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Production and Cytotoxic effects of Chemotherapeutic Pigment Prodigiosin on HL60 and K562 tumor cell lines.

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Objectives : Prodigiosin is a bacterial pigment which exhibited various biological activities viz antibacterial, immunosuppressive and anticancer properties. It exhibited cytotoxic effect on cell lineages by either intercalating genome, inducing caspases dependent apoptosis, altering cell signaling pathways or inhibiting the action of topoisomerase I/II. It has been reported to kill hepatocellular carcinoma cells, breast cancer cells and neuroblastoma cells. The present study was aimed at production of Prodigiosin and determining its cytotoxicity on leukemic cell line HL60 and K562.

Methods : Peptone glycerol medium was used for production of prodigiosin. Different biochemical tests and 16s r-RNA gene sequence were done to identify the isolate. Bacterial culture incubated in sterile production medium at $28 \pm 2^\circ\text{C}$. Prodigiosin production was confirmed by taking absorbance at 535 nm and by HPLC. Pure prodigiosin was further used for different biological activities. Cell viability was determined by the MTT assay. Cells were incubated in 96-well microtiter cell culture plates, in the absence (control cells) or in the presence of increasing amounts of pure pigment.

Results : On that basis of gene sequence studies, the strain was found to be *Serratia marcescens* strain NBRC 102204. The gene sequence was submitted to NCBI (ON878214). In initial experiments, maximum concentration of prodigiosin synthesized was 950 units/cell in pigment production medium. It had a dose-dependent potent inhibitory effect on both cancer cell line. Increase in concentration of pigment showed increased anticancer activity i.e., from $10\mu\text{g/well}$ onwards. This cytotoxic effect might be due to apoptosis, and fragmentation of DNA.

Conclusions : Prodigiosin has been linked to a number of biological effects, such as anticancer effects and the induction of apoptosis in T/B lymphocytes. Significant cytotoxic effects of prodigiosin were evidenced for HL-60 and K562 tumor cell lines. The cell line studies depicts that the prodigiosin could be used in treatment of leukemia and as an antineoplastic drug.

Prodigiosine Mode of Action.jpg

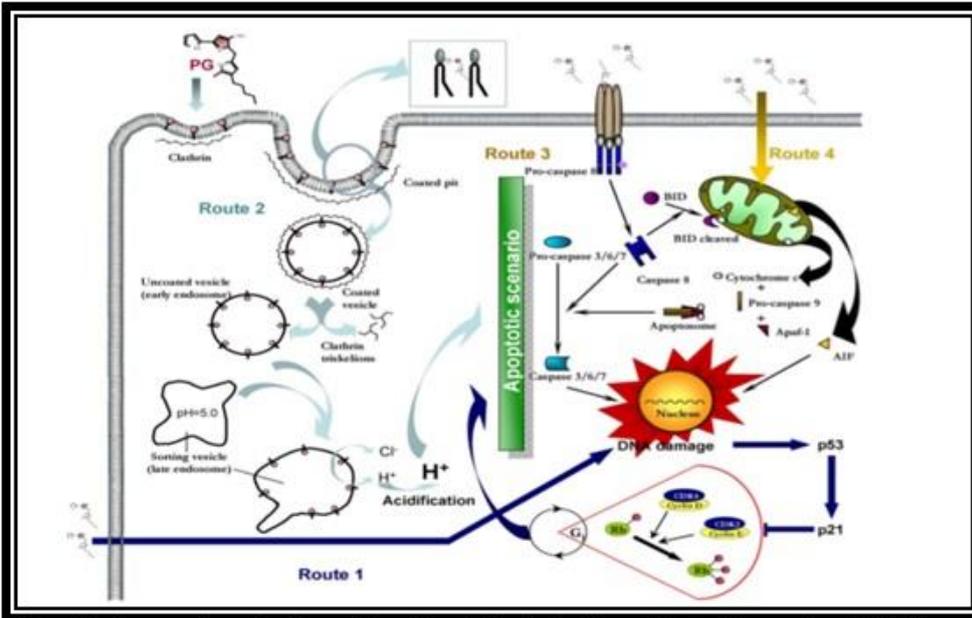


Fig.: Various modes of action of Prodigiosin (Adapted from: Perez-Tomas *et. al.*, 2003)