Mitomycin C
PRODUCT DATA SHEET

issue date 01/06/2020

Product Name:	Mitomycin C
Product Number:	M009
CAS Number:	50-07-7
Molecular Formula:	$C_{15}H_{18}N_4O_5$
Molecular Weight:	334.33
Form:	Powder
Appearance:	Violet blue crystal
Solubility:	Water: Soluble
Source:	*Streptomyces caespitosus*
Water Content (Karl Fischer):	≤2.5%
Potency (on a dry basis):	≥970 µg/mg
pH:	6.0-7.5
Melting Point:	360°C
Storage Conditions:	2-8°C
Description:	Mitomycin C is a natural methylazirinopyrroloindoledione antineoplastic antibiotic isolated from *Streptomyces* spp that is able to inhibits bacterial DNA synthesis. Many structural variants of Mitomycin C have been isolated, and are called the Mitomycins. Mitomycin C has a unique and efficient mechanism of action of crosslinking DNA, and even a single crosslink per genome can cause death of a bacterial cell. It was discovered in the 1950s in Japan from fermentation cultures of S. caespitosus. Mitomycin C has anti-tumor properties.
Mechanism of Action:	Mitomycin C is activated by reduction *in vivo* , generating oxygen radicals which produce crosslinks in DNA by alkylation. The Mitomycin C itself does not react with DNA. Rather, upon reduction of the quinone, a transformation ensues, and the aziridine ring opens to product the unstable vinylogous quinone methide 2, which has high alkylating reactivity. It has high efficiency and specificity for CpG sequences, and these sequences are very rare in the mammalian genome, thus mammalian DNA is crosslinked relatively poorly. This mechanism ultimately inhibits DNA synthesis. It can also cause mutagenesis and stimulate genetic recombination, chromosome breakage, and sister chromatid exchange.
Spectrum:	Mitomycin C is broad-spectrum, effective for Gram-negative and Gram-positive bacteria.

Cancer Applications

The antiproliferative effects of Mitomycin C may have a role in treating cancer as it was shown to inhibit the progression of dermal Kaposi's sarcoma post renal transplantation.

Since only 5% of all guanines in the mammalian genome are present in CpG islands, it isn't optimally designed for killing tumor cells. However, retaining this cross-linking ability but altering the sequence specificity could allow the design of more efficacious anti-tumor properties (Tomasz, 1995).

References:

Renault J, Baron M; Mailliet P (1981). Heterocyclic quinones.2.Quinoxaline-5,6-(and 5-8)-diones - Potential antitumoral agents. Eur. J. Med. Chem. 16(6):545–550

Mao Y, Varoglu M and Sherman DH (1999) Molecular characterization and analysis of the biosynthetic gene cluster for the antitumor antibiotic mitomycin C from *Streptomyces lavendulae* NRRL 2564. *Chem. and Biology* 6(4): 251–263

Szybalski, W and Iyer VN (1964) Crosslinking of DNA by enzymatic or activated mitomycins and porfiromycins, bifunctionally 'alkylating' antibiotics. Feder. Proc. 23:946-957

Tomasz M (1995) Mitomycin C: Small, fast and deadly (but very selective). Chem. Biol. 2(9):575-579 PMID 9383461