Product Data Sheet

Product Name: FICZ
Cat. No.: GC36043

Chemical Properties

Cas. No.	172922-91-7		
SMILES	O=CC1=C2C(NC3=C2C=CC=C3)=CC4=C1NC5=C4C=CC=C5		
Formula	$C_{19}H_{12}N_2O$	M.Wt	284.31
Solubility	DMSO : 10 mg/mL (35.17 mM)	Storage	Store at -20°C
General tips	For obtaining a higher solubility , please warm the tube at 37 ℃ and shake it in the ultrasonic bath for a while.Stock solution can be stored below -20℃ 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	FICZ		

Protocol

Cell experiment [1]:

Cell lines	BMSCs
Preparation Method	To detect the inflammatory responses of BMSCs, the cells were rendered quiescent by serum starvation and then stimulated with 1 μg ml-1 lipopolysaccharide (LPS) supplemented with 500 nM FICZ, 1 μM SR1 (AhR antagonist StemRegenin 1) or dimethyl sulphoxide (DMSO) for 6 h.
Reaction Conditions	500 nM; 6h

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Applications	The results demonstrated that LPS significantly up-regulated the expressions of IL-1β, 6 and TNF-α and FICZ or SR1 prevented or exacerbated the inflammatory responses.

Animal experiment [2]:

Animal models	Male C57BL/6J mice (24-29 g, 10 weeks of age)
Preparation Method	Animals were randomized into the following four groups: Sham-treated with vehicle or with FICZ and TAC-treated with vehicle or with FICZ. Treatment with FICZ (i.p., 5 mg kg-1) or with vehicle (dimethylsulfoxide) was initiated 5 min after Sham or TAC surgery and was repeated 2 days after surgery. CMRI was performed on 8 animals in each group before and 3 days after surgery. Subsequently, animals were anesthetized with isoflurane, and hearts were excised, weighed, and prepared for biochemical and immunofluorescence studies.
Dosage form	5 mg/kg; i.p.,
Applications	Cardiac structure and function were evaluated by cardiac magnetic resonance imaging (CMRI) before and 3 days after Sham or TAC surgery in mice treated with FICZ or with vehicle, and cardiac tissue was used for biochemical studies. CMRI analysis revealed that FICZ improved cardiac function and attenuated cardiac hypertrophy.

References:

Huang J, et al. Beneficial roles of the AhR ligand FICZ on the regenerative potentials of BMSCs and primed cartilage templates. RSC Adv. 2022 Apr 13;12(18):11505-11516.
Tamayo M, et al. The Aryl Hydrocarbon Receptor Ligand FICZ Improves Left Ventricular Remodeling and Cardiac Function at the Onset of Pressure Overload-Induced Heart Failure in Mice. Int J Mol Sci. 2022 May 12;23(10):5403.

Background

FICZ (Formyl-indolo [3,2-b] carbazole), as an endogenous ligand for the aryl hydrocarbon receptor (AhR), can exert pleiotropic effects including protection against inflammation, fibrosis, and oxidative stress[1].

In vitro, treatment with 0.01 nM-1 μM FICZ in HepG2 cells, FICZ stimulated cell growth at low concentrations but inhibited cell growth at high concentrations[2]. In vitro experiment it demonstrated that treatment LPS combined with 200 nM FICZ in YAMC cells did not influence LPS-induced IL-6 release[3]. In vitro, 50 μM FICZ obviously induced apoptosis, whereas all tested compounds in higher concentrations (L-KYN 1 mM, KYNA 5 mM, FICZ 50 μM) increased necrosis in melanoma A375 cells. Statistically, FICZ obviously inhibited DNA synthesis in A375 cells at a concentration range of 10-6-50 μM,

but there is only observed inhibitory effect on RPMI7951 cells in the highest tested micromolar concentrations[4].

In vivo efficacy test it shown that per mouse was treatment with 1 μg (50 μg/kg) intraperitoneally enhanced the level of IL-22 in colonic samples, and ameliorated colitis induced by TNBS (trinitrobenzene sulfonic acid) or DSS (dextran sulfate sodium)[5]. In vivo, 10 μg/kg FICZ in mice orally resulted in transient AhR activation, with the effect waning in less than 18h[6].

[1]Tamayo M, et al. The Aryl Hydrocarbon Receptor Ligand FICZ Improves Left Ventricular Remodeling and Cardiac Function at the Onset of Pressure Overload-Induced Heart Failure in Mice. Int J Mol Sci. 2022 May 12;23(10):5403.

[2]Mohammadi-Bardbori A, et al. The highly bioactive molecule and signal substance 6-formylindolo[3,2-b]carbazole (FICZ) plays bi-functional roles in cell growth and apoptosis in vitro. Arch Toxicol. 2017 Oct;91(10):3365-3372.

[3]Li X, et al. 6-Formylindolo (3, 2-b) Carbazole (FICZ)-mediated protection of gut barrier is dependent on T cells in a mouse model of alcohol combined with burn injury. Biochim Biophys Acta Mol Basis Dis. 2020 Nov 1;1866(11):165901.

[4]Walczak K, et al. Effect of Tryptophan-Derived AhR Ligands, Kynurenine, Kynurenic Acid and FICZ, on Proliferation, Cell Cycle Regulation and Cell Death of Melanoma Cells-In Vitro Studies. Int J Mol Sci. 2020 Oct 26;21(21):7946.

[5]Rannug A. How the AHR Became Important in Intestinal Homeostasis-A Diurnal FICZ/AHR/CYP1A1 Feedback Controls Both Immunity and Immunopathology. Int J Mol Sci. 2020 Aug 8;21(16):5681.

[6]Wheeler JL, et al. Differential consequences of two distinct AhR ligands on innate and adaptive immune responses to influenza A virus. Toxicol Sci. 2014 Feb;137(2):324-34.