

5-Fluorouracil

Nucleobase analog for *in vitro* and *in vivo* cytotoxicity assays

Catalog code: sud-5fu

<https://www.invivogen.com/5-fluorouracil>

For research use only. Not for human use.

Version 21G12-MM

PRODUCT INFORMATION

Contents

250 mg at 10 mg/ml

5-fluorouracil (5-FU) is supplied as one bottle of a colorless, water soluble solution at a concentration of 10 mg/ml, filtered to sterility for customer convenience.

Storage and stability

- 5-FU is shipped at room temperature. Upon receipt, store at room temperature (15-25°C) in a cool and dark place.
- 5-FU is stable for at least one year when properly stored.

Quality control

- Purity ≥97% (UHPLC)
- The absence of bacterial contamination (e.g. lipoproteins and endotoxins) has been confirmed using HEK-Blue™ TLR2 and HEK Blue™ TLR4 cells.

SAFETY CONSIDERATIONS

5-FU exhibits reproductive toxicity. Refer to the safety data sheet for handling instructions.

DESCRIPTION

5-FU is a nucleobase analog of uracil in which the hydrogen at position 5 is replaced by fluorine. It is widely used for chemotherapy as an antineoplastic, antimetabolic agent¹⁻⁴. It is a pyrimidine antagonist that functions by inhibiting DNA synthesis. As with all pyrimidine antagonists, 5-FU is a pro-drug and the intracellular conversion of 5-FU into 5-fluoro-uridine-monophosphate (FUMP) and 5-fluoro-deoxy-uridine-monophosphate (FdUMP) is essential for its action. The active metabolite 5-FdUMP is an irreversible inhibitor of thymidylate synthase (TS) and hence of DNA synthesis through deoxythymidine triphosphate (dTTP) deprivation which in turn leads to apoptosis. As 5-FU is similar in shape but does not undergo the same chemistry as uracil, it inhibits RNA replication enzymes, thereby blocking RNA synthesis and stopping the growth of cancerous cells. Hence, the antitumor activity results from the inhibition of TS by FdUMP, as well as from the incorporation of 5-FU metabolites into RNA and DNA¹.

1. Sethy C. & Kundu C.N., 2021. 5-Fluorouracil (5-FU) resistance and the new strategy to enhance the sensitivity against cancer: Implication of DNA repair inhibition. *Biomed Pharmacother.* 137:111285. 2. Entezar-Almahdi E. *et al.*, 2020. Recent Advances in Designing 5-Fluorouracil Delivery Systems: A Stepping Stone in the Safe Treatment of Colorectal Cancer. *Int J Nanomedicine.* 15:5445-5458. 3. Tsukihara H. *et al.*, 2016. Folic Acid-Metabolizing Enzymes Regulate the Antitumor Effect of 5-Fluoro-2'-Deoxyuridine in Colorectal Cancer Cell Lines. *PLoS One.* 11(9):e0163961. 4. Longley D.B. *et al.*, 2003. 5-fluorouracil: mechanisms of action and clinical strategies. *Nat Rev Cancer.* 3(5):330-8.

CYTOTOXICITY OF 5-FU

5-FU readily enters the cell using the same facilitated transport mechanism as uracil and is rapidly converted into cytotoxic nucleotides. Therefore, to avoid systemic toxicity of 5-FU, doses must be minimized. For this reason, InvivoGen has created vectors carrying genes encoding uracil phosphoribosyltransferase (UPRT), an enzyme found in prokaryotes and lower eukaryotes but apparently absent from mammalian cells. UPRT catalyzes the direct conversion of 5-FU to 5-FUMP, whereas in mammalian cells 5-FU is converted to 5-FUMP through the concerted action of two highly regulated enzymes. Therefore, the expression of UPRT substantially increases 5-FU cytotoxicity in transfected cells. UPRT encoding genes available from InvivoGen are *E. coli upp* and *S. cerevisiae fur*. Both genes were fused to cytosine deaminase genes to generate the following fusion genes: *E. coli codA::upp* and *S. cerevisiae fcy::fur*. For more information, visit <https://www.invivogen.com>.

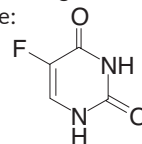
CHEMICAL PROPERTIES

CAS number: 51-21-8

Formula: C₄H₃FN₂O₂

Molecular weight: 130.1 g/mol

Structure:



METHOD

Cytotoxicity assay:

1. Seed cells at a density of 1 x 10³ cells/well in a 96-well plate containing 100 µl of culture medium.
2. Prepare sterile stock dilutions of the 10 mg/ml 5-FU solution.
3. Following an overnight incubation, add increasing concentrations of 5-FU to the wells.

Note: Include a control well without 5-FU.

4. After 5-7 days, wash cells with fresh medium and assess cytotoxicity using the method of your choice such as the trypan blue dye exclusion assay.

RELATED PRODUCTS

Product	Description	Cat. Code
Ganciclovir	For HSV-tk/GCV selection	sud-gcv
pSELECT-zeo-Fcy::fur	Plasmid encoding <i>Fcy::fur</i>	psetz-fcyfur
pUNO1-codA::upp	Plasmid encoding <i>codA::upp</i>	puno1-codaupp

TECHNICAL SUPPORT

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