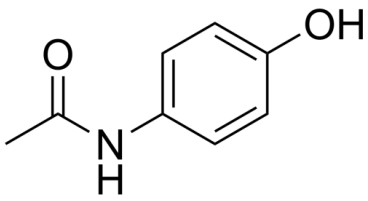
Data Sheet

Product Name:	Acetaminophen
Cat. No.:	CS-2819
CAS No.:	103-90-2
Molecular Formula:	$C_8H_9NO_2$
Molecular Weight:	151.16
Target:	Bacterial; COX; Endogenous Metabolite; Histone Acetyltransferase; Parasite
Pathway:	Anti-infection; Epigenetics; Immunology/Inflammation; Metabolic Enzyme/Protease
Solubility:	DMSO : 250 mg/mL (1653.88 mM; Need ultrasonic); H2O : 10 mg/mL (66.16 mM; Need ultrasonic)



BIOLOGICAL ACTIVITY:

Acetaminophen (Paracetamol) is a selective cyclooxygenase-2 (**COX-2**) inhibitor with an **IC_{50}** of 25.8 μM; is a widely used antipyretic and analgesic agent[1][2][3]. Acetaminophen is a potent **hepatic N-acetyltransferase 2 (NAT2)** inhibitor[4]. IC50 & Target: IC50: 113.7 μM (COX-1), 25.8 μM (COX-2)[1] ***In Vitro: In vitro***, acetaminophen elicites a 4.4-fold selectivity toward COX-2 inhibition (IC_{50} 113.7 μM for COX-1; IC_{50} 25.8 μM for COX-2). Following oral administration of the drug, maximal ***ex vivo*** inhibitions are 56% (COX-1) and 83% (COX-2). Acetaminophen plasma concentrations remaine above the ***in vitro*** IC_{50} for COX-2 for at least 5 h postadministration. ***Ex vivo*** IC_{50} values (COX-1: 105.2 μM; COX-2: 26.3 μM) of acetaminophen compared favorably with its ***in vitro*** IC_{50} values. In contrast to previous concepts, acetaminophen inhibited COX-2 by more than 80%, i.e., to a degree comparable to nonsteroidal antiinflammatory drugs (NSAIDs) and selective COX-2 inhibitors. However, a >95% COX-1 blockade relevant for suppression of platelet function is not achieved[1]. MTT assay shows that Acetaminophen (APAP) in a dose of 50 mM significantly ($p<0.001$) reduces cell viability to 61.5±6.65%. Interestingly, the significant ($p<0.01$) increase in cell viability to 79.7±2.47% is observed in the Acetaminophen/HV110 co-treated cells, compared to Acetaminophen treated cells[2]. ***In Vivo:*** Administering Acetaminophen (250 mg/kg, orally) to the mice causes significant ($p<0.001$) liver damage and necrosis of cells as evidenced by the elevated serum hepatic enzymes alanine aminotransferase (ALT), aminotransferase (AST), alkaline phosphatase (ALP), and gamma-glutamyl transferase (γGT) compared with normal group. Conversely, effects of pretreatment with different doses of citral (125, 250, and 500 mg/kg) exhibited a significant ($p<0.05$) decrease in serum activities of ALT (91.79%, 93.07%, and 95.61%, resp.), AST (93.40%, 91.89%, and 96.52%, resp.), ALP (39.29%, 37.07%, and 59.80%, resp.), and γGT (92.83%, 91.59%, and 93.0%, resp.), when compared to the Acetaminophen group. Similar results were found in pretreatment with SLM on the activity of ALT (95.90%), AST (95.03%), ALP (70.52%), and γGT (92.69%)[3].

PROTOCOL (Extracted from published papers and Only for reference)

Cell Assay: [2]Human hepatoma cell line HepG2 is cultured in low glucose DMEM supplemented with 10% fetal bovine serum (FBS), 100 U/mL Penicillin and 100 μg/mL Streptomycin and 2 mM l-glutamine. The cells are maintained in 75 cm^2 flasks at 37°C in a humidified atmosphere containing 5% CO_2 and split at 80% confluence every 5 days. Cells are seeded in 24-well plate (2×10^5 cells) and incubated at 37°C overnight followed by cells pretreatment with complete DMEM containing high glucose concentration in order to downregulate autophagy. After 6 h, cells are treated with different concentrations of postbiotics obtained from ***Lactobacillus fermentum*** BGHV110 strain (HV110) in order to select appropriate dose for further experiments. Postbiotic is dissolved in complete DMEM medium and added to the cells in specific final concentration. In all other experiments seeded cells are treated with 50 mM Acetaminophen alone or co-treated with 50 mM Acetaminophen and selected dose of lyophilized HV110. To analyze autophagic flux, simultaneously with treatments, cells are exposed to lysosomotropic agent Chloroquine at a concentration of 25 μM, to inhibit

autophagosome-lysosome fusion[2].

Animal Administration: Acetaminophen (APAP) is prepared in vehicle (saline that contains 0.1% Tween 80 solution) (Mice)[2].[3]

Mice[3]

Male *Swiss* mice (30-40 g) are used. The experimental animals are divided into six groups of five animals each. Firstly, each group receive orally during seven days the following treatment: Group I: the mice do not receive any treatment (normal). Group II: the mice receive citral vehicle (0.1% Tween 80 solution). Groups III-V: the mice are pretreated with citral at doses of 125, 250, and 500 mg/kg, respectively. Group VI: the mice are pretreated with the hepatoprotective standard drug Silymarin (SLM) (200 mg/kg). After this time, the animals fasted for 8 h and then receive oral Acetaminophen on the seventh day at a dose of 250 mg/kg in Groups II-VI. Group I orally receive saline that contained 0.1% Tween 80 solution (Acetaminophen vehicle). The stock solution is used as the first concentration of 50 mg/mL and after that is diluted in 0.1% Tween 80 solution to prepare the solutions of 25 and 12.5 mg/mL. After 12 h of Acetaminophen administration, serum samples and liver tissue are collected followed by biochemistry and histological analysis.

References:

[1]. Hinz, B, et al. Acetaminophen (paracetamol) is a selective cyclooxygenase-2 inhibitor in man. FASEB J, 2008. 22(2): p. 383-90.

[2]. Miroslav Dinić, et al. Lactobacillus fermentum Postbiotic-induced Autophagy as Potential Approach for Treatment ofAcetaminophen Hepatotoxicity. Front Microbiol. 2017 Apr 6;8:594.

[3]. Uchida NS, et al. Hepatoprotective Effect of Citral on Acetaminophen-Induced Liver Toxicity in Mice. Evid Based Complement Alternat Med. 2017;2017:1796209.

[4]. Rothen JP, et al. Acetaminophen is an inhibitor of hepatic N-acetyltransferase 2 in vitro and in vivo. Pharmacogenetics. 1998 Dec;8(6):553-9.

CAIndexNames:

Acetamide, N-(4-hydroxyphenyl)-

SMILES:

O=C(C)NC1=CC=C(O)C=C1

Caution: Product has not been fully validated for medical applications. For research use only.

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