.5 µM) that fails to inhibit FAAH even at a concentration of 100 µM

5 mg
10 mg
50 mg
100 mg

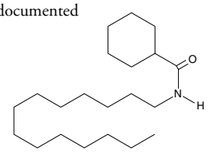


N-pentadecyl-cyclohexanecarboxamide

N-Cyclohexanecarbonyl-tetradecylamine 10008317

MF: $C_{21}H_{41}NO$ **FW:** 323.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
Summary: An analog of N-cyclohexanecarbonylpentadecylamine, a selective inhibitor of acidic PEAase (IC_{50} = 4.5 µM), that contains one less carbon in the alkyl chain; its biological activity has not been documented

5 mg
10 mg
50 mg
100 mg

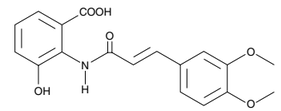


N-tetradecyl-cyclohexanecarboxamide

3,4-DAA 10007980

MF: $C_{18}H_{17}NO_6$ **FW:** 343.3 **Purity:** ≥95%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: An orally active synthetic derivative of the tryptophan metabolite anthranilic acid with varied immunological effects

1 mg
5 mg
10 mg
50 mg

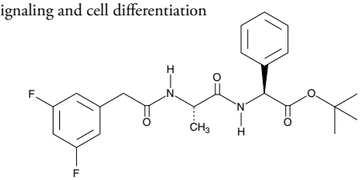


2-[3-(3,4-dimethoxy-phenyl)-acryloylamino]-3-hydroxy-benzoic acid

NEW DAPT 13197

[208255-80-5] GSI-IX
MF: $C_{23}H_{26}F_2N_2O_4$ **FW:** 432.5 **Purity:** ≥95%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: An inhibitor of γ-secretase, blocking the production of total Aβ in human primary neuronal cultures with an IC_{50} value of 115 nM and Aβ42 with an IC_{50} value of 200 nM; reduces brain levels of Aβ *in vivo* when given orally; indirectly inhibits Notch, affecting cell signaling and cell differentiation

5 mg
10 mg
25 mg
50 mg



N-[2-(3,5-difluorophenyl)acetyl]-L-alanyl-2-phenyl-1,1-dimethylethyl ester-(2S)-glycine

DARPP-32 (Phospho-Thr[34]) Polyclonal Antibody 10603

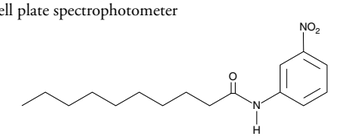
Supplied as: affinity-purified IgG **Stability:** ≥1 year at -20°C
Summary: Antigen: phosphopeptide corresponding to amino acid residues surrounding phospho-Thr[34] of rat DARPP-32 • Host: rabbit • Cross Reactivity: (+) rat DARPP-32 • Application(s): WB • DARPP-32 is a dopamine and cAMP-regulated phosphoprotein that is associated with dopaminoceptive neurons.

1 ea

Decanoyl *m*-Nitroaniline 90349

[72298-61-4] DemNA
MF: $C_{16}H_{24}N_2O_3$ **FW:** 292.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: One of several nitroaniline fatty acid amides that can be used to measure FAAH activity; exposure to FAAH results in the release of the yellow colorimetric dye *m*-nitroaniline (ε = 13,500 at 410 nm) allowing for fast and convenient measurement of FAAH activity using a 96-well plate spectrophotometer

5 mg
10 mg
25 mg
50 mg



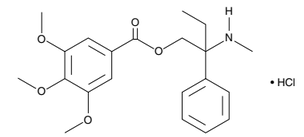
N-(3-nitrophenyl)-decanamide

• Also Available: **N-Decanoyl p-Nitroaniline** (10005851)

N-Desmethyltrimebutine (hydrochloride) 10010574

[294882-33-0]
MF: $C_{21}H_{27}NO_5$ • HCl **FW:** 409.9 **Purity:** ≥99%
A crystalline solid **Stability:** ≥1 year at 4°C
Summary: A spasmolytic with possible local anesthetic action used in gastrointestinal disorders

1 mg
5 mg
10 mg



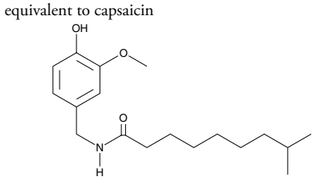
3,4,5-trismethoxy-2-(methylamine)-2-phenylbutyl ester benzoic acid, monohydrochloride

• Also Available: **N-Desmethyltrimebutine-d$_3$ (hydrochloride)** (10010575)

Dihydrocapsaicin 92355

[19408-84-5]
MF: $C_{18}H_{29}NO_3$ **FW:** 307.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: An impurity found in natural hot pepper extracts and represents about 10% of the compound present in commercial preparations purporting to be pure capsaicin; separation by HPLC is required in order to obtain pure dihydrocapsaicin; the potency at TRPV1 appears equivalent to capsaicin

5 mg
10 mg
50 mg
100 mg

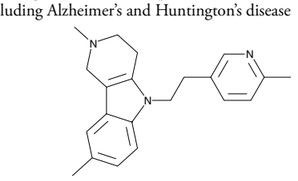


N-[(4-hydroxy-3-methoxyphenyl)methyl]-8-methyl-nonanamide

Dimebolin 9000556

[3613-73-8] Dimebon™
MF: $C_{21}H_{25}N_3$ **FW:** 319.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: An orally available drug that has shown promise in the treatment of neurodegenerative diseases, including Alzheimer's and Huntington's disease

1 mg
5 mg
10 mg
100 mg

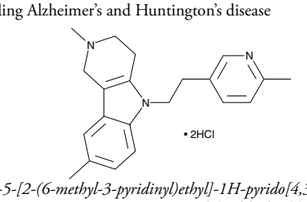


2,3,4,5-tetrahydro-2,8-dimethyl-5-[2-(6-methyl-3-pyridinyl)ethyl]-1H-pyrido[4,3-b]indole

Dimebolin (hydrochloride) 10011349

[97657-92-6]
MF: $C_{21}H_{25}N_3$ • 2HCl **FW:** 392.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: An orally available drug that has shown promise in the treatment of neurodegenerative diseases, including Alzheimer's and Huntington's disease

1 mg
5 mg
10 mg
100 mg

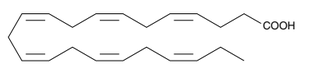


2,3,4,5-tetrahydro-2,8-dimethyl-5-[2-(6-methyl-3-pyridinyl)ethyl]-1H-pyrido[4,3-b] indole, dihydrochloride

Docosahexaenoic Acid 90310

[6217-54-5] Cervonic Acid
MF: $C_{22}H_{32}O_2$ **FW:** 328.5 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: An essential fatty acid and the most abundant ω-3 fatty acid in neural tissues, especially in the retina and brain; constitutes as much as 40% of the total PUFA pool in retinal and neuronal membranes; dietary supplementation *via* fish oil inhibits the progression of atherosclerosis and delays photoreceptor degeneration in retinitis pigmentosa; deprivation in neonatal rats causes developmental defects and can lead to hypertension

50 mg
100 mg
250 mg
500 mg



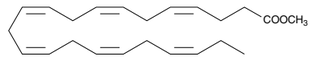
4Z,7Z,10Z,13Z,16Z,19Z-DHA

• Also Available: **Docosahexaenoic Acid-d$_5$** (10005057)

Docosahexaenoic Acid methyl ester 10006865

[2566-90-7] Cervonic Acid methyl ester
MF: $C_{23}H_{34}O_2$ **FW:** 342.5 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥6 months at -20°C
Summary: An ester version of DHA free acid which is less water soluble, but more amenable for the formulation of fatty acid-containing diets and dietary supplements

50 mg
100 mg
500 mg
1 g



4Z,7Z,10Z,13Z,16Z,19Z-DHA, methyl ester

Docosahexaenoic Acid Quant-PAK 10006829

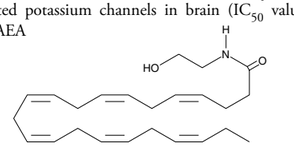
Cervonic Acid
Stability: ≥1 year at -20°C
Summary: The DHA Quant-PAK has been designed for the convenient, precise quantification of DHA by GC- or LC-MS. It includes a 50 µg vial of DHA-d$_5$ and a precisely weighed vial of unlabeled DHA, with the precise weight (2-4 mg) indicated on the vial. This unlabeled DHA can be used to quantify the DHA-d$_5$ standard by constructing a standard curve of peak intensity ratios (deuterated *versus* unlabeled).

1 ea

Docosahexaenoyl Ethanolamide 10007534

[162758-94-3] DHEA
MF: $C_{24}H_{37}NO_2$ **FW:** 371.6 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: The ethanolamine amide of DHA that has been detected in both brain and retina at concentrations similar to those for AEA; binds to the rat brain CB_1 receptor (K_i = 324 nM), which is approximately 10-fold higher than the K_i for AEA; inhibits shaker-related voltage-gated potassium channels in brain (IC_{50} value of 1.5 µM) slightly better than does AEA

5 mg
10 mg
25 mg
50 mg

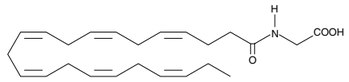


N-(2-hydroxyethyl)-4Z,7Z,10Z,13Z,16Z,19Z-docosahexaenamide

Docosahexaenoyl Glycine 9000328

[132850-40-9]
MF: $C_{24}H_{35}NO_3$ **FW:** 385.5 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: Consists of DHA, an ω-3 PUFA, with glycine attached at its carboxy terminus

5 mg
10 mg
50 mg
100 mg

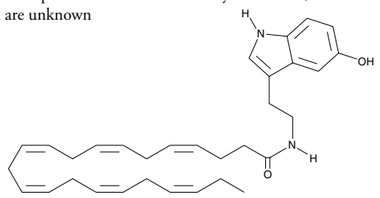


N-(1-oxo-4Z,7Z,10Z,13Z,16Z,19Z-docosahexaenyl)-glycine

NEW Docosahexaenoyl Serotonin 9000639

[283601-58-1]
MF: $C_{32}H_{42}N_2O_2$ **FW:** 486.7 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: A hybrid molecule patterned after arachidonoyl serotonin; effects of docosahexaenoyl serotonin are unknown

5 mg
10 mg
50 mg
100 mg

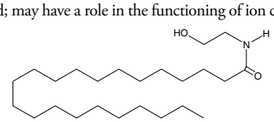


N-[2-(5-hydroxy-1H-indol-3-yl)ethyl]-4Z,7Z,10Z,13Z,16Z,19Z-docosahexaenamide

Docosanoyl Ethanolamide 10005823

[94109-05-4]
MF: $C_{24}H_{49}NO_2$ **FW:** 383.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A saturated N-acylethanolamide whose non-CB receptor-mediated pharmacology is still being elucidated; may have a role in the functioning of ion channels

5 mg
10 mg
25 mg
50 mg

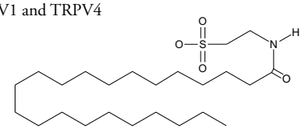


N-(2-hydroxyethyl)-docosanamide

N-Docosanoyl Taurine 10007288

MF: $C_{24}H_{49}NO_4S$ **FW:** 447.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: One of several novel taurine-conjugated fatty acids that act as a FAAH substrate and may activate TRPV1 and TRPV4

1 mg
5 mg
10 mg
50 mg

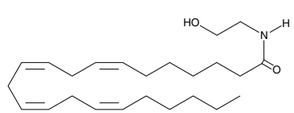


2-[(1-oxodocosyl)amino]-ethanesulfonic acid

Docosatetraenoyl Ethanolamide 90385

[150314-35-5] DEA
MF: $C_{24}H_{41}NO_2$ **FW:** 375.6 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: An endoCB containing docosatetraenoic acid in place of the arachidonate moiety of AEA; acts on CB_1 receptors with a potency and efficacy similar to that of AEA but its specific role and relative importance as a cannabinergic neurotransmitter have not been elucidated

5 mg
10 mg
25 mg
50 mg

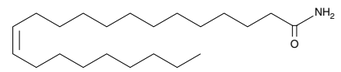


N-(2-hydroxyethyl)-7Z,10Z,13Z,16Z-docosatetraenamide

13-Docosenamide 90377

[112-84-5] Armoslip E, Erucamide
MF: $C_{22}H_{43}NO$ **FW:** 337.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
Summary: An amide of docosenoic acid first identified in the CSF of sleep-deprived cats; causes reduced mobility and slightly lessened awareness in rats

100 mg
500 mg
1 g
5 g

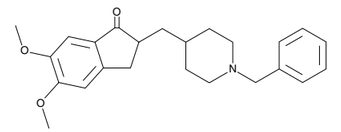


13Z-docosenamide

Donepezil 13245

[120014-06-4] Aricept®
MF: $C_{24}H_{29}NO_3$ **FW:** 379.5 **Purity:** ≥95%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A reversible AChE inhibitor that readily crosses the blood-brain barrier to reduce the breakdown of acetylcholine; commonly used in the treatment of Alzheimer's disease to improve cognition, memory, and behavior

10 mg
25 mg
50 mg
100 mg



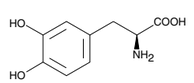
2,3-dihydro-5,6-dimethoxy-2[[1-(phenylmethyl)-4-piperidinyl]methyl]-1H-inden-1-one

• Also Available: **Donepezil-d$_7$**$^+$ (10010671)

L-DOPA 13248

[59-92-7] 3,4-Dihydroxyphenylalanine, Levodopa, Pardopa, Syndopa
MF: $C_9H_{11}NO_4$ **FW:** 197.2 **Purity:** ≥95%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A metabolic precursor of dopamine that crosses the blood brain barrier; used to treat Parkinson's disease and stroke damage

5 g
25 g
50 g
100 g



3-hydroxy-L-tyrosine

Dopamine β-hydroxylase (C-Term; human) Polyclonal Antibody 10009370

DBH
Supplied as: peptide affinity-purified antibody **Stability:** ≥1 year at -20°C
Summary: Antigen: peptide from the C-terminal region of human DBH • Host: sheep • Cross Reactivity: (+) human, murine, and non-human primate DBH • Application(s): WB • DBH catalyzes the conversion of dopamine to norepinephrine and serves as a marker of noradrenergic cells. DBH antibodies and antibodies for other markers of catecholamine biosynthesis are widely used as markers of dopaminergic and noradrenergic neurons in a variety of pathologies including depression, schizophrenia, Parkinson's disease, and drug abuse. The expression of DBH is also elevated during stress.

1 ea

Dopamine β-hydroxylase (N-Term; human) Polyclonal Antibody 10009371

DBH
Supplied as: peptide affinity-purified antibody **Stability:** ≥1 year at -20°C
Summary: Antigen: peptide from the N-terminal region of human DBH • Host: sheep • Cross Reactivity: (+) human and non-human primate DBH • Application(s): WB • DBH catalyzes the conversion of dopamine to norepinephrine and serves as a marker of noradrenergic cells. DBH antibodies and antibodies for other markers of catecholamine biosynthesis are widely used as markers of dopaminergic and noradrenergic neurons in a variety of pathologies including depression, schizophrenia, Parkinson's disease, and drug abuse. The expression of DBH is also elevated during stress.

1 ea

Dopamine Transporter (C-Term) Polyclonal Antibody 10009372

DAT
Supplied as: peptide affinity-purified antibody **Stability:** ≥1 year at -20°C
Summary: Antigen: peptide from the intracellular C-terminal region of human DAT • Host: rabbit • Cross Reactivity: WB: (+) human and murine striatal samples (SDS-solubilized) DAT; IHC: (+) Macaque monkey brain DAT • Application(s): IHC and WB • The DAT is responsible for the reaccumulation of dopamine after it has been released. DAT antibodies and antibodies for other markers of catecholamine biosynthesis are widely used as markers of dopaminergic and noradrenergic neurons in a variety of pathologies including depression, schizophrenia, Parkinson's disease, and drug abuse. Levels of DAT protein expression are altered by chronic drug administration.

1 ea

Dopamine Transporter (Extracellular Loop 2) Polyclonal Antibody 10009373

DAT (EL^2)
Supplied as: peptide affinity-purified antibody **Stability:** ≥1 year at -20°C
Summary: Antigen: peptide from the EL2 region of human DAT • Host: rabbit • Cross Reactivity: WB: (+) human and murine striatal samples (SDS-solubilized) DAT; IHC: (+) Macaque monkey brain (formaldehyde-fixed) DAT • Application(s): IHC and WB • The DAT is responsible for the reaccumulation of dopamine after it has been released. DAT antibodies and antibodies for other markers of catecholamine biosynthesis are widely used as markers of dopaminergic and noradrenergic neurons in a variety of pathologies including depression, schizophrenia, Parkinson's disease, and drug abuse. Levels of DAT protein expression are altered by chronic drug administration.

1 ea

Doppel Polyclonal Antibody 10005517

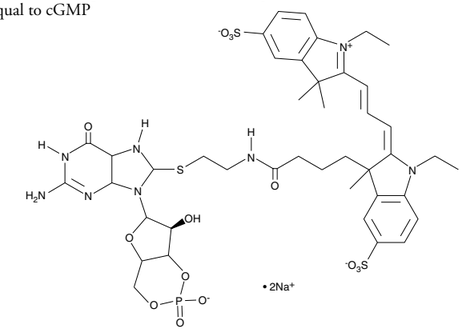
Supplied as: peptide affinity-purified antibody **Stability:** ≥2 years at -20°C
Summary: Antigen: human doppel protein amino acids 112-120 • Host: rabbit • Cross Reactivity: (+) human, murine, and rat doppel protein • Application(s): IHC (formalin-fixed paraffin-embedded sections) and WB • Doppel is a homolog of the PrP^c. Like PrP, doppel has two N-linked oligosaccharides, and is presented on the cell surface *via* a glycosylphosphatidylinositol anchor. Cayman's antibody recognizes both the nonglycosylated and glycosylated forms of the protein.

1 ea

8-DY547-cGMP 10010109

MF: $C_{42}H_{55}N_8O_{14}PS_3$ • 2Na **FW:** 1,069.1 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: A fluorescently-labeled cyclic nucleotide to study cyclic nucleotide-gated A2 channel activation; opens the channel in a rapid and reversible manner with efficiency equal to cGMP

50 µg
100 µg
500 µg
1 mg



1-ethyl-2-((4E)-4-(1-ethyl-3-(4-(2-(methylthio)ethylamino)-4-oxobutyl)-5-sulfonatoindolin-2-ylidene)but-2-en-2-yl)-3,3-dimethyl-3H-indolium-5-sulfonate-guanosine-3',5'-cyclic monophosphate, disodium salt

Dynamin (Phospho-Ser^{774}) Polyclonal Antibody 10009785

Supplied as: affinity-purified antibody **Stability:** ≥1 year at -20°C
Summary: Antigen: phosphopeptide corresponding to amino acid residues surrounding phospho-Ser^{774} of rat dynamin • Host: sheep • Cross Reactivity: (+) rat dynamin • Application(s): WB • Dynamin is a member of a group of nerve terminal proteins called dephosphins that regulate synaptic vesicle endocytosis. Cyclin dependent protein kinase 5 phosphorylates dynamin at Ser^{774} and Ser^{778}. Phosphorylation of these sites on dynamin is thought to play a key role in synaptic vesicle trafficking.

1 ea

Dynamin (Phospho-Ser^{778}) Polyclonal Antibody 10009786

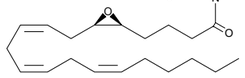
Supplied as: affinity-purified antibody **Stability:** ≥1 year at -20°C
Summary: Antigen: phosphopeptide corresponding to amino acid residues surrounding phospho-Ser^{778} of rat dynamin • Host: sheep • Cross Reactivity: (+) rat dynamin • Application(s): WB • Dynamin is a member of a group of nerve terminal proteins called dephosphins that regulate synaptic vesicle endocytosis. Cyclin dependent protein kinase 5 phosphorylates dynamin at Ser^{774} and Ser^{778}. Phosphorylation of these sites on dynamin is thought to play a key role in synaptic vesicle trafficking.

1 ea

(±)5(6)-EET Ethanolamide 10008596

(±)5(6)-EpETrE Ethanolamide
MF: $C_{22}H_{37}NO_3$ **FW:** 363.5 **Purity:** ≥95%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: Racemic version of a potential CYP450 metabolite of AEA

25 µg
50 µg
100 µg
500 µg

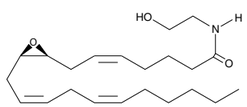


N-(2-hydroxyethyl)-(±)5(6)-epoxy-8Z,11Z,14Z-eicosatrienamide

(±)8(9)-EET Ethanolamide 10008597

(±)8(9)-EpETrE Ethanolamide
MF: $C_{22}H_{37}NO_3$ **FW:** 363.5 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: Racemic version of a CYP450 metabolite of AEA

25 µg
50 µg
100 µg
500 µg

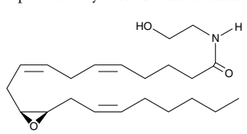


N-(2-hydroxyethyl)-(±)8(9)-epoxy-5Z,11Z,14Z-eicosatrienoic amide

(±)11(12)-EET Ethanolamide 10008598

(±)11(12)-EpETrE Ethanolamide
MF: $C_{22}H_{37}NO_3$ **FW:** 363.5 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: Racemic version of an epoxide produced by CYP450 metabolism of AEA

25 µg
50 µg
100 µg
500 µg

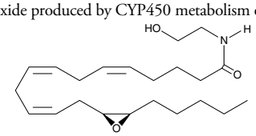


N-(2-hydroxyethyl)-(±)11(12)-epoxy-5Z,8Z,14Z-eicosatrienamide

(±)14(15)-EET Ethanolamide 10008599

(±)14(15)-EpETrE Ethanolamide
MF: $C_{22}H_{37}NO_3$ **FW:** 363.5 **Purity:** ≥95%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: A racemic version of an epoxide produced by CYP450 metabolism of AEA

25 µg
50 µg
100 µg
500 µg

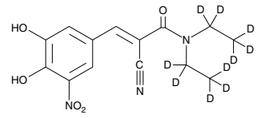


N-(2-hydroxyethyl)-(±)14(15)-epoxy-5Z,8Z,11Z-eicosatrienamide

Entacapone-d$_{10}$ 10010571

MF: $C_{14}H_5D_{10}N_3O_5$ **FW:** 315.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at 4°C
Summary: An internal standard for the quantification of entacapone by GC- or LC-MS

1 mg
5 mg
10 mg



2-cyano-3-(3,4-dihydroxy-5-nitrophenyl)-N,N-diethyl-2-propenamide-d$_{10}$

EP$_1$ Receptor Polyclonal Antibody 101740

PGE$_2$ Receptor 1
Supplied as: peptide affinity-purified IgG **Stability:** ≥1 year at -20°C
Summary: Antigen: human EP$_1$ receptor C-terminal amino acids 380-402 • Host: rabbit • Cross Reactivity: (+) human, murine, and rat EP$_1$ receptor; (-) EP$_2$, EP$_3$, and EP$_4$ receptors • Application(s): ICC and WB • The EP$_1$ receptor is one of four GPCRs that mediate the action of PGE$_2$. The EP$_1$ receptor is expressed in a variety of tissues, including the kidney, lung, and sensory neuron.

1 ea

- Also Available: **EP$_2$ Receptor Polyclonal Antibody** (101750)
- Also Available: **EP$_2$ Receptor Polyclonal PE Antibody** (10477)

EP$_3$ Receptor Polyclonal Antibody 101760

PGE$_2$ Receptor 3
Supplied as: peptide affinity-purified IgG **Stability:** ≥1 year at -20°C
Summary: Antigen: human EP$_3$ receptor amino acids 308-327 • Host: rabbit • Cross Reactivity: (+) human, murine, and bovine EP$_3$ receptor; (-) EP$_1$, EP$_2$, and EP$_4$ receptors • Application(s): ICC and WB • The EP$_3$ receptor is one of four GPCRs that mediate the action of PGE$_2$. Studies with EP$_3$ knockout mice indicate the EP$_3$ receptor plays a role in pain sensation to some stimuli.

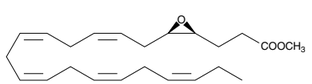
1 ea

- Also Available: **EP$_4$ Receptor (C-Term) Polyclonal Antibody** (101775)
- Also Available: **EP$_4$ Receptor (N-Term) Polyclonal Antiserum** (101770)

4(5)-EpDPE methyl ester 90314

[121818-29-9] 4,5-epoxy Docosapentaenoic Acid methyl ester
MF: $C_{23}H_{34}O_3$ **FW:** 358.5 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥6 months at -80°C
Summary: A stable derivative of 4(5)-EpDPE, a CYP450 metabolite of DHA which can be further metabolized to the diol metabolite; the active free acid can be regenerated from the methyl ester by careful base hydrolysis

25 µg
50 µg
100 µg
500 µg



4,5-epoxy-7Z,10Z,13Z,16Z,19Z-docosapentaenoic acid, methyl ester

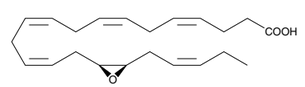
FAAH and MAGL Inhibitors

Item No.	Item Name	FAAH	MAGL	Comments
10010547	O-Arachidonoyl Glycidol	IC_{50} = 12 µM in membrane fractions of rat cerebella		Also blocks 2-oleoyl glycerol hydrolysis
10007517	N-Arachidonyl Maleimide		IC_{50} = 140 nM (rat)	
70665	Arachidonoyl Serotonin	IC_{50} = 12 µM in mouse neuroblastoma cells		A very tight binding, competitive inhibitor of FAAH
62120	Arachidonoyl Trifluoromethyl Ketone	IC_{50} = 82 nM (rat)		Also a general PLA_2 inhibitor
13140	4-(n-nonyl) Benzeneboronic Acid	IC_{50} = 9.1 nM	IC_{50} = 7.9 µM	
71652	CAY10401	K_i = 0.14 nM (rat)		A selective, potent FAAH inhibitor
10005102	CAY10435	K_i = 0.57 nM (rat)		A selective, potent FAAH inhibitor
10010032	CAY10570	IC_{50} = 1.3 µM		A reversible FAAH inhibitor
10215	IDFP	IC_{50} = 3 nM	IC_{50} = 0.8 nM	
10008660	JP83	IC_{50} = 14 nM (human)		A potent, irreversible FAAH inhibitor
10008661	JP104	IC_{50} = 7.3 nM (human)		A potent, irreversible FAAH inhibitor
13158	JZL 184	IC_{50} = 4 µM (murine)	IC_{50} = 8 nM (murine)	
13668	JZL 195	IC_{50} = 2 nM	IC_{50} = 4 nM	
90155	Linoleoyl Ethanolamide	K_i = 9.0 µM		Hydrolyzed effectively by FAAH
70660	Methyl Arachidonyl Fluorophosphonate	IC_{50} = 2.5 nM		Also a selective, active-site directed, irreversible inhibitor of $cPLA_2$ and $iPLA_2$
10005459	Oleoyl Ethyl Amide	IC_{50} = 5.25 nM in rat brain homogenates		A selective FAAH inhibitor; does not bind CB_1 or CB_2 receptors
71650	Oleoyl Oxazolopyridine	K_i = 1.3 nM (human) K_i = 2.3 (rat)		A potent FAAH inhibitor
62640	Oleyl Trifluoromethyl Ketone			10 µM inhibits 95.7% of human FAAH activity and 94.8% of rat FAAH activity
90357	R-Palmitoyl-(2-methyl) Ethanolamide			100 µM inhibits FAAH-mediated hydrolysis of AEA by 54%
10010907	PF-622	IC_{50} = 0.033 - 0.99 µM		Highly selective for FAAH relative to other Ser hydrolases
10010908	PF-750	IC_{50} = 0.016 - 0.6 µM		Highly selective for FAAH relative to other Ser hydrolases
13279	PF-3845	K_i = 0.23 µM		A potent, selective, irreversible FAAH inhibitor
71655	PHOP	K_i = 0.094 nM (human) K_i = 0.2 nM (rat) IC_{50} = 1.1 nM		A potent FAAH inhibitor
13621	Pristimerin		IC_{50} = 93 nM	Rapid, reversible, and noncompetitive
10046	URB597	IC_{50} = 4.6 nM in brain membranes IC_{50} = 0.5 nM in intact neurons		Exhibits anti-nociceptive and anxiolytic effects without evoking other symptoms associated with cannabinoid-like compounds
10007457	URB602		IC_{50} = 28 µM (rat brain)	

16(17)-EpDPE 10174

16,17-epoxy Docosapentaenoic Acid
MF: $C_{22}H_{32}O_3$ **FW:** 344.5 **Purity:** ≥90%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: A DHA metabolite derived *via* epoxidation of the 16,17-double bond; epoxygenase metabolites of DHA have been detected in a murine model of inflammation

25 µg
50 µg
100 µg
500 µg

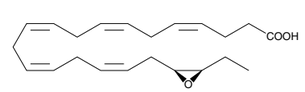


(±)16(17)-epoxy-4Z,7Z,10Z,13Z,19Z-docosapentaenoic acid

19(20)-EpDPE 10175

19,20-epoxy Docosapentaenoic Acid
MF: $C_{22}H_{32}O_3$ **FW:** 344.5 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: A DHA metabolite, derived *via* epoxidation of the ω-3 double bond of DHA; epoxygenase metabolites of DHA have been detected in a murine model of inflammation

25 µg
50 µg
100 µg
500 µg



(±)19(20)-epoxy-4Z,7Z,10Z,13Z,16Z-docosapentaenoic acid

FABP7 (human recombinant) 10009551

B-FABP, Brain-FABP
M$_r$: 19 kDa **Purity:** ≥90% **Stability:** ≥1 year at -80°C
Supplied in: 50 mM sodium phosphate, pH 7.2, containing 20% glycerol and 100 mM sodium chloride
Source: Recombinant N-terminal His-tag protein expressed in *E. coli*
Summary: One of nine known cytosolic FABPs ranging in size from 14-15 kDa containing 127-132 amino acids; exclusively expressed in the CNS where its main function is possibly the binding and transport of PUFA like DHA.

25 µg
50 µg
100 µg

Fatty Acid Amide Hydrolase (human recombinant) 10010183

M$_r$: 67.5 kDa **Purity:** 100,000 x g supernatant **Stability:** ≥6 months at -80°C
Supplied in: 20 mM Hepes, pH 7.8, 150 mM sodium chloride, 1 mM EDTA, 1 mM DTT, 0.5% CHAPS, and 20% glycerol
Source: Recombinant N-terminal His-tag protein expressed in *Sf*21 cells
Summary: A Ser hydrolase that degrades many fatty acid amides, including AEA; a key therapeutic target in the treatment of pain, obesity, and various neurological diseases, where higher endoCB activity would be beneficial

25 U
50 U
100 U

Fatty Acid Amide Hydrolase Polyclonal Antibody 101600

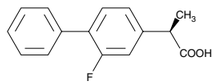
Anandamide Amidohydrolase, FAAH, Oleamide Hydrolase
Supplied as: peptide affinity-purified IgG **Stability:** ≥1 year at -20°C
Summary: Antigen: rat FAAH amino acids 561-579 • Host: rabbit • Cross Reactivity: (+) human, rat, murine, and ferret FAAH • Application(s): IHC and WB • FAAH catalyzes the hydrolysis of biologically significant fatty acid amides. FAAH is expressed in a wide variety of tissues and is particularly abundant in liver, pancreas, brain, testes, uterus, small intestine, and ocular tissue.

1 ea

(R)-Flurbiprofen 70255

[51543-40-9] E-7869, Flurizan, Tarenflurbil
MF: $C_{15}H_{13}FO_2$ **FW:** 244.3 **Purity:** ≥99%
A crystalline solid **Stability:** ≥2 years at room temperature
Summary: A member of the 2-aryl propionic acid group of NSAIDs that reduces inflammation through inhibition of NF-κB and AP-1 activation; decreases survival of prostate tumor cells by inducing p75NTR protein expression; inhibits the enzyme γ-secretase thereby preventing the formation of the amyloid β peptide (Ab42) from amyloid β precursor protein

10 mg
50 mg
100 mg
500 mg



(R)-(-)-2-fluoro-α-methyl-4-biphenylacetic acid

• Also Available: **(±)-Flurbiprofen** (70250)

$GABA_A$ Receptor δ-subunit (N-Term) Polyclonal Antibody 10600

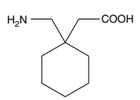
γ-Aminobutyric Acid A Receptor
Supplied as: affinity-purified IgG **Stability:** ≥1 year at -20°C
Summary: Antigen: fusion protein from the N-terminus of the δ-subunit of rat $GABA_A$ receptor • Host: rabbit • Cross Reactivity: (+) rat and murine $GABA_A$ receptor • Application(s): IHC, IP, and WB • GABA is the primary inhibitory neurotransmitter in the CNS, causing a hyperpolarization of the membrane through the opening of a Cl^- channel associated with the $GABA_A$ receptor ($GABA_A$-R) subtype. $GABA_A$-Rs are important therapeutic targets for a range of sedative, anxiolytic, and hypnotic agents and are implicated in several diseases including epilepsy, anxiety, depression, and substance abuse.

1 ea

Gabapentin 10008346

[60142-96-3] Neurontin®
MF: $C_9H_{17}NO_2$ **FW:** 171.2 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A GABA analogue that acts as an anticonvulsant with proven analgesic effects in neuropathic pain caused by Complex Regional Pain Syndrome type one, multiple sclerosis, cancer, and HIV infection; does not bind to GABA receptors, does not influence neural uptake of GABA, and does not inhibit the GABA-metabolizing enzyme, GABA transaminase; penetrates the blood-brain barrier, unlike GABA, and binds to the α2δ-type voltage-gated calcium channels

10 mg
25 mg
50 mg
100 mg



1-(aminomethyl)-cyclohexaneacetic acid

Gap-43 (Phospho-Ser[41]) Polyclonal Antibody 10009400

Supplied as: peptide affinity-purified antibody **Stability:** ≥1 year at -20°C
Summary: Antigen: phosphopeptide corresponding to amino acid residues surrounding phospho-Ser[41] of Gap-43 • Host: rabbit • Cross Reactivity: (+) rat Gap-43 • Application(s): WB • Gap-43 is thought to have an important role in neuronal development and plasticity because it is expressed at high levels in growth cones during development and during axonal regeneration.

1 ea

GFAP (human) EIA Kit* 10007621

Glial Fibrillary Acidic Protein
Stability: ≥6 months at 4°C
Summary: GFAP is a 40-53 kDa monomeric molecule found only in adult glial cells of the CNS and represents the major part of the cytoskeleton of astrocytes. Traumatic injury to the adult CNS results in a rapid inflammatory response by the resident astrocytes, characterized mainly by hypertrophy, proliferation of astrocytes, and increased GFAP expression, resulting in astrogliosis. Thus, GFAP is considered to be a reliable cell-specific biomarker for monitoring neuronal activity under developmental and pathological conditions such as brain injury and retinal stress.

96 wells

GluR1 (Phospho-Ser[831]) Polyclonal Antibody 10602

Glutamate Receptor Subunit 1
Supplied as: affinity-purified IgG **Stability:** ≥1 year at -20°C
Summary: Antigen: phosphopeptide corresponding to amino acid residues surrounding phospho-Ser[831] of GluR1 • Host: rabbit • Cross Reactivity: (+) rat GluR1 • Application(s): WB • Ion channels activated by glutamate that are activated by α-amino-3-hydroxy-5-methyl-4-isoxalone propionic acid (AMPA) are known as AMPA receptors (AMPAR). The AMPAR are comprised of four distinct glutamate receptor subunits designated (GluR1-4) and they play key roles in virtually all excitatory neurotransmission in the brain. GluR1 is potentiated by phosphorylation at Ser^{831} which has been shown to be mediated by either PKC or CaM kinase II.

1 ea

GluR1 (Phospho-Ser[845]) Polyclonal Antibody 10601

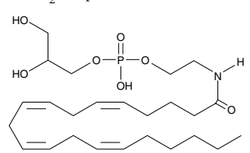
Glutamate Receptor Subunit 1
Supplied as: affinity-purified IgG **Stability:** ≥1 year at -20°C
Summary: Antigen: phosphopeptide corresponding to amino acid residues surrounding phospho-Ser[845] of GluR1 • Host: rabbit • Cross Reactivity: (+) rat GluR1 • Application(s): IHC and WB • Ion channels activated by glutamate that are activated by α-amino-3-hydroxy-5-methyl-4-isoxalone propionic acid (AMPA) are known as AMPA receptors (AMPAR). The AMPAR are comprised of four distinct glutamate receptor subunits designated (GluR1-4) and they play key roles in virtually all excitatory neurotransmission in the brain. GluR1 is potentiated by phosphorylation at Ser^{845} which has been shown to be mediated by either PKC or CaM kinase II.

1 ea

Glycerophospho-N-Arachidonoyl Ethanolamine 10011347

[201738-25-2] Glycerophosphoanandamide, Glycerophospho-Arachidonoyl Ethanolamide, GP-NArE
MF: $C_{25}H_{44}NO_7P$ **FW:** 501.6 **Purity:** ≥97%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: The precursor of AEA, also known as anandamide, an endogenous CB neurotransmitter that binds to both CB_1 and CB_2 receptors

1 mg
5 mg
10 mg
50 mg



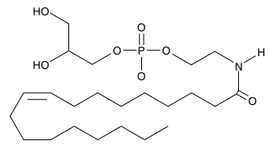
mono(2,3-dihydroxypropyl)-mono[2-[[(5Z,8Z,11Z,14Z)-1-oxo-5,8,11,14-eicosatetraen-1-yl]ethyl]ester phosphoric acid

*SPI-BIO Assays are available through Cayman Chemical only within North & South America and Asia; elsewhere contact SPI-BIO.

Glycerophospho-N-Oleoyl Ethanolamine 10011357

[201738-24-1]
MF: $C_{23}H_{46}NO_7P$ **FW:** 479.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: The precursor of OEA, an endogenous, potent agonist for PPARα (EC_{50} = 120 nM); OEA suppresses food intake and reduces weight gain in rats and PPARα wild-type mice, but not in PPARα knockout mice

1 mg
5 mg
10 mg
50 mg

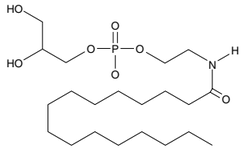


mono(2,3-dihydroxypropyl)-mono[2-[[(9Z)-1-oxo-9-octadecenyl]amino]ethyl] ester phosphoric acid

Glycerophospho-N-Palmitoyl Ethanolamine 10011356

[100575-09-5] GP-NAE, GP-NPEA
MF: $C_{21}H_{44}NO_7P$ **FW:** 453.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: Precursor of PEA, an endogenous CB found in brain, liver, and other mammalian tissues; PEA has potent anti-inflammatory activity *in vivo*

1 mg
5 mg
10 mg
50 mg



mono(2,3-dihydroxypropyl)-mono[2-[(1-oxohexadecyl)amino]ethyl]ester phosphoric acid

Glycine Receptor Polyclonal Antibody 10009399

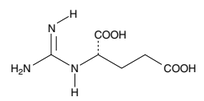
Supplied as: peptide affinity-purified antibody **Stability:** ≥1 year at -20°C
Summary: Antigen: peptide from N-terminal region of the α1-subunit of the rat glycine receptor • Host: rabbit • Cross Reactivity: (+) human, murine, and rat glycine receptor • Application(s): IHC (frozen sections) and WB • Glycine receptors are members of the ligand-gated ion channel family (LGICs) that mediate rapid chemical neurotransmission. The binding of glycine to its receptor produces a large increase in chloride conductance, which causes membrane hyperpolarization.

1 ea

α-Guanidinoglutaric Acid 80340

[73477-53-9] GGA
MF: $C_6H_{11}N_3O_4$ **FW:** 189.2 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
Summary: A linear mixed-type inhibitor of nNOS having a K_i value of 2.69 µM; normally present in small quantities in the cerebral cortex of cats with increased levels following seizure

5 mg
10 mg
50 mg
100 mg

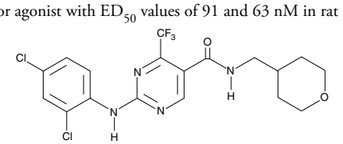


N-(aminoiminomethyl)-L-glutamic acid

GW 842166X 10010372

[666260-75-9]
MF: $C_{18}H_{17}Cl_2F_3N_4O_2$ **FW:** 449.3 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A potent CB_2 receptor agonist with ED_{50} values of 91 and 63 nM in rat and human, respectively

1 mg
5 mg
10 mg
25 mg

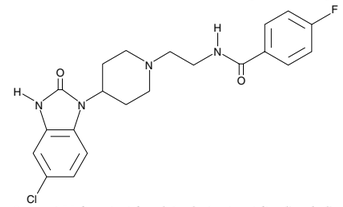


2-[(2,4-dichlorophenyl)amino]-N-[(tetrahydro-2H-pyran-4-yl)methyl]-4-(trifluoromethyl)-5-pyrimidinecarboxamide

Halopemide 13205

[59831-65-1] NSC 354856, R34301
MF: $C_{21}H_{22}ClFN_4O_2$ **FW:** 416.2 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A potent inhibitor of PLD, inhibiting human PLD_1 and PLD_2 *in vitro* (IC_{50} = 220 and 310 nM, respectively) and PLD activity in cells; inhibits the dopamine receptor

1 mg
5 mg
10 mg
25 mg

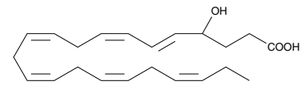


N-[2-[4-(5-chloro-2,3-dihydro-2-oxo-1H-benzimidazol-1-yl)-1-piperidinyl]-ethyl]-4-fluoro-benzamide

(±)4-HDoHE 33200

[90906-40-4] 4-hydroxy DHA
MF: $C_{22}H_{32}O_3$ **FW:** 344.5 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥2 years at -20°C
Summary: An autoxidation product of DHA *in vitro* that can also be produced from incubation of DHA with rat liver, brain, and intestinal microsomes and enzymatic transformation of DHA by RBL-1 cells; is a potential marker of oxidative stress in brain and retina where DHA is an abundant PUFA

25 µg
50 µg
100 µg
250 µg



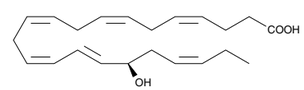
(±)4-hydroxy-5E,7Z,10Z,13Z,16Z,19Z-DHA

• Also Available: **(±)7-HDoHE** (33300)
• Also Available: **(±)8-HDoHE** (33350)
• Also Available: **(±)10-HDoHE** (33400)
• Also Available: **(±)11-HDoHE** (33450)
• Also Available: **(±)13-HDoHE** (33500)
• Also Available: **(±)14-HDoHE** (33550)
• Also Available: **(±)16-HDoHE** (33600)
• Also Available: **(±)17-HDoHE** (33650)
• Also Available: **(±)20-HDoHE** (33750)

17(R)-HDoHE 10005099

[155976-53-7] 17(R)-hydroxy DHA
MF: $C_{22}H_{32}O_3$ **FW:** 344.5 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥2 years at -20°C
Summary: The primary oxygenation product of DHA when exposed to aspirin-inhibited COX-2; serves as a precursor to resolvins and has intrinsic biological activity, such as the inhibition of TNF-α-induced IL-1β expression in human glioma cells

25 µg
50 µg
100 µg
250 µg

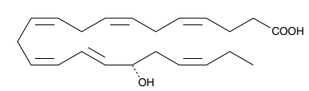


17R-hydroxy-4Z,7Z,10Z,13Z,15E,19Z-DHA

17(S)-HDoHE 10009799

17(S)-hydroxy DHA
MF: $C_{22}H_{32}O_3$ **FW:** 344.5 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥2 years at -20°C
Summary: A primary mono-oxygenation product of DHA in human whole blood, human leukocytes, and murine brain and serves as a precursor to 17(S)-resolvins

25 µg
50 µg
100 µg
250 µg



17S-hydroxy-4Z,7Z,10Z,13Z,15E,19Z-docosahexaenoic acid

Thomas G. Brock, Ph.D.

Multiple Sclerosis and Prostaglandin E_2 Signaling

Multiple sclerosis (MS) is a devastating disease, slowly but inexorably stripping away many of the everyday capabilities that most of us take for granted. The sufferers, some 2.5 million people worldwide, are often young to middle aged adults, in the prime of their lives. It is more common in Caucasians and people of Northern European descent, and occurs in twice as many women as men. This bias in distribution suggests that genetics is a contributing factor. Like many long-term, progressive diseases, there is an underlying inflammatory component. There may also be environmental factors, such as infectious agents, that initiate or sustain disease in some cases. In short, the causes of MS are poorly understood. As a result, there is no specific treatment. Instead, disease-modifying drugs are used to reduce disease activity or delay disease progression. This article delves into some of the known and suspected pathophysiological features of MS and an emerging approach to modify the course of the disease.

Some Details About MS

There are different forms of MS, with the most common form starting as relapsing MS, with symptoms becoming apparent during an active disease stage, or attack, and then remitting. Symptoms for relapsing-remitting MS (RRMS) can vary between individuals, with the most common being fatigue, muscle stiffness or spasms, and problems with walking and balance. In addition, persons with MS may experience bowel or bladder problems, vision difficulties, memory loss, sexuality issues, and either acute or chronic pain. Eventually, the relapsing-remitting pattern may evolve into one of increasing progression of disability, known as secondary progressive MS. A small percentage of individuals suffer from primary progressive MS, in which symptoms never subside but rather continue to steadily worsen.

The symptoms of MS are a manifestation of the underlying pathology, damage to the myelin sheath surrounding nerve axons in the CNS and neurodegeneration in various regions of the CNS (Figure 1). Myelin plays a critical role in controlling the speed of signaling along neuronal axons that extend from the nerve body to adjacent neurons, so disruption of myelin delays neuronal communication. Sufficient demyelination of a nerve will ultimately lead to the death of that cell, but neurodegeneration may also involve the death of bystander cells. Since the symptoms are intermittent in early MS, it might be expected that demyelination might also be intermittent. However, magnetic resonance imaging (MRI) has revealed that MS is an active and progressive disease at the neuronal level, even in the early relapsing-remitting phase.

As mentioned above, inflammation is also a feature of MS. The term 'inflammation' is an unfortunately broad term that may include both innate and adaptive immune responses, from either resident or invading cells, and has initiating, propagating, and resolving aspects.[1] Resident microglia and astrocytes normally actively suppress inflammation, preventing the proliferation and effector functions of infiltrating T cells. Neurons both secrete mediators and express surface proteins which modulate (typically suppressing) the activity of infiltrating leukocytes. Thus, the key to inflammation in MS is also the pathological hallmark of inflammation: an increase in immune cell numbers. In MS, this is seen primarily as an increase in T helper 1 (Th1) and Th17 cells. Secondary to increased cellularity is the production of specific mediators that further drive a specific type of inflammatory response, resulting in neurodegeneration.

Modeling MS in Animals

Experimental Autoimmune Encephalomyelitis (EAE) is an animal model of MS. It is useful to realize that there are many variations of EAE. They vary in how they are conducted, the effects they produce, and, hence, what aspects of MS they model. In general terms, animals are injected with whole or parts of various proteins that make up myelin, with adjuvants (immune system activators), which produces an autoimmune response that leads to inflammation of the brain and spinal cord (encephalomyelitis) and, in some models, demyelination. Specific antigens that have been used in EAE models include myelin oligodendrocyte glycoprotein (MOG), proteolipid protein (PLP), neurofilament light (NF-L), and myelin basic protein (MBP). In mouse models, pertussis toxin will often be included to facilitate the movement of leukocytes across the blood-brain barrier. As an alternative to injecting antigens, EAE can be produced by adoptive transfer of myelin-reactive CD_4^+ T cells.

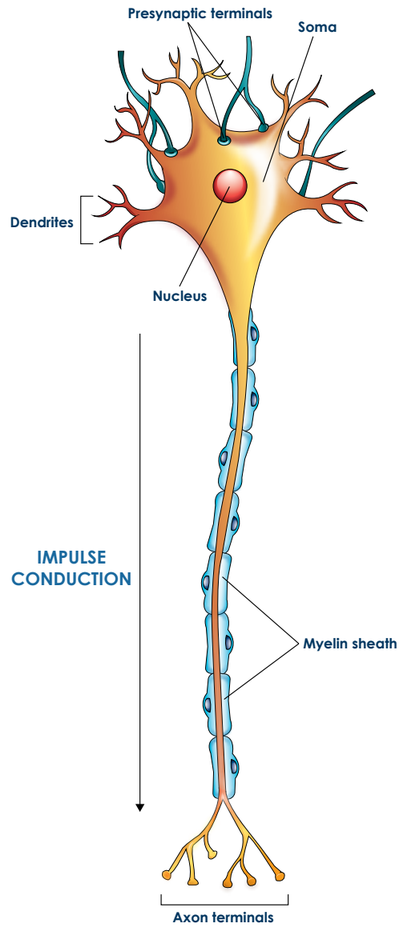


Figure 1. The myelin sheath that surrounds the axon of a nerve cell is formed by the plasma membrane of other cells, wrapping around the axon several times. It greatly increases the rate of impulse conduction from the soma to axon terminals.

As with humans and MS, only certain strains of mice and rats can acquire EAE. Furthermore, different strains will develop different forms of EAE. For instance, treatment with whole guinea pig spinal cord in complete Freund's adjuvant produces, in Lewis rats, brief neurological deficits from neuroinflammation with little or no demyelination, while the same treatment in DA (dark agouti) rats produces extensive demyelination in a severe relapsing-remitting pattern.[2,3] Thus, different EAE models can be used to study different aspects or stages of MS.

Th1 and Th17 appear to play a pivotal role in EAE.[4] More specifically, the Th1 cells are a specific interferon (IFN)-γ-secreting subset whose differentiation is driven by IL-12 and IL-23, which can be made by dendritic cells. Th17 cells are CD_4^+ cells whose differentiation is initiated by TGF-β and IL-6 or IL-21, with or without TNF-α and IL-1β, with maturation requiring IL-23. Th17 cells produce pro-inflammatory mediators, including IL-17A, IL-17B, IL-21, and IL-22. Adoptive transfer of either myelin-specific Th1 or Th17 cells to naïve mice produces inflammation of the CNS, suggesting that they play important roles in encephalomyelitis. Indeed, fingolimod (FTY720), which decreases the number of lymphocytes in circulation, completely prevents the development of EAE pathology, when given prophylactically.[5] This underscores the importance of T cells as effectors in the pathology of EAE.

Prostaglandin E_2

It has long been known that dietary supplementation of ω-6 fatty acids, including arachidonic acid (AA), alters immune response and reduces histopathological changes in the CNS in animals subjected to EAE.[6] AA is released from membrane phospholipids by the action of cytosolic phospholipase A_2 ($cPLA_2$). Genetic and pharmacologic ablation of $cPLA_2$ protects against EAE.[7,8] Free AA may be converted to prostaglandins (PG) by the cyclooxygenase (COX) enzymatic pathway. One PG, PGE_2, is known to be produced in abundance in the CNS in both MS and EAE. The synthesis of PGE_2 from AA is initiated by the constitutively-expressed COX-1 or the induced COX-2, which produce an unstable intermediate, PGH_2 (see related story, page 42). PGE synthases (PGES) complete the biosynthesis of PGE_2. Of the three known PGES enzymes, the microsomal PGES-1 (mPGES-1) form is of particular interest, as its expression is induced by pro-inflammatory mediators. Generally speaking, increased PGE_2 generation in inflammation involves the induced expression and action of both COX-2 and mPGES-1. An important caveat is that the expression of these two genes, as well as message stability and the translation and turnover of the proteins, are not necessarily linked: there are examples, albeit few to date, where one enzyme is abundant while the other is not.

The role of PGE_2 in EAE remains unclear. COX inhibitors have variable effects, reducing pathology in some reports and exacerbating it in others. PGE_2 can induce energy in T helper cells *in vitro*,[9] suggesting that it might suppress T cell-mediated inflammation. However, PGE_2 induces Th1 differentiation and Th17 cell expansion, promoting inflammation in EAE.[10] And yet, knockout of mPGES-1, producing a strong reduction in PGE_2, had no effect on Th1 and Th17 cytokine production in an allergic inflammation mouse model but allowed vascular remodeling, indicating that PGE_2 may be homeostatic.[11] Interestingly, using a targeted lipidomics approach, Shimizu and colleagues again concluded that PGE_2 is the principle AA-derived product increased in EAE lesions.[12] Further, they found that mPGES-$1^{-/-}$ mice showed less severe symptoms of EAE and lower production of IFN-γ and IL-17. In short, PGE_2 is consistently found to be elevated in MS and EAE, but there is no consensus to its effect(s).

In fact, the actions of PGE_2 are multifaceted. PGE_2 can activate four different 'E-prostanoid' (EP) receptors, $EP_{1\text{-}4}$, all GPCRs. Their distribution is cell-type dependent and the expression of each can be altered by, for example, inflammatory cytokines. EP_2 and EP_4 are typically G_s-coupled, while EP_3 is linked to G_i (Figure 2). EP_1 signals through G_q, activating PLCβ and producing a transient rise in calcium. As a result, the effects of PGE_2 will be cell type-, time-, and receptor-dependent. In EAE, the expression of EP_1, EP_2, and EP_4, but not EP_3, increase in the spinal cord, although it's not clear if this is related to a change in cellularity due to inflammation.[12] Knockout of EP_1, EP_2, or EP_3 did not affect the course of disease.[12,13] However, a selective EP_4 antagonist dose-dependently reduced EAE clinical score and this effect was increased in $EP_2^{-/-}$ mice, indicating that these receptors act in an additive fashion.[13] Importantly, the EP_4 antagonist was without effect if given at the onset of disease in the EAE model and had to be given 3 to 7 days after immunization. In contrast, an activator of EP_4, when given at or before immunization, blocked changes in the blood-brain barrier that were associated with T cell recruitment. These studies demonstrate two distinct roles for PGE_2 in EAE and, most likely, MS. Undoubtedly, there are other actions of PGE_2 in the brain that remain to be elucidated.

References

1. Amor, S., Puentes, F., Baker, D., *et al. Immunology* **129**, 154-169 (2010).
2. Issazadeh, S., Mustafa, M., Ljungdahl, A., *et al., J. Neurosci. Res.* **40**, 579-590 (1995).
3. Lorentzen, J.C., Issazadeh, S., Storch, M., *et al. J. Neuroimmunol.* **63**, 193-205 ((1995).
4. El-behi, M., Rostami, A., and Ciric, B. *J. Neuroimmune Pharmacol.* **5**, 189-197 (2010).
5. Chun, J. and Hartung, H.P. *Clin. Neuropharmacol.* **33(2)**, 91-101 (2010).
6. Mertin, J., and Stackpoole, A. *Prostaglandins Med.* **1**, 283-291 (1978).
7. Kalyvas, A. and David, S. *Neuron* **41**, 323-335 (2004).
8. Marusic, S., Leach, M.W., Pelker, J.W., *et al. J. Exp. Med.* **202(6)**, 841-851 (2005).
9. Mannie, M.D., Prevost, K.D., and Marinakis, C.A. *Cell. Immunol.* **160**, 132-138 (1995).
10. Yao, C., Sakata, D., Esaki, Y., *et al. Nat. Med.* **15**, 633-640 (2009).
11. Lundequist, A., Nallamshetty, S.N., Xing, W., *et al. J. Immunol.* **184**, 433-441 (2010).
12. Kihara, Y., Matsushita, T., Kita, Y., *et al. Proc. Natl. Acad. Sci. USA* **106(51)**, 21807-21812 (2009).
13. Esaki, Y., Li, Y., Sakata, D., *et al. Proc. Natl. Acad. Sci. USA* **107(27)**, 12233-12238 (2010).

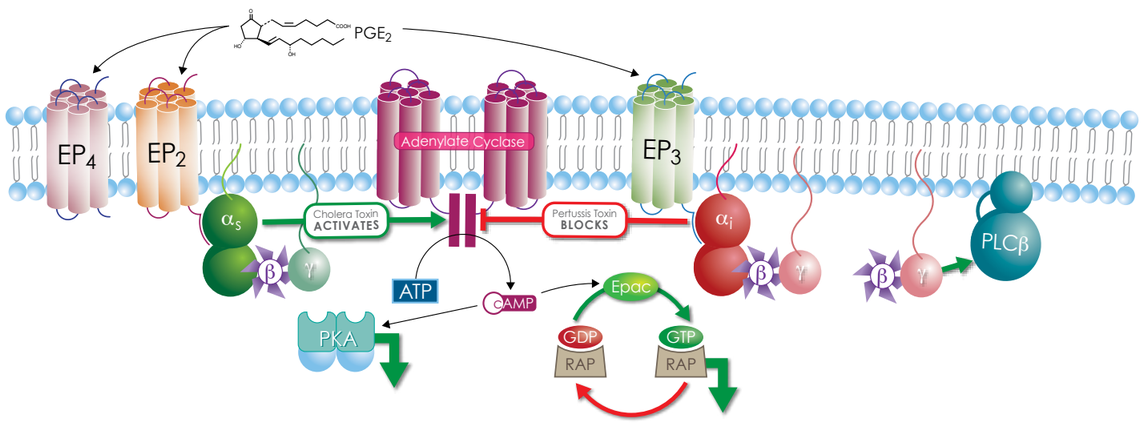


Figure 2. Three EP receptors act through adenylate cyclase and cAMP. EP_3 also activates PLCβ to increase Ca^{2+}.

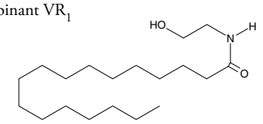
Cyclic Nucleotide Gated/Ion Channel Antibodies

Item No.	Item Name	Formulation	Host	Cross Reactivity	Application
13700	$Ca_v\beta1$ Calcium Channel Monoclonal Antibody (Clone S7-18)	100 µg of protein G-purified IgG in PBS, pH 7.4, containing 50% glycerol and 0.09% sodium azide	Mouse	(+) Human, murine, and rat $Ca_v\beta1$	ICC, IHC, and WB
13701	$Ca_v\beta4$ Calcium Channel Monoclonal Antibody (Clone S10-7)	100 µg of protein G-purified IgG in 100 µl PBS, pH 7.4, containing 50% glycerol and 0.09% sodium azide	Mouse	(+) Human, murine, and rat $Ca_v\beta4$	ICC, IF, IHC, and WB
13702	$Ca_v1.2$ Calcium Channel Monoclonal Antibody (Clone S57-46)	100 µg of protein G-purified IgG in 100 µl PBS, pH 7.4, containing 50% glycerol and 0.09% sodium azide	Mouse	(+) Human, murine, and rat $Ca_v1.2$	ICC, IF, IHC, and WB
13703	$Ca_v1.3$ Calcium Channel Monoclonal Antibody (Clone S38-8)	100 µg of protein G-purified IgG in 100 µl PBS, pH 7.4, containing 50% glycerol and 0.09% sodium azide	Mouse	(+) Human, murine, and rat $Ca_v1.3$	ICC, IF, IHC, and WB
13706	$Ca_v1.3$ Calcium Channel Monoclonal Antibody (Clone S48A-9)	100 µg of protein G-purified IgG in 100 µl PBS, pH 7.4, containing 50% glycerol and 0.09% sodium azide	Mouse	(+) Human, murine, and rat $Ca_v1.3$	ICC, IHC, and WB
13704	$Ca_v3.2$ Calcium Channel Monoclonal Antibody (Clone S55-10)	100 µg of protein G-purified IgG in 100 µl PBS, pH 7.4, containing 50% glycerol and 0.09% sodium azide	Mouse	(+) Human, murine, and rat $Ca_v3.2$	ICC, IHC, and WB
13705	HCN1 Cyclic Nucleotide-gated Channel Monoclonal Antibody (Clone S70-28)	100 µg of protein G-purified IgG in 100 µl PBS, pH 7.4, containing 50% glycerol and 0.09% sodium azide	Mouse	(+) Human, murine, and rat HCN1	ICC, IHC, IP, and WB
13707	HCN2 Cyclic Nucleotide-gated Channel Monoclonal Antibody (Clone S71-37)	100 µg of protein G-purified IgG in 100 µl PBS, pH 7.4, containing 50% glycerol and 0.09% sodium azide	Mouse	(+) Human and murine HCN2	ICC, IHC, IP, and WB
13708	HCN3 Cyclic Neuclotide-gated Channel Monoclonal Antibody (Clone S141-28)	100 µg of protein G-purified IgG in 100 µl PBS, pH 7.4, containing 50% glycerol and 0.09% sodium azide	Mouse	(+) Murine and rat HCN3	ICC, IHC, and WB
13709	HCN4 Cyclic Nucleotide-gated Channel Monoclonal Antibody (Clone S114-10)	100 µg of protein G-purified IgG in 100 µl PBS, pH 7.4, containing 50% glycerol and 0.09% sodium azide	Mouse	(+) Human, murine, and rat HCN4	ICC, IHC, and WB
13711	KCNQ1 Potassium Channel Monoclonal Antibody (Clone S37A-10)	100 µg of protein G-purified IgG in 100 µl PBS, pH 7.4, containing 50% glycerol and 0.09% sodium azide	Mouse	(+) Human, murine, and rat KCNQ1	ICC, IHC, IP, and WB
13712	KCNQ2 Potassium Channel Monoclonal Antibody (Clone S26A-23)	100 µg of protein G-purified IgG in 100 µl PBS, pH 7.4, containing 50% glycerol and 0.09% sodium azide	Mouse	(+) Human, murine, and rat KCNQ2	ICC, IHC, IP, and WB
13713	KCNQ4 Potassium Channel Monoclonal Antibody (Clone S16B-8)	100 µg of protein G-purified IgG in 100 µl PBS, pH 7.4, containing 50% glycerol and 0.09% sodium azide	Mouse	(+) Human, murine, and rat KCNQ4	ICC, IP, and WB
13714	$K_{ir}2.1$ Potassium Channel Monoclonal Antibody (Clone S21-32)	100 µg of protein G-purified IgG in 100 µl PBS, pH 7.4, containing 50% glycerol and 0.09% sodium azide	Mouse	(+) Human, murine, and rat $K_{ir}2.1$	IHC and WB
13715	$K_{ir}2.2$ Potassium Channel Monoclonal Antibody (Clone S21-32)	100 µg of protein G-purified IgG in 100 µl PBS, pH 7.4, containing 50% glycerol and 0.09% sodium azide	Mouse	(+) Human, murine, and rat $K_{ir}2.2$	IHC and WB
13716	$K_{ir}2.3$ Potassium Channel Monoclonal Antibody (Clone S25-35)	100 µg of protein G-purified IgG in 100 µl PBS, pH 7.4, containing 50% glycerol and 0.09% sodium azide	Mouse	(+) Human, murine, and rat $K_{ir}2.3$	IHC and WB
13717	$K_v3.1b$ Potassium Channel Monoclonal Antibody (Clone S16B-8)	100 µg of protein G-purified IgG in 100 µl PBS, pH 7.4, containing 50% glycerol and 0.09% sodium azide	Mouse	(+) Human (weak), murine, and rat $K_v3.1b$	IHC and WB
13718	$Na_v1.7$ Sodium Channel Monoclonal Antibody (Clone S68-6)	100 µg of protein G-purified IgG in 100 µl PBS, pH 7.4, containing 50% glycerol and 0.09% sodium azide	Mouse	(+) Human, murine, and rat $Na_v1.7$	ICC, IP, and WB
13719	TRPC4 Calcium Channel Monoclonal Antibody (Clone S77-15)	100 µg of protein G-purified IgG in 100 µl PBS, pH 7.4, containing 50% glycerol and 0.09% sodium azide	Mouse	(+) Human, murine, and rat TRPC4	ICC, IP, and WB
13720	TRPM7 Channel (Ser/Thr Kinase) Monoclonal Antibody (Clone S74-25)	100 µg of protein G-purified IgG in 100 µl PBS, pH 7.4, containing 50% glycerol and 0.09% sodium azide	Mouse	(+) Human, murine, and rat TRPM7	ICC, IP, and WB

Heptadecanoyl Ethanolamide 90342

MF: $C_{19}H_{39}NO_2$ **FW:** 313.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A synthetic analog of PEA which incorporates an odd-numbered (17-carbon) fatty acid chain; potentiates the Ca^{2+} influx in response to AEA several fold in cells expressing human recombinant VR_1

5 mg
10 mg
50 mg
100 mg

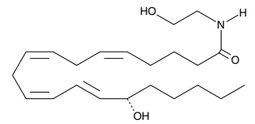


N-(2-hydroxyethyl)hexadecanamide

15(S)-HETE Ethanolamide 10169

[161744-53-2] 15(S)-HAEA
MF: $C_{22}H_{37}NO_3$ **FW:** 363.5 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: Less potent than AEA at the CB_1 receptor (K_i = 600 *versus* 90 nM); inhibits FAAH

25 µg
50 µg
100 µg
500 µg



15(S)-hydroxy-N-(2-hydroxyethyl)-5Z,8Z,11Z,13E-eicosatetraenamide

HU-210
(DEA Schedule I Regulated Compound) 90082

[112830-95-2]
MF: $C_{25}H_{38}O_3$ **FW:** 386.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A synthetic agonist analog of Δ⁹-THC, which is the primary psychoactive component of marijuana; a potent CB_1 and CB_2 receptor agonist that binds to neuroblastoma cell membrane CB_1 receptors with about the same affinity as CP 55,940; demonstrates ED_{50} values of 5-20 µg/kg in murine hypothermia, analgesia, hypoactivity, and catalepsy models

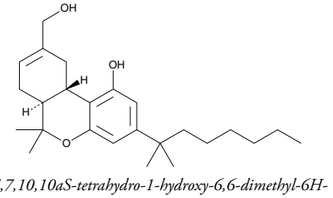
1 mg
5 mg
10 mg
25 mg

3-(1,1'-dimethylheptyl)-6aR,7,10,10aR-tetrahydro-1-hydroxy-6,6-dimethyl-6H-dibenzo[b,d]pyran-9-methanol

HU-211 10006350

[112924-45-5] Dexanabinol
MF: $C_{25}H_{38}O_3$ **FW:** 386.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A synthetic terpene-based CB devoid of CB_1 and CB_2 receptor agonist activity; exhibits neuroprotective, antioxidant, and anti-inflammatory properties

1 mg
5 mg
10 mg
25 mg

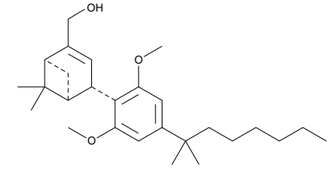


3-(1,1-dimethylheptyl)-6aS,7,10,10aS-tetrahydro-1-hydroxy-6,6-dimethyl-6H-dibenzo[b,d]pyran-9-methanol

HU-308 90086

[256934-39-1]
MF: $C_{27}H_{42}O_3$ **FW:** 414.6 **Purity:** ≥98%
A solution in methyl acetate **Stability:** ≥1 year at -20°C
Summary: A potent, selective agonist for the CB_2 receptor (K_i = ~20 nM compared to that of CB_1 K_i = >10 µM); elicits hypotensive, analgesic, and anti-inflammatory activity, but none of the behavioral tetrad of psychomotor responses characteristic of the phenolic components of hemp, such as Δ⁹-THC when administered to whole animals

1 mg
5 mg
10 mg
25 mg

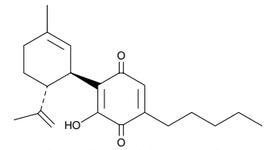


4-[4-(1,1-dimethylheptyl)-2,6-dimethoxyphenyl]-6,6-dimethyl-bicyclo[3.1.1]hept-2-ene-2-methanol

HU-331 10005673

[137252-25-6]
MF: $C_{21}H_{28}O_3$ **FW:** 328.5 **Purity:** ≥95%
A solution in methyl acetate **Stability:** ≥1 year at -20°C
Summary: A hydroxylquinone cannabidiol analog that exhibits potent antineoplastic activity in a variety of human cancer cell lines; inhibits the growth of human Raji and Jurkat lymphoma cells *in vitro* (EC_{50} = ~0.2 µg/ml; EC_{80} =1.56 µg/ml); inhibits growth of HT-29 colon cancer cells, which have been inoculated into nude mice, by more than 50% at a dose of 5 mg/kg

1 mg
5 mg
10 mg
50 mg

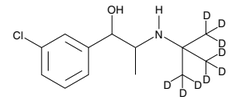


3-hydroxy-2-[(1R,6R)-3-methyl-6-(1-methylethenyl)-2-cyclohexen-1-yl]-5-pentyl-2,5-cyclohexadiene-1,4-dione

Hydroxy Bupropion-d_9* 10010669

MF: $C_{13}H_{11}D_9ClNO$ **FW:** 250.8 **Chemical Purity:** ≥95%
Deuterium Incorporation: ≤1% d_0
A crystalline solid **Stability:** ≥1 year at 4°C
Summary: An internal standard for the quantification of hydroxy bupropion by GC- or LC-MS

5 mg
10 mg
50 mg

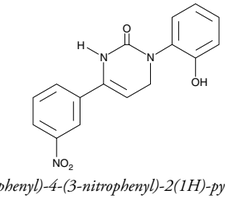


3-chloro-α-[1-[(1,1-dimethylethyl)amino]ethyl]-benzenemethanol-d_9

Icilin 10137

[36945-98-9] AG 3-5
MF: $C_{16}H_{13}N_3O_4$ **FW:** 311.3 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A synthetic CMR1/TRPM8 superagonist that is 2.5-fold more efficacious and nearly 200-fold more potent than the reference cold thermosensory agonist, l-menthol; induces sensations of intense cold when applied orally in humans, and induces 'wet dog shakes', a behavioral marker of cold sensation, when given to rats

1 mg
5 mg
10 mg
50 mg



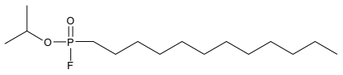
3,6-dihydro-1-(2-hydroxyphenyl)-4-(3-nitrophenyl)-2(1H)-pyrimidinone

**SPI-BIO Assays are available through Cayman Chemical only within North & South America and Asia; elsewhere contact SPI-BIO.*

IDFP 10215

[615250-02-7] Isopropyl Dodecylfluorophosphonate
MF: $C_{15}H_{32}FO_2P$ **FW:** 294.4 **Purity:** ≥98%
A solution in methyl acetate **Stability:** ≥1 year at -20°C
Summary: An organophosphorus compound that dually inhibits MAGL and FAAH with IC_{50} values of 0.8 and 3 nM, respectively; at 10 mg/kg, it elevates brain levels of 2-AG and AEA more than 10-fold and decreases levels of arachidonic acid by a similar magnitude

500 µg
1 mg
5 mg
10 mg

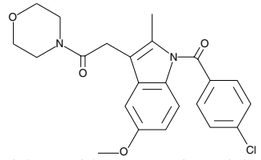


P-dodecyl-1-methylethyl ester-phosphonofluoridic acid

IMMA 70275

BML-190, Indomethacin Morpholinylamide
MF: $C_{23}H_{23}ClN_2O_4$ **FW:** 426.9 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
Summary: A selective CB_2 receptor agonist; binding constant for the CB_2 receptor is 435 nM compared to >20,000 nM for the CB_1 receptor

5 mg
10 mg
50 mg
100 mg



1-(4-chlorobenzoyl)-5-methoxy-2-methyl-1H-indole-3-acetic acid, morpholineamide

IP Receptor (human) Polyclonal Antibody 10005518

Prostacyclin Receptor, PGI_2 Receptor
Supplied as: peptide affinity-purified IgG **Stability:** ≥1 year at -20°C
Summary: Antigen: human IP receptor N-terminal amino acids 1-16 • Host: rabbit • Cross Reactivity: (+) human, murine, and rat IP receptor • Application(s): WB • The IP receptor mediates the actions of PGI_2, a potent vasorelaxant and inhibitor of human platelet aggregation. The IP receptor also participates in signal transduction of the pain response, cardioprotection, and inflammation.

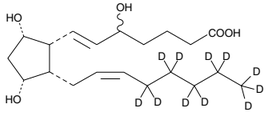
1 ea

• Also Available: **IP Receptor (murine) Polyclonal Antibody** (160070)

8,12-*iso*-iPF$_{2\alpha}$-VI-d$_{11}$ 10006878

8,12-epi-iPF$_{2\alpha}$-VI-d$_{11}$
MF: $C_{20}H_{23}D_{11}O_5$ **FW:** 365.6 **Chemical Purity:** ≥95%
Deuterium Incorporation: ≤1% d_0
A solution in acetonitrile **Stability:** ≥1 year at -80°C
Summary: An internal standard for the quantification of 8,12-*iso*-iPF$_{2\alpha}$-VI by GC- or LC-MS

10 µg
25 µg
50 µg
100 µg

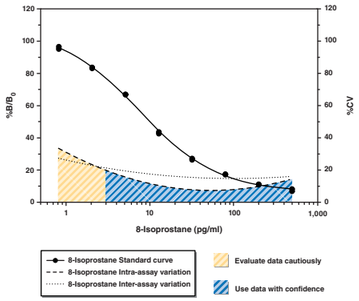


5S,9α,11α-trihydroxy-(12α)-prosta-6E,14Z-dien-1-oic-16,16,17,17,18,18,19,19,20,20,20-d$_{11}$ acid,

8-Isoprostane EIA Kit 516351

iPF$_{2\alpha}$-III, 8-epi PGF$_{2\alpha}$, 8-iso PGF$_{2\alpha}$
Stability: ≥1 year at -20°C
Sensitivity: 50% B/B_0: 10 pg/ml • 80% B/B_0: 2.7 pg/ml
Summary: The isoprostanes are a family of eicosanoids of non-enzymatic origin produced by the random oxidation of tissue phospholipids by oxygen radicals. Isoprostanes appear as artifacts in tissue and plasma samples which have undergone oxidative degradation during prolonged or improper storage. They also appear in the plasma and urine under normal conditions and are elevated by oxidative stress. At least one of the isoprostanes, 8-isoprostane has been shown to have biological activity. It is a potent pulmonary and renal vasoconstrictor and has been implicated as a causative mediator of hepatorenal syndrome and pulmonary oxygen toxicity. 8-Isoprostane has been proposed to be a marker of antioxidant deficiency and oxidative stress and elevated levels have been found in heavy smokers. Its levels are also a relative indicator of sample integrity for lipid-containing samples such as serum, plasma, and whole cell preparations. Plasma from healthy volunteers contains modest amounts of 8-isoprostane (40-100 pg/ml) that increase with the age of the test subject. Normal human urinary levels range from 10-50 ng/mmol creatinine, which is an order of magnitude higher than many enzymatically derived eicosanoids.

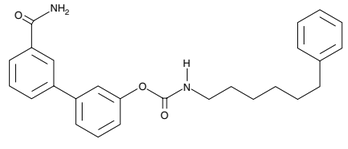
96 strip/solid wells
480 strip/solid wells



JP83 10008660

MF: $C_{26}H_{28}N_2O_3$ **FW:** 416.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: An irreversible FAAH inhibitor of the carbamate class with an IC_{50} value of 14 nM for the human recombinant enzyme when tested using radiolabeled oleamide as the substrate

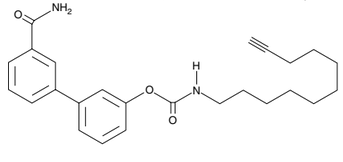
5 mg
10 mg
50 mg
100 mg



JP104 10008661

MF: $C_{25}H_{30}N_2O_3$ **FW:** 406.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: An irreversible FAAH inhibitor of the carbamate class with an IC_{50} value of 7.3 nM for the human recombinant enzyme when tested using radiolabeled oleamide as the substrate; the alkyl derivative on JP104 reacts with azide-modified reporter tags, such as azido-rhodamine or azido-biotin, for visualization of JP104 bound to FAAH *in vivo*

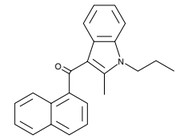
5 mg
10 mg
50 mg
100 mg



JWH 015 10009018

[155471-08-2]
MF: $C_{23}H_{21}NO$ **FW:** 327.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A selective aminoalkylindole CB_2 receptor agonist (K_is = 13.8 and 383 nM for human recombinant CB_2 and CB_1 receptors, respectively); improve the neurological deficit in a model of human multiple sclerosis; reduce microglial activation, abrogate antigen expression, and decrease the number of CD4+ infiltrating T-cells in the spinal cord; reduces interferon-γ-induced up-regulation of CD40 expression in murine microglial cells by interfering with the JAK/STAT1 pathway

1 mg
5 mg
10 mg
25 mg

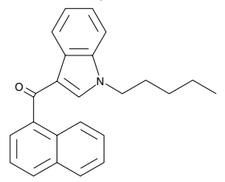


(2-methyl-1-propyl-1H-indol-3-yl)-1-naphthalenyl-methanone

JWH 018 13169

[209414-07-3]
MF: $C_{24}H_{23}NO$ **FW:** 341.5 **Purity:** ≥98%
A solution in methyl acetate **Stability:** ≥1 year at -20°C
Summary: A selective agonist of the CB_2 receptor with K_i values of 9.0 and 2.94 nM for CB_1 and CB_2, respectively

5 mg
25 mg
100 mg
1 g



(1-pentyl-1H-indol-3-yl)-1-naphthalenyl-methanone

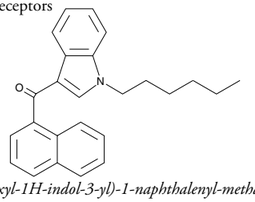
• Also Available: **JWH 018-d$_9$** (13824)

JWH 018 Metabolites		
Item No.	**Product Name**	**Sizes**
NEW 9000844	JWH 018 2-hydroxyindole metabolite	1 mg • 5 mg • 10 mg • 50 mg
NEW 9000851	JWH 018 4-hydroxyindole metabolite	1 mg • 5 mg • 10 mg • 50 mg
NEW 9000852	JWH 018 5-hydroxyindole metabolite	1 mg • 5 mg • 10 mg • 50 mg
NEW 9000853	JWH 018 6-hydroxyindole metabolite	1 mg • 5 mg • 10 mg • 50 mg
NEW 9000854	JWH 018 7-hydroxyindole metabolite	1 mg • 5 mg • 10 mg • 50 mg
NEW 9000855	JWH 018 N-(5-hydroxypentyl) metabolite	1 mg • 5 mg • 10 mg • 50 mg
NEW 9000856	JWH 018 N-pentanoic acid metabolite	1 mg • 5 mg • 10 mg • 50 mg
NEW 9000867	JWH 018 N-pentanoic acid metabolite-d$_4$	100 µg • 500 µg • 1 mg • 5 mg

JWH 019 13633

[209414-08-4]
MF: $C_{25}H_{25}NO$ **FW:** 355.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A cannabimimetic indole that shows high-affinity for both CB_1 (K_i = 9.8 nM) and CB_2 (K_i = 5.6 nM) receptors

5 mg
25 mg
100 mg
1 g

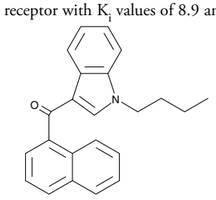


(1-hexyl-1H-indol-3-yl)-1-naphthalenyl-methanone

JWH 073 13170

[208987-48-8]
MF: $C_{23}H_{21}NO$ **FW:** 327.4 **Purity:** ≥97%
A solution in methyl acetate **Stability:** ≥1 year at -20°C
Summary: A selective agonist of the CB_1 receptor with K_i values of 8.9 and 38 nM for CB_1 and CB_2, respectively

5 mg
25 mg
100 mg
1 g



(1-butyl-1H-indol-3-yl)-1-naphthalenyl-methanone

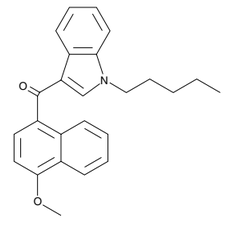
• Also Available: **JWH 073-d$_7$** (9000868)

JWH 073 Metabolites		
Item No.	**Product Name**	**Sizes**
NEW 10633	JWH 073 2-hydroxyindole metabolite	1 mg • 5 mg • 10 mg • 50 mg
NEW 9000861	JWH 073 4-hydroxyindole metabolite	1 mg • 5 mg • 10 mg • 50 mg
NEW 9000862	JWH 073 5-hydroxyindole metabolite	1 mg • 5 mg • 10 mg • 50 mg
NEW 9000863	JWH 073 6-hydroxyindole metabolite	1 mg • 5 mg • 10 mg • 50 mg
NEW 9000864	JWH 073 7-hydroxyindole metabolite	1 mg • 5 mg • 10 mg • 50 mg
NEW 9000865	JWH 073 N-(5-hydroxybutyl) metabolite	1 mg • 5 mg • 10 mg • 50 mg
NEW 9000866	JWH 073 N-butanoic acid metabolite	1 mg • 5 mg • 10 mg • 50 mg
NEW 9000870	JWH 073 N-butanoic acid metabolite-d$_4$	100 µg • 500 µg • 1 mg • 5 mg

NEW JWH 081 10579

[210179-46-7]
MF: $C_{25}H_{25}N_2O_2$ **FW:** 371.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A cannabimimetic indole with selectivity for the CB_1 receptor (K_i = 1.2 nM) and 10-fold reduced affinity for the CB_2 receptor (K_i = 12.4 nM)

5 mg
10mg
25 mg
100 mg

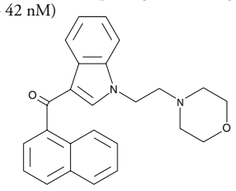


(4-methoxy-1-naphthalenyl)(1-pentyl-1H-indol-3-yl)-methanone

JWH 200 13171

[103610-04-4]
MF: $C_{25}H_{24}N_2O_2$ **FW:** 384.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: An aminoalkylindole that acts as a CB receptor ligand, binding the CB_1 receptor with high-affinity (IC_{50} = 7.8 - 42 nM)

5 mg
25 mg
100 mg
1 g



[1-[2-(4-morpholinyl)ethyl]-1H-indol-3-yl]-1-naphthalenyl-methanone

JWH 250 13634

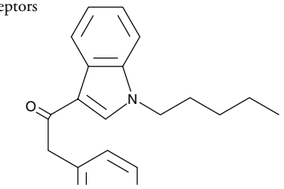
[864445-43-2]

MF: $C_{22}H_{25}NO_2$ **FW:** 335.2 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A cannabimimetic indole that shows high-affinity for both CB_1 (K_i = 11 nM) and CB_2 (K_i = 33 nM) receptors

5 mg
25 mg
100 mg
1 g



1-(1-pentyl-1H-indol-3-yl)-2-(2-methoxyphenyl)-ethanone

NEW JWH 251 10578

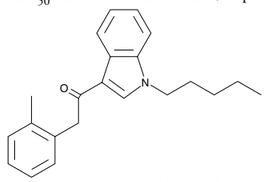
[864445-39-6]

MF: $C_{22}H_{25}NO$ **FW:** 319.4 **Purity:** ≥98%

A solution in methyl acetate **Stability:** ≥1 year at -20°C

Summary: A cannabimimetic indole with selectivity for the CB_1 receptor (K_i = 29 nM) and (K_i = 146 nM for CB_1 and CB_2, respectively); stimulates GTPγS binding of CB_1 and CB_2 receptors with EC_{50} values of 29 and 8.3 nM, respectively

5 mg
25 mg
100 mg
1 g



2-(2-methylphenyl)-1-(1-pentyl-1H-indol-3-yl)-ethanone

NEW JWH 398 13636

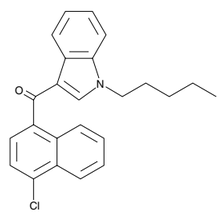
[210179-46-7]

MF: $C_{24}H_{24}ClN_2O_2$ **FW:** 377.9 **Purity:** ≥98%

A solution in methyl acetate **Stability:** ≥1 year at -20°C

Summary: An agonist at both the CB_1 receptor and the CB_2 receptor (K_is = 2.3 and 2.8 nM, respectively)

1 mg
5 mg
10mg
25 mg



(4-chloronaphthalen-1-yl)(1-pentylindolin-3-yl)-methanone

JZL 184 13158

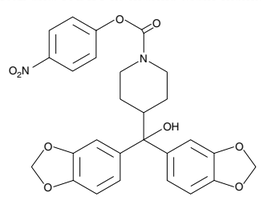
[1101854-58-3]

MF: $C_{27}H_{24}N_2O_9$ **FW:** 520.2 **Purity:** ≥97%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A potent and selective inhibitor of MAGL that displays an IC_{50} values of 8 nM and 4 µM for inhibition of MAGL and FAAH in murine brain membranes, respectively

5 mg
10 mg
50 mg
100 mg



4-nitrophenyl-4-(dibenzo[d][1,3]dioxol-5-yl(hydroxy)methyl)piperidine-1-carboxylate

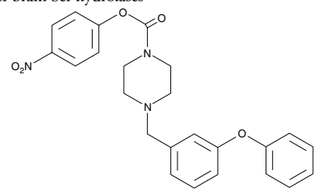
JZL 195 13668

MF: $C_{24}H_{23}N_3O_5$ **FW:** 433.5 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A potent inhibitor of both FAAH and MAGL (IC_{50} = 2 and 4 nM, respectively); poorly inhibits other brain Ser hydrolases

5 mg
10 mg
50 mg
100 mg



4-nitrophenyl 4-(3-phenoxybenzyl)piperazine-1-carboxylate

(-)-(α)-Kainic Acid 78050

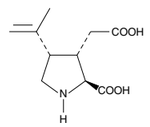
[487-79-6]

MF: $C_{10}H_{15}NO_4$ **FW:** 213.2 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at room temperature

Summary: A natural marine product originally isolated from the red marine alga *D. simplex* that is a potent CNS stimulant; developed as the prototype neuroexcitatory amino acid for the induction of seizures in experimental animals, at a typical dose of 10-30 mg/kg in mice; neuroexcitotoxic and epileptogenic, acting through specific kainate receptors

5 mg
10 mg
25 mg
50 mg



2S-carboxy-4S-(1-methylethenyl)-3S-pyrroldineacetic acid

L-759,633 10009280

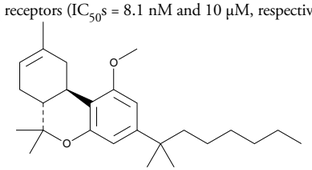
[174627-50-0]

MF: $C_{26}H_{40}O_2$ **FW:** 384.6 **Purity:** ≥98%

A solution in methyl acetate **Stability:** ≥1 year at -20°C

Summary: A high-affinity CB_2 receptor-selective agonist (K_is = 6.4 and 1,043 nM for CB_2 and CB_1, respectively); inhibits forskolin-stimulated cAMP production in CHO cells transfected with CB_2 or CB_1 receptors (IC_{50}s = 8.1 nM and 10 µM, respectively)

1 mg
5 mg
10 mg
25 mg



3-(1,1-dimethylheptyl)-6aR,7,10,10aR-tetrahydro-1-methoxy-6,6,9-trimethyl-6H-dibenzo[b,d]pyran

Lercanidipine-d_3 (hydrochloride)* 10010572

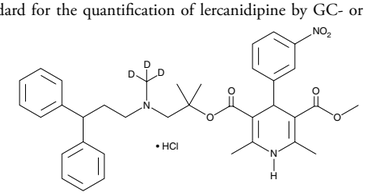
MF: $C_{36}H_{38}D_3N_3O_6$ • HCl **FW:** 651.2 **Chemical Purity:** ≥96%

Deuterium Incorporation: ≤1% d_0

A crystalline solid **Stability:** ≥1 year at 4°C

Summary: An internal standard for the quantification of lercanidipine by GC- or LC-MS

1 mg
5 mg
10 mg



1,4-dihydro-2,6-dimethyl-4-(3-nitrophenyl)-3-[2-[(3,3-diphenylpropyl)methylamino]-1,1-dimethyl]5-methylester, 3,5-pyridinecarboxylic acid-d_3, monohydrochloride

**SPI-BIO Assays are available through Cayman Chemical only within North & South America and Asia; elsewhere contact SPI-BIO.*

Lignoceric Acid 13353

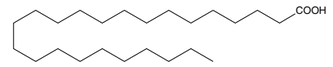
[557-59-5] FL 88

MF: $C_{24}H_{48}O_2$ **FW:** 368.6 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A 23-carbon saturated (23:0) fatty acid that is synthesized during brain development and is found in cerebrosides

50 mg
100 mg
250 mg
500 mg



tetracosanoic acid

N-Lignoceroyl Taurine 10007286

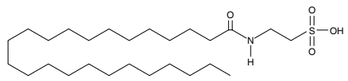
[807370-75-8]

MF: $C_{26}H_{53}NO_4S$ **FW:** 475.8 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: One of the several novel taurine-conjugated fatty acids that act as a FAAH substrate and may activate TRPV1 and TRPV4

1 mg
5 mg
10 mg
50 mg



2-[(1-oxotetracosyl)amino]-ethanesulfonic acid

α-Linolenoyl Ethanolamide 90215

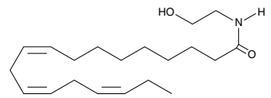
[57086-93-8]

MF: $C_{20}H_{35}NO_2$ **FW:** 321.5 **Purity:** ≥98%

A solution in ethanol **Stability:** ≥1 year at -20°C

Summary: An endoCB containing α-linolenic acid in place of the arachidonate moiety of AEA; detected in porcine brain, but its specific role and relative importance as a cannabinergic neurotransmitter have not been elucidated

5 mg
10 mg
25 mg
50 mg



N-(2-hydroxyethyl)-9Z,12Z,15Z-octadecatrienamide

Dihomo-γ-Linolenoyl Ethanolamide 90235

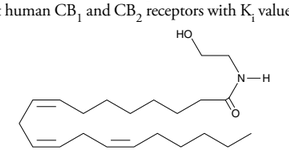
[150314-34-4]

MF: $C_{22}H_{39}NO_2$ **FW:** 349.6 **Purity:** ≥98%

A solution in ethanol **Stability:** ≥1 year at -20°C

Summary: An endoCB containing dihomo-γ-linoleate in place of the arachidonate moiety of AEA; binds to recombinant human CB_1 and CB_2 receptors with K_i values of 857 and 598 nM, respectively

5 mg
10 mg
25 mg
50 mg



N-(2-hydroxyethyl)-8Z,11Z,14Z-eicosatrienamide

N-(α-Linolenoyl) Tyrosine 10032

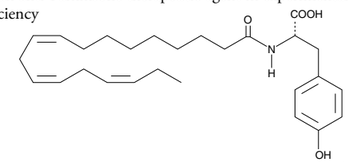
[259143-19-6] NALT

MF: $C_{27}H_{39}NO_4$ **FW:** 441.6 **Purity:** ≥98%

A solution in ethanol **Stability:** ≥1 year at -20°C

Summary: A simple α-amide conjugate between the ω-3 essential fatty acid α-linolenate and the amino acid tyrosine that was prepared as a mechanism for enhancing CNS dopamine content by facilitated transport of the tyrosine precursor across the blood-brain barrier; increased CNS dopamine levels and exhibited an activity profile consistent with an anti-Parkinson's therapeutic agent in experimental rat models of dopamine insufficiency

5 mg
10 mg
50 mg
100 mg



N-(L-tyrosine)-9Z,12Z,15Z-octadecatrienamide

Methyl α-Linolenyl Fluorophosphonate 70662

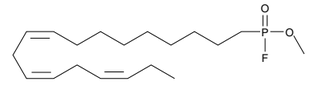
MLnFP

MF: $C_{19}H_{34}FO_2P$ **FW:** 344.4 **Purity:** ≥98%

A solution in methyl acetate **Stability:** ≥1 year at -80°C

Summary: An analog of MAFP, which has been widely studied as an inhibitor of phospholipases, FAAH, and as a CB receptor ligand; pharmacology of the α-linolenyl analog of MAFP has not been completely investigated

1 mg
5 mg
10 mg
50 mg



9Z,12Z,15Z-octadecatrienyl-phosphonofluoridic acid, methyl ester

Methyl γ-Linolenyl Fluorophosphonate 70664

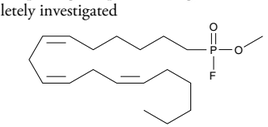
MγLnFP

MF: $C_{19}H_{34}FO_2P$ **FW:** 344.4 **Purity:** ≥98%

A solution in methyl acetate **Stability:** ≥1 year at -80°C

Summary: An analog of MAFP, which has been widely studied as an inhibitor of phospholipases, FAAH, and as a CB receptor ligand; pharmacology of the γ-linolenyl analog of MAFP has not been completely investigated

1 mg
5 mg
10 mg
50 mg



6Z,9Z,12Z-octadecatrienyl-phosphonofluoridic acid, methyl ester

Linoleoyl Ethanolamide 90155

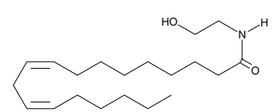
[68171-52-8]

MF: $C_{20}H_{37}NO_2$ **FW:** 323.5 **Purity:** ≥98%

A solution in ethanol **Stability:** ≥1 year at -20°C

Summary: An endoCB that contains linoleate in place of the arachidonate moiety of AEA; has been detected in porcine brain and murine peritoneal macrophages and has weak affinity for the CB_1 and CB_2 receptors (K_is =10 µM and 25 µM, respectively); 4-fold less potent than AEA at causing catalepsy in mice (ED_{50} = 26.5 mg/kg); increases ERK phosphorylation and AP-1-dependent transcription approximately 1.5 fold at 15 µM in a CB-receptor-independent manner; inhibits human FAAH-dependent hydrolysis of AEA (K_i = 9.0 µM), but is also effectively hydrolyzed by the enzyme

5 mg
10 mg
50 mg
100 mg

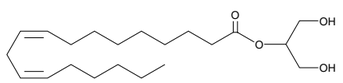


N-(2-hydroxyethyl)-9Z,12Z-octadecadienamide

2-Linoleoyl Glycerol 62260

[3443-82-1] 2-LG
MF: $C_{21}H_{38}O_4$ **FW:** 354.5 **Purity:** ≥98%
A solution in acetonitrile **Stability:** ≥6 months at - 80°C
Summary: A congener of 2-AG in which a linoleoyl group replaces the arachidonoyl group that potentiates the activity of other endoCBs, including 2-AG; this 'entourage' effect has been attributed to blockade of the breakdown and reuptake pathways that normally function to rapidly reduce endoCB levels following release

500 µg
1 mg
5 mg
10 mg

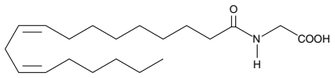


9Z,12Z-octadecadienoic acid, 2-glyceryl ester

Linoleoyl Glycine 9000326

[2764-03-6] Glycine Linoleamide, LinGly, N-Linoleoyl Glycine
MF: $C_{20}H_{35}NO_3$ **FW:** 337.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: An endogenous homolog of arachidonyl glycine that inhibits AEA hydrolysis in FAAH-containing N18TG2 cell membranes with an IC_{50} value of 25 µM

5 mg
10 mg
50 mg
100 mg

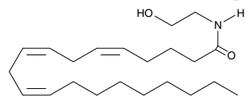


N-9Z,12Z-1-oxo-octadecadien-1-yl-glycine

Mead Acid Ethanolamide 90195

[169232-04-6]
MF: $C_{22}H_{39}NO_2$ **FW:** 349.6 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: Essentially identical to AEA in its agonist binding to CB_1 and CB_2 receptors; binds with a K_i value of 753 nM in L cells expressing the human CB_1 receptor and binds with a K_i value of 1,810 nM in AtT-20 cells expressing the human CB_2 receptor

500 µg
1 mg
5 mg
10 mg

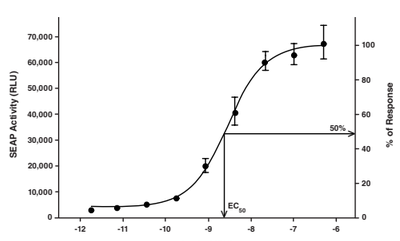


N-(2-hydroxyethyl)-5Z,8Z,11Z-eicosatrienamide

Melanocortin-3 Receptor STEP Reporter Assay Kit (Luminescence) 600180

MC3R
Stability: ≥1 year at -20°C
Summary: MC3R helps regulate energy homeostasis and mice lacking MC3R have increased fat mass and reduced lean mass. Therefore, agonists that selectively activate MC3R might have beneficial effects related to weight gain and glucose metabolism. This assay consists of a 96-well plate coated with both MC3R and Secretory Alkaline Phosphatase (SEAP) reporter constructs. Cells grown on the STEP complex will express MC3R at the cell surface. Binding of agonists to MC3R initiates a signaling cascade resulting in expression of SEAP. SEAP activity is measured following addition of luminescence-based alkaline phosphatase substrate provided in the kit.

1 ea



Melanocortin-4 Receptor Polyclonal Antibody 10006355

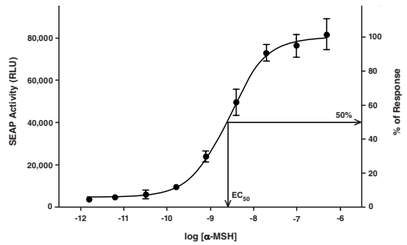
MC4R
Supplied as: peptide affinity-purified IgG **Stability:** ≥1 year at -20°C
Summary: Antigen: mouse MC4R amino acids 21-33 • Host: rabbit • Cross Reactivity: (+) human, murine, and rat MC4R • Application(s): IHC (formalin-fixed paraffin-embedded sections) and WB • MC4R is expressed primarily in the brain. Genetic studies in mice and humans have established a critical role of MC4R in appetite regulation. Heterozygous mutations in MC4R account for 1-6% of severe cases of human obesity.

1 ea

Melanocortin-4 Receptor STEP Reporter Assay Kit (Luminescence) 600190

MC4R
Stability: ≥1 year at -20°C
Summary: MC4R has important roles in weight regulation, sexual function, and inflammation. Mice deficient in MC4R have increased lipid deposition associated with elevated adiposity, while mutations in MC4R in humans are associated with early onset or severe obesity. This assay consists of a 96-well plate coated with both MC4R and Secretory Alkaline Phosphatase (SEAP) reporter constructs. Cells grown on the STEP complex will express MC4R at the cell surface. Binding of agonists to MC4R initiates a signaling cascade resulting in expression of SEAP. SEAP activity is measured following addition of a luminescence-based alkaline phosphatase substrate provided in the kit.

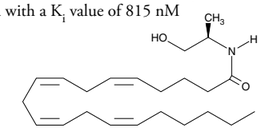
1 ea



R-1 Methanandamide 90070

[157182-49-5] (R)-(+)-Arachidonoyl-1'-Hydroxy-2'-Propylamide
MF: $C_{23}H_{39}NO_2$ **FW:** 361.6 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: The most potent CB_1 receptor agonist in the methanandamide series with a K_i value of 20 nM for the CB_1 receptor, which is four-fold lower than that of AEA (K_i =78 nM); more resistant than AEA to hydrolytic inactivation by FAAH; binds to the CB_2 receptor from murine spleen with a K_i value of 815 nM

5 mg
10 mg
50 mg
100 mg

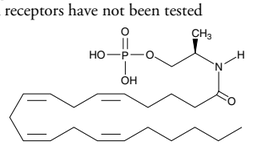


N-(2-hydroxy-1R-methylethyl)-5Z,8Z,11Z,14Z-eicosatetraenamide

R-1 Methanandamide Phosphate 10004281

R-1MAP, (R)-(+)-Arachidonoyl-1'-Hydroxy-2'-Propylamide Phosphate
MF: $C_{23}H_{40}NO_5P$ **FW:** 441.5 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: A water soluble prodrug analog of AEA with similar activity to that of AEA in the growth inhibition of C6 glioma cells; also a structural variant of LPA, however, its effects on the various LPA receptors have not been tested

1 mg
5 mg
10 mg
50 mg

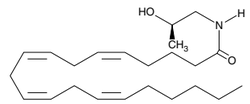


N-(2-phosphate-1R-methylethyl)-5Z,8Z,11Z,14Z-eicosatetraenamide

R-2 Methanandamide 90074

(R)-(-)-Arachidonoyl-2'-Hydroxy-1'-Propylamide
MF: $C_{23}H_{39}NO_2$ **FW:** 361.6 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: A CB analog with a methyl group in the (R) configuration at C-2 of the ethanolamine group; is not a FAAH inhibitor and is nearly as susceptible to amide hydrolysis as AEA itself

5 mg
10 mg
50 mg
100 mg

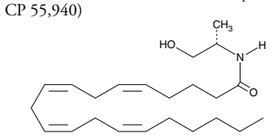


N-(2R-hydroxypropyl)-5Z,8Z,11Z,14Z-eicosatetraenamide

S-1 Methanandamide 90072

(S)-(-)-Arachidonoyl-1'-Hydroxy-2'-Propylamide
MF: $C_{23}H_{39}NO_2$ **FW:** 361.6 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: A CB_1 receptor ligand with less potency than R-1 methanandamide; inhibits electrically evoked contractions in isolated murine vas deferens (IC_{50} = 230 nM); binding affinity for CB_1 receptors is less than that of AEA (K_i = 175 nM for the displacement of radiolabeled CP 55,940)

5 mg
10 mg
50 mg
100 mg

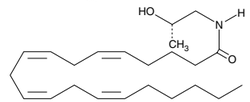


N-(2-hydroxy-1S-methylethyl)-5Z,8Z,11Z,14Z-eicosatetraenamide

S-2 Methanandamide 90076

(S)-(+)-Arachidonoyl-2'-Hydroxy-1'-Propylamide
MF: $C_{23}H_{39}NO_2$ **FW:** 361.6 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: The second most potent CB_1 receptor agonist in the methanandamide series (K_i = 26 nM for the CB_1 receptor); less prone to FAAH inactivation and inhibits the murine vas deferens twitch response (IC_{50} = 47 nM)

5 mg
10 mg
50 mg
100 mg



N-(2S-hydroxypropyl)-5Z,8Z,11Z,14Z-eicosatetraenamide

Monoacylglycerol Lipase (human recombinant) 10007812

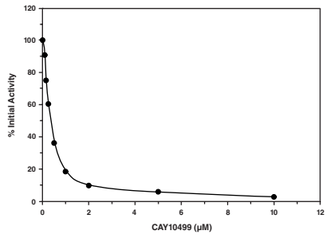
MAGL
M_r: 34 kDa **Purity:** ≥95% **Stability:** ≥6 months at -80°C
Supplied in: 50 mM Hepes, pH 7.4, containing 100 mM sodium chloride, 5 mM magnesium chloride, 0.1% Trition, and 25% glycerol
Source: human recombinant N-terminal His-tagged protein purified from *E. coli*
Summary: MAGL is a Ser hydrolase responsible for the hydrolysis of 2-AG to arachidonic acid and glycerol, thus terminating its biological function.

10 µg
25 µg
50 µg

Monoacylglycerol Lipase Inhibitor Screening Assay Kit 705192

MAGL
Stability: ≥6 months at -80°C
Summary: MAGL is the main enzyme responsible for the inactivation of 2-AG. Cayman's MAGL Inhibitor Screening Assay provides a convenient method for screening human MAGL inhibitors. MAGL hydrolyzes 4-nitrophenylacetate resulting in a yellow product, 4-nitrophenol, with an absorbance maximum at 405-412 nm.

96 wells



Monoacylglycerol Lipase Polyclonal Antibody 100035

MAGL
Supplied as: peptide affinity-purified IgG **Stability:** ≥1 year at -20°C
Summary: Antigen: human MAGL amino acids 1-14 • Host: Rabbit • Cross Reactivity: (+) human, murine, bovine, and rat MAGL • Application(s): IHC and WB • MAGL hydrolyzes 2-AG to terminate its biological activity and works consecutively with HSL to mobilize fatty acids from the triglyceride stores of adipocytes.

1 ea

Monoacylglycerol Lipase (FL) Polyclonal Antibody 10212

MAGL
Supplied as: purified IgG **Stability:** ≥1 year at -20°C
Summary: Antigen: purified recombinant human MAGL • Host: rabbit • Cross Reactivity: (+) human and rat MAGL • Application(s): ICC, IHC, and WB • MAGL hydrolyzes 2-AG to terminate its biological actions and works consecutively with HSL to mobilize fatty acids from the triglyceride stores of adipocytes.

1 ea

Monoacylglycerol Lipase Western Ready Control 10009566

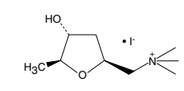
MAGL
Purity: Whole cell lysate **Stability:** ≥2 years at -20°C
Summary: Source: human recombinant C-terminal His-tagged MAGL expressed in *E. coli* • Application(s): positive control for WB

1 ea

NEW (+)-Muscarine (iodide salt) 10230

[24570-49-8]
MF: $C_9H_{20}NO_2$ • I **FW:** 301.2 **Purity:** ≥95%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A biologically active stereoisomer of muscarine that mimics the action of acetylcholine at muscarinic receptors

1 mg
5 mg
10 mg
25 mg



2,5-anhydro-1,4,6-tridexoy-6-(trimethylammonio)-D-ribo-hexitol, iodide

Thomas G. Brock, Ph.D.

The National Institute on Aging suggests that there are three stages in Alzheimer's Disease (AD): mild, moderate, and severe. These are based on changes in a person's memory, cognition, use of words, and behavior. For example, memory changes progress from losing memory of recent events (mild disease) to confusing the identity of others (moderate) to failing to recognize self or close family members (severe). This graded change in the severity of symptoms undoubtedly reflects the progressive nature of the changes in the physical and functional features of the brain. One approach to treatment may focus on preventing the progression of ongoing processes. This necessitates the identification of the factors that help drive or amplify the events that are already underway.

Two well-accepted neuropathological features of AD are tangles and plaques. In the original report in 1906, Alois Alzheimer was using a newly-developed staining method to examine brain slices from a deceased 56-year old patient, Auguste Deter, who had rapidly developed dementia typical of older individuals. Tangles were described as "striking changes of the neurofibrils", which had become receptive to dyes that do not stain normal tissue, suggested a "chemical change". We now know that, in tangles, the microtubule-associated tau protein becomes hyperphosphorylated and aggregates within cells as paired helical filaments. These tau filaments stain nicely with silver stains like those used by Alzheimer. This contrasts with plaques, which appeared as "minute miliary foci caused by deposition of a particular substance in the cortex", which were millet seed-like (miliary) forms observable without staining. Plaques are now known to result from the abnormal processing of amyloid precursor protein (APP) by secretase enzymes to produce β-amyloid (Aβ), leading to large extracellular proteinaceous deposits that contribute to neurodegeneration (Figure 1).

A third, less well-known feature of Deter's brain was described by Alzheimer: "the glia have developed numerous fibres; further, many glia include adipose inclusions." The rich accumulation of "lipoid granules" in ganglion cells and glia was further described in subsequent papers by Alzheimer and others, with the granules being numerous, filling the body of the cells around the nucleus. It is possible that these lipid deposits reflect, at least in part, the accumulation of nondegradable lipofuscin associated with oxidative stress and aberrant autophagy.[1] Alternatively, the lipid inclusions may be indicative of defective lipid metabolism with consequent lipid peroxidation, particularly of polyunsaturated fatty acids (PUFA).[2] Note that these concepts are not mutually exclusive, as lipofuscin contains abundant free PUFA.[3] Interestingly, there is growing evidence that the PUFA arachidonic acid and its metabolites contribute to AD.

Arachidonic Acid and Phospholipases

Two PUFAs predominate in the brain: arachidonic acid (AA) and docosahexaenoic acid (DHA). These are each present in abundance, being esterified in phospholipids in the multitude of membranes of all of the diverse types of cells throughout the different regions of the brain. Typically, bulky PUFAs like AA and DHA are attached at the central carbon of the glycerol backbone of phospholipids, which is designated the *sn*-2 position (Figure 2). The enzymes that release fatty acids from this position are, as a group, called phospholipases A_2 (PLA_2). The superfamily of PLA_2s has numerous members that may be divided into 15 groups within four major classes.[4] Of these, the group IV A (GIVA) $PLA_2\alpha$, known informally as cytosolic PLA_2 ($cPLA_2$), releases AA preferentially, over DHA and other FAs at the *sn*-2 position, from membrane phospholipids. $cPLA_2$ immunoreactivity is elevated in AD brain[5] and $cPLA_2$ is induced within reactive glial cells in human cases of AD and in transgenic mice overexpressing mutant APP.[6-8] Amyloid protein Aβ42 directly increases $cPLA_2$ activity in astrocytes.[9] Genetic ablation or reduction of $cPLA_2$ in mice overexpressing mutant APP protects the mice against deficits in learning and memory, behavioral alterations, and premature mortality associated with Aβ deposition.[8] Finally, a polymorphism of the gene encoding $cPLA_2$ was recently found in patients with late-onset AD but not in matched healthy controls.[10] Taken together, these studies suggest that aberrant action of this AA-selective PLA_2 is associated with AD, that activity is stimulated by Aβ42, and that cognitive deficits, to some extent, are due to that activity.

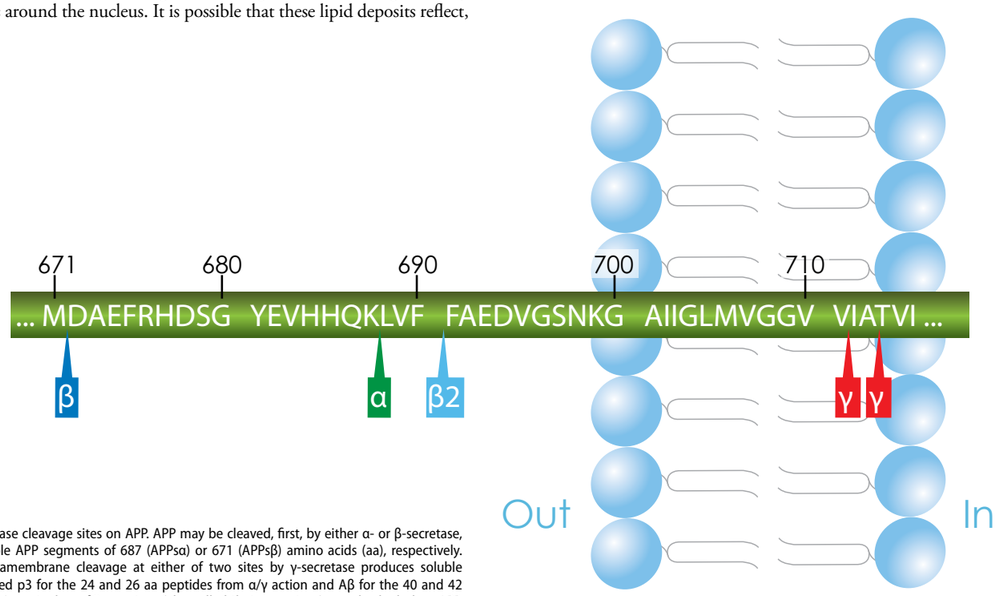


Figure 1. Secretase cleavage sites on APP. APP may be cleaved, first, by either α- or β-secretase, producing soluble APP segments of 687 (APPsα) or 671 (APPsβ) amino acids (aa), respectively. Subsequent intramembrane cleavage at either of two sites by γ-secretase produces soluble fragments, termed p3 for the 24 and 26 aa peptides from α/γ action and Aβ for the 40 and 42 aa pieces from β/γ proteolysis. β2-secretase (also called theta-secretase) can also hydrolyze APP. Numbers indicate residue position in APP.

The initial consequence of $cPLA_2$ activity is the release of AA. Direct imaging of radiolabeled AA in brains of live, non-anesthetized humans using positron emission tomography revealed increased AA metabolism in patients with AD than in controls,[11] placing AA at the site of disease. Fatty acids liberated from phospholipids are only transiently free before they are metabolized, bound by certain proteins, or reacylated into membranes. AA added to cells can directly initiate pathways that drive apoptosis and inhibition of reacylation of AA induces apoptosis in neurons.[12] Increased free AA is recognized as an important change in the early induction stage of ischemic cell death in brain neurons.[13] Regarding the development of neurofibrillary tangles, free PUFAs, and specifically AA, are well known to induce the polymerization of tau protein.[14,15] Also, AA directly interacts with subunits of NADPH oxidase, promoting its assembly and the formation of reactive oxygen species.[16] Finally, AA binds Rho GDP-dissociation inhibitor 1 (GDIR),[17] allowing guanine-nucleotide exchange and activation of small GTPases, which are known to be involved in AD.[18] Through these and other actions, AA directly plays a role in the pathogenesis of AD.

NSAIDs and Prostaglandins

In addition to directly contributing to the disease process, AA may be enzymatically converted to a large number of products which may also be important in AD. Foremost, AA may be modified by the cyclooxygenases (COX), COX-1 and COX-2, to initiate the biosynthesis of prostaglandins (PGs). Both COX-1 and COX-2 catalyze two modifications, an oxygenation and peroxidation, to give the intermediate PGH_2, which is then processed by distal enzymes to give the active product (Figure 2). COX-1 is typically constitutively expressed, whereas the expression of COX-2 is induced by a variety of inflammatory cues. The best-known product, PGE_2, is a pro-inflammatory mediator that is elevated in cerebrospinal fluid early in AD but decreased in advanced disease.[19] There are three PGE_2 synthases (PGES): constitutive (cPGES), microsomal-1 (mPGES-1), and microsomal-2 (mPGES-2). Both mPGES-1 and mPGES-2 are inducible, the former by inflammation and the latter by sulfhydryl-reducing reagents. The paired but transient induction of COX-2 and mPGES-1 during inflammation leads to a dramatic increase in PGE_2 synthesis, which in turn leads to a host of effects, including pain, fever, altered smooth muscle tone, sleep, and leukocyte suppression. Aspirin and nonsteroidal anti-inflammatory drugs (NSAIDs), including ibuprofen and indomethacin, inhibit both COX isoforms non-selectively. Several COX-2 selective inhibitors (coxibs) have also recently been developed.

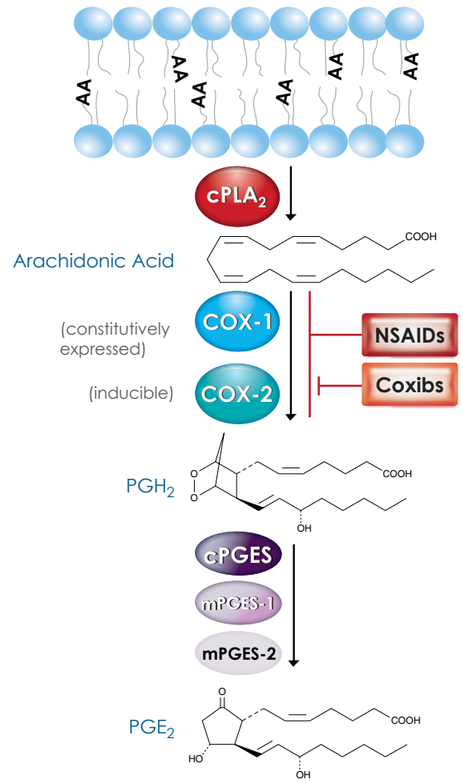


Figure 2. Biosynthesis of PGE_2. $cPLA_2$ is an AA-selective enzyme that releases this PUFA from membrane phospholipids in response to Aβ. Free AA is metabolized by constitutively-expressed COX-1 and inducible COX-2 to the intermediate PGH_2. The synthesis of PGE_2 is completed by PGES, including cPGES, mPGES-1, and mPGES-2. NSAIDs inhibit both forms of COX, while coxibs selectively inhibit COX-2.

Numerous epidemiological studies have examined the effectiveness of long-term NSAID use in treating AD.[20] The results are equivocal, with some suggestion that NSAIDs may be protective in early stages of disease but deleterious in established disease.[21] Selective COX-2 inhibitors are, perhaps surprisingly, generally less effective, or possibly worse, than non-selective COX inhibitors. Positive staining for both COX-1 and COX-2, as well as mPGES-1, has been reported in brain tissue from patients with AD.[22,23] Interestingly, COX-1 activity, manifested as PGE_2 synthesis, precedes the induced expression of COX-2 when Aβ is injected into rat brain.[24] In addition, the COX-1 selective inhibitor triflusal reduces neuroinflammation in a mouse model of AD.[25] Taken together, these results suggest that a COX-1/mPGES-1 pathway is important in initiating neuroinflammation triggered by Aβ early in the development of AD, with COX-2/mPGES-1 action being secondary.

Directions

It is important to keep in mind what Alois Alzheimer noted more than a century ago: changes in lipid metabolism are a distinguishing feature in the brains of patients with AD. Both AA and PGE_2 appear to play distinct and important roles in AD. Clearly, they represent only a portion of the dysregulation in lipid metabolism. However, each contributes, in its own way, to the early pathogenesis of AD, indicating that further studies on these and related lipids might reveal useful ways to prevent or minimize the ultimate impact of the disease.

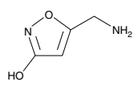
References

1. Moreira, P.I., Carvalho, C., Zhu, X., *et al. Biochim. Biophys. Acta* **1802**, 2-10 (2010).
2. Foley, P. Biochim. *Biophys. Acta* **1801**, 750-753 (2010).
3. Bazan, H.E.P., Bazan, N.G., Feeney-Burns, L., *et al. Invest. Ophthamol. Vis. Sci.* **31(8)**, 1433-1443 (1990).
4. Burke, J.E. and Dennis, E.A. *J. Lipid Res.* **50**, S237-S242 (2009).
5. Stephenson, D.T., Lemere, C.A., Selkoe, D.J., and Clemens, *J.A. Neurobiol. Dis.* **3**, 51-63 (1996).
6. Stephenson, D., Rash, K., Smalstig, B., *et al. Glia* **27**, 110-128 (1999).
7. Lukiw, W.J., Cui, J.-G., Marcheselli, V.L., *et al. J. Clin. Invest.* **115(10)**, 2774-2783 (2005).
8. Sanchez-Mejia, R.O., Newman, J.W., Toh, S., *et al. Nat. Neurosci.* **11(11)**, 1311-1318 (2008).
9. Hicks, J.B., Lai, Y., Sheng, W., *et al. Biochim. Biophys. Acta* **1778(11)**, 2512-2519 (2008).
10. Cordeiro, Q., Noguti, R., Bottino, C.M.C., *et al. Arq. Neuropsiquiatr.* **68(2)**, 189-193 (2010).
11. Esposito, G., Giovacchini, G., Liow, J.-S., *et al. J. Nucl. Med.* **49**, 1414-1421 (2008).
12. Baskin, D.S., Ngo, H., Didenko, V. *Toxicol. Sci.* **74**, 361-368 (2003).
13. Lipton, P. *Physiol. Rev.* **79**, 1431-1568 (1999).
14. Wilson, D.M., and Binder, L.I. *Am. J. Pathol.* **150**, 2181-2195 (1997).
15. King, M.E., Gamblin, T.C., Kuret, J., and Binder, L.I. *J. Neurochem.* **74**, 1749-1757 (2000).
16. Swain, S.D., Helgerson, S.L., Davis, A.R., *et al. J. Biol. Chem.* **272**, 29502-29510 (1997).
17. Brock, T.G. *Lipids* **43**, 161-169 (2008).
18. Hooff, G.P., Wood, W.G., Müller, W.E., *et al. Biochim. Biophys. Acta* **1801**, 896-905 (2010).
19. Combrinck, M., Williams, J., De Berardinis, M.A., *et al. J. Neurol. Neurosurg. Psychiatry* **77**, 85-88 (2006).
20. Imbimbo, B.P. *Expert Opin. Investig. Drugs* **18(8)**, 1147-1168 (2009).
21. Imbimbo, B.P., Solfrizzi, V., and Panza, F. *Front. Aging Neurosci.* **2**, (2010).
22. Hoozemans, J.J.M., Rozemuller, J.M., van Haastert, E.S., *et al. Curr. Pharm. Des.* **14**, 1419-1427 (2008).
23. Chaudhry, U.A., Zhuang, H., Crain, B.J., *et al. Alzheimers Dement.* **4(1)**, 6-13 (2008).
24. Dargahi, L., Nasiraei-Moghadam, S., Abdi, A., *et al. J. Mol. Neurosci.* (2010).
25. Coma, M., Serenó, L., Da Rocha-Souto, B., *et al. Neurobiol. Dis.* **38**, 482-491 (2010).

NEW Muscimol 13667

[2763-96-4] Agarin, Pantherine
MF: $C_4H_6N_2O_2$ **FW:** 114.1 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A full $GABA_A$ agonist and partial $GABA_C$ agonist; binds $GABA_A$ on both high- and low-affinity sites (K_d = 10 and 270 nM, respectively), stimulating chloride efflux with an EC_{50} vaule of 200 nM; activates $GABA_C$ receptors with an EC_{50} value of 1.3 µM; impairs memory formation and retrieval; attenuates airway constriction

1 mg
5 mg
10 mg
25 mg

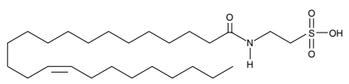


5-(aminomethyl)-3(2H)-isoxazolone

N-Nervonoyl Taurine 10007287

MF: $C_{26}H_{51}NO_4S$ **FW:** 473.8 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: One of several novel taurine-conjugated fatty acids that act as a FAAH substrate; activates TRPV1 and TRPV4

1 mg
5 mg
10 mg
50 mg

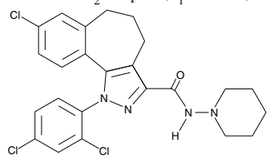


2-[(1-oxo-15Z-tetracosenyl)amino]-ethanesulfonic acid

NESS 0327 10004184

[494844-07-4]
MF: $C_{24}H_{23}Cl_3N_4O$ **FW:** 489.8 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: An extremely potent CB receptor antagonist with high selectivity for the CB_1 receptor (K_i = 0.35 pM) compared to the CB_2 receptor (K_i = 21 nM)

1 mg
5 mg
10 mg
25 mg

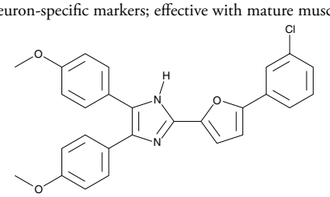


8-chloro-1-(2,4-dichlorophenyl)-1,4,5,6-tetrahydro-N-1-piperidinyl-benzo[6,7]cyclohepta[1,2-c]pyrazole-2-carboxamide

Neurodazine 13224

[937807-66-4]
MF: $C_{27}H_{21}ClN_2O_3$ **FW:** 456.9 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: Induces neuronal differentiation in skeletal muscle cells, as indicated by the upregulated expression of neuron-specific markers; effective with mature muscle fibers as well as myoblasts

5 mg
10 mg
25 mg
50 mg

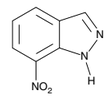


2-[5-(3-chlorophenyl)-2-furanyl]-4,5-bis(4-methoxyphenyl)-1H-imidazole

7-Nitroindazole 81340

[2942-42-9]
MF: $C_7H_5N_3O_2$ **FW:** 163.1 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at 4°C
Summary: A non-selective inhibitor of NOS isoforms *in vitro* (IC_{50}s = 0.71, 0.78, and 5.8 µM for rat nNOS, bovine eNOS, and rat iNOS, respectively); shows good anti-nociceptive effects without affecting blood pressure *via* inhibition of eNOS *in vivo*

50 mg
100 mg
250 mg
500 mg



7-nitro-1H-indazole

NMDA Receptor NR1 Subunit Monoclonal Antibody 10607

Supplied as: 15 µg antibody vial; lyophilized from 5 mM ammonium bicarbonate
Stability: ≥1 year at -20°C
Summary: Antigen: fusion protein containing amino acids 1-564 of the NR1 subunit of rat NMDA receptor • Host: mouse • Cross Reactivity: (+) rat and murine NMDA receptor • Application(s): IP and WB • Ion channels activated by glutamate that are sensitive to NMDA are designated NMDA receptors (NMDAR). The NMDAR plays an essential role in memory, neuronal development and has also been implicated in several disorders of the CNS including Alzheimer's, epilepsy and ischemic neuronal cell death.

1 ea

NMDA Receptor NR2A Subunit Polyclonal Antibody 10608

Supplied as: affinity-purified IgG **Stability:** ≥1 year at -20°C
Summary: Antigen: fusion protein from the C-terminus of the NR2A subunit of rat NMDA receptor • Host: rabbit • Cross Reactivity: (+) human, rat, and murine NMDA receptor • Application(s): IHC, IP, and WB • Ion channels activated by glutamate that are sensitive to NMDA are designated NMDA receptors (NMDAR). The NMDAR plays an essential role in memory, neuronal development and has also been implicated in several disorders of the CNS including Alzheimer's, epilepsy and ischemic neuronal cell death.

1 ea

NMDA Receptor NR2B Subunit Polyclonal Antibody 10609

Supplied as: affinity-purified IgG **Stability:** ≥1 year at -20°C
Summary: Antigen: fusion protein from the C-terminus of the NR2B subunit of rat NMDA receptor • Host: rabbit • Cross Reactivity: (+) human, rat, and murine NMDA receptor • Application(s): IHC, IP, and WB • Ion channels activated by glutamate that are sensitive to NMDA are designated NMDA receptors (NMDAR). The NMDAR plays an essential role in memory, neuronal development and has also been implicated in several disorders of the CNS including Alzheimer's, epilepsy and ischemic neuronal cell death.

1 ea

NMDA Receptor NR2B Subunit (Phospho-Tyr[1252]) Polyclonal Antibody 10009759

Supplied as: peptide affinity-purified antibody **Stability:** ≥1 year at -20°C
Summary: Antigen: phosphopeptide corresponding to amino acid residues surrounding phospho-Tyr[1252] of the human NMDAR NR2B Subunit • Host: rabbit • Cross Reactivity: (+) human and rat NMDA receptor • Application(s): WB • The NMDAR plays an essential role in memory and neuronal development, and has also been implicated in several disorders of the CNS including Alzheimer's disease, epilepsy, and ischemic neuronal death. Phosphorylation of Tyr[1252] in the NR2B subunit is thought to potentiate NMDAR-dependent influx of calcium.

1 ea

NMDA Receptor NR2B Subunit (Phospho-Tyr[1336]) Polyclonal Antibody 10009760

Supplied as: peptide affinity-purified antibody **Stability:** ≥1 year at -20°C
Summary: Antigen: phosphopeptide corresponding to amino acid residues surrounding phospho-Tyr[1336] of the human NMDAR NR2B Subunit • Host: rabbit • Cross Reactivity: (+) human and rat NMDA receptor • Application(s): WB • The NMDAR plays an essential role in memory and neuronal development, and has also been implicated in several disorders of the CNS including Alzheimer's disease, epilepsy, and ischemic neuronal death. Phosphorylation of Tyr[1336] in the NR2B subunit is thought to potentiate NMDAR-dependent influx of calcium. Ischemia may also increase the phosphorylation of this site.

1 ea

NMDA Receptor NR2B Subunit (Phospho-Tyr[1472]) Polyclonal Antibody 10009761

Supplied as: peptide affinity-purified antibody **Stability:** ≥1 year at -20°C
Summary: Antigen: phosphopeptide corresponding to amino acid residues surrounding phospho-Tyr[1472] the of NMDAR NR2B Subunit • Host: rabbit • Cross Reactivity: (+) human and rat NMDA receptor • Application(s): WB • The NMDAR plays an essential role in memory and neuronal development, and has also been implicated in several disorders of the CNS including Alzheimer's disease, epilepsy, and ischemic neuronal death. Phosphorylation of Tyr[1472] on the NR2B subunit may regulate the functional expression of the receptor in LTP and other forms of plasticity.

1 ea

nNOS Electrophoresis Standard 360870

Neuronal NO Synthase, ncNOS, NOS I
MF: Homodimer **FW:** 160 kDa/subunit **Purity:** ≥95%
Stability: ≥1 year at -80°C
Summary: Each vial contains nNOS (rat) to be used as a standard for WB and electrophoresis. The enzyme has been carefully purified to exclude all unrelated proteins and may not be catalytically active.

1 ea

nNOS Polyclonal Antibody 160870

Neuronal NO Synthase, ncNOS, NOS I
Supplied as: peptide affinity-purified antibody **Stability:** ≥1 year at -20°C
Summary: Antigen: human nNOS amino acids 1422-1433 • Host: rabbit • Cross Reactivity: (+) human and rat nNOS; (-) eNOS and iNOS • Application(s): ICC, IHC, IP, and WB • NOS catalyzes the oxidation of arginine to NO and citrulline. nNOS is a soluble enzyme found in brain, the peripheral nervous system and skeletal muscle.

1 ea

nNOS (rat recombinant) 60870

Neuronal NO Synthase, ncNOS, NOS I
M_r: 150 kDa **Purity:** cell lysate 100,000 x g supernatant **Stability:** ≥1 year at -80°C
Supplied in: 50 mM HEPES, pH 7.4, containing 100 mM sodium chloride, 5 µM tetrahydrobiopterin and 25% glycerol
Source: Recombinant enzyme isolated from a Baculovirus overexpression system in *Sf*9 cells

50 units
100 units
250 units
500 units

nNOS (rat recombinant) - Purified 60875

Neuronal NO Synthase, ncNOS, NOS I
M_r: 160 kDa **Purity:** ≥95% **Stability:** ≥9 months at -80°C
Supplied in: 50 mM HEPES, pH 7.4, containing 20% glycerol, 100 mM sodium chloride, and 10 µM tetrahydrobiopterin
Source: Recombinant enzyme isolated from a Baculovirus overexpression system in *Sf*9 cells

10 units
50 units

nNOS Western Ready Control 10009632

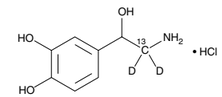
Neuronal NO Synthase, ncNOS, NOS I
Purity: Whole cell lysate **Stability:** ≥2 years at -20°C
Summary: Source: human recombinant C-terminal His-tagged nNOS expressed in Sf21 cells • Application(s): Positive control for WB

1 ea

DL-Noradrenaline-d_2 ^{13}C (hydrochloride)* 10010680

MF: $C_7{}^{13}CH_7D_2NO_3$ • HCl **FW:** 208.6 **Chemical Purity:** ≥95%
Deuterium Incorporation: ≤1% d_0
A crystalline solid **Stability:** ≥1 year at 4°C
Summary: An internal standard for the quantification of DL-noradrenaline by GC- or LC-MS

5 mg
10 mg
50 mg

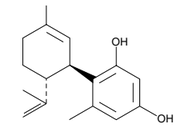


4-(2-amino-1-hydroxyethyl)-1,2-benzenediol-d_2, monohydrochloride

O-1602 10006803

[317321-41-8]
MF: $C_{17}H_{22}O_2$ **FW:** 258.4 **Purity:** ≥98%
A solution in methyl acetate **Stability:** ≥1 year at -20°C
Summary: A cannabidiol analog with close structural similarity to O-1918, a selective antagonist of abnormal cannabidiol (Abn-CBD) at the non-CB_1/CB_2 endothelial receptor; O-1918 does not bind to CB_1 or CB_2 receptors at concentrations up to 30 µM and inhibits the vasorelaxant effects of Abn-CBD *in vitro* and in whole animals

1 mg
5 mg
10 mg
25 mg

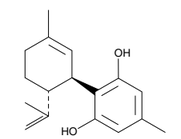


5-methyl-4-[(1R,6R)-3-methyl-6-(1-methylethenyl)-2-cyclohexen-1-yl]-1,3-benzenediol

O-1821 10006804

[35482-50-9]
MF: $C_{17}H_{22}O_2$ **FW:** 258.4 **Purity:** ≥97%
A solution in methyl acetate **Stability:** ≥1 year at -20°C
Summary: A cannabidiol analog with close structural similarity to O-1918, a selective antagonist of Abn-CBD at the non-CB_1/CB_2 endothelial receptor; O-1918 does not bind to CB_1 or CB_2 receptors at concentrations up to 30 µM and inhibits the vasorelaxant effects of Abn-CBD *in vitro* and in whole animals

1 mg
5 mg
10 mg
50 mg



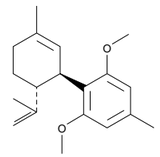
5-methyl-2-[(1R,6R)-3-methyl-6-(1-methylethenyl)-2-cyclohexen-1-yl]-1,3-benzenediol

**SPI-BIO Antibodies are available through Cayman Chemical only within North & South America and Asia; elsewhere contact SPI-BIO.*

O-1918 10004914

[536697-79-7]
MF: $C_{19}H_{26}O_2$ **FW:** 286.4 **Purity:** ≥98%
A solution in methyl acetate **Stability:** ≥1 year at -20°C
Summary: A cannabidiol analog that acts as a selective antagonist of Abn-CBD at the non-CB_1/CB_2 endothelial receptor; does not bind to CB_1 or CB_2 receptors at concentrations up to 30 µM and inhibits the vasorelaxant effects of Abn-CBD *in vitro* and in whole animals; blocks the Abn-CBD-induced activation of the PtdIns 3-kinase/Akt pathway in human umbilical vein endothelial cells

1 mg
5 mg
10 mg
25 mg

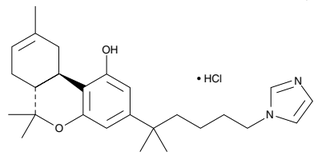


1,3-dimethoxy-5-methyl-2-[(1R,6R)-3-methyl-6-(1-methylethenyl)-2-cyclohexen-1-yl]-benzene

O-2545 (hydrochloride) 10009195

MF: $C_{26}H_{36}N_2O_2$ • HCl **FW:** 445 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A potent water-soluble agonist of CB_1 and CB_2 receptors with K_i values of 1.5 and 0.32 nM, respectively; when dissolved in saline, is highly efficacious in murine behavioral models when administered either intravenously or intracerebroventricularly

500 µg
1 mg
5 mg
10 mg

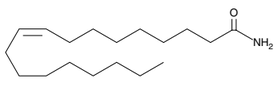


6a,7,10,10a-tetrahydro-3-[5-(1H-imidazol-1-yl)-1,1-dimethylpentyl]-6,6,9-trimethyl-6H-dibenzo[b,d]pyran-1-ol, monohydrochloride

9-Octadecenamide 90375

[301-02-0] Oleamide
MF: $C_{18}H_{35}NO$ **FW:** 281.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
Summary: The amide of oleic acid first identified in the CSF of sleep-deprived cats; induces physiological sleep when injected into rats intraperitoneally at 5 to 50 mg doses

50 mg
100 mg
500 mg
1 g

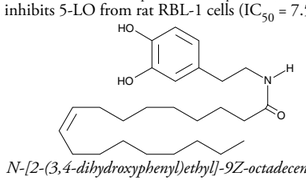


9Z-octadecenamide

N-Oleoyl Dopamine 10115

[105955-11-1] ODA
MF: $C_{26}H_{43}NO_3$ **FW:** 417.6 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: A selective, endogenous TRPV1 agonist that is a 'hybrid' analog, which incorporates components of both the AEA-like and dopamine neurotransmitter pathways; binds to the human recombinant TRPV1 (K_i = 36 nM) with equipotency to that of capsaicin and slightly more potency than that of N-arachidonoyl dopamine; causes hyperalgesia and nocifensive behavior that is blocked by the TRPV1 antagonist iodo-resiniferatoxin; has weak affinity for the rat CB_1 receptor (K_i = 1.6 µM) and is a very weak inhibitor of FAAH; inhibits 5-LO from rat RBL-1 cells (IC_{50} = 7.5 nM)

5 mg
10 mg
50 mg
100 mg

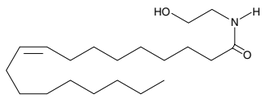


N-[2-(3,4-dihydroxyphenyl)ethyl]-9Z-octadecenamide

Oleoyl Ethanolamide 90265

[111-58-0] Oleic Acid Ethanolamide
MF: $C_{20}H_{39}NO_2$ **FW:** 325.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
Summary: An analog of the endoCB AEA found in brain tissue and in chocolate whose biosynthesis is reduced in the intestine of rats following food deprivation; an endogenous, potent agonist for PPARα (EC_{50} = 120 nM in a transactivation assay); systemic administration suppresses food intake and reduces weight gain in rats (10 mg/kg intraperitoneally) and PPARα wild type mice, but not in PPARα knockout mice

5 mg
10 mg
50 mg
100 mg



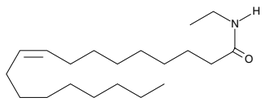
N-(2-hydroxyethyl)-9Z-octadecenamide

• Also Available: **Oleoyl Ethanolamide-d_4** (9000552)

Oleoyl Ethyl Amide 10005459

[85075-82-7] OEtA, N-Ethyloleamide
MF: $C_{20}H_{39}NO$ **FW:** 309.5 **Purity:** ≥98%
A solution in methyl acetate **Stability:** ≥1 year at -20°C
Summary: A selective FAAH inhibitor (IC_{50} = 5.25 nM in rat brain homogenates) with potential analgesic and anxiolytic activity; does not inhibit acidic PEA or bind to CB_1 or CB_2 receptors

1 mg
5 mg
10 mg
50 mg

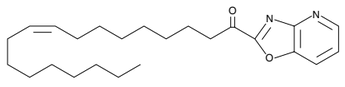


N-ethyl-9Z-octadecenamide

Oleoyl Oxazolopyridine 71650

[288862-58-8] CAY10400
MF: $C_{24}H_{36}N_2O_2$ **FW:** 384.6 **Purity:** ≥98%
A solution in methyl acetate **Stability:** ≥1 year at -20°C
Summary: A potent FAAH inhibitor exhibiting K_i values of 1.3 and 2.3 nM for the human and rat enzymes, respectively

100 µg
500 µg
1 mg
5 mg

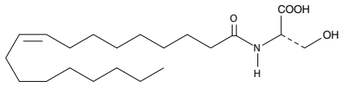


1-oxazolo[4,5-b]pyridin-2-yl-octadec-9Z-en-1-one

N-Oleoyl-L-Serine 13058

MF: $C_{21}H_{39}NO_4$ **FW:** 369.5 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: An endogenous lipid that has been reported to stimulate bone formation and to inhibit bone resorption

1 mg
5 mg
10 mg
50 mg

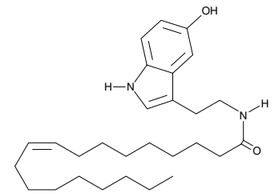


(S)-3-hydroxy-2-oleamidopropanoic acid

NEW Oleoyl Serotonin 9000629

[1002100-44-8]
MF: $C_{28}H_{44}N_2O_2$ **FW:** 440.1 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: A hybrid molecule patterned after N-arachidonoyl serotonin; inhibits capsaicin-induced TRPV1 channel activation (IC_{50} = 2.57 µM) without blocking FAAH-mediated hydrolysis of arachidonoyl ethanolamine (IC_{50} > 50 µM)

5 mg
10 mg
50 mg
100 mg

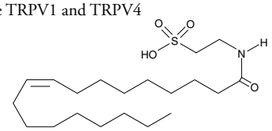


N-[2-(5-hydroxy-1H-indol-3-yl)ethyl]-9Z-octadecenamide

N-Oleoyl Taurine 10005609

[52514-04-2]
MF: $C_{20}H_{39}NO_4S$ **FW:** 389.6 **Purity:** ≥98%
A solution in DMSO **Stability:** ≥1 year at -20°C
Summary: A prominent amino-acyl endoCB isolated from rat brain during lipidomics profiling that may activate TRPV1 and TRPV4

500 µg
1 mg
5 mg
10 mg

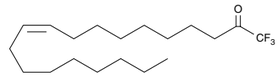


2-[(1-oxo-9Z-octadecenyl)amino]-ethanesulfonic acid

Oleyl Trifluoromethyl Ketone 62640

[177987-23-4] OTK
MF: $C_{19}H_{33}F_3O$ **FW:** 334.5 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: An analog of oleic acid in which the COOH group is replaced by trifluoromethyl ketone; it's a potent inhibitor of FAAH, in both human and rat; in transfected Cos-7 cells, 10 µM OTK inhibits 95.7% of human FAAH activity and 94.8% of rat FAAH activity

1 mg
5 mg
10 mg
50 mg

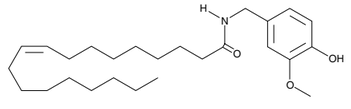


1,1,1-trifluoro-10Z-nonadecen-2-one

Olvanil 90262

[58493-49-5] NE 19550, N-Vanillyloleamide
MF: $C_{26}H_{43}NO_3$ **FW:** 417.6 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: A structural analog of capsaicin, which is the noxious active component of hot peppers of the *Capsicum* genus, and the amide of vanillylamine and oleic acid; acts as an agonist at TRPV1, inducing desensitization analgesia in rat and murine models of pain; potentiates the agonist activity of endogenous CBs by inhibiting the reuptake of AEA; a more potent reuptake inhibitor than AM404, which is commonly used for this purpose (50% inhibition of reuptake at 10 µM *versus* 12% for AM404 at the same dose); a CB_1 agonist, but does not bind to CB_2 receptors or inhibit FAAH

5 mg
10 mg
50 mg
100 mg

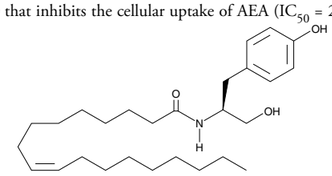


N-[(4-hydroxy-3-methoxyphenyl)methyl]-9Z-octadecenamide

OMDM-1 10171

(S)-N-Oleoyl Tyrosinol
MF: $C_{27}H_{45}NO_3$ **FW:** 431.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: An endoCB analog that inhibits the cellular uptake of AEA (IC_{50} = 2.4 µM)

1 mg
5 mg
10 mg
50 mg

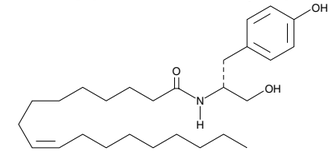


(S)-N-(1-(4-hydroxyphenyl)-2-hydroxyethyl)oleamide

OMDM-2 10179

(R)-N-Oleoyl Tyrosinol
MF: $C_{27}H_{45}NO_3$ **FW:** 431.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: An endoCB analog specifically designed to be a potent and selective inhibitor of the cellular uptake of AEA; inhibits the cellular uptake of tritiated AEA (IC_{50} = 3 µM) in RBL-2H3 cells, with negligible effects on the CB_1 receptor and TRPV1

1 mg
5 mg
10 mg
50 mg



(R)-N-(1-(4-hydroxyphenyl)-2-hydroxyethyl)oleamide

Orexin Receptor 1 STEP Reporter Assay Kit (Luminescence) 600240

OX1R
Stability: ≥1 year at -80°C
Summary: The OX1R may be an important therapeutic target for treatment of sleep disorders, obesity, emotional stress, and addiction. Cayman's Orexin 1 Receptor STEPReporter Assay (Luminescence) consists of a 96-well plate coated with both OX1R and SEAP reporter constructs (OX1R STEP Plate). Cells grown on the STEP complex will express OX1R at the cell surface. Binding of agonists to OX1R initiates a signal transduction cascade resulting in expression of SEAP which is secreted into the cell culture medium. SEAP activity is measured following addition of a luminescence-based alkaline phosphatase substrate provided in the kit.

100 tests

Orexin Receptor 2 STEP Reporter Assay Kit (Luminescence) 600250

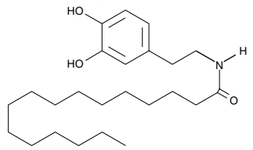
OX2R
Stability: ≥1 year at -80°C
Summary: The OX2R may be an important therapeutic target for treatment of sleep disorders, obesity, emotional stress, and addiction. Cayman's Orexin 2 Receptor STEP Reporter Assay (Luminescence) consists of a 96-well plate coated with both OX2R and SEAP reporter constructs (OX2R STEP Plate). Cells grown on the STEP complex will express OX2R at the cell surface. Binding of agonists to OX2R initiates a signal transduction cascade resulting in expression of SEAP which is secreted into the cell culture medium. SEAP activity is measured following addition of a luminescence-based alkaline phosphatases substrate provided in the kit.

100 tests

N-Palmitoyl Dopamine 10007697

[136181-87-8] PALDA
MF: $C_{24}H_{41}NO_3$ **FW:** 391.6 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: A 'hybrid' analog which incorporates components of both the AEA-like and dopaminergic neurotransmitter pathways; is nearly inactive as a TRPV1 ligand and fails to elicit hyperalgesic or nocifensive responses *in vivo*; exhibits an 'entourage' effect at concentrations of 0.1-10 µM by potentiating the TRPV1-mediated effects of NADA and AEA

5 mg
10 mg
50 mg
100 mg

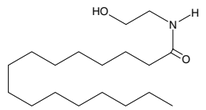


N-[2-(3,4-dihydroxyphenyl)ethyl]-hexadecanamide

Palmitoyl Ethanolamide 90350

[544-31-0]
MF: $C_{18}H_{37}NO_2$ **FW:** 299.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: An endogenous CB found in brain, liver, and other mammalian tissues found to have anti-anaphylactic and anti-inflammatory activity *in vitro*; an endoCB that significantly elevates cAMP in cells expressing CB_2 receptors; demonstrates low affinity for the CB_2 receptor, at about 10 µM, and no appreciable affinity for the CB_1 receptor

5 mg
10 mg
50 mg
100 mg

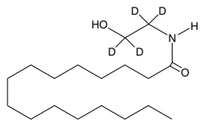


N-(2-hydroxyethyl)-hexadecanamide

Palmitoyl Ethanolamide-d_4 9000551

Palmidrol-d_4, PEA-hydroxyethyl-1,1,2,2-d_4
MF: $C_{18}H_{33}D_4NO_2$ **FW:** 303.5 **Chemical Purity:** ≥98%
Deuterium Incorporation: ≤1% d_0
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: An internal standard for the quantification of PEA by GC- or LC-MS

100 µg
500 µg
1 mg
5 mg

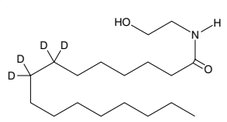


N-(2-hydroxyethyl-1,1,2,2-d_4)-hexadecanamide

Palmitoyl Ethanolamide-d_4 10007824

Palmidrol-d_4, PEA-7,7,8,8-d_4
MF: $C_{18}H_{33}D_4NO_2$ **FW:** 303.5 **Chemical Purity:** ≥98%
Deuterium Incoporation: ≤1% d_0
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: An internal standard for the quantification of PEA by GC- or LC-MS

100 µg
500 µg
1 mg
5 mg

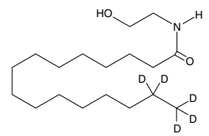


N-(2-hydroxyethyl)-hexadecanamide-7,7,8,8-d_4

Palmitoyl Ethanolamide-d_5 9000573

Palmidrol-d_5, PEA-15,15,16,16,16-d_5
MF: $C_{18}H_{32}D_5NO_2$ **FW:** 304.5 **Chemical Purity:** ≥98%
Deuterium Incorporation: ≤1% d_0
A solution in methyl acetate **Stability:** ≥2 years at -20°C
Summary: An internal standard for the quantification of PEA by GC- or LC-MS

500 µg
1 mg
5 mg
10 mg

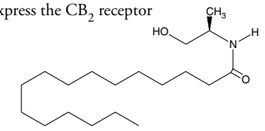


N-(2-hydroxyethyl)-hexadecanamide-15,15,16,16,16-d_5

R-Palmitoyl-(1-methyl) Ethanolamide 90353

[142128-47-0] R-1 PMA
MF: $C_{19}H_{39}NO_2$ **FW:** 313.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A synthetic analog of PEA which incorporates an (R)-methyl group vicinal to the alcohol on the ethanolamine moiety, which may protect the molecule from enzymatic hydrolysis, leading to prolonged duration of action and enhanced potency *in vivo*; expected to show enhancement of the inhibitory activity of PEA on mast cells and other cells known to express the CB_2 receptor

5 mg
10 mg
50 mg
500 mg

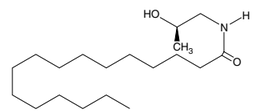


N-(2-hydroxy-1R-methylethyl)-hexadecanamide

R-Palmitoyl-(2-methyl) Ethanolamide 90357

[179951-56-5] RP-2ME
MF: $C_{19}H_{39}NO_2$ **FW:** 313.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at 4°C
Summary: A metabolically stable analog of the anti-inflammatory endogenous CB, PEA; inhibits FAAH-mediated hydrolysis of AEA by 54% at a concentration of 100 µM; has weak CB receptor affinity, in that 100 µM inhibits agonist binding (1 nM CP 55,940 or WIN 55212-2) only 26% and 15.5% at the human CB_1 and CB_2 receptors, respectively

5 mg
10 mg
50 mg
100 mg

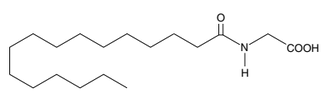


N-(2R-hydroxypropyl)-hexadecanamide

N-Palmitoyl Glycine 10009020

[2441-41-0] N-Hexadecanoyl-Glycine, PalGly
MF: $C_{18}H_{35}NO_3$ **FW:** 313.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: An 18-carbon saturated fatty acid that is structurally similar to the phospholipid-derived N-acyl ethanolamines; inhibits heat-induced firing of nociceptive neurons in rat dorsal horn; induces transient calcium influx in native dorsal root ganglion (DRG) cells and in the PTX-sensitive, DRG-like cell line F-11 (EC_{50} = 5.5 µM)

1 mg
5 mg
10 mg
50 mg

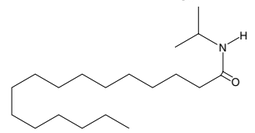


N-(1-oxohexadecyl)-glycine

Palmitoyl N-Isopropylamide 91354

[189939-61-5] PIA
MF: $C_{19}H_{39}NO$ **FW:** 297.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: Analog of PEA which incorporates isopropyl amide in place of the native ethanolamide; inhibits the re-uptake of AEA, as well as FAAH (IC_{50} = 10 µM)

5 mg
10 mg
50 mg
100 mg

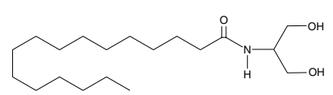


N-isopropyl-hexadecanamide

Palmitoyl Serinol 62175

[126127-31-9]
MF: $C_{19}H_{39}NO_3$ **FW:** 329.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
Summary: A stable analog of 2-palmitoyl glycerol bearing an amide linkage in place of the labile glyceryl ester which endows it with a prolonged *in vivo* half-life; also an analog of C-16 ceramide; causes apoptosis (IC_{50} = 80 µM) when incubated with neuroblastoma cells

5 mg
10 mg
50 mg
100 mg

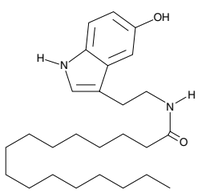


N-[2-hydroxy-1-(hydroxymethyl)ethyl]-hexadecanamide

NEW Palmitoyl Serotonin 9000630

[212707-51-2]
MF: $C_{26}H_{42}N_2O_2$ **FW:** 414.6 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: A hybrid molecule patterned after arachidonoyl serotonin; while saturated 11- or 12-carbon fatty acids linked to serotonin potently inhibit capsaicin-induced TRPV1 channel activation (IC_{50} = 0.76 µM) without blocking FAAH-mediated hydrolysis of arachidonoyl ethanolamine (IC_{50} > 50 µM), the effects of palmitoyl serotonin are unknown

1 mg
5 mg
10 mg
25 mg

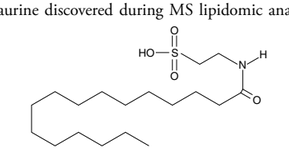


N-[2-(5-hydroxy-1H-indol-3-yl)ethyl]-hexadecanamide

N-Palmitoyl Taurine 10005611

[83982-06-3]
MF: $C_{18}H_{37}NO_4S$ **FW:** 363.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
Summary: A fatty acyl amide of taurine discovered during MS lipidomic analysis of rat brain

1 mg
5 mg
10 mg
50 mg

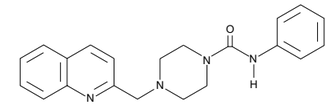


2-[(1-oxohexadecyl)amino]-ethanesulfonic acid

PF-622 10010907

[898235-65-9]
MF: $C_{21}H_{22}N_4O$ **FW:** 346.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A potent, time-dependent, irreversible FAAH inhibitor with IC_{50} values 0.99 and 0.333 µM when preincubated with human recombinant FAAH for 5 and 60 minutes, respectively

500 µg
1 mg
5 mg
10 mg

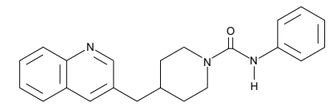


N-phenyl-4-(2-quinolinylmethyl)-1-piperazinecarboxamide

PF-750 10010908

MF: $C_{22}H_{23}N_3O$ **FW:** 345.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A potent, time-dependent, irreversible FAAH inhibitor with IC_{50} values 0.6 and 0.016 µM when preincubated with recombinant human FAAH for 5 and 60 minutes, respectively

1 mg
5 mg
10 mg
50 mg

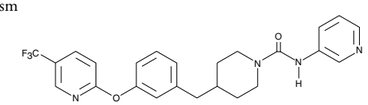


N-phenyl-4-(quinolin-2-ylmethyl)piperidine-1-carboxamide

PF-3845 13279

MF: $C_{24}H_{23}F_3N_4O_2$ **FW:** 456.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A potent, selective, and irreversible inhibitor of FAAH (K_i = 0.23 µM); produces prolonged elevation of AEA in the brain and plasma in rats after treatment; significantly and persistently reduces inflammatory pain in rats through a CB receptor-dependent mechanism

500 µg
1 mg
5 mg
10 mg

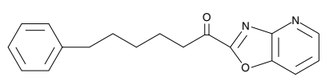


N-(pyridin-3-yl)-4-(3-(5-(trifluoromethyl)pyridin-2-yloxy)benzyl)piperdine-1-carboxamide

PHOP 71655

[288862-83-9] CAY10402, Phenyl hexanoyl oxazolopyridine
MF: $C_{18}H_{18}N_2O_2$ **FW:** 294.4 **Purity:** ≥98%
A solution in methyl acetate **Stability:** ≥1 year at -20°C
Summary: A potent FAAH inhibitor, exhibiting K_i values of 0.094 and 0.2 nM for the human and rat enzymes, respectively

100 µg
500 µg
1 mg
5 mg



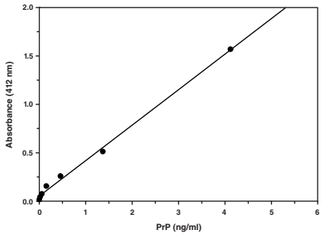
1-oxazolo[4,5-b]pyridin-2-yl-6-phenyl-1-hexanone

Prion Protein Antibodies					
Item No.	**Item Name**	**Formulation**	**Host**	**Cross Reactivity**	**Application**
189750	PrP Monoclonal Antibody (308)	200 µg lyophilized IgG containing 200 µg BSA	Mouse	(+) Hamster, murine, ovine, and human PrP (-) Bovine PrP	IHC and WB
10009030	PrP Monoclonal Antibody (11C6)	Lyophilized IgG	Mouse	(+) Human and murine PrP	EIA, FC, and WB
189710	PrP Monoclonal Antibody (12F10)	Lyophilized IgG	Mouse	(+) Human, bovine, and ovine PrP (-) Hamster and murine PrP	IHC and WB
10009025	PrP Monoclonal Antibody (2G11)	200 µg lyophilized IgG containing 200 µg BSA	Mouse	(+) Human and hamster PrP	IHC
189760	PrP Monoclonal Antibody (8G8)	Lyophilized IgG	Mouse	(+) Hamster, murine, ovine, and human PrP (-) Bovine PrP	IHC and WB
10009034	PrP Monoclonal Antibody (BAR221)	Lyophilized IgG	Sheep	(+) Murine, bovine, ovine, and human PrP	EIA, FC, IHC, and WB
10009035	PrP Monoclonal Antibody (BAR224)	Lyophilized IgG	Sheep	(+) Murine, bovine, and ovine PrP (-) Human PrP	EIA, FC, IHC, and WB
10009036	PrP Monoclonal Antibody (BAR233)	Lyophilized IgG	Sheep	(+) Murine, ovine, and human PrP	EIA, FC, and WB
10009037	PrP Monoclonal Antibody (BAR236)	Lyophilized IgG	Sheep	(+) Murine, ovine, and human PrP	EIA, FC, and WB
189720	PrP Monoclonal Antibody (SAF-32)	Lyophilized IgG	Mouse	(+) Human, hamster, bovine, ovine, and murine PrP	ELISA, FC, IHC, and WB
189730	PrP Monoclonal Antibody (SAF-53)	200 µg lyophilized IgG containing 200 µg BSA	Mouse	(+) Human, hamster, and murine PrP (-) Bovine and ovine PrP	ELISA and FC
189740	PrP Monoclonal Antibody (SAF-54)	200 µg lyophilized IgG containing 200 µg BSA	Mouse	(+) Human, hamster, bovine, ovine, and murine PrP	IHC
189755	PrP Monoclonal Antibody (SAF-61)	200 µg lyophilized IgG containing 200 µg BSA	Mouse	(+) Hamster, murine, bovine, ovine, and human PrP	ELISA and FC
189770	PrP Monoclonal Antibody (SAF-70)	Lyophilized IgG	Mouse	(+) Hamster, murine, bovine, ovine, and human PrP	WB
189765	PrP Monoclonal Antibody (SAF-83)	200 µg lyophilized IgG containing 200 µg BSA	Mouse	(+) Hamster and murine PrP (-) Human, bovine, and ovine PrP	ELISA, FC, and WB
189775	PrP Monoclonal Antibody (SAF-84)	200 µg lyophilized IgG containing 200 µg BSA	Mouse	(+) Hamster, bovine, ovine, and murine PrP (-) Human PrP	IHC and WB

Prion Protein EIA Kit* 589751

Stability: ≥6 months at -20°C
Summary: This EIA is based on a double-antibody sandwich technique and has been validated for the detection of native cellular prion protein (PrP^c) in brain extracts. It can also be used to detect PrP^c extracted from other tissues, as well as denaturated PrP and recombinant PrP. The antibodies used in this kit were raised against SAF from hamster brain and crossreact with PrP from most mammalian species including murine, human, ovine, and cattle.

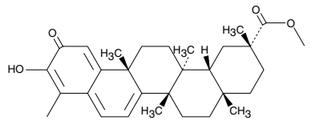
96 wells



Pristimerin 13621

[1258-84-0] Celastrol methyl ester, NSC 99281
MF: $C_{30}H_{40}O_4$ **FW:** 464.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A naturally occuring terpenoid that potently inhibits MAGL (IC_{50} = 93 nM); at 1 µM, significantly inhibits endogenous MAGL in isolated rat neurons

5 mg
10 mg
25 mg
50 mg



3-hydroxy-9β,13α-dimethyl-2-oxo-24,25,26-trinoroleana-1(10),3,5,7-tetraen-29-oic acid, methyl ester

**SPI-BIO Assays are available through Cayman Chemical only within North & South America and Asia; elsewhere contact SPI-BIO.*

Prostaglandin D Synthase (lipocalin-type) Polyclonal Antibody 160003

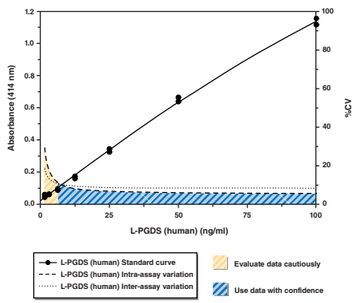
Lipocalin-PGDS, L-PGDS
Supplied as: peptide affinity-purified IgG **Stability:** ≥1 year at -20°C
Summary: Antigen: human L-PGDS amino acids 30-41 • Host: rabbit • Cross Reactivity: (+) human and murine L-PGDS; (-) H-PGDS • Application(s): WB • L-PGDS catalyzes the isomerization of PGH_2 to produce PGD_2. The enzyme is localized in the CNS and male genital organs of various mammals and the human heart.

1 ea

Prostaglandin D Synthase (lipocalin-type; human) EIA Kit 10007684

Lipocalin-PGDS, L-PGDS
Stability: ≥6 months at -20°C
Limit of Detection: 6 ng/ml
Summary: Lipocalin-type PGDS (β-trace) has two functions: it catalyzes the conversion of PGH_2 to PGD_2 and acts as a carrier protein for lipid-like molecules (*i.e.*, retinoids and thyroid hormones). L-PGDS is present in a variety of body fluids including CSF, seminal fluid, and plasma. This assay has been validated using CSF which contains approximately 12-30 µg/ml of L-PGDS.

96 strip/solid wells
480 strip/solid wells



Prostaglandin D Synthase (lipocalin-type; human) Monoclonal Antibody (clone 10A5) 10004342

Lipocalin-PGDS, L-PGDS
Supplied as: purified IgG **Stability:** ≥6 months at -20°C
Summary: Antigen: recombinant human L-PGDS • Host: rat, clone 10A5 • Isotype: $IgG_{1κ}$ • Cross Reactivity: (+) human and murine L-PGDS • Application(s): IHC and WB • L-PGDS catalyzes the isomerization of PGH_2 to produce PGD_2. The enzyme is localized in the CNS and male genital organs of various mammals and the human heart.

1 ea

Prostaglandin D Synthase (lipocalin-type; human) Western Ready Control 10009741

Lipocalin-PGDS, L-PGDS
Purity: Whole cell lysate **Stability:** ≥2 years at -20°C
Source: human recombinant N-terminal GST-tagged L-PGDS expressed in *E. coli* • Application(s): Positive control for WB

1 ea

Prostaglandin D Synthase (lipocalin-type; human recombinant) 10006788

Lipocalin-PGDS, L-PGDS
M_r: 46 kDa **Purity:** ≥95% **Stability:** ≥6 months at -80°C
Supplied in: 50 mM sodium phosphate, pH 7.2, containing 20% glycerol, 150 mM sodium chloride, 1 mM DTT, and 0.5 mM EDTA
Source: recombinant enzyme expressed in *E. coli*

100 µg
250 µg
500 µg

Prostaglandin D Synthase (lipocalin-type; murine) Polyclonal Antibody 10004344

Lipocalin-PGDS, L-PGDS
Supplied as: peptide affinity-purified IgG **Stability:** ≥6 months at -20°C
Summary: Antigen: recombinant murine L-PGDS • Host: rabbit • Cross Reactivity: (+) human and murine L-PGDS • Application(s): IHC and WB • L-PGDS catalyzes the isomerization of PGH_2 to produce PGD_2. The enzyme is localized in the CNS and male genital organs of various mammals and the human heart.

1 ea

Prostaglandin D Synthase (lipocalin-type; murine recombinant) 10006787

Lipocalin-PGDS, L-PGDS
M_r: 46 kDa **Purity:** ≥95% **Stability:** ≥6 months at -80°C
Supplied in: 50 mM sodium phosphate, pH 7.2, containing 20% glycerol, 150 mM sodium chloride, 1 mM DTT, and 0.5 mM EDTA
Source: recombinant GST-tagged L-PGDS expressed in *E. coli*

100 µg
250 µg
500 µg

Prostaglandin D Synthase (lipocalin-type; rat recombinant) 10010548

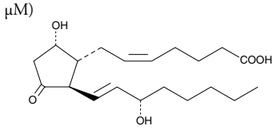
Lipocalin-PGDS, L-PGDS
M_r: 47.5 kDa **Purity:** ≥95% **Stability:** ≥6 months at -80°C
Supplied in: 50 mM sodium phosphate, pH 7.2, containing 100 mM sodium chloride, 1 mM DTT, 0.5 mM EDTA, and 20% glycerol
Source: recombinant N-terminal GST-tagged L-PGDS expressed in *E. coli*

100 µg
250 µg
500 µg

Prostaglandin D_2 12010

[41598-07-6]
MF: $C_{20}H_{32}O_5$ **FW:** 352.5 **Purity:** ≥99%*
A crystalline solid **Stability:** ≥1 year at -20°C
Summary: The major eicosanoid product of mast cells released in large quantities during allergic and asthmatic anaphylaxis; also produced in the brain *via* an alternative pathway involving a soluble, secreted PGD-synthase also known as β-trace where it induces normal physiological sleep and lowering of body temperature; inhibits platelet aggregation, relaxes vascular smooth muscle, and inhibits human ovarian tumor cell proliferation (IC_{50} = 6.8 µM)

1 mg
5 mg
10 mg
50 mg



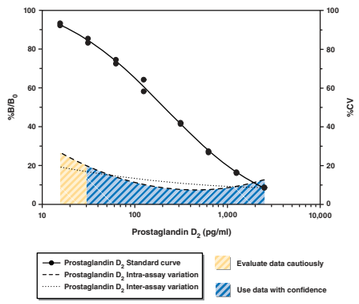
9α,15S-dihydroxy-11-oxo-prosta-5Z,13E-dien-1-oic acid

• Also Available: **Prostaglandin D_2-d_4** (312010)

Prostaglandin D_2 EIA Kit 512031

Stability: ≥1 year at -80°C
Sensitivity: 50% B/B_0: 240 pg/ml • 80% B/B_0: 55 pg/ml
Summary: The direct measurement of PGD_2 in an EIA format is made possible with Cayman's PGD_2 EIA Kit. The antibody utilized in this assay was generated in a unique way allowing the direct measurement of PGD_2 without prior conversion to the methoximine compound, as required in our PGD_2-MOX and PGD_2-MOX Express EIA Kits (Item Nos. 512011 and 500151). The assay has been validated specifically for PGD_2 measurements from tissue culture supernatants or purified enzyme preparations.

96 strip/solid wells
480 strip/solid wells



• Also Available: **Prostaglandin D_2 FPIA Kit - Red** (10007835)
• Also Available: **Prostaglandin D_2 FPIA Kit - Green** (500581)

**All 5-cis 2-series PGs (those containing a 5,6-double bond) will contain a small amount of the 5-trans isomer. This isomer is generally undetectable using normal phase silica columns and plates, but may be resolved using RP-HPLC. The purity for all such 2-series PGs excludes the 1-3% trans isomer which will generally be present.*

vol. 10 Ne

Thomas G. Brock, Ph.D.

'Spice' Wars

The names 'Spice Diamond', 'Spike99', and 'K2 Summit' might be found on a weekend volleyball tournament listing. Remarkably, they are also found on lists compiled by the Chilean Ministry of Health, the Chief Medical Officer of the Russian Federation, and the United Kingdom's Advisory Council on the Misuse of Drugs. They are commonly called 'Spice blends', or simply 'spice', and refer to plant materials adulterated with CB-like drugs sold in convenient resealable pouches (Figure 1). These herbal products are creating the same drug testing challenge that has plagued sporting events like the Olympics and the Tour de France: keeping up with resourceful suppliers. The World Anti-Doping Agency has organized and streamlined drug testing in sports. Unfortunately, testing and enforcement of Spice blends depends on scattered forensic labs and byzantine legislatures, stacking the game decidedly in favor of the suppliers. Step one in countering these designer drugs is understanding the opposition. Let's get started.

Figure 1. Some spice blends

What's on the Label?

WARNING: NOT FOR HUMAN CONSUMPTION! That's standard on many labels. Some products are described as 'herbal incense' and for 'meditation', suggesting that they might be burnt and that the smoke might alter your mood. Some are sold as 'pre-rolled joints'. The original spice products (Spice Silver, Gold, and Diamond) were described as containing mixtures of traditionally-used medicinal herbs, each with potential mood-altering effects. For example, skullcap (*S. nana*) reduces anxiety and insomnia, sacred lotus (*N. nucifera*) provides a pleasant, dreamy feeling, and Indian warrior (*P. densiflora*) is a muscle relaxant. Presumably, different blends of these and other plants would provide distinct overall effects. In fact, all Spice blends produced a cannabis-like high. You can find 'Spice blends' at eHeadShops, like FastAroma.com, which reports that K2 Summit contains "a combination of rare plants, herbal extracts, and botanical concentrates." TopK2.net puts in bold that the product is "100% legal" and provides a buyer review that "K2 is better than the real thing. I can't believe it's still legal." Some sites reassure customers that products are "new formulations" and "do not contain THC (Δ^9-tetrahydrocannabinol) or illegal synthetic CBs." In part, this suggests that they will pass a drug test. Let the buyer beware.

Cannabis and cannabinoids

Like all herbs, *C. sativa* contains a mixture of chemicals, including THC and cannabidiol (Figure 2). In the body, THC activates two classical CB receptors, CB_1 and CB_2, as well as GPR55. CB_1 is restricted primarily to neuronal cells and is located at various sites within the brain, while CB_2 is more diffusely distributed, being present on leukocytes, splenocytes, peripheral and enteric neurons, and possibly other cell types. Because of their different distributions, it is presumed that CB_1 and CB_2 have distinct roles in producing the effects on mood, appetite, immunity, memory, and pain perception that are produced by THC and other CBs. GPR55 is abundant in the brain, ileum, and bone cells; however, its function is unclear. Interestingly, cannabidiol does not activate either CB_1 or CB_2, but instead activates GPR55 and a serotonin receptor. As a result, cannabidiol lacks the psychotropic effects of THC and, in fact, has some distinct, opposing effects from THC.

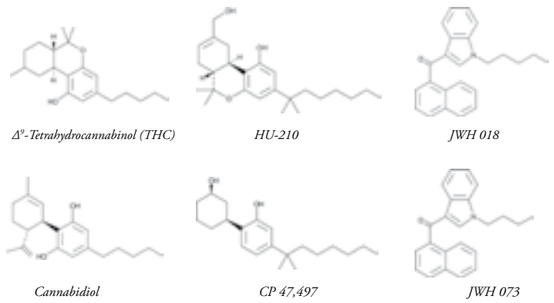


Figure 2. Structures of some natural and synthetic cannabinoids

Numerous compounds, both natural and synthetic, that activate CB_1 and CB_2 have been discovered. The endogenous ligands for these receptors, as well as GPR55, are called 'endoCBs' and include bioactive lipids like arachidonoyl ethanolamide, or anandamide. The first generation of laboratory-generated compounds was developed primarily to facilitate the discovery of receptors for THC (before CB_1 and CB_2 had been isolated). The structure of these synthetic CBs were initially subtle variations of THC and included HU-210 (Figure 2). This, in turn, led to the development of a cyclohexylphenol (CP) series, including CP 47,497 and CP 55,940, which proved to be 20 to 100 times more potent than THC in certain tests. With the discovery of two receptors for CBs, it was hypothesized that compounds could be produced that selectively activated receptors to produce certain effects (*e.g.*, pain reduction) without others (*e.g.*, psychotropic alterations). This pursuit was led by Billy Martin and John W. Huffman who have produced a large number of 'JWH' compounds, many based on an aminoalkylindole structure. These vary in receptor selectivity and potency. Many, like JWH 018, are much more potent than THC at both CB_1 and CB_2. Importantly, almost nothing is known about the pharmacology, toxicology, and safety profile of JWH compounds in humans.

Discovery and Analysis

In 2009, German scientists reported the presence of either JWH 018 or a homolog of CP 47,497 in several herbal blends, including the original Spice products.[1] Self-testing produced alteration of mood and perception, considerably reddened conjunctivae, tachycardia, and xerostomia (dry mouth). The conclusion was that "CB-like designer drugs were used as adulterants in commercially available products designed for inhalative application."[1] Shortly thereafter, the C8-homolog of CP 47,497 and JWH 018 were again found in herbal blends.[2,3] Moreover, JWH 073, a minor variant of JWH 018, was also detected for the first time.[3] In an analysis of forty-six differently named herbal products, Uchiyama and colleagues found varying ratios of JWH 018, JWH 073, and CP 47,497-C8 in forty-four samples.[4] Many samples also contained CP 47,497, its *trans*-diastereomer, and the *trans*-diastereomer of CP 47,497-C8, as well as the endoCB oleamide. Moreover, three additional compounds related to CP 47,497 were observed but not identified.[4] Taken together, these studies demonstrated that many herbal blends are, in fact, blends of natural and synthetic CBs.

Cannabinoid	K2	Tribal Warrior	Spike99	exSES	Neder Gold
(±)-CP 47,497				++	
(±)-CP 47,497-C8		++	++	++	
JWH 018	+++	++++	+++		
JWH 019			+		
JWH 073	+++	++	+++		
JWH 200	+++				
JWH 250		++	+++		

Table 1. Identification of synthetic cannabinoids in herbal blends, by Cayman's laboratories.

In an effort to develop products and methods to identify adulterated blends, Cayman has prepared a mixture of 12 synthetic CB standards (Item No. 13830) and developed an automated method to screen for and positively identify these compounds in commercial herbal products. In this approach, a standardized HPLC method is used in order to match retention times with known standards and both MS and MS/MS spectra are generated under reproducible conditions and imported into a searchable MS library database. Ion Trap MS is ideally suited for this application because fragmentation occurs in discrete stages and can be carefully controlled at each stage. Using this methodology, five commercially-available herbal blends were analyzed at Cayman's laboratories, and four were found to contain a mixture of synthetic CBs (Table 1). Importantly, two novel compounds, JWH 200 and JWH 250, were positively identified, suggesting that the variety of synthetic CBs that are currently in use may be underappreciated. Cayman Chemical intends to continue developing products and methods to aid the forensic analysis of synthetic CBs.

As indicated above, little is known about the metabolism of synthetic CBs, so users don't fear drug testing. However, recent analysis of urine samples following herbal use indicated that JWH 018 can be detected in urine as its metabolites, formed by hydroxylation of the indole ring and the N-alkyl chain.[5] These results supported an earlier analysis of the metabolism of JWH 015 by liver microsomes.[6] Studies on the identification of JWH 018 in human serum following consumption by smoking indicate that it remains in the circulation for a few hours.[1,7] Thereafter, its metabolites must be detected. Cayman has synthesized a number of these metabolites of JWH compounds, again to facilitate their detection. Thus, the capacity for effective testing of synthetic CBs in urine and serum is near at hand.

The Game is Afoot!

As near as can be discerned, Spice blends have been available since at least 2006. The impression is that the diversity of products and CB adulterants is increasing, and forensics has a long way to go to catch up. Complicating this problem, the herbal blends are available world-wide and each country is reacting individually and at its own rate. Certain countries, including Sweden and Germany, have listed HU-210, CP 47,497 and homologs, and JWH 018 as narcotics,[8] leaving other JWH compounds available for sale. In the United States, the Drug Enforcement Administration currently lists these as Drugs and Chemicals of Concern, although some states and branches of the military have banned the possession of certain herbal blend products.

Case reports of the effects of Spice abuse are emerging, demonstrating withdrawal phenomena, dependence syndrome, and triggering of psychotic episodes in susceptible individuals.[9,10] Regarding this latter report, it has been proposed that Spice blends may have a higher potency for psychosis, as they lack cannabidiol, which has antipsychotic potency and may serve to counter the psychotic effects of THC in *C. sativa*.[10] Interestingly, recent on-line reviews by users suggest that sellers are providing different blends, some spiked with CBs and some not, for certain products sent to different countries. Customers, as well as enforcement agencies, may be challenged when guessing what's in a blend, regardless of what's on the label. At least the enforcement agencies can count on Cayman to develop methods and products to facilitate testing.

Product Type	Names (catalog numbers
Synthetic Cannabinoid HPLC Mixture (13830)	Includes (±)-CP 47,497, (±)-CP 47,497-C8-homolog, (±)-CP 55,490, HU-308, HU-331, JWH 015, JWH 018, JWH 019, JWH 073, JWH 200, JWH 250, WIN 55212-2
CP 47,497	(±)-CP 47,497 (16851), (+)-CP 47,497 (13219), (–)-CP 47,497 (13218), (±)-CP 47,497-C8-homolog (13216), (±)-epi CP 47,497 (13801), (±)-3-epi CP 47,497-C8-homolog (13802)
CP 55,940	(±)-CP 55,940 (13241), (+)-CP 55,940 (13608), (–)-CP 55,940 (90084), (±)-5-epi CP 55,940 (13803)
HU compounds	HU-210* (90082), HU-211 (10006350), HU-308 (90086), HU-331 (10005673)
JWH compounds	JWH 007-d9 (10486), JWH 015 (10009018), JWH 018 (13169), JWH 018-d9 (13824), JWH 019 (13633), JWH 073 (13170), JWH 073-d7 (9000868), JWH 081 (10579), JWH 200 (13171), JWH 250 (13634), JWH 251 (10578), JWH 398 (13636)
JWH metabolites	JWH 018 2-hydroxyindole metabolite (9000844), JWH 018 4-hydroxyindole metabolite (9000851), JWH 018 5-hydroxyindole metabolite (9000852), JWH 018 6-hydroxyindole metabolite (9000853), JWH 018 7-hydroxyindole metabolite (9000854), JWH 018 N-(5-hydroxypentyl) metabolite (9000855), JWH 018 N-pentanoic acid metabolite (9000856), JWH 073 4-hydroxyindole metabolite (9000861), JWH 073 5-hydroxyindole metabolite (9000862), JWH 073 6-hydroxyindole metabolite (9000863), JWH 073 7-hydroxyindole metabolite (9000864), JWH 073 N-(5-hydroxybutyl) metabolite (9000865), JWH 073 N-butanoic acid metabolite (9000866), JWH 073 N-butanoic acid metabolite-d5 (9000870)
Others	9-Octadecenamide (90375), Cannabidiol* (90080), WIN 55212-2 (10009023)

Table 2. Synthetic cannabinoids available from Cayman Chemical.
***DEA Schedule 1 Regulated Compound**

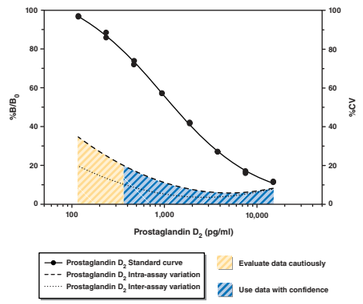
References

1. Auwärter, V., Dresen, S., Weinmann, W., *et al. J. Mass Spectrom.* **44**, 832-837 (2009).
2. Uchiyama, N., Kikura-Hanajiri, R., Kawahara, N., *et al. Forensic Toxicol.* **27**, 61-66 (2009).
3. Lindigkeit, R., Boehme, A., Eiserloh, I., *et al. Forensic Sci. Int.* **191**, 58-63 (2009).
4. Uchiyama, N., Kikura-Hanajiri, R., Ogata, J., *et al. Forensic Sci. Int.* **198**, 31-38 (2010).
5. Sobolevsky, T., Prasolov, I., and Rodchenkov, G. *Forensic Sci. Int.* **200**, 141-147 (2010).
6. Zhang, Q., Ma, P., Cole, R.B., et al. *Anal. Bioanal. Chem.* **386**, 1345-1355 (2006).
7. Teske, J., Weller, J.-P., Fieguth, A., *et al. J. Chromatogr. B* (2010).
8. EMCDDA Thematic Paper: *Understanding the 'Spice' phenomenon.* (2009).
9. Zimmermann, U.S., Winkelmann, P.R., Pilhatsch, M., *et al. Dtsch. Arztebl. Int.* **106(27)**, 464-467 (2009).
10. Müller, H., Sperling, W., Köhrmann, M., *et al. Schizophr. Res.* **118**, 309-310 (2010).

NEW Prostaglandin D_2 Express EIA Kit 512041

Stability: ≥6 months at -80°C
Sensitivity: 50% B/B_0: 1,300 pg/ml • 80% B/B_0: 350 pg/ml
Specificity: Refer to PGD_2 EIA Kit (Item No. 512031)

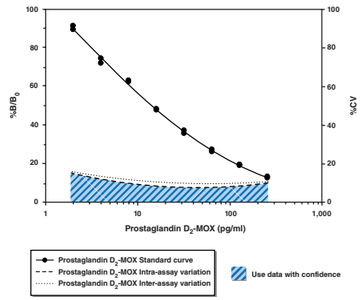
96 strip/solid wells
480 strip/solid wells



Prostaglandin D_2-MOX EIA Kit 512011

Stability: ≥1 year at -20°C
Sensitivity: 50% B/B_0: 15 pg/ml • 80% B/B_0: 3.1 pg/ml

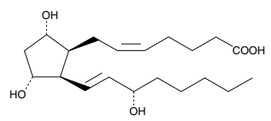
96 strip/solid wells
480 strip/solid wells



8-*iso* Prostaglandin $F_{2\alpha}$ 16350

[27415-26-5] iPF$_{2\alpha}$-III, 8-Isoprostane, 8-epi PGF$_{2\alpha}$, 15-F2t-Isoprostane
MF: $C_{20}H_{34}O_5$ **Purity:** ≥99%*
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: An isoprostane produced by the non-enzymatic peroxidation of arachidonic acid in membrane phospholipids and the most frequently studied member of the isoprostane family

1 mg
5 mg
10 mg
50 mg



9α,11α,15S-trihydroxy-(8β)-prosta-5Z,13E-dien-1-oic acid

• Also Available: **8-iso Prostaglandin $F_{2\alpha}$-d_4** (316350)

**All 5-cis 2-series PGs (those containing a 5,6-double bond) will contain a small amount of the 5-trans isomer. This isomer is generally undetectable using normal phase silica columns and plates, but may be resolved using RP-HPLC. The purity for all such 2-series PGs excludes the 1-3% trans isomer which will generally be present.*

Prostaglandin I Synthase Polyclonal Antibody 160640

PGIS, Prostacyclin Synthase
Supplied as: peptide affinity-purified IgG **Stability:** ≥1 year at -20°C
Summary: Antigen: bovine PGIS amino acids 299-329 • Host: rabbit • Cross Reactivity: (+) bovine, ovine, and human PGIS • Application(s): IP and WB • PGIS catalyzes the isomerization of PGH_2 to PGI_2.

1 ea

• Also Available: **Prostaglandin I Synthase (murine) Polyclonal Antibody** (100023)

PSD95 Monoclonal Antibody (Clone 7E3) 10011436

Postsynaptic Density Protein 95
Supplied as: protein G affinity-purified IgG at a concentration of 1 mg/ml in PBS, pH 7.4, containing 0.09% sodium azide and 50% glycerol
Stability: ≥1 year at -20°C
Summary: Antigen: rat recombinant PSD95 • Host: mouse, clone 7E3 • Isotype: IgG_{2a} • Cross Reactivity: (+) murine, rat, and bovine PSD95 • Application(s): WB • PSD95, also known as synapse-associated protein 90 kDa, is a member of the membrane-associated guanylate kinase family of proteins. PSD95 is a scaffolding protein and is involved in the assembly and function of the postsynaptic density complex.

25 µg
100 µg

PSD95 Monoclonal Antibody (Clone 6G6) 10011435

Postsynaptic Density Protein 95
Supplied as: protein G affinity-purified IgG at a concentration of 1 mg/ml in PBS, pH 7.4, containing 0.09% sodium azide and 50% glycerol **Stability:** ≥1 year at -20°C
Summary: Antigen: rat recombinant PSD95 • Host: mouse, clone 6G6 • Isotype: IgG_{2a} • Cross Reactivity: (+) murine, rat, and bovine PSD95 • Application(s): ICC and WB • PSD95, also known as synapse-associated protein 90 kDa, is a member of the membrane-associated guanylate kinase family of proteins. PSD95 is a scaffolding protein and is involved in the assembly and function of the postsynaptic density complex.

25 µg
100 µg

PSD95 Polyclonal Antibody 10009506

Postsynaptic Density Protein of 95
Supplied as: affinity-purified IgG **Stability:** ≥1 year at -20°C
Summary: Antigen: peptide corresponding to amino acid residues from the N-terminal region of rat PSD95 • Host: rabbit • Cross Reactivity: (+) rat and murine PSD95; expected to react with bovine, human, non-human primates, and zebrafish • Application(s): WB • PSD95 is a very prominent component of the postsynaptic densities of synapses.

1 ea

Ribosomal S6 Kinase 2 Polyclonal Antibody 10009411

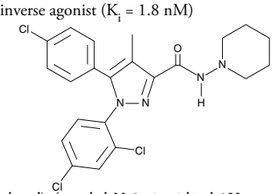
RSK2
Supplied as: peptide affinity-purified antibody **Stability:** ≥1 year at -20°C
Summary: Antigen: peptide corresponding to amino acid residues from the C-terminal region of rat ribosomal S6 kinase 2 • Host: rabbit • Cross Reactivity: (+) rat RSK2; expected to react with bovine, canine, chicken, murine, and human RSK2 • Application(s): WB • The p90 RSKs 1-4 are downstream members of the extracellular signal-regulated kinase MAPK cascade. The loss of RSK2 activity in humans leads to Coffin-Lowry syndrome, which is characterized by mental retardation and growth deficit.

1 ea

Rimonabant 9000484

[168273-06-1] SR141716
MF: $C_{22}H_{21}Cl_3N_4O$ **FW:** 463.8 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A selective CB_1 receptor inverse agonist (K_i = 1.8 nM)

5 mg
10 mg
25 mg
50 mg

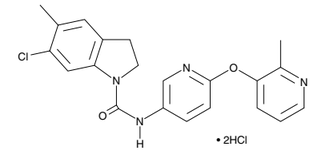


5-(4-chlorophenyl)-1-(2,4-dichlorophenyl)-4-methyl-N-1-piperidinyl-1H-pyrazole-3-carboxamide

NEW SB 242084 (hydrochloride) 10096

[1049747-87-6]
MF: $C_{21}H_{19}ClN_4O_2$ • 2HCl **FW:** 467.8 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: An antagonist of the 5-HT_{2C} receptor (pK_i = 9.0), with at least 100-fold more selectivity over other 5-HT, dopamine, or adrenergic receptors; brain penetrant with significant anxiolytic activity; used extensively in animal research

1 mg
5 mg
10 mg
25 mg

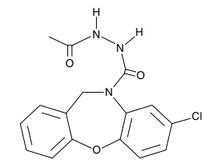


6-chloro-2,3-dihydro-5-methyl-N-[6-[(2-methyl-3-pyridinyl)oxy]-3-pyridinyl]-1H-indole-1-carboxamide, dihydrochloride

SC-19220 14060

[19395-87-0]
MF: $C_{16}H_{14}ClN_3O_3$ **FW:** 331.8 **Purity:** ≥96%
A crystalline solid **Stability:** ≥1 year at -20°C
Summary: A dibenzoxazepine which acts as a selective antagonist of PGE_2 at the human EP_1 receptor (IC_{50} = 6.7 µM); at doses between 0.3-300 µM, is a competitive antagonist of PGE_2-induced smooth muscle contractions of guinea pig ileum and stomach and trachea; binds very weakly and shows no selectivity for the murine EP_1 receptor

1 mg
5 mg
10 mg
25 mg

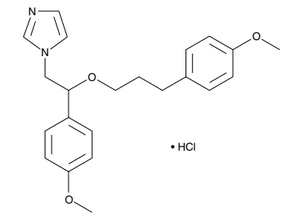


8-chloro-dibenz[b,f][1,4]oxazepine-10(11H)-carboxy-(2-acetyl)hydrazide

SKF-96365 (hydrochloride) 10009312

[130495-35-1]
MF: $C_{22}H_{26}N_2O_3$ • HCl **FW:** 402.9 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: Inhibits the receptor-mediated influx of calcium *via* voltage-gated calcium channels (IC_{50} = 10 µM); inhibits the acetylcholine-induced depolarization of circular smooth muscle in a dose-dependent manner at 3-50 µM

1 mg
5 mg
10 mg
50 mg

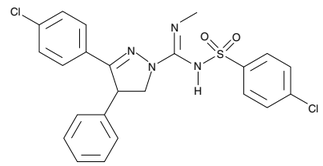


1-[2-(4-methoxyphenyl)-2-[3-(4-methoxyphenyl)propoxy]ethyl]-1H-imidazole, monohydrochloride

(±)-SLV 319 10009226

[362519-49-1]
MF: $C_{23}H_{20}Cl_2N_4O_2S$ **FW:** 487.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A mixture of the potent and selective CB_1 receptor antagonist SLV 319 (K_i = 7.8 nM) and its distomer, SLV 319 (+)-enantiomer

1 mg
5 mg
10 mg
50 mg

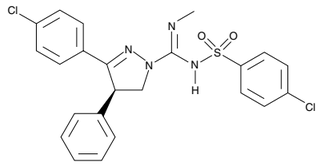


3-(4-chlorophenyl)-N-[(4-chlorophenyl)sulfonyl]-4,5-dihydro-N'-methyl-4-phenyl-1H-pyrazole-1-carboximidamide

(R)-SLV 319 10009227

[656827-86-0]
MF: $C_{23}H_{20}Cl_2N_4O_2S$ **FW:** 487.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: Inactive enantiomer of SLV 319 with 100-fold less affinity for the CB_1 receptor than (S)-SLV 319

1 mg
5 mg
10 mg
50 mg



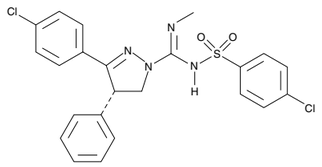
3-(4-chlorophenyl)-N-[(4-chlorophenyl)sulfonyl]-4,5-dihydro-N'-methyl-4R-phenyl-1H-pyrazole-1-carboximidamide

(S)-SLV 319 10009022

[464213-10-3]

MF: $C_{23}H_{20}Cl_2N_4O_2S$ **FW:** 487.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A potent and selective CB_1 receptor antagonist (K_is = 7.8 and 7,943 nM for CB_1 and CB_2, respectively); less lipophilic (log *P* = 5.1) and therefore more water soluble than other known CB_1 receptor ligands

1 mg
5 mg
10 mg
50 mg



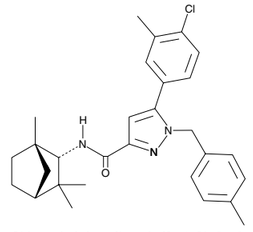
3-(4-chlorophenyl)-N-[(4-chlorophenyl)sulfonyl]-4,5-dihydro-N'-methyl-4S-phenyl-1H-pyrazole-1-carboximidamide

SR 144528 9000491

[192703-06-3]

MF: $C_{29}H_{34}ClN_3O$ **FW:** 475.2 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A selective CB_2 receptor inverse agonist that displays a K_i value of 0.6 nM for rat spleen and human recombinant CB_2 receptors (K_i = 400 nM for rat brain and human CB_1 receptors)

5 mg
10 mg
25 mg
50 mg

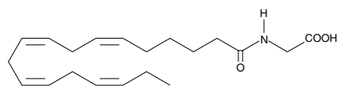


5-(4-chloro-3-methylphenyl)-1-[(4-methylphenyl)methyl]-N-[(1S,2S,4R)-1,3,3-trimethylbicyclo[2.2.1]hept-2-yl]-1H-pyrazole-3-carboxamide

Stearidonoyl Glycine 9000327

MF: $C_{20}H_{31}NO_3$ **FW:** 333.5 **Purity:** ≥98%
A solution in ethanol **Stability:** ≥2 years at -20°C
Summary: Consists of stearidonic acid, an ω-3 PUFA, with glycine attached at its carboxy terminus

5 mg
10 mg
25 mg
50 mg



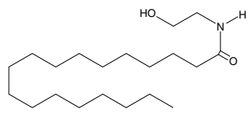
2-(6Z,9Z,12Z,15Z)-octadeca-tetraenamidoacetic acid

Stearoyl Ethanolamide 90245

[111-57-9] Ceramid, Stearic Acid Ethanolamide

MF: $C_{20}H_{41}NO_2$ **FW:** 327.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A member of the family of fatty N-acyl ethanolamines collectively called anandamides and the most abundant of several fatty acid ethanolamides produced by the PLD hydrolysis of murine neuroblastoma cell membrane phospholipids; its specific role in the cannabinergic system remains to be elucidated

5 mg
10 mg
25 mg
50 mg



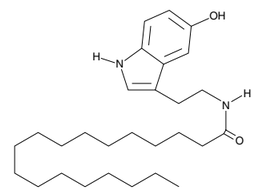
N-(2-hydroxyethyl) octadecanamide

NEW Stearoyl Serotonin 9000631

[67964-87-8]

MF: $C_{28}H_{46}N_2O_2$ **FW:** 442.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A hybrid molecule patterned after arachidonoyl serotonin; while saturated 11- or 12-carbon fatty acids linked to serotonin potently inhibit capsaicin-induced TRPV1 channel activation (IC_{50} = 0.76 µM) without blocking FAAH-mediated hydrolysis of arachidonoyl ethanolamine (IC_{50} > 50 µM), the effects of stearoyl serotonin are unknown

1 mg
5 mg
10 mg
25 mg



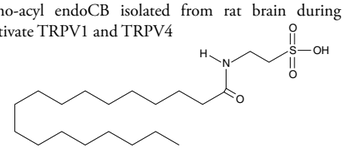
N-[2-(5-hydroxy-1H-indol-3-yl)ethyl]-octadecanamide

N-Stearoyl Taurine 10005610

[63155-80-6]

MF: $C_{20}H_{41}NO_4S$ **FW:** 391.6 **Purity:** ≥98%
A solution in methanol **Stability:** ≥1 year at -20°C
Summary: A prominent amino-acyl endoCB isolated from rat brain during lipidomics profiling that may activate TRPV1 and TRPV4

1 mg
5 mg
10 mg
50 mg

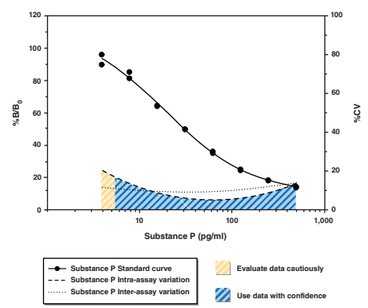


2-[(1-oxooctadecyl)amino]-ethanesulfonic acid

Substance P EIA Kit 583751

Stability: ≥1 year at -20°C
Sensitivity: 50% B/B_0: 32 pg/ml • 80% B/B_0: 8.2 pg/ml
Summary: Substance P is a bioactive 12-amino acid peptide (Arg-Pro-Lys-Pro-Gln-Gln-Phe-Phe-Gly-Leu-Met-amide) first isolated in 1931 from brain and intestine. The peptide is involved in many physiological processes including pain modulation, smooth muscle contraction, blood pressure control, kidney function, and water homeostasis. Substance P is widely distributed in numerous tissues and body fluids including the central and peripheral nervous system, gastrointestinal tract, respiratory tract, visual system, and circulatory system. Serum levels of substance P determined by EIA, after C-18-solid phase extraction (SPE) purification, range between 5-115 pg/ml with a mean of 38 pg/ml. These values are similar to those obtained by RIA analysis of substance P in plasma of healthy adults. Cayman's substance P EIA is a competitive assay that provides accurate measurements of substance P with a working range of 3.9 to 500 pg/ml. Inter- and intra-assay CVs of less than 20% can be achieved at most concentrations of the standard curve.

96 strip/solid wells
480 strip/solid wells



Synapsin I Polyclonal Antibody 10606

Supplied as: affinity-purified IgG **Stability:** ≥1 year at -20°C
Summary: Antigen: native protein purified from bovine brain • Host: rabbit • Cross Reactivity: (+) human, rat, and murine synapsin I • Application(s): IF, IHC, IP, and WB • Synapsin I plays a key role in synaptic plasticity in brain. This effect is due in large part to the ability of the synapsins to regulate the availability of synaptic vesicles for release. In addition to its role in plasticity, the expression of synapsin I is a precise indicator of synapse formation.

1 ea

Synapsin I Polyclonal Antibody (neat serum) 10605

Supplied as: neat serum **Stability:** ≥1 year at -20°C
Summary: Antigen: native protein purified from bovine brain • Host: rabbit • Cross Reactivity: (+) human, rat, and murine synapsin I • Application(s): WB • Synapsin I plays a key role in synaptic plasticity in brain. This effect is due in large part to the ability of the synapsins to regulate the availability of synaptic vesicles for release. In addition to its role in plasticity, the expression of synapsin I is a precise indicator of synapse formation.

1 ea

NEW Synthetic Cannabinoid HPLC Mixture 13830

Purity: ≥95% for each compound
A solution in ethanol **Stability:** ≥1 year at -20°C
Summary: Contains (±)-CP 47,497, (±)-CP 47,497-C8-homolog, (±)-CP 55,940, HU-308, HU-331, JWH 015, JWH 018, JWH 019, JWH 073, JWH 200, JWH 250, and WIN 55212-2 (100 µg each)

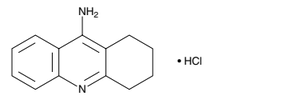
1 ea

Tacrine (hydrochloride) 70240

[1684-40-8] Cognex, Romotal

MF: $C_{13}H_{14}N_2$ • HCl **FW:** 234.7 **Purity:** ≥98%
A crystalline solid **Stability:** ≥1 year at -20°C
Summary: A derivative of aminoacridine that functions as an inhibitor of both AChE and butyrylcholinesterase; used clinically in the treatment of Alzheimer's disease; inhibits the uptake of serotonin and noradrenaline in rat cerebral cortex and decreases depolarization-induced calcium influx through L-type calcium channels in SN56 neuronal cells

500 mg
1 g
5 g
10 g



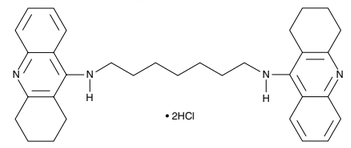
1,2,3,4-tetrahydro-9-acridinamine, monohydrochloride

bis(7)-Tacrine 10005836

[224445-12-9] 1,7-N-heptylene-bis-9,9'-amino-1,2,3,4-tetrahydro-acridine

MF: $C_{33}H_{40}N_4$ • 2HCl **FW:** 565.6 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A tacrine dimer, linked *via* a 7-carbon alkyl spacer; inhibits AChE (IC_{50} = 0.40 nM), making it more than 1,000 times more potent than tacrine; protects against hydrogen peroxide induced apoptosis in rat pheochromocytoma cells

5 mg
10 mg
50 mg
100 mg



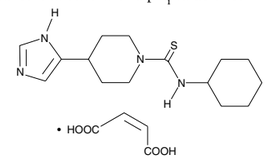
N,N'-bis(1,2,3,4-tetrahydro-9-acridinyl)-1,7-heptanediamine, dihydrochloride

Thioperamide Maleate 10011127

[148440-81-7]

MF: $C_{15}H_{24}N_4S$ • $C_4H_4O_4$ **FW:** 408.5 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A selective histamine H_3 receptor antagonist that crosses the blood-brain barrier; binds to rat cerebral cortical cells *in vitro* with a pK_i value of 8.4

1 mg
5 mg
10 mg
25 mg



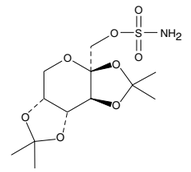
N-cyclohexyl-4-(1H-imidazol-5-yl)-(2Z)-2-butenedioate-1-piperidinecarbothioamide

NEW Topiramate 13623

[97240-79-4] Epitomax, McN4853, Topamax®, TPM

MF: $C_{12}H_{21}NO_8S$ **FW:** 339.4 **Purity:** ≥98%
A crystalline solid **Stability:** ≥2 years at -20°C
Summary: A sugar sulfamate that exhibits potent anticonvulsant activity, completely blocking seizures (ED_{50} = 39 mg/kg orally) in mice in the maximal electroshock seizure test; the drug form Topamax ® is used to treat seizures associated with epilepsy and to prevent migraine headaches

50 mg
100 mg
500 mg
1 g



2,3:4,5-bis-O-(1-methylethylidene)-β-D-fructopyranose 1-sulfamate

Tryptophan Hydroxylase Polyclonal Antibody 10009396

TPH

Supplied as: peptide affinity-purified antibody **Stability:** ≥1 year at -20°C
Summary: Antigen: recombinant rabbit TPH • Host: sheep • Cross Reactivity: (+) human and rat TPH; expected to react with other mammals; (-) rabbit TPH • Application(s): IHC (frozen sections) and WB • TPH catalyzes the first step in the biosynthesis of serotonin and melatonin. Thus, expression of TPH can be used as an indicator of the localization of serotonin and melatonin in brain.

1 ea

Tryptophan Hydroxylase (Phospho-Ser[58]) Polyclonal Antibody 10009397

TPH

Supplied as: peptide affinity-purified antibody **Stability:** ≥1 year at -20°C
Summary: Antigen: phosphopeptide corresponding to amino acid residues surrounding phospho-Ser^{58} of TPH • Host: rabbit • Cross Reactivity: (+) rabbit TPH; expected to react with bovine, canine, human, murine, non-human primate, rat, *Xenopus*, and zebrafish TPH • Application(s): WB • TPH catalyzes the 5-hydroxylation of tryptophan, which is the first step in the biosynthesis of indoleamines (serotonin and melatonin). The activity of TPH is enhanced by phosphorylation by cAMP-dependent protein kinase (PKA) and Ca^{2+}/calmodulin kinase II (CAMKII). Both PKA and CAMKII phosphorylate Ser^{58} which lies within the regulatory domain of TPH.

1 ea

Tryptophan Hydroxylase (Phospho-Ser^{260}) Polyclonal Antibody 10009398

TPH

Supplied as: peptide affinity-purified antibody **Stability:** ≥1 year at -20°C

Summary: Antigen: phosphopeptide corresponding to amino acid residues surrounding phospho-Ser^{260} of rat TPH • Host: rabbit • Cross Reactivity: (+) human and rat TPH; expected to react with bovine, canine, chicken, murine, and zebrafish TPH • Application(s): WB • TPH catalyzes the 5-hydroxylation of tryptophan, which is the first step in the biosynthesis of indoleamines (serotonin and melatonin). The activity of TPH is enhanced by phosphorylation by cAMP-dependent protein kinase (PKA) and Ca^{2+}/calmodulin kinase II (CAMKII). CAMKII phosphorylate Ser^{260} which lies within the regulatory domain of TPH.

1 ea

Tyrosine Hydroxylase Polyclonal Antibody 10604

TH

Supplied as: affinity-purified IgG **Stability:** ≥1 year at -20°C

Summary: Antigen: SDS-denatured rat TH, purified from pheochromocytoma • Host: rabbit • Cross Reactivity: (+) mammalian tyrosine hydroxylase • Application(s): IF, IHC, and WB • TH is the rate-limiting enzyme in the synthesis of the catecholamines dopamine and norepinephrine.

1 ea

- Also Available: **Tyrosine Hydroxylase (Phospho-Ser^{19}) Polyclonal Antibody** (10009412)
- Also Available: **Tyrosine Hydroxylase (Phospho-Ser^{31}) Polyclonal Antibody** (10009413)

Tyrosine Hydroxylase (Phospho-Ser^{40}) Polyclonal Antibody 10009414

TH

Supplied as: affinity-purified antibody **Stability:** ≥1 year at -20°C

Summary: Antigen: phosphopeptide corresponding to amino acid residues surrounding phospho-Ser^{40} of rat TH • Host: rabbit • Cross Reactivity: (+) mammalian and non-mammalian TH • Application(s): IF (frozen sections), IHC (frozen sections), and WB • TH is the rate-limiting enzyme in the synthesis of the catecholamines dopamine and norepinephrine. The activity of TH is also regulated by phosphorylation. Phospho-specific antibodies for the phosphorylation sites on TH can be used to great effect in studying this regulation and in identifying the cells in which TH phosphorylation occurs.

1 ea

UCM707 10045

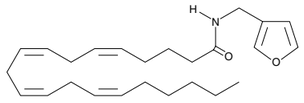
[390824-20-1]

MF: $C_{25}H_{37}NO_2$ **FW:** 383.6 **Purity:** ≥98%

A solution in methyl acetate **Stability:** ≥1 year at -20°C

Summary: A 3-furyl arachidonoyl analog that acts as a potent and selective reuptake inhibitor of AEA (IC_{50} = 0.8 µM) but has low affinity for FAAH (IC_{50} = 30 µM); potentiates the biological effects of AEA when co-administered in rats

1 mg
5 mg
10 mg
50 mg



N-(3-furanylmethyl)-5Z,8Z,11Z,14Z-eicosatetraenamide

URB447 13261

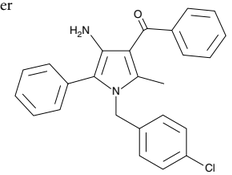
[1132922-57-6]

MF: $C_{25}H_{21}ClN_2O$ **FW:** 400.9 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A mixed CB_1 receptor antagonist/CB_2 receptor agonist with IC_{50} values of 313 and 41 nM, respectively; reduces food intake and body-weight gain in *ob/ob* mice and Swiss mice (20 mg/kg) with an efficacy comparable to rimonabant; does not penetrate the blood-brain barrier

5 mg
10 mg
25 mg
50 mg



[4-amino-1-[(4-chlorophenyl)methyl]-2-methyl-5-phenyl-1H-pyrrol-3-yl]phenyl-methanone

URB597 10046

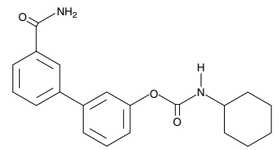
[546141-08-6]

MF: $C_{20}H_{22}N_2O_3$ **FW:** 338.4 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A potent and selective inhibitor of FAAH (IC_{50} = 4.6 nM in brain membranes and 0.5 nM in intact neurons); exhibits both anti-nociceptive and anxiolytic effects *in vivo* without evoking other symptoms associated with CB-like compounds

5 mg
10 mg
50 mg
100 mg



(3'-(aminocarbonyl)[1,1'-biphenyl]-3-yl)-cyclohexylcarbamate

URB602 10007457

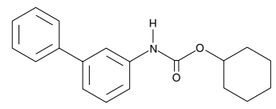
[565460-15-3]

MF: $C_{19}H_{21}NO_2$ **FW:** 295.4 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A selective inhibitor of MAGL (IC_{50} = 28 µM for the rat brain enzyme); does not inhibit FAAH at concentrations up to 100 µM, or other lipid metabolizing enzymes such as diacylglycerol lipase or COX-2

5 mg
10 mg
50 mg
100 mg



[1,1'-biphenyl]-3-yl-carbamic acid, cyclohexyl ester

URB754 10007691

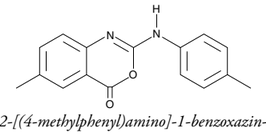
[86672-58-4]

MF: $C_{16}H_{14}N_2O_2$ **FW:** 266.3 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: Reported to be a potent, noncompetitive inhibitor of MAGL (IC_{50} = 200 nM for the recombinant rat brain enzyme); however, data (testing concentrations up to 100 µM) from other labs refute this claim; inhibits rat brain FAAH (IC_{50} = 32 µM) and binds weakly to the rat CB_1 receptor (IC_{50} = 3.8 µM); does not inhibit COX-1 or COX-2 at concentrations up to 100 µM

5 mg
10 mg
25 mg
50 mg



6-methyl-2-[(4-methylphenyl)amino]-1-benzoxazin-4-one

11-*cis* Vaccenyl Acetate 10010101

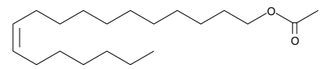
[6186-98-7]

MF: $C_{20}H_{38}O_2$ **FW:** 310.5 **Purity:** ≥98%

A solution in ethanol **Stability:** ≥1 year at -20°C

Summary: The male-specific mating pheromone of the fruit fly *D. melanogaster*; acts selectively through the Or67d odorant receptor to control mating behavior in both male and female fruit flies

5 mg
10 mg
50 mg
100 mg



(11Z)-11-octadecen-1-ol, acetate

VDM11 10006731

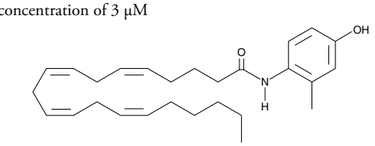
[313998-81-1]

MF: $C_{27}H_{39}NO_2$ **FW:** 409.6 **Purity:** ≥98%

A solution in ethanol **Stability:** ≥1 year at -20°C

Summary: An AEA transport inhibitor with essentially no activity on the CB_1 receptor, CB_2 receptor, or TRPV1; inhibits FAAH and MAGL and may act as an alternative FAAH substrate; inhibits glutamergic synaptic transmission between hippocampal neurons at a concentration of 3 µM

5 mg
10 mg
25 mg
50 mg



N-(4-hydroxy-2-methylphenyl)-5Z,8Z,11Z,14Z-eicosatetraenamide

WIN 55212-2 (mesylate) 10009023

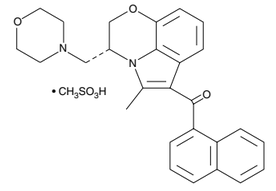
[131543-23-2]

MF: $C_{27}H_{26}N_2O_3 \bullet CH_4SO_3$ **FW:** 522.6 **Purity:** ≥98%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A potent aminoalkylindole CB receptor agonist (K_i = 3.3 and 62.3 nM for human recombinant CB_1 and CB_2 receptors, respectively); increases extracellular glutamate levels, in primary cultures of rat cerebral cortex neurons, displaying a bell-shaped concentration-response curve; induces release of the proinflammatory neuropeptide CGRP from trigeminal ganglion neurons in a calcium-dependent manner (EC_{50} = 26 µM)

5 mg
10 mg
25 mg
50 mg



[(3R)-2,3-dihydro-5-methyl-3-(4-morpholinylmethyl)pyrrolo[1,2,3-de]-1,4-benzoxazin-6-yl]-1-naphthale

WWL70 10011213

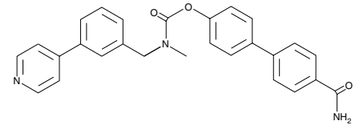
[947669-91-2]

MF: $C_{27}H_{23}N_3O_3$ **FW:** 437.5 **Purity:** ≥97%

A crystalline solid **Stability:** ≥2 years at -20°C

Summary: A selective inhibitor of α/β-hydrolase domain 6 (ABHD6) (IC_{50} = 70 nM), a Ser hydrolase that catalyzes the hydrolysis of 2-AG

1 mg
5 mg
10 mg
25 mg



N-methyl-N-[[3-(4-pyridinyl)phenyl]methyl]-4'-(aminocarbonyl)[1,1'-biphenyl]-4-yl ester, carbamic acid

Alphabetical Index

Catalog Number Index


vol. 10
Ne
Neuroscience
(800) 364 9897
www.caymanchem.com