# Clarithromycin, USP
# PRODUCT DATA SHEET

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| **Product Name:** | Clarithromycin, USP |
| **Product Number:** | C033 |
| **CAS Number:** | 81103-11-9 |
| **Molecular Formula:** | $C_{38}H_{69}NO_{13}$ |
| **Molecular Weight:** | 747.95 |
| **Form:** | Powder |
| **Appearance:** | White crystalline powder |
| **Source:** | Semi-synthetic |
| **Water Content (Karl Fischer):** | ≤ 2.0% |
| **pH:** | 8.0-10.0 |
| **Optical Rotation:** | -94° to -102° |
| **Storage Conditions:** | Store in cool, dry conditions in well sealed containers. |
| **Description:** | Clarithromycin, USP is a macrolide antibiotic that is derivative of Erythromycin. This compound is both a substrate and inhibitor of CYP3A4. Clarithromycin related EvoPure compounds C, D, H, I, J, K, L, M and Z are also available which are highly pure derivatives. Clarithromycin is slightly soluble in aqueous solution (0.33 µg/mL). The compound has shown anti-cancer properties. Clarithromycin, USP conforms to United States Pharmacopeia specifications.<br><br>For all Clarithromycin products, click here. |
| **Mechanism of Action:** | Macrolide antibiotics inhibit bacterial growth by targeting the 50S ribosomal subunit preventing peptide bond formation and translocation during protein synthesis. Resistance to Clarithromycin is commonly attributed to mutations in 50S rRNA preventing Clarithromycin binding allowing the cell to synthesize error-free proteins.<br><br>Anti-cancer mechanisms include reduction of cytokines, inhibition of autophagy, and anti-angiogenesis. The compound can act on signal transduction pathways, transcription factors, drug pharmacokinetics, growth signals, and metastasis. These features can be exploited to make tumor cells more prone to apoptosis and reduce escape mechanisms. The mechanism used depend on the type of cancer. |
| **Spectrum:** | Clarithromycin is a broad-spectrum antibiotic with bacteriostatic action wide range of Gram- positive and Gram-negative bacteria including anaerobes. It is also effective for Mycoplasma and Mycobacteria. |

**Microbiology Applications**

Clarithromycin 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 for infected patients. Representative MIC values include:

- *Haemophilus influenza* 2 µg/mL - 32 µg/mL
- *Streptococcus pneumoniae* 0.12 µg/mL – 64 µg/mL
- For a complete list of clarithromycin MIC values, click here.

TOKU-E's Clarithromycin used in methacrylate-based copolymer films that released the compound (along with doxycycline and rifampicin) for up to 21 days were found to prevent biofilm formation when in an *in vitro* bioreactor model (Rose et al, 2015).

**Cancer Applications**

Clarithromycin is involved in autophagy-lysosome pathway. It can inhibit autophagy in myeloma and myeloid leukaemia cells. It inhibits lysosomal function after fusion of the autophagosomes with the lysosomes. Thus, it could be a potential adjuvant where autophagy is used by the tumor as an escape mechanism. (Nakamura et al, 2010).

The combined treatment of clarithromycin with the proteasome inhibitor bortezomib enhances cytotoxicity in the breast cancer cell lines MDA-MB-231 and MDA-MB-468. A wild-type murine embryonic fibroblast (MEF) cell line also exhibited enhanced cytotoxicity (Komatsu et al, 2012).

Direct antineplastic effects of CAM may depend on the tumor type. Researchers found a direct anti-tumor activity of CAM on lymphoma cells (Ochi et al, 2006) and it directly induced apoptosis in a murine B cell lymphoma cell line (Ohara et al, 2004).

**References:**


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