Small Molecules

AICAR

AMPK activator

Catalog # 72704

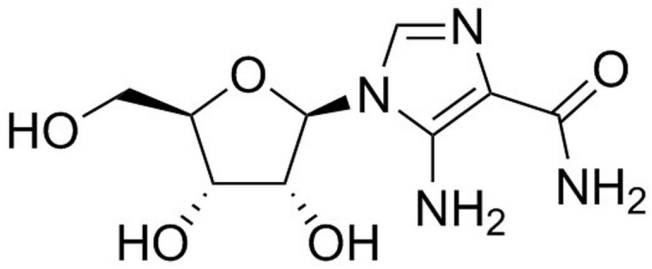
50 mg

STEMCELL™ TECHNOLOGIES
Scientists Helping Scientists™ | WWW.STEMCELL.COM
TOLL FREE PHONE 1 800 667 0322 • PHONE +1 604 877 0713
INFO@STEMCELL.COM • TECHSUPPORT@STEMCELL.COM
FOR GLOBAL CONTACT DETAILS VISIT OUR WEBSITE

Product Description

AICAR is an adenosine analog that selectively activates AMP-activated protein kinase (AMPK). AMPK functions as a metabolic sensor that regulates lipid and glucose metabolism to maintain cellular energy homeostasis and to protect against metabolic stress (Hardie & Carling). By activating AMPK, AICAR inhibits lipid synthesis and glucose uptake in hepatocytes and adipocytes, respectively (Corton et al.; Salt et al.).

Molecular Name:	AICAR
Alternative Names:	Acadesine; AICA Riboside; NSC 105823
CAS Number:	2627-69-2
Chemical Formula:	$C_9H_{14}N_4O_5$
Molecular Weight:	258.2 g/mol
Purity:	≥ 98%
Chemical Name:	5-amino-1-β-D-ribofuranosyl-1H-imidazole-4-carboxamide
Structure:	



Properties

Physical Appearance:	A crystalline solid
Storage:	Product stable at -20°C as supplied. Protect from prolonged exposure to light. Stable as supplied for 12 months from date of receipt.
Solubility:	· PBS (pH 7.2) ≤ 9 mM · DMSO ≤ 75 mM · Absolute ethanol ≤ 3 mM For example, to prepare a 10 mM stock solution in DMSO, resuspend 10 mg in 3.87 mL of fresh DMSO. Prepare stock solution fresh before use. Information regarding stability of small molecules in solution has rarely been reported, however, as a general guide we recommend storage in DMSO at -20°C. Aliquot into working volumes to avoid repeated freeze-thaw cycles. The effect of storage of stock solution on compound performance should be tested for each application. For use as a cell culture supplement, stock solution should be diluted into culture medium immediately before use. Avoid final DMSO concentration above 0.1% due to potential cell toxicity.

Published Applications

MAINTENANCE AND SELF-RENEWAL
· Induces upregulation of the pluripotency network genes (Klf4, Klf2, Nanog, Oct4, Myc, Sox2) and epigenetic-associated proteins (Dnmt3a, Mbd3) in mouse embryonic stem (ES) cells, and inhibits retinoic acid-induced differentiation (Adamo et al.; Shi et al.).
DIFFERENTIATION
· Promotes differentiation and mineralization of MC3T3-E1 osteoblastic cells (Kanazawa et al.).
· Inhibits proliferation and promotes osteogenic differentiation, while inhibiting adipogenic differentiation, of human amnion-derived mesenchymal stem cells (MSCs) and rabbit bone marrow-derived MSCs (Wu et al.).
· Suppresses proliferation and induces astroglial differentiation in neural stem cells (NSCs) and in the immortalized NSC line C17.2 (C17.2-NSC; Zang et al. 2008, 2009).
· Decreased proliferation and Nanog expression in mouse ES cells, with increased erythroid differentiation (Chae et al.).

References

Adamo L et al. (2009) AICAR activates the pluripotency transcriptional network in embryonic stem cells and induces KLF4 and KLF2 expression in fibroblasts. BMC Pharmacol 9: 2.
Chae H-D et al. (2012) 5-Aminoimidazole-4-carboxyamide ribonucleoside induces G(1)/S arrest and Nanog downregulation via p53 and enhances erythroid differentiation. Stem Cells 30(2): 140–9.
Corton JM et al. (1995) 5-aminoimidazole-4-carboxamide ribonucleoside. A specific method for activating AMP-activated protein kinase in intact cells? Eur J Biochem 229(2): 558–65.
Hardie DG & Carling D. (1997) The AMP-activated protein kinase--fuel gauge of the mammalian cell? Eur J Biochem 246(2): 259–73.
Kanazawa I et al. (2007) Adiponectin and AMP kinase activator stimulate proliferation, differentiation, and mineralization of osteoblastic MC3T3-E1 cells. BMC Cell Biol 8: 51.
Salt IP et al. (2000) 5-aminoimidazole-4-carboxamide ribonucleoside (AICAR) inhibits insulin-stimulated glucose transport in 3T3-L1 adipocytes. Diabetes 49(10): 1649–56.
Shi X et al. (2013) AICAR sustains J1 mouse embryonic stem cell self-renewal and pluripotency by regulating transcription factor and epigenetic modulator expression. Cell Physiol Biochem 32(2): 459–75.
Wu W et al. (2011) AICAR, a small chemical molecule, primes osteogenic differentiation of adult mesenchymal stem cells. Int J Artif Organs 34(12): 1128–36.
Zang Y et al. (2008) AICAR induces astroglial differentiation of neural stem cells via activating the JAK/STAT3 pathway independently of AMP-activated protein kinase. J Biol Chem 283(10): 6201–8.
Zang Y et al. (2009) AMP-activated protein kinase is involved in neural stem cell growth suppression and cell cycle arrest by 5-aminoimidazole-4-carboxamide-1-beta-D-ribofuranoside and glucose deprivation by down-regulating phospho-retinoblastoma protein and cyclin D. J Biol Chem 284(10): 6175–84.

Related Small Molecules

For a complete list of small molecules available from STEMCELL Technologies, visit www.stemcell.com/smallmolecules or contact us at techsupport@stemcell.com.

This product is hazardous. Please refer to the Safety Data Sheet (SDS).