

## Microscopy in Biomedical Research: Virotherapy in breast cancer.

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Breast cancer is the most common cancer among women, and is the main cause of cancer death among women in Malaysia. The rate of the cancer incidence differs between different countries. The highest rate is in America and Europe while the lowest rate is in Asia and Africa [1]. In the year 2000, there were 3825 cases of breast cancer incident were reported in Malaysia but the numbers increased 13% in the year 2002 with 4337 cases of female breast cancer incident regardless of ethnicity and age [2].

Scientist and researcher are working to improve the way breast cancer is treated. The currently available treatments for breast cancer patient are surgery, chemotherapy, hormone therapy and radiotherapy, but they are not always effective and often have unpleasant side effects. With the development of advanced biology techniques, viruses of animal origin have been tested for virus therapy of human cancer currently.

Newcastle disease virus (NDV) occurs worldwide and causes severe economic impact on the world poultry industry, ranging from losses due to disease and the expense of vaccination to the significant cost of diagnostic laboratory investigations [3]. NDV or paramyxovirus type 1 is a member of the *Paramyxoviridae* family and has been assigned to the genus *Avulavirus* in the subfamily *Paramyxovirinae* recently [4]. NDV contains a non segmented single stranded RNA genome which coded six proteins including nucleocapsid protein (NP), phosphoprotein (P), large protein (L), envelope matrix protein (M), hemagglutinin-neuraminidase (HN), and fusion protein (F) [5]. Strains of NDV can be classified into three major groups according to its pathogenicity for chickens. It has been classified to velogenic also known as exotic Newcastle (highly virulent), mesogenic (intermediate) and lentogenic (nonvirulent) [6].

Newcastle disease virus (NDV) has antineoplastic properties and it is currently being tested as an anticancer agent in vivo and in vitro in Malaysia. Currently in Malaysia local strain of NDV, AF2240 have been actively studied [7]. NDV strain AF2240 was inoculated into MCF-7 and MDA-MB-231 breast cancer cell lines and MCF-10 normal breast cancer cell line. The samples were processed after day 1, 2 and 3 post inoculations for transmission electron microscopy (TEM), TUNEL assay and cytoskeletal studies were observed under confocal laser scanning microscope (CLSM). The mode of NDV strains AF2240 in destroying the MCF-7 and MDA-MB-231 cells is

primarily in inducing apoptosis. The cells begun to show apoptotic features and ultrastructural changes after day 1 post inoculation but the cytoskeletal remain its' integrity until day 2. Prominent changes were noted after 3 days post inoculation where the DNA fragmentation, ultrastructural and cytoskeletal proteins were disrupted.

The in-vivo study was carried out by xenotransplanting MDA-MB-231 breast cancer cell line onto female athymic nude mice. Then the mice were monitored and observed for nine weeks. Post tumor transplantation, the tumor was measured weekly with a pair of digital caliper and the size of tumor was recorded. After 5 weeks of treatment with NDV, the regressions of tumor were observed. This study showed that direct administration of NDV strain AF2240 through intra-tumoral caused partial regression of breast cancer tumor after 12 weeks of observation.

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