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Natural Products for Cancer Therapy

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Commentary

Cancer is the major killer and dreaded disease caused by abnormal proliferation of body cells. These abnormal cells can block circulations, and damage organ functions which may lead to death. The annual incidence of cancer worldwide is estimated at 30,000. While the most common killer among malignancies is lung cancer, breast cancer poses the biggest threat [1]. With the increasing prevalence of cancer, patients are now turning to complementary and alternative medicine (CAM) to treat the disease [2]. The CAM includes medical herbs and plant foods such as fruits, vegetables, and spices containing many biologically active phytochemicals with various health promoting effects [3,4]. It has long been established that a diet rich in fresh fruits, vegetables, seeds, grains and legumes, antioxidants and other beneficial compounds may help in prevention of cancer. Although diet is not a cure for cancer, it may help prevent some cancers from developing, while avoiding the some of the adverse effects from conventional treatments [5]. However, using natural compounds in diets and supplements is still not a substitute for regular medical care. In cancers surgery, radiotherapy and chemotherapy are still the treatments of choice. However natural compounds may be considered as complementary medicine in the treatment these diseases [6]. Natural compounds are not only sources of drugs or drug templates but in many instances they had been a source of discovery of novel biology that provided better understanding of target and pathway involved in the diseases processes as well as in the majority of cancer drugs used today [7,8]. Between 60 to 75% of anticancer drugs are derived from natural compounds. It has been claimed that drugs derived from natural compounds are more efficacious for cancer patients than those manufactured synthetically [6]. Currently, it is known that approximately 10,000 out of 500,000 plant species are likely to have medicinal substances of which most located in the rain forests, grasslands and fields. However, only a fraction of these plants have been analysed and investigated for their therapeutic potential. It is unfortunate that as a result of deforestation, many valuable medicinal herbs and plants are becoming rare and these precious inheritances are now lost [9].

In Malaysia, studies on plants and herbs as potential sources of cancer therapeutics are on the rise. Among the plants being investigated for their therapeutic potential include *Typhonium flagelliforme* for treatment of leukemias [10,11], chalcone from *Boesenbergia rotunda* for lung cancers [12], and *Elephantopus scaber* for human breast cancers [13]. At the same time, several active principles have been identified and investigated to include girinimbine from roots of *Murraya koenigii* for liver cancers [14], dentatin from wild shrub *Clausena excavata* Burm for prostate cancers [15], kenaf seed oil from *Hibiscus cannabinus* and phenylbutenoids from *Zingiber cassumunar* Roxb for leukemias [16,17].

The Zingiberaceae family of plants is found in tropical and subtropical areas, and approximately 161 species from 18 genera of this family are found in Peninsular Malaysia. The plant species belonging to the Zingiberaceae family have been reported to possess biological activities responsible for medicinal value. The ginger rhizome is generally recognized as safe, and it is used traditionally in local folklore medicine for various ailments [18]. *Zingiber zerumbet* (L) Smith belonging to this family is an edible ginger, originating from South-East Asia and been cultivated for thousands of years [19]. Generally, the rhizomes and the leaves are used for spice, tea, beverages and medical purposes, while the milky, mucilaginous substances of the pinecones are as shampoo and natural hair conditioner, especially in Asia and Hawaii [20] contained several types of phytochemicals and the rhizome, in particular, has been used in traditional Oriental medicine for various human ailments in different parts of the globe, especially for the treatment of digestive conditions [21].

Zerumbone (ZER) is a crystalline, monocyclic, sesquiterpene, phytochemical substance that was first isolated in 1956 from the essential volatile oil of rhizomes of *Zingiber zerumbet* (L) Smith [22]. Several pharmacological potentials of ZER identified through several test models include potent and strong anticancer activity. ZER is poorly soluble in water and consequently poor oral bioavailability and delivery [23]. Thus, there is need to improve delivery of this compound before its therapeutic potential can be realized. One of the approaches to

increase solubility of ZER is by incorporation into nanocarriers and nanoparticles [24]. For this purpose, there are several nanocarriers that can be used to include solid lipid nanoparticles (SLN), nanostructured lipid carriers (NLC), as well as lipid drug conjugates [25,26].

Leukemia is a cancer of the blood-forming cells and the most common cancer among children [27] caused by the production of immature and abnormal blood cells that are unable to perform normal functions [28]. In 2010 alone, leukaemia was diagnosed 10 times more often in adults than in children and it is more common in males than females [29]. While in Malaysia, the incidence of leukemia ranked fourth among all cancers in males and fifth among females [30]. Currently, the most widely used anti-leukemia therapies are chemotherapy, radiotherapy, hormonal therapy, immune therapy and bone marrow transplantation. Generally, most of these treatments will damage healthy cells and tissues with short- to long-term side-effects. To avoid these side-effects extensive research are being conducted to discover innocuous therapeutic compounds as candidates for next generation anti-leukemic drugs. Although pharmaceutical companies prefer synthetic compounds to natural materials, the search for new and effective natural therapeutic agents which offer better survival rates and fewer side-effects, still persists among researchers worldwide [31].

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