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Mechanisms of cell death in eukaryotic microorganism: An in-depth overview

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Eukaryotic microorganisms shared similar characteristics with mammalian cells, such as typical plasma membrane, organelles, as well as life cycle progression and death pathway mechanisms, however as a single living cell, their life cycle is shorter than mammalian cells. Pathogenic species of eukaryotic microorganism such as *Leishmania*, *Plasmodium*, *Trypanosome*, *Toxoplasma* have been studied for many years for their potential antimicrobial therapy. Therefore, the mode of drug action and cell death are crucial as treatment for this disease wouldn't harm the host. Study on *Acanthamoeba spp.*, proved that eukaryotic organism shares similar death mechanism as in mammalian cells, which consist of apoptosis, necrosis and autophagic cell death. Apoptosis and autophagic cell death mechanisms are thought to be the safest way for the diseased cell or parasite should die. Our study also indicated that different xenobiotic introduced will trigger different type of cell death as well as the duration of exposure. The effect of selected anti-amoebic agent were introduced to the *Acanthamoeba spp.* (corneal scrapping isolates) from an *Acanthamoeba keratitis* patient and microscopy analyses were used to determine the mode of cell death on this *Acanthamoeba spp.*, The effect on plasma membrane, lysosomal structure, and the DNA structure was observed in detail. Our study indicated that the mode of cell death in this *Acanthamoeba spp.*, began with autophagic cell death followed by apoptosis mechanism. High lysosomal activities might activate other death associated protein before proceed to apoptosis event in the *Acanthamoeba* cells. Typical markers of mammalian apoptosis were observed suggesting the presence of similar apoptotic cascade in *Acanthamoeba* cells. Morphological alteration that were visualized were cell shrinkage, DNA fragmentation and nuclear chromatin condensation. In conclusion, critical analysis of cell death pathway caused by antimicrobial is crucial prior to treatment as it will assure its efficacy and assure the safety of the host (patient).

Biography

Fatimah Binti Hashim has her expertise in protozoology and cytotoxicity based on microscopy analyses. Most of the works are on cytotoxic effects of plant compound, plant extract, lanthanide complexes on *Acanthamoeba sp.* (corneal scrapping and environmental isolates). Recent works are on isolation and identification of protozoan species from fish gills. Microscopy analysis based on fluorescence, scanning and electron microscopy are her interest techniques for cytotoxicity and protozoan morphological identification. Other interest are on molecular work of genotoxicity specifically by alkaline comet assay technique and DNA laddering assay.

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