

<b>Product Name:</b>	Cefepime
<b>Product Number:</b>	C008
<b>CAS Number:</b>	88040-23-7
<b>Molecular Formula:</b>	$C_{19}H_{24}N_6O_5S_2$
<b>Molecular Weight:</b>	480.56
<b>Form:</b>	Powder
<b>Appearance:</b>	White or off-white powder
<b>Solubility:</b>	sparingly soluble in aqueous solution
<b>Source:</b>	Semi-synthetic
<b>Storage Conditions:</b>	-20°C
<b>Description:</b>	<p>Cefepime is a broad-spectrum, fourth-generation cephalosporin antibiotic. It is commonly used in antimicrobial susceptibility testing. It is sparingly soluble in water (17.3 mg/ml). Cefepime has potential for use as an antitumor agent, showing inhibition of human breast cancer cells <i>in vitro</i> when complexed with manganese.</p> <p>We also offer:</p> <ul style="list-style-type: none"><li>• Cefepime Hydrochloride (<a href="#">C009</a>)</li></ul>
<b>Mechanism of Action:</b>	<p>Like <math>\beta</math>-lactams, cephalosporins interfere with penicillin binding protein (PBP) activity involved in the final phase of peptidoglycan synthesis. PBP's catalyze a pentaglycine crosslink between alanine and lysine residues providing additional strength to the cell wall. Without a pentaglycine crosslink, the integrity of the cell wall is severely compromised and ultimately leads to cell lysis and death. Resistance to cephalosporins is commonly due to cells containing plasmid-encoded <math>\beta</math>-lactamases. Interestingly, cefepime is resistant to various <math>\beta</math>-lactamases encoded by otherwise resistant <math>\beta</math>-lactam bacteria strains.</p>
<b>Spectrum:</b>	<p>Cefepime is a broad-spectrum antibiotic targeting a wide variety of naturally antibiotic resistant Gram-positive and Gram-negative bacteria. Some of these naturally resistant bacteria include <i>Pseudomonas aeruginosa</i>, <i>Staphylococcus aureus</i>, and <i>Streptococcus pneumoniae</i>.</p>

**Microbiology Applications** Cefepime is commonly used in clinical *in vitro* microbiological antimicrobial susceptibility tests (panels, discs, and MIC strips) against Gram -positive and Gram-negative microbial isolates. Medical microbiologists use AST results to recommend antibiotic treatment options.

- *Pseudomonas aeruginosa* 32 µg/mL – 256 µg/mL
- *Staphylococcus aureus* 2 µg/mL – 16 µg/mL.
- For a representative complete list of cefepime MIC values, [click here](#).

Cefepime was used in a MALDI-TOF MS-based direct-on-target microdroplet growth assay as part of a screening panel for rapid detection of ESBL, and AmpC β-Lactamases in *Enterobacterales* (Correa-Martinez et al, 2019).

## Cancer Applications

Cefepime (50mM) was mixed with 8 different metal salts (copper, zinc, cobalt, nickel, cadmium, chromium, iron, and manganese ) in a 1:1 ratio and evaluated for proteasome-inhibitory and anti-proliferative properties using MDA-MB 231 human breast cancer cells. The complex with manganese had the highest inhibition of cell proliferation and proteasome activity. The complex induced apoptosis in a dose-and time-dependent manner and has the potential for use as an antitumor agent (Zhang et al, 2015).

## References:

Georgopapadakou NH and Bertasso A (1993) Mechanisms of Action of Cephalosporin 3'-quinolone Esters, Carbamates, and Tertiary Amines in *Escherichia Coli*. *Antimicrob. Agents. Chemother.* 37(3):559-565

Zhang Z, Bi C, Fan Y, Wang H and Bao Y (2015) Cefepime, a fourth-generation cephalosporin, in complex with manganese, inhibits proteasome activity and induces the apoptosis of human breast cancer cells. *Int. J. Molec. Med.* 36(4): 1143-1150

### Cefepime from TOKU-E:

Correa-Martinez C, Idelevich EA, Sparbier K, Kostrzewa M, and Becker K (2019) Rapid detection of extended-spectrum B-lactamases (ESBL) and AmpC B-Lactamases in *Enterobacterales*: Development of a screening panel using the MALDI-TOF MS-based direct-on-target microdroplet growth assay. *Front. Microbiol.* 10:13 PMID 30733710