Fluconazole
PRODUCT DATA SHEET

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Product Name:	Fluconazole
Product Number:	F010
CAS Number:	86386-73-4
Molecular Formula:	$C_{13}H_{12}F_2N_6O$
Molecular Weight:	306.27
Form:	Powder
Appearance:	White or almost white crystalline powder
Solubility:	Practically insoluble in water (0.001 mg/ml). Sparingly soluble in ethanol (20 mg/ml) and DMSO (33 mg/ml).
Source:	Synthetic
Storage Conditions:	≤30°C
Description:	Fluconazole is broad-spectrum fungistatic first-generation triazole antifungal developed and patented by Pfizer in 1981 in the UK. It targets ergosterol synthesis in a wide range of fungal species such as *Candida* and *Cryptococcus.* It differs from other azole antifungals in that it contains a friazole ring instead of an imidazole ring. Fluconazole is practically insoluble in water but is sparingly soluble in organic solvents such as ethanol and DMSO.
Mechanism of Action:	Fluconazole interferes with the conversion of lanosterol to ergosterol, an essential cell membrane component. The inhibition of ergosterol synthesis increases cell permeability which disrupts normal cellular function. Resistance to antifungals can include alteration in drug target, alteration in sterol biosynthesis, reduction in the intercellular concentration of target enzyme, or overexpression of the antifungal drug target (Ghannoum and Rice, 1999). It is a fungal cytochrome P-450 inhibitor, specifically sterile C-14-α-demethyllation. Resistance in *C. albicans* is due to mutations in the *ERG11* gene which codes for C-14-α-demethyllation. Mutations in this gene prevent the compound from binding while still allowing binding to the enzyme's natural substrate lanosterol. It also inhibits the human cytochrome P450 system, particularly the isozyme CYP2C9. Therefore, in theory, compounds that are metabolized by this enzyme tend to increase in concentration.
Spectrum:	Broad-spectrum including *Candida spp. (excluding C. krusei and* C. glabrata*) and Cryptococcus neoformans*. Also effective against dermatophytes such as *Microsporum*, *Epidermophyton* and *Trichophyton.*

Microbiology Applications

Fluconazole is commonly used in clinical *in vitro* microbiological antimicrobial susceptibility tests (panels, discs, and MIC strips) against fungal isolates. Medical microbiologists use AST results to recommend antibiotic treatment options. Representative MIC values include:

- *Blastomyces dermatidis* 1 µg/ml – 64 µg/ml
- Candida albicans ≤ 0.0313 µg/mL - 8 µg/mL

For a representative list of Fluconazole MIC values, click here

Please note that MIC data are complicated by variability in testing methods and lack of standardized approaches, thus there is a wide range of MICs reported. Consequently, *in vivo* research models are more predictive (Saag and Dismukes, 1988).

References:

Ghannoum MA and Rice LB (1999) Antifungal agents: Mode of action, mechanisms of resistance, and correlation of these mechanisms with bacterial resistance. Clin. Microbiol. Rev. 12 (4):501-517 PMID 10515900

Re JH et al (1997) Development of interpretive breakpoints for antifungal susceptibility testing: Conceptual framework and analysis of *in vitro-in vivo* correlation data for fluconazole, itraconazole, and *Candida* Infections. Clin. Infect. Dis. 24(2):235–247

Saag MS and Dismukes WE(1988) Azole antifungal agents: Emphasis on new triazoles. Antimicrob. Agents. Chemother. 32(1):1-8

Sobel, JD and Akins RA (2004) Fungicidal activity of fluconazole against *Candida albicans* in a synthetic vagina-simulative medium. Antimicrob. Agents Chemother. 48(1):161-167

Vincent-Ballereau FN, Patey ON, Lafaix C (1991) Fluconazole. Review and situation among antifungal drugs in the treatment of opportunistic mycoses of human immuno-deficiency virus infections. Pharm Weekbl Sci. 13(2):45-57 PMID 1870943