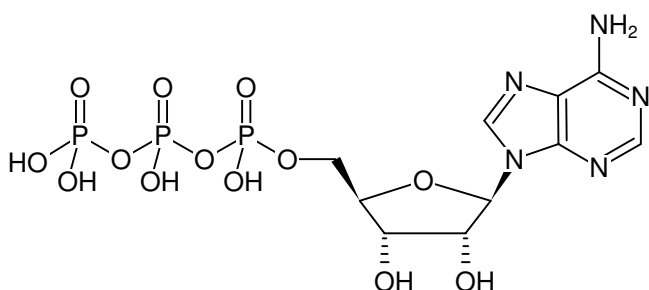



ATP Solid (>98%)

Adenosine-5'-triphosphate, Sodium salt

Cat. No.	Amount
ATP_1000G	1.000 g



Structural formula of ATP Solid (>98%)

For in vitro use only!
Shipping: shipped on blue ice

Storage Conditions: store at -20 °C

Additional Storage Conditions: Short term exposure (up to 1 week cumulative) to ambient temperature possible.

Shelf Life: 12 months

Molecular Formula: C₁₀H₁₆N₅O₁₃P₃ (free acid)

Molecular Weight: 507.18 g/mol (free acid)

Exact Mass: 507.00 g/mol (free acid)

CAS#: 51963-61-2

Purity: ≥ 98 % (HPLC)

Form: lyophilised

Spectroscopic Properties: λ_{max} 259 nm, ε 15.1 L mmol⁻¹ cm⁻¹ (Tris-HCl pH 7.0)

Applications:

 ATP-sensitive calcium channels^[1]

 V-ATPases (cellular proton pumps)^[2]

 ATP-coupled chromatin remodelling^[3]

 ATP-binding cassette transporters^[4]

 ATP-grasp enzymes^[5]

 Agonistic ligand, mainly for nucleoside receptor A₁
 Nucleoside-triphosphates can be converted by different membrane-bound phosphatases into nucleosides acting as nucleoside receptor ligands.

Specific Ligands:

Ligand for purinergic receptors:

 P2X₁-P2X₃^[6,7]

 P2X_{1/4}^[8]

 P2X₄^[7]

 P2X₇^[9,10,11]

 P2X₁ - P2X₇^[12]

 P2Y₁^[10,14]

 P2Y₂^[13,14]

 P2Y₁₁^[14]
Quality Control Specifications: in vitro transcription (T7 RNA polymerase): visible RNA fragments after 5 min incubation, DNases, RNases, Nicking Activity: not detectable, Proteases: not detectable

Selected References:

 [1] Wang *et al.* (2011) The biological effect of endogenous sulfur dioxide in the cardiovascular system. *Eur. J. Pharmacol.* **670** (1):1.

 [2] Scott *et al.* (2011) Duelling functions of the V-ATPase. *EMBO J.* **30** (20):4113.

 [3] Erdel *et al.* (2011) Chromatin remodelling in mammalian cells by ISWI-type complexes—where, when and why? *FEBS J.* **278** (19):3608.

 [4] Gatti *et al.* (2011) Novel insights into targeting ATP-binding cassette transporters for antitumor therapy. *Curr. Med. Chem.* **18** (27):4237.

 [5] Fawaz *et al.* (2011) The ATP-grasp enzymes. *Bioorg. Chem.* **39** (5):185.

 [6] Lambertucci *et al.* (2015) Medicinal chemistry of P2X receptors: Agonists and orthosteric antagonists. *Curr. Med. Chem.* **22** (7):915.

 [7] Ralevic (2015) P2X receptors in the cardiovascular system and their potential as therapeutic targets in disease. *Curr. Med. Chem.* **22** (7):851.

 [8] Harhun *et al.* (2014) ATP-evoked sustained vasoconstrictions mediated by heteromeric P2X_{1/4} receptors in cerebral arteries. *Stroke* **45** (8):2444.

**ATP Solid (>98%)**

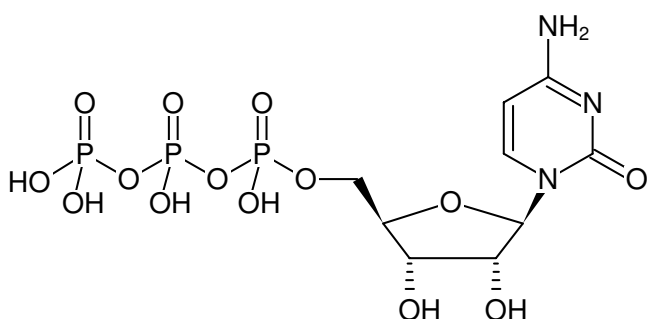
Adenosine-5'-triphosphate, Sodium salt

- [9] Facci *et al.* (2014) Toll-like receptors 2, -3 and -4 prime microglia but not astrocytes across central nervous system regions for ATP-dependent interleukin-1 β release. *Sci. Rep.* **4**:6824.
- [10] Stolz *et al.* (2015) Homodimeric anoctamin-1, but not homodimeric anoctamin-6, is activated by calcium increases mediated by the P2Y1 and P2X7 receptors. *Pflugers Archiv* DOI:10.1007/s00424-015-1687-3.
- [11] Lord *et al.* (2014) Pharmacology of a novel central nervous system-penetrant P2X7 antagonist JNJ-42253432. *J. Pharmacol. Exp. Ther.* **351** (3):628.
- [12] Dal Ben *et al.* (2015) Purinergic P2X receptors: Structural models and analysis of ligand-target interaction. *Eur. J. Med. Chem.* **89**:561.
- [13] Xie *et al.* (2014) The P2Y2 nucleotide receptor mediates the proliferation and migration of human hepatocellular carcinoma cells induced by ATP. *J. Biol. Chem.* **289** (27):19137.
- [14] Kim *et al.* (2002) Methanocarba modification of uracil and adenine nucleotides: High potency of northern ring conformation at P2Y1, P2Y2, P2Y4 and P2Y11 but not P2Y6 receptors. *J. Med. Chem.* **45**:208.
- Volonte *et al.* (2009) Membrane components and purinergic signalling: the purinome, a complex interplay among ligands, degrading enzymes, receptors and transporters. *FEBS J.* **276**:318.
- Yegutkin (2008) Nucleotide and nucleoside converting enzymes: Important modulators of purinergic signalling cascade. *Biochim. Biophys. Acta* **1783**:673.
- Hasko *et al.* (2007) Shaping of monocyte and macrophage function by adenosine receptors. *Pharmacol. & Therapeutics* **113**:264.
- Holland *et al.* (1991) Detection of specific polymerase chain reaction product by utilizing the 5'→3' exonuclease activity of *Thermus aquaticus* DNA polymerase. *Proc. Natl. Acad. Sci. USA* **88** (16):7276.
- Erlich *et al.* (1988) Primer-directed enzymatic amplification of DNA with a thermostable DNA polymerase. *Science* **29** (239):487.
- Williams *et al.* (1986) Effects of purine nucleotides on the binding of [3H]cyclopentyladenosine to adenosine A1-receptors in rat brain membranes. *J. Neurochem.* **47** (1):88.
- Sanger *et al.* (1977) DNA sequencing with chain-terminating inhibitors. *Proc. Natl. Acad. Sci. USA* **74**:5463.

**CTP - Solid (>95%)**

Cytidine-5'-triphosphate, Sodium salt

Cat. No.	Amount
CTP_1000G	1.000 g



Structural formula of CTP - Solid (>95%)

For in vitro use only!**Shipping:** shipped on blue ice**Storage Conditions:** store at -20 °C**Additional Storage Conditions:** Short term exposure (up to 1 week cumulative) to ambient temperature possible.**Shelf Life:** 12 months**Molecular Formula:** C₉H₁₆N₃O₁₄P₃ (free acid)**Molecular Weight:** 483.16 g/mol (free acid)**CAS#:** 36051-68-0**EC number:** 252-849-3**Purity:** ≥ 95 % (HPLC)**Form:** lyophilised**Spectroscopic Properties:** λ_{max} 271 nm, ε 8.9 L mmol⁻¹ cm⁻¹ (Tris-HCl pH 7.0)**Applications:**Physiological role in coronary artery disease^[1]Physiological role in lipid metabolism^[2]Physiological role in farnesol induced apoptosis^[3]**Specific Ligands:**CTP synthase^[4]Phosphocholine cytidyltransferase alpha^[2]Ligand for purinergic receptors:P2Y₆^[5]P2X₃^[6]**Quality Control Specifications:**

in vitro transcription (T7 RNA polymerase): visible RNA fragments after 5 min incubation, DNases, RNases, Nicking Activity: not detectable, Proteases: not detectable

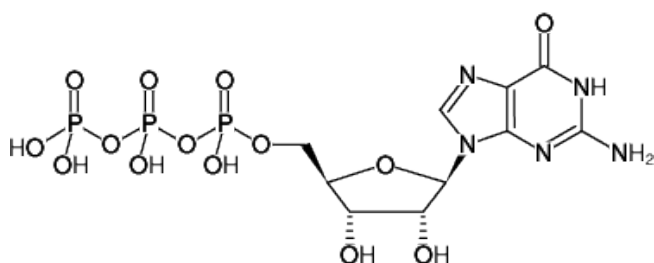
Selected References:

- [1] Lui *et al.* (2010) Evaluation of CT perfusion in setting of cerebral ischemia: patterns and pitfalls. *American Journal of Neuroradiology* **31**:1552.
- [2] Luoma (2010) Gene activation regresses arteriosclerosis, promotes health, and enhances longevity. *Lipids in health and disease* **9**:67.
- [3] Joo *et al.* (2010) Molecular mechanisms involved in farnesol-induced apoptosis. *Cancer letters* **287**:123.
- [4] Cabeen *et al.* (2010) A metabolic assembly line in bacteria. *Nature Cell Biology* **12**:731.
- [5] Jayasekara *et al.* (2013) 4-Alkoxyimino-cytosine nucleotides: tethering approaches to molecular probes for the P2Y6 receptor. *MedChemComm.* **4** (8):1156.
- [6] Garzia-Guzman *et al.* (1997) Molecular characterization and pharmacological properties of the human P2X3 purinoreceptor. *Mol. Brain Res.* **47** (1):59.
- Spangler *et al.* (2011) Interaction of the diguanylate cyclase YdeH of *Escherichia coli* with 2', (3')-substituted purine and pyrimidine nucleotides. *J. Pharmacol. Exp. Ther.* **336** (1):234.

**GTP Solid (>90%)**

Guanosine-5'-triphosphate, Sodium salt

Cat. No.	Amount
GTP_1000G	1.000 g



Structural formula of GTP Solid (>90%)

For in vitro use only!**Shipping:** shipped on blue ice**Storage Conditions:** store at -20 °C**Additional Storage Conditions:** Short term exposure (up to 1 week cumulative) to ambient temperature possible.**Shelf Life:** 12 months**Molecular Formula:** C₁₀H₁₆N₅O₁₄P₃ (free acid)**Molecular Weight:** 523.18 g/mol (free acid)**Exact Mass:** 522.99 g/mol (free acid)**CAS#:** 56001-37-7**Purity:** ≥ 90 % (HPLC)**Form:** lyophilised**Spectroscopic Properties:** λ_{max} 252 nm, ε 14.2 L mmol⁻¹ cm⁻¹ (Tris-HCl pH 7.0)**Applications:**Assembly of ribosomal units^[1]Microdomain formation by small GTPases^[2]Antiviral activity of large GTPases (dynamin superfamily)^[3]Regulation of exocytosis by Rho GTPases^[4]Mechanism of hydrolysis by ADP-ribosylation factors^[5]**Specific Ligands:**Guanylate binding proteins^[6]Yeast septins^[7]**Quality Control Specifications:** in vitro transcription (T7 RNA polymerase): visible RNA fragments after 5 min incubation, DNases, RNases, Nicking Activity: not detectable, Proteases: not detectable**Selected References:**[1] Blombach *et al.* (2011) Assembling the archeal ribosome: roles for transition factor-related GTPases. *Biochemical Society Transactions* **39**:45.[2] Stuermer (2011) Microdomain-forming proteins and the role of the reggies/flottilins during axon regeneration in zebrafish. *Biochimica Biophysica Acta, Molecular Basis of Disease* **1812**:415.[3] Haller *et al.* (2011) Human MxA protein: An Interferon-induced Dynamin-like GTPase with broad antiviral activity. *J. Interferon and Cytokine Research* **31**:79.[4] Stephane *et al.* (2011) Rho GTPases and exocytosis: what are the molecular links? *Seminars in Cell and Developmental Biology* **22**:27.[5] East *et al.* (2011) Models for the function of Arf GAPs. *Seminars in Cell and Developmental Biology* **22**:3.[6] Vestal *et al.* (2011) The guanylate binding proteins: Emerging insights into the biochemical properties and functions of this family of large interferon-induced guanosine triphosphatase. *J. Interferon and Cytokine Research* **31**:89.[7] Younghoon *et al.* (2011) Septin structure and function in yeast and beyond. *Trends in Cell Biology* **21**:141.Drummond *et al.* (2011) Reconstitution and Organization of Escherichia coli Proto-ring Elements (FtsZ and FtsA) inside Giant Unilamellar Vesicles Obtained from Bacterial Inner Membranes. *Methods Mol. Biol.* **777**:29.Katsuki *et al.* (2011) Preparation of dual-color polarity-marked fluorescent microtubule seeds. *Methods Mol. Biol.* **777**:117.Ramachandran *et al.* (2009) Membrane Insertion of the Pleckstrin Homology



GTP Solid (>90%)

Guanosine-5'-triphosphate, Sodium salt

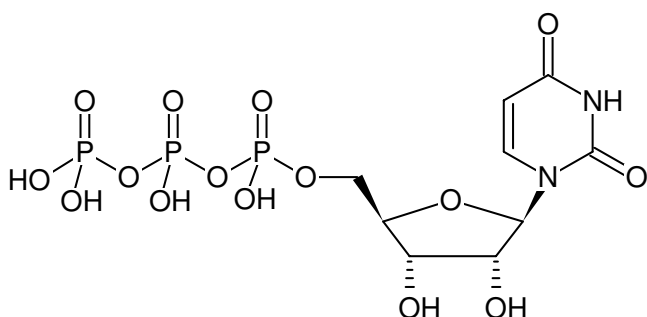
Domain Variable Loop 1 Is Critical for Dynamin-catalyzed Vesicle Scission.
Molecular Biology of the Cell **20 (22):4630.**



UTP Solid (>90%)

Uridine-5'-triphosphate, Sodium salt

Cat. No.	Amount
UTP_1000G	1.000 g



Structural formula of UTP Solid (>90%)

For in vitro use only!

Shipping: shipped on blue ice

Storage Conditions: store at -20 °C

Additional Storage Conditions: Short term exposure (up to 1 week cumulative) to ambient temperature possible.

Shelf Life: 12 months

Molecular Formula: C₉H₁₅N₂O₁₅P₃ (free acid)

Molecular Weight: 484.14 g/mol (free acid)

CAS#: 19817-92-6

Purity: ≥ 90 % (HPLC)

Form: lyophilised

Spectroscopic Properties: λ_{max} 262 nm, ε 9.8 L mmol⁻¹ cm⁻¹ (Tris-HCl pH 7.0)

Applications:

Activation of purinergic receptors^[1,2,3,4]

Cardioprotection against hypoxic damage^[2]

Enzyme kinetic parameters^[5]

Phosphorylation of EGF-receptor via purinergic receptors^[3]

Stimulation of neurogenesis and dopaminergic neurons^[6]

Specific Ligands:

Enterovirus 71 3D RNA polymerase^[7]

Ligand for purinergic receptors:

P2X₁^[4]
P2Y₂^[7,8,9,10]
P2Y₄^[8,10,11]
P2Y₆^[8]

Quality Control Specifications: in vitro transcription (T7 RNA polymerase): visible RNA fragments after 5 min incubation, DNases, RNases, Nicking Activity: not detectable, Proteases: not detectable

Selected References:

[1] Raqeeb *et al.* (2011) Purinergic P2Y2 receptors mediate rapid Ca²⁺ mobilization, membrane hyperpolarization and nitric oxide production in human vascular endothelial cells. *Cell Calcium* **49**:240.

[2] Golan *et al.* (2011) Extracellular nucleotide derivatives protect cardiomyocytes against hypoxic stress. *Biochemical Pharmacology* **81**:1219.

[3] Boucher *et al.* (2011) Distinct activation of epidermal growth factor receptor by UTP contributes to epithelial cell wound repair. *American Journal Pathology* **178**:1092.

[4] Sugihara *et al.* (2011) Dual signaling pathway of arterial constriction by extracellular uridine-5'-triphosphate in the rat. *J. Pharmacological Sciences (Japan)* **115**:293.

[5] Ma *et al.* (2011) Molecular cloning and analysis of the UDP-glucose pyrophosphorylase in *Streptococcus equi* subsp. *Zooepidemicus*. *Molecular Biology Reports* **38**:2751.

[6] Delic *et al.* (2011) Nucleotides affect neurogenesis and dopaminergic differentiation of mouse fetal midbrain-derived neural precursor cells. *Purinergic Signalling* **6**:417.

[7] Jiang *et al.* (2011) Biochemical characterization of enterovirus 71 3D RNA polymerase. *Biochim. Biophys. Acta, Gene Regulatory Mechanisms* **1809**:211.

**UTP Solid (>90%)**

Uridine-5'-triphosphate, Sodium salt

[8] Pendergast *et al.* (2001) Synthesis and P2Y receptor activity of a series of uridine dinucleoside 5'-polyphosphates. *Bioorg. Med. Chem. Lett.* **11 (2)**:157.

[9] Shaver *et al.* (1997) 4-substituted uridine 5'-triphosphates as agonists of the P2Y2 purinergic receptor. *Nucleosides and Nucleotides* **16 (7)**:1099.

[10] Kim *et al.* (2002) Methanocarpa modification of uracil and adenine nucleotides: High potency of northern ring conformation at P2Y1, P2Y2, P2Y4 and P2Y11 but not P2Y6 receptors. *J. Med. Chem.* **45**:208.

[11] Nguyen *et al.* (1995) Cloning, expression, and chromosomal localization of human uridine nucleotide receptors. *J. Biol. Chem.* **270 (52)**:30845.