According to the World Health Organization (WHO), cancer is one of the leading causes of death worldwide, accounting for 8.2 million deaths in 2012. More than 70% of the world’s cancer deaths occur in Asia, Africa, and Central and South America. Lung, liver, stomach, colorectal and breast cancers cause the most cancer deaths each year worldwide. Other common cancers include prostate cancer, blood cell cancers such as leukemia, immune cell cancers such as lymphoma, liver cancer, brain cell cancers such as glioma, skin cancer, and colorectal cancer.

Cancer involves the rapid growth of abnormal cells that grow beyond normal boundaries, frequently invading other tissues or spreading (metastasizing) to other organs. Cancer growths arise from single cells that transform from normal cells into tumor cells following a typical progression that begins with pre-cancerous lesions and ends with malignant tumors.

As mortality rates have decreased in Asia similar to other global regions, rapid increases in cancer rates have led to considerable human and economic costs.¹

There is a public health imperative to focus on preventative care and low-cost treatments. A critical need exists for healthcare companies to produce effective, low-cost products that can be used to help prevent and treat devastating diseases such as cancer.

*McCord Research has three U.S. and worldwide patents pending on this research*
McCord Research health products that include patented hydroxytyrosol, cost less than $30/month, and have been rigorously tested for effectiveness and quality through scientific research and with the rigors involved in the production of prescription drugs. Hydroxytyrosol and the formulas containing hydroxytyrosol in these products may not be as effective as expensive, advanced medications that fight cancer, but they have shown remarkable effects against cancer cells and they will offer hope to patients who need affordable cancer treatment.

Hydroxytyrosol is shown scientifically to have dose-dependent anti-cancer effects against several types of cancer cells including leukemic, lymphoma, lung cancer, liver cancer, colorectal cancer, breast cancer, prostate cancer, brain cancer, stomach cancer, and skin cancer cells. This research was performed in the McCord Research Laboratory directed by Dr. Thomas Karagiannis at the world-renowned Baker IDI research institute in Melbourne, Australia.
Figure 4: Decreased viability of various non-hematological malignancies following incubation with hydroxytyrosol. Selected cancerous cell lines include epithelial lung adenocarcinoma, hepatocellular carcinoma, colorectal carcinoma, breast adenocarcinoma, prostate adenocarcinoma, brain glioblastoma, gastric carcinoma and epidermal squamous carcinoma.
Dr. Karagiannis is well known for his cutting-edge cancer research as well as epigenetic (heritable changes in the chromosome not affecting the DNA sequence), antioxidant research, and diabetes research. Dr. Karagiannis has been investigating the anti-cancer effects of hydroxytyrosol for many years. Growing evidence links antioxidants with a decreased risk of chronic diseases such as coronary heart disease, cancer, and several other aging-related health concerns. Oxidative stress has been linked to collateral damage in cancer chemotherapy. The beneficial health effects of phenolic compounds isolated from the olive (Olea Europaea) are now evident. In particular, the antioxidant and anti-inflammatory properties of hydroxytyrosol in Olivamine® have been widely investigated and shown to have beneficial uses for the treatment of free radical-associated and inflammation-associated diseases including cancer. Olivamine® is Advanced Molecular Fusion that selectively enters damaged cells to repair mitochondrial free radical damage and restore cells to full vitality extending their lifespan by as much as 20%.

Cancer treatment compounds are often non-naturally occurring, cause harmful side-effects, and are expensive to produce. Chemo-therapeutic agents used for the treatment of cancer such as doxorubicin, vinblastine, and mitomycin C, can be prohibitively expensive, and can cause a variety of serious side effects.

Co-therapy and/or co-administration of hydroxytyrosol and chemotherapeutic agents or radiation treatments have demonstrated beneficial results against cancer cells. This is

**Figure 5:** Decreased viability of various selected hematological malignancies following incubation with hydroxytyrosol.
critically important because the results indicate that hydroxytyrosol does not interfere with chemotherapeutic or radiation treatments, but rather enhances those treatments.

The cytotoxic (decreased viability), apoptotic (or programmed cell death), and cell damaging (double-strand DNA breakage) effects (indicated by the accumulation of the biomarker γH2AX) of hydroxytyrosol (HT) and HT-containing formulations in human cancer cells (as opposed to normal human circulating blood cells or peripheral blood mononuclear cells; PBMC) cells are shown. “Hydroxytyrosol-containing formulations” or “HT-containing formulations” encompasses any formulation or composition that includes hydroxytyrosol. In addition, expression of genes related to epigenetic processes induced by hydroxytyrosol treatment of leukemic cells is shown as either up-regulated or down-regulated by hydroxytyrosol treatment.

**Figure 6:** Synergistic increase in apoptosis and double strand DNA breaks in K562 Leukemia cells (left panels) induced by concomitant hydroxytyrosol and doxorubicin treatment, but not in normal PBMCs (right panels)
Table 1: Overview of the DNA damaging, cytotoxic, and apoptotic effects of doxorubicin (dox), vinblastine (VBL), and mitomycin C (MMC) in K562 leukemic cells.

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<th>Enhanced DNA Damaging effects</th>
<th>Enhanced Cytotoxic Effects</th>
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<td><strong>Figure 7:</strong> Hydroxytyrosol enhances the DNA damaging, cytotoxic, and apoptotic effects of doxorubicin, vinblastine and mitomycin C in K562 leukemic cells.</td>
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**Figure 8:** Hydroxytyrosol enhances the DNA damaging effects of UVA and γ-radiation in K562 leukemic cells.
The results further demonstrate applications of treatment, suppression and/or amelioration of diseases currently treated with chemotoxic compounds, such as cancer. They also confirm the specificity of potential treatments using hydroxytyrosol, in particular the specificity and enhancement of treatment regimens using hydroxytyrosol in combination with chemo-therapeutic agents. Other important anti-cancer effects of hydroxytyrosol have been discovered recently by Dr. Karagiannis for McCord Research that are not reported here due to the sensitive nature of these findings.

The ability of hydroxytyrosol to induce double-stranded breaks in the DNA of malignant cells, but not normal cells, is demonstrated. Double-strand breaks are extremely harmful to cells and have serious consequences for cell survival. Hydroxytyrosol also enhances the cytotoxic, apoptotic, and DNA damaging effects of the chemotherapeutic drugs, doxorubicin (dox), vinblastine (VBL), and mitomycin C (MMC), as well as radiation treatments of cancer cells.

**Figure 9:** Hydroxytyrosol increases the proliferation of normal PBMCs and induces cell death in malignant K562 leukemic cells following 120 hr incubation.

**Figure 10:** Decreased viability of K562 leukemic cells and increased viability of normal PBMCs induced by hydroxytyrosol, oleuropein, and formulations containing hydroxytyrosol.
In summary, hydroxytyrosol and formulas containing hydroxytyrosol including Olivamine®, have demonstrated specific dose-dependent anti-cancer effects that include decreasing cancer cell viability, increasing cancer cell death (apoptosis), and increasing cancer cell DNA damage (double-strand DNA breaks) demonstrated in various types of cancer cells. These anti-cancer effects were carefully researched in a cutting-edge research laboratory led by a leading cancer researcher, Dr. Thomas Karagiannis who has published numerous papers in peer reviewed journals. It is demonstrated that hydroxytyrosol and formulas containing hydroxytyrosol do not interfere with chemotherapy or radiation treatments, but instead were found to enhance the effects of chemotherapeutic drugs including doxorubicin, vinblastine, and mitomycin C, and to enhance the anti-cancer effects of radiation on cancer cells.

Hydroxytyrosol was also discovered to enhance the viability and proliferation of normal cells (PBMCs) in a dose-dependent manner. In addition, hydroxytyrosol was discovered to effect many genes associated with the epigenetic processes.

McCord Research's investigation of the role of hydroxytyrosol and cancer is far more extensive than has been revealed in this paper. The purpose of this document is to present some of our basic research while protecting the most sensitive and protected findings.

Olivamine®-containing products that include hydroxytyrosol represent high quality but relatively low cost, scientifically-based, effective treatments for cancer that will offer hope to patients in need of affordable anti-cancer therapies.
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References


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