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Área: MED

Pyrrole derivatives as new compounds for breast and prostate cancer

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Palavras Chave:*(cancer, anticancer, tubulin, pyrroles).*

Highlights

Research about anticancer activity of Pyrrole Derivatives (PDs) to achieve potent inhibition of tubulin polymerization and cancer cell growth of breast and prostate cells. Pharmacokinetics evaluation using in vitro approach.

Abstract

Cancer is a major global health challenge due to its high incidence and mortality. Breast and prostate cancers are among the most prevalent, with triple-negative breast cancer and prostate cancer being particularly aggressive and difficult to treat. This study evaluates the anticancer potential of pyrrole derivatives through experimental assays and molecular modeling. The compounds were tested against MDA-MB-231 (triple-negative breast cancer) and DU-145 (adenocarcinoma prostate tumor) cell lines, using doxorubicin and colchicine as references. Additionally, cytotoxicity was assessed in HepG2 (hepatocellular carcinoma line) cells and HFF-1 (non-tumoral control to evaluate selective toxicity). Among compounds in this series, 1a, which has a chlorine at C3, and 1c, which has an N-ethyl substituent, exhibited the most promising activity when considering both cancer. 1a showed IC_{50} values of 8.47 µM (MDA-MB-231) and 33.14 µM (DU-145), while 1c had 20.50 µM and 30.93 µM, respectively. Both exhibited low cytotoxicity against HFF-1 CC_{50} > 64 µM and moderate cytotoxicity to HepG2 (hepatocellular carcinoma) cells (Table 1). These findings highlight the potential of pyrrole derivatives as structural templates for the design of potent and selective lead compounds for novel drug discovery for anticancer therapy.

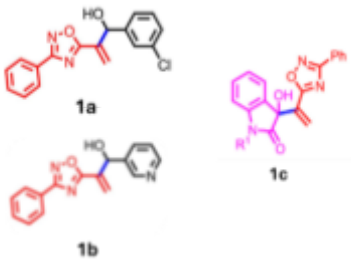

Table 1. Cytotoxicity of compounds against tumor cell lines and fibroblasts.

Compounds	CC50 (µM)			
	MDA-MB-231	DU-145	HFF-1	HepG2
1a	8.47 ± 0.34	33.14 ± 4.36	>64	20.19 ± 1.24
1b	>64	>64	>64	>64
1c	20.50 ± 1.54	30.93 ± 9.0	>64	26.79 ± 3.13
Doxorubicin	0.01± 0.002	0.04± 0.001	0.47± 0.01	0.85 ± 0.33
Colchicine	0.02 ± 0.001	0.014 ± 0.002	0.024 ± 0.003	ND

ND = not determined *SI = [HFF-1]/[MDA-MB-231]

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