EDITORIAL

Possible Economic Gains from Cancer Research

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Some of the wealthiest countries worldwide have spent billions United States dollar (USD) on innovation and research. Countries such as the United States of America (USA), China, Japan, Germany and South Korea head the list with expenditure of between 50 and 410 billion USD (up to 3 per cent of gross domestic product, GDP) in 2011 (1–3). CARICOM, in comparison, spends approximately 0.13 per cent of its budget on science, technology and innovation (4). Developing countries are now placing greater emphasis on using research and innovation as a tool to drive economic growth. Despite the contraction of the global economy over the past few years, CARICOM governments need to maintain investment in their science base in order to secure economic prosperity.

Cancer is a leading cause of death worldwide, with prostate cancer being the sixth leading cause of death in men and breast cancer the primary cause of cancer deaths among women (5–8). With the current growth in the elderly population, an increase in cancer diagnoses and associated health expenditure can be anticipated. Expensive therapies and technologies have become the standard of care for cancer patients, which have raised concerns that the costs associated with cancer treatment could begin to outpace healthcare inflation. There is therefore need for the development of more cost-effective treatment strategies. Medicinal plants remain a major source for the discovery and development of novel anti-cancer drugs (9). Some Jamaican plants which have demonstrated bioactivity against cancerous cells include *Catharanthus roseus* (10), commonly known as periwinkle and from which the chemotherapeutic drugs vincristine and vinblastine were developed, *Petiveria alliacea* (11, 12), commonly known as guinea hen weed and *Cannabis sativa* (13). Recent and novel work undertaken by Lowe *et al,* and published in this issue, describes the efficacy of an endemic plant, *Tillandsia recurvata* (ball moss), in fighting cancers of different histogenic origins (14). Their timely work along with work being undertaken by other scientists/investigators may serve as the force necessary to push the government and the private sector to invest more in the research activities being pursued by scientific researchers.

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Lowe *et al* investigated the *in vitro and in vivo* anticancer effects of the Jamaican ball moss [*T recurvata*] (14). This plant can be found throughout the island growing on trees and power lines. Natives of countries such as Brazil, Bolivia, Mexico and the USA have used the plant in folk medicine for the treatment of hypoglycaemia, rheumatoid arthritis, liver infections and cancer; however, there are no reports of its use in Jamaica. The bioactivity of ball moss can possibly be attributed to the presence of phytochemicals such as cycloartane triterpenoids, pentacyclic triterpenes, sterols, and flavonoids, which are naturally occurring compounds in plants. Lowe *et al* describe the *in vitro* activity of a crude methanolic extract of the *T recurvata* on the proliferation of five different cancer cell lines namely, prostate cancer–PC-3, breast cancer, Kaposi sarcoma, B-16 melanoma and a B-cell lymphoma from a transgenic mouse strain. The extract was also evaluated *in vivo* in tumour-bearing mice. The cell lines tested in the study represent some of the more commonly diagnosed cancers worldwide.

The PC-3 prostate cancer cell line is human in origin and useful in assessing the response of prostate cancer cells to chemotherapeutic agents. They are highly metastatic compared to other prostate cancer cell lines and mimic, to a certain extent, human disease progression as it is androgen insensitive, a feature possessed by metastatic human prostate cancer. Kaposi sarcoma is a tumour caused by the human herpes virus 8, also called the Kaposi sarcoma-associated herpes virus and occurs more often in men than in women. HIV infection is known to be a major risk factor for its development (15, 16). The B-16 melanoma cell line is a type of murine skin cancer cell line that is very popular because of the ease with which it can be implanted in the skin and visually monitored. *In vivo* melanoma models created from this cell line have great similarity to clinical metastasis and are therefore important in oncology research. B-cell lymphoma is a cancer of the lymphatic system. They are found more frequently in older adults and in immunocompromised individuals (such as those with AIDS).

Results from the study revealed that the Jamaican ball moss was active against all the cell lines tested *in vitro* and Kaposi sarcoma *in vivo*. The breast cancer cell line showed the most sensitivity while the Kaposi sarcoma cell line showed the least sensitivity *in vitro*. Despite having the least sensitivity *in vitro*, however, Kaposi sarcoma cell line-induced tumours had regressed or dried up after fifteen days of treatment. The apparent mechanism of action of the crude

extract involves the induction of apoptosis in cancer cells. The crude extract also proved to be safe for use as the maximum tolerable dose was significantly higher than the effective dosage used in the study (14).

The research describes the Jamaican ball moss as a reservoir of unique bioactive compounds possessing potent anti-cancer activity against some major types of cancer through the induction of apoptosis. This research puts us a step closer toward creating a pharmaceutical product from an endemic plant and can help to promote the establishment of pharmaceutical companies centred on the creation of products from Jamaican plants. This will also serve as a stimulus for other researchers to move in a similar direction.

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