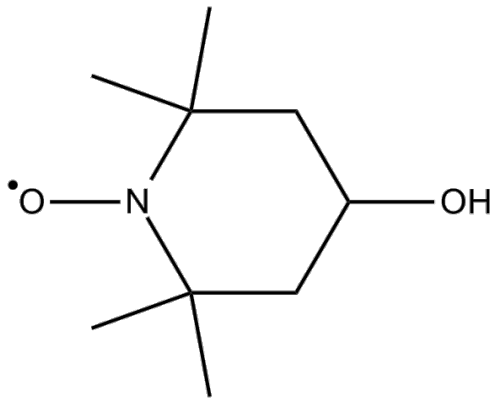
Product Data Sheet

Product Name: Tempol
Cat. No.: GC17151

Chemical Properties

Cas. No.	2226-96-2		
Chemical Name	1-λ1-oxidanyl-2,2,6,6-tetramethylpiperidin-4-ol		
SMILES	CC1(CC(CC(N1[O])(C)C)O)C		
Formula	$C_9H_{18}NO_2$	M.Wt	172.24
Solubility	≥ 15.55mg/mL in DMSO	Storage	Store at -20°C
General tips	For obtaining a higher solubility , please warm the tube at 37 °C and shake it in the ultrasonic bath for a while.Stock solution can be stored below -20°C for several months.		
Shipping Condition	Evaluation sample solution : ship with blue ice All other available size: ship with RT , or blue ice upon request.		

Structure



Protocol

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Cell experiment: To investigate the effect of Tempol, DEF, and DEF coadministered with Tempol on H2O2-mediated cell injury and death, confluent cultures of PT cells are preincubated (10 min at 37°C) with Tempol (0.03 to 10 mM), DEF (0.03 to 10 mM), or DEF (3 mM) in combination with Tempol (3 mM). The ranges of concentrations of Tempol and DEF are based on those previously shown in this laboratory to reduce on H2O2-mediated cell injury and death in (1) cultured rat cardiac myoblasts (Tempol) and (2) primary cultures of rat PT cells (DEF). PT cell cultures are then incubated with H2O2 (1 mM) for four hours, after which cellular injury and death are assessed. Upon completion of incubations, cellular injury and death are assessed using the spectrophotometric assays described later in this article[2].

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Animal experiment: Mice[1] Female or male BALB/c mice (5-7 weeks of age) are used. Mice are infected intraperitoneally (i.p.) with 102 blood trypomastigote forms of the type I Colombian strain of T. cruzi. Treatments are performed daily for 30 days from the establishment of CCC (60 dpi) by i.p. injection of 15 mg/kg trans-resveratrol (10% ethanol/PBS), vehicle (10% ethanol/PBS), 5 mg/Kg EX527 (0.1% DMSO), or peroral administration of 40 mg/Kg Resveratrol (10%ethanol-PBS), 500 mg/kg Metformin (dissolved in water), 100 mg/kg Tempol (dissolved in water), Benznidazole (25 mg/Kg, dissolved in water) and vehicle (water or 10%ethanol-PBS). Rats[2] 83 male Wistar rats weighing 230 to 320 g are used.Upon completion of surgical procedures, the animals are randomly allocated to the eight groups. At one minute before commencement of reperfusion, animals received a bolus injection of either vehicle (saline, 4 mL/kg, IV), Tempol (30 mg/kg in saline, IV), DEF (40 mg/kg in saline, IV), or DEF (40 mg/kg in saline, IV) in combination with Tempol (30 mg/kg in saline, IV). The corresponding groups then received a continuous infusion of one of the following throughout the reperfusion period: vehicle (saline, 4 mL/kg/h, IV), Tempol (30 mg/kg/h in saline, IV), DEF (40 mg/kg/h in saline, IV), or Tempol and DEF in combination (30 and 40 mg/kg/h, respectively, in saline, IV). To elucidate the effects of Tempol or DEF on cardiovascular hemodynamics and organ function in sham-operated rats, respective groups of animals received the treatments described previously in this article and as outlined. The concentration of Tempol administered in vivo is based on those previously demonstrated by us to provide significant protection against myocardial ischemia/reperfusion injury in an in vivo rat model. Similarly, the concentration of DEF used is identical to that which we have previously used to provide significant protection against hepatic ischemia/reperfusion injury in in vivo rat and rabbit models.

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References:

[1]. Vilar-Pereira G, et al. Resveratrol Reverses Functional Chagas Heart Disease in Mice. PLoS Pathog. 2016 Oct 27;12(10):e1005947.
[2]. Chatterjee PK, et al. Tempol, a membrane-permeable radical scavenger, reduces oxidant stress-mediated renal dysfunction and injury in the rat. Kidney Int. 2000 Aug;58(2):658-73.

Background

Tempol is a superoxide scavenger (superoxide dismutase mimetic). It is a member of non-thiol-containing radiation protectors that can permeate the membrane.

In vitro, Tempol disrupted H2O2-mediated reduction in mitochondrial respiration and increase in LDH secretion from rat PT cells, suggesting in a decrease in cell injury and death, [1]. In human prostate cancer cell, Tempol activated uPAR (urokinase receptor) [2].

In vivo, Tempol treatment showed 1) renal function and injury improvement 2) PMN infiltration and lipid peroxidation reduction 3) reduced nitrosative and oxidative stress [1]. In cirrhotic rats, Tempol decreased portal pressure and raised portal blood flow [3]. In 2K1C rats, Tempol inhibited upregulation of TGF-beat and MMPs, and prevented changes of cardiac hypertensive [4]. It also prevented cerebral vessel remodeling in hypertensive rats [5].

References:
1. Chatterjee PK, Cuzzocrea S, Brown PA et al. Tempol, a membrane-permeable radical scavenger, reduces oxidant stress-mediated renal dysfunction and injury in the rat. Kidney Int. 2000 Aug;58(2):658-73.
2. Lejeune D, Hasanuzzaman M, Pitcock A et al. The superoxide scavenger TEMPOL induces urokinase receptor (uPAR) expression in human prostate cancer cells. Mol Cancer. 2006 Jun 6;5:21.
3. García-Calderó H, Rodríguez-Vilarrupla A, Gracia-Sancho J et al. Tempol administration, a superoxide dismutase mimetic, reduces hepatic vascular resistance and portal pressure in cirrhotic rats. J Hepatol. 2011 Apr;54(4):660-5.
4. Rizzi E, Castro MM, Ceron CS et al. Tempol inhibits TGF-β and MMPs upregulation and prevents cardiac hypertensive changes. Int J Cardiol. 2013 Apr 30;165(1):165-73.
5. Pires PW, Deutsch C, McClain JL et al. Tempol, a superoxide dismutase mimetic, prevents cerebral vessel remodeling in hypertensive rats. Microvasc Res. 2010 Dec;80(3):445-52.

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