3.1 Research gaps identified

There are a number of chemotherapeutic, immuno-modulating agents and cytotoxic drugs in Western medicine which are very expensive and have serious adverse effects and morbidity associated with them. Accordingly, there is a considerable interest in the development of safe, low-cost and novel anti-cancer agents from natural sources inclusive of plant secondary metabolites, which modulate multiple biochemical pathways in cancer cells simultaneously.

The leaves of *M. umbellatum* have been used to treat various infections and inflammatory conditions traditionally. In a comprehensive screening of plants for pharmacological activities, *M. umbellatum* showed anti-cancer activity against Lewis lung carcinoma in mice and cytotoxic activity in brine shrimp lethality assay. Active constituents such as umbelactone, β-amyrin, sitosterol, ursolic acid and sitosterol-β-D-glucoside have been isolated from the plant, however, no further anti-cancer studies have been carried out for this plant.

*N. jatamansi* is used traditionally for treatment of various types of cancer as reported by Hartwell. It is also used in traditional Thai medicine for treating cancer. The active constituents include sesquiterpenoids and alkaloids. In recent preliminary studies, the plant was found to possess cytotoxicity against lung and prostate cancer cells. However, further systematic studies are requisite to explore the anti-cancer activity of the plant.

*M. umbellatum* and *N. jatamansi* are two medicinal plants which can add to the armamentarium of plant-derived products against cancer. Hence, these plants need to be investigated systematically for their anti-cancer activity and identify the phytochemical basis of their action.
3.2 Aims

To evaluate the anticancer activities of bioactive fractions of extracts of leaves of *Memecylon umbellatum* and roots and rhizomes of *Nardostachys jatamansi* and establish the phytochemical basis of activity.

3.2.1 Objectives

1. To carry out bioactivity-guided fractionation of methanol extract of leaves of *Memecylon umbellatum* as well as petroleum ether and methanol extracts of roots and rhizomes of *Nardostachys jatamansi* by cytotoxicity assays (MTT/SRB) in cancer cells
2. To carry out *in vitro* and *in vivo* studies for possible anticancer activity of four most active fractions
3. To carry out phytochemical investigation of four most active fractions