



# Seeds4Hope

A program of the Windsor Essex County Cancer Centre Foundation

## 2013 SEEDS4HOPE GRANT RECIPIENT

*Dr. Siyaram Pandey*



### **“Preclinical Evaluation of Anti-Cancer Activity of Long Pepper Extract (LPE) in *in vitro*, *in vivo* and *ex-vivo* Models of Leukemia and Other Aggressive Human Carcinoma Cells: Identification and Enrichment of Factors from LPE Responsible for Inducing Apoptosis in Cancer Cells”**

#### **SUMMARY OF RESEARCH PROJECT**

Cancer is one of the leading causes of death in Windsor and in Canada more generally, and researchers have made considerable advances in understanding cancer mechanism and progression. However, we are still far from finding appropriate treatments for this disease. Most chemotherapies, for instance, destroy the body’s healthy cells along with the cancerous ones, causing severe side effects, including hair loss, severe diarrhea, and a suppressed immune system. In the quest to help improve cancer treatment, researchers have turned to natural health products (NHPs), which have shown great promise. The past 70 years have introduced various natural products as the source of many drugs in cancer therapy. Approximately 75% of the approved anticancer therapies have been derived from natural products. However, only a fraction of the vast variety of NHPs has been studied for their anticancer effects. In addition, there remains the challenge of finding a natural product that can target cancer cells without harming the non-cancerous healthy cells.

Long pepper has been used for centuries in traditional Chinese and traditional Ayurvedic medicine in India to treat digestive disorders, respiratory ailments, and inflammation. We want to determine if long pepper extract can help in the fight against cancer. Our preliminary studies have shown that indeed, an extract from the long pepper plant (LPE) causes some human cancer cells, including human pancreatic and colon cancer cell lines, to essentially commit suicide. In this study, we will evaluate the anticancer potential of LPE in different types of human cancer cells (based on increasing aggressiveness), in animal models, and in blood cancer cells taken with the permission of patients in Windsor-Essex County. We will identify the natural compound(s) in LPE that are responsible for any anticancer activity and investigate how these compounds take action. We will also carry out experiments to determine if LPE causes toxicity and, if so, what is the best tolerated dose.

#### **HOW THIS RESEARCH HELPS ADVANCE QUALITY CANCER CARE IN OUR COMMUNITY**

If successful, this research project would present a new window of opportunity for the treatment of human cancers by a non-toxic plant extract. Furthermore, the study would lead to the possibility of refining our current formula for long-pepper extract so that it is better suited for potential future use in treating cancer patients. The biochemical knowledge of how this extract kills cancer cells will transform the understanding of natural compounds as chemotherapeutics, rather than simply ingredients for more traditional cancer treatments and drugs. After this study, our next step will be to offer this natural product to recently-diagnosed cancer patients in Windsor-Essex County in clinical trials. If these carefully-supervised clinical trials are successful, the long pepper extract could be developed into a treatment that can be prescribed by doctors in our community and elsewhere.



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### **PROGRESS REPORT**

In the first year of this research project, we made extracts of long pepper in hot or cold water or alcohol and tested their ability to kill cancer cells. Only alcoholic extract showed the ability to kill cancer cells. We have completed our testing on bone cancer, colon cancer, ovarian cancer, melanoma, pancreatic cancer, lymphoma and leukemia. We have extremely exciting results; long pepper extract was able to activate cell suicide program selectively in cancer cells without harming noncancerous healthy cells. We also tested this extract in mice that were transplanted with human colon cancer. The long pepper extract was given orally to mice over two months. The results indicated that this extract was well tolerated (no toxic effect) in mice and it halted the growth of the transplanted tumor. We have identified a few compounds in this extract that may be responsible for its anticancer activity. Interestingly, we found that purified single compound could not be as effective as the extract, indicating that several compounds present in the extract might be working together to kill cancer cells. In the second year, we will attempt to identify all of the compounds in the extract and test their combinations for the best anticancer activity. We will also test long pepper extract on blood samples from leukemia patients. We will also study the effect of other natural extracts in combination with long pepper extracts on different cancer cells.