

The Natural Approach to Cancer

by Sylvie Beljanski

The Beljanski Foundation was formed in 1999 and is named after the French biochemist Mirko Beljanski PhD (1923–1998).¹ This nonprofit organization was started by Mirko Beljanski's wife, Monique, and his daughter, Sylvie, in New York City, one year after his death.

For 17 years, the Beljanski Foundation has promoted research and shared knowledge of effective nontoxic natural products that work both alone and in synergy with traditional Western medicine. These values, at the very core of integrative medicine, are the legacy of Mirko Beljanski, who uncovered the link between environmental toxins and carcinogenesis when he was working at the Pasteur Institute in Paris.

The Beljanski Foundation has three missions: first, engage in scientific research in the public interest to carry on and conduct investigations, experiments, analyses, and studies on diseases and disorders and to foster and develop scientific methods for the diagnosis, prevention, treatment, alleviation, and cure thereof; second, to continue to develop the work of Professor Mirko Beljanski focusing on the regulation of the reproduction of cells and specifically cancer, DNA system modifications, and viral infections; and finally, to publish and disseminate all research resulting from the studies and scientific investigation accomplished under the auspices of the Beljanski Foundation.

The Beljanski Foundation's commitment to research on natural products is distinctive; large research entities and pharmaceutical companies that depend on developing intellectual

property aren't motivated to work on natural products because of the difficulties in obtaining strong patent protection. Pharmaceutical and biotech companies are having trouble coming up with new-to-nature molecules they can successfully patent and turn into lucrative medicines. They know the healing power of natural substances. But natural substances are not supposed to be patentable. Or if they are patentable because a new process is involved, the patent protection may be weak and drug companies are not interested.

Medicines, both herbal and pharmaceutical, are big business. These days, Americans spend \$200 billion per year on prescription drugs and \$20 billion on herbs and other dietary supplements. When choosing the best remedy or preventive medicine, most of us simply want the safest, most effective option available, whether it's food, herbs, or a pharmaceutical drug. But the question of using herbs vs. drugs is not moot. People often turn to supplements because they are perceived as more natural than drugs, can have fewer side effects, and generally cost less.

There are millions of people taking herbs and other dietary supplements who swear by their efficacy. And though many herbs and supplements are safe and effective, medical science has been slow to verify health claims. While pharmaceutical companies spent more than \$51.3 billion in 2005 on drug discovery and development, herbs and other supplements often don't get big money for research since they can't be patented. Noted herbalist James A. Duke, PhD, says that choosing between

herbs and drugs is difficult because the information that we need to make these decisions is largely unavailable. To date there have been only a few clinical trials in which an herbal medicine was compared with a pharmaceutical drug and a placebo control.

In this context, Beljanski is exceptional; he discovered and developed natural products based on a lifetime of scientific research. He developed a truly fundamental theory of carcinogenesis, and his discovery of the anticancer activity of several plant extracts was based on practical application of his ideas. This article provides an overview of the research he started at the Pasteur Institute and continues with brief descriptions of ongoing research here in the US sponsored by the Beljanski Foundation.

Original Research at the Pasteur Institute

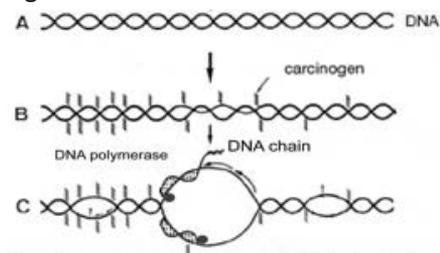
Mirko Beljanski was the first scientist to appreciate and to develop the concept that unregulated DNA strand separation or DNA destabilization could be the primary basis of pathologies such as cancer that are normally assumed to be genetic diseases. Our DNA is normally in the form of a two-stranded double helix that is held together by weak chemical interactions called hydrogen bonds. These weak bonds suit the dynamic needs of the cell that must open up the duplex so that single strands are available for the vital processes of gene expression and DNA duplication, after which the bonds are reestablished and the duplex is reformed. The enzymes that copy DNA

and transcribe DNA into RNA can only work on single strands and the cell uses a complex system of proteins to control opening and reclosing of the double-stranded DNA. Beljanski realized that the DNA duplex must also be susceptible to external factors and environmental contaminants, including carcinogens that interact directly with DNA and may induce a destabilizing effect.

This model of the destabilizing effects of carcinogens on the DNA duplex is illustrated in Figure 1. Carcinogens with affinity for DNA may bind at various sites along the duplex. This binding exerts a destabilizing effect that can break the hydrogen bonds, giving rise to openings or loops in the normally tight duplex. These loops or single-stranded regions are the physical manifestation of DNA destabilization, and when persistent these openings provide entry points for the enzymes that are active on the exposed single strands. The result is unregulated DNA duplication and gene expression, two of the principal characteristics of a cancer cell.

Beljanski developed an assay, called the Oncotest, to measure DNA destabilization. When purified DNA from a cancer cell and a healthy cell were compared in the Oncotest, he found that the cancer DNA showed destabilization. When known carcinogens were added to each sample, the destabilization of the cancer cell DNA increased dramatically, whereas the healthy cell DNA remained stable. He reasoned that the cancer DNA, already partially destabilized, was very sensitive to binding of the carcinogen and further destabilization. The intact duplex of the healthy DNA was resistant to carcinogen binding and subsequent destabilization.

Figure 1



Once the strands are separated, enzymes for DNA replication have increased access to the duplication sites located inside the double helix and duplication can become abnormally accelerated.

The Oncotest was ultimately used to test hundreds of compounds for their effect on DNA stability and their potential to act as carcinogens. These data indicate that DNA destabilization is a general phenomenon associated with many different carcinogens. In addition to finding other substances such as lactose, saccharin, and cholesterol that had no effect in the Oncotest (because they don't bind to DNA), Beljanski identified a class of compounds that were carcinogenic in the Oncotest. Some of these compounds did not show mutagenic potential in the mainstream Ames test used to classify cancer-causing compounds. This result illustrates Beljanski's departure from the mutational theory of carcinogenesis. The Oncotest revealed that a compound could be carcinogenic (by affecting DNA structure) without necessarily being a mutagen (which act by altering DNA and protein sequences).

Beljanski also used the Oncotest to screen for compounds that reduce instead of increase DNA destabilization; that is, compounds that act as opposites of carcinogens. He focused on screening natural compounds, not just because of their diversity, but because he thought that natural compounds would be better tolerated as anticancer agents in humans. Following extensive analyses of natural compounds, Beljanski identified a small number that acted as anticarcinogens in the Oncotest. What is more, these extracts did not affect the results obtained with normal DNA. Two of the extracts he found derived from tropical plants, *Pao pereira*, a tree that grows in the Amazon rain forest, and *Rauwolfia vomitoria*, a shrub found in West Africa. These two extracts were particularly effective and became the focus of his research.

The plant extracts were subjected to a long series of tests to examine their effect on cultured cancer cells, on animals with various kinds of cancer, and ultimately in numerous human case studies. The extracts showed several consistent and remarkable properties. They stopped the proliferation of cancer cell lines maintained in the laboratory while having no effect on healthy cells. They were toxic to tumor cells in mice,

but did no harm to healthy mice. They have proved to have anticancer effects on a range of human malignancies, but have shown no significant side effects.

Prostate Cancer and Prostate Inflammation

Research in the US into the anticancer effects of the *Pao pereira* and *Rauwolfia vomitoria* extracts began at Columbia University Medical Center under the direction of Dr. Aaron Katz and his colleague Dr. Deborah Bemis. Using rigorous tests both in vitro (cell-based studies) and in vivo (animal studies), they showed that the extracts inhibit growth of human prostate cancer cells by inducing apoptosis (cell death) or inducing cell cycle arrest (also leads to cell death). These are very attractive mechanisms of action for anticancer agents. The laboratory went on to conduct in vivo studies showing that both of the plant extracts significantly shrink prostate tumors in mice, and what is more, they found that the mice showed no toxic effects from the extracts. The Columbia studies demonstrated the efficacy and the safety of the plant extracts and so reconfirmed the claims originally made by Beljanski.^{2,3}

Whenever two anticancer agents work by different mechanisms of action, it makes sense to use them together to take advantage of the potential for a synergistic effect. So Katz conducted a small clinical trial using a combination of *Pao pereira* and *Rauwolfia vomitoria* extracts in men with elevated PSA (prostate specific antigen) levels. PSA is primarily an indicator of inflammation in the prostate and as chronic inflammation appears to be a major factor in progression to cancer. It is a serious health issue for men.

Katz found that the extract combination not only reduced PSA in men with high levels, but also provided relief from urinary problems in men with BPH (benign prostatic hyperplasia). BPH is an inflammation that causes enlargement of the prostate, impeding the normal flow of urine. These symptoms can become serious and have a big impact the



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➤ quality of life of men with BPH. Katz's work with the *Pao pereira/Rauwolfia vomitoria* combination demonstrated that these extracts have powerful anti-inflammatory effects in the prostate.⁴

Pancreatic and Ovarian Cancer

Further research on the *Pao pereira* and *Rauwolfia vomitoria* extracts has been conducted at Kansas University Medical Center by Dr. Qi Chen in Dr. Jeanne Drisko's group. Their work focused on pancreatic and ovarian cancer.

The Kansas group evaluated the antitumor effects of the extracts in various pancreatic and ovarian cancers. These two cancers are notoriously difficult to treat because the tumors are commonly diagnosed late and often become resistant to chemotherapy drugs. Chen explored the anticancer activity of the extracts both alone and in combination with widely used drugs to determine whether the extracts could reduce the drug resistance of the tumor cells.⁵⁻⁸

Five pancreatic cancer and three ovarian cancer cell lines were tested. All cell lines exhibited resistance to the first-line chemodrugs (gemcitabine for pancreatic cancer and carboplatin for ovarian cancer). The extracts induced dose-dependent cytotoxicities in all tested cancer cell lines. A normal epithelial cell was used as a control, and the differences in cell viability between the cancer cells and the normal cells were statistically significant, indicating low toxicity of the extracts. To test whether the extracts could enhance the

cancer cells' sensitivities to chemodrugs, they were combined with gemcitabine to treat pancreatic cancer cells, and with carboplatin to treat ovarian cancer cells. The combined treatments significantly enhanced cell death in cancer cells that were strongly resistant to the drugs. Combination indices (CIs) were <1, indicating synergistic effects. These studies were reproduced in vivo using mice transplanted with drug resistant pancreatic or ovarian cancers cells. At optimal doses tumor growth was significantly suppressed by both extracts alone. In combination studies, the extracts remarkably enhanced the effect of the drugs, reducing tumor burden by as much as 90%.

RNA Fragments and Immunity

Beljanski had a longstanding interest in the immune system and was focused specifically on finding a way to support immunity that was weakened by chemo- and radiotherapies. For example chemotherapy treatments are designed to destroy cancers, but they have well-known side effects such as damaging the stem cells in the bone marrow that produce white blood cells.

Neutrophils make up the majority of WBCs and are the body's main defense against bacteria and viruses. A disorder called neutropenia results from an abnormally low level of neutrophils in the blood and makes us vulnerable to infections. Platelets help our blood to clot and prevent excessive bleeding. Decreased levels of platelets, a condition called thrombocytopenia, can cause bruising or bleeding that may

become life threatening. Neutropenia and thrombocytopenia induced by chemotherapy are a major concern because there are so many cancer patients undergoing these anticancer treatments every year.

Beljanski developed a safe and effective remedy for restoring neutrophil and platelet counts in cancer patients receiving chemotherapy drugs. Acting as primers for DNA synthesis, these short-chain RNAs function as triggers for cell division and differentiation of bone marrow stem cells, leading to the production of white blood cells, specifically neutrophils, and platelets.

Clinical Trial with RNA fragments

Recently, a major cancer hospital – the Cancer Treatment Centers of America – conducted a phase I clinical trial with the small RNA fragments to determine whether they would restore normal platelet counts in patients with chemotherapy-induced thrombocytopenia (CIT).⁹ Many of the subjects were advanced cancer patients who had already received multiple cycles of chemotherapy. They suffered from a variety of solid tumors and were administered a variety of drugs and drug cocktails.

The results of the trial were striking. Patients receiving RNA fragments demonstrated a more rapid recovery in platelet counts than patients who did not receive the RNAs. None of the patients receiving the RNA fragments required a chemotherapy dose reduction due to thrombocytopenia and no patients required a platelet transfusion.

Whether chemotherapy-induced thrombocytopenia forces the



Sylvie Beljanski is committed to continuing the Beljanski family legacy as international leaders in environmental medicine research. Born in New York City and raised and educated in Paris, Ms. Beljanski completed her undergraduate studies at the Sorbonne. She then went on to pursue a law degree and was admitted to the French Bar Association.

In 1996, she founded Natural Source International Ltd., a company that offers science-based dietary supplements stemming from a lifetime of research in environmental medicine by her father, famed biochemist Mirko Beljanski, PhD.

Ms. Beljanski is dedicated to spreading the word and educating the public about the effects of our environment. Traveling throughout the world, she has educated thousands of people about the importance of detoxification as a defense against harmful toxins that can cause serious disease and infection. She presents the Beljanski Approach to Wellness with practical recommendations to avoid environmental toxins, remove them, and repair the cellular process.

Ms. Beljanski serves as vice president of the Beljanski Foundation Inc., a 501(c)3 nonprofit organization whose mission is to further Beljanski's research within a network of high-profile research institutions around the world, including Columbia University Medical Center and the University of Kansas Medical Center.

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suspension of treatment or the cancellation of the regimen or if a platelet transfusion is required, the tumor has a respite from the drugs; and rather than shrink, it begins to grow again often in more aggressive form. So the availability of Beljanski's RNA fragments can have a positive and profound effect on the course of treatment and the outcome of therapy and they do not cause any negative side effects of their own.

Current and Future Activities

The successful research program of the Beljanski Foundation continues. Current research focuses on the effects of the *Pao* and *Rauwolfia* extracts on brain cancer, inflammation, and cancer stem cells.

To fulfill the part of the Beljanski Foundation's mission focused on education, a AMA-accredited continuing medical education webinar for US health-care professionals is now provided. "A Natural Approach to Cancer" is a 1-hour CME presentation with specific learning objectives that

provides AMA PRA Category 1 Credit – the highest continuing education accreditation available for licensed health professionals in the US.¹⁰

The presentation, narrated by the Beljanski Foundation's senior scientific advisor, John Hall, PhD, covers the cumulative destabilizing effect environmental toxins have on the physical structure of DNA and explores the underlying scientific theories and breakthroughs on DNA destabilization made by Beljanski while he worked at the Pasteur Institute. Using illustrations and engaging graphics, the webinar reviews Beljanski's discovery of and clinical studies of natural extracts that act at the cellular level selectively on destabilized DNA and the validating research programs conducted at Columbia University, Kansas University Medical Center, and other US medical institutions that the Beljanski Foundation has sponsored.

Notes

1. The Beljanski Foundation [website]. <http://www.beljanski.org>.
2. Bemis DL, Capodice JL, Gorroochurn P, Katz AE, Buttyan R. Anti-prostate cancer activity of B-carboline alkaloid enriched extract from *Rauwolfia vomitoria*. *Int J Oncol*. 2006;29:1065–1073.
3. Bemis DL, Capodice JL, Desai M, Katz AE, Buttyan R. B-carboline alkaloid-enriched extract from the Amazonian rain forest tree *Pao pereira* suppresses prostate cancer cells. *J Soc Integr Oncol*. 2009;7(2).
4. Burchill M. Two herbal extracts for protecting prostate cell DNA. *Integr Med*. April 2010;9(2).
5. Yu J, Drisko J, Chen Q. Inhibition of pancreatic cancer and potentiation of gemcitabine effects by the extract of *Pao pereira*. *Oncol Rep J*. 2013;30(1). doi:10.3892/or.2013.2461.
6. Yu J, Chen Q. Antitumor activities of *Rauwolfia vomitoria* extract and potentiation of gemcitabine effects against pancreatic cancer. *Integr Cancer Ther*. 2014 Apr 24;13(3):217–225.
7. Yu J, Chen Q. The plant extract of *Pao pereira* potentiates carboplatin effects against ovarian cancer. *Pharm Biol*. 2014;52(1).
8. Yu J, Ma Y, Drisko J, Chen Q. Antitumor activities of *Rauwolfia vomitoria* extract and potentiation of carboplatin effects against ovarian cancer. *Curr Ther Res Clin Exp*. 2013 Dec;75:8–14. doi:10.1016/j.curtheres.2013.04.001.
9. Levin RD, Daehler MA, Grutsch JF, Hall JL, Gupta D, Lis CG. Dose escalation study of an antithrombocytopenic agent in patients with chemotherapy induced thrombocytopenia. *BMC Cancer*. 2010;10:565.
10. Continuing medical education: "A Natural Approach to Cancer" [Web page]. The Beljanski Foundation. <http://www.beljanski.org/eng/mirko-beljanski-extracts/cme>.

Presented by THE *Beljanski* FOUNDATION, INC.

A Natural Approach to Cancer

CME Webinar AMA PRA Category 1 Credit

A Natural Approach to Cancer is a one-hour CME webinar presentation that explores the underlying scientific theories and breakthroughs on DNA destabilization made at the Pasteur Institute by famed molecular biologist Mirko Beljanski, PhD, and recent validating research programs conducted at Columbia University, Kansas University Medical Center, and other U.S. medical institutions. The presentation will also cover Dr. Beljanski's discovery of and clinical studies of natural extracts (***Pao pereira*, *Rauwolfia vomitoria*, Golden leaf of *Ginkgo biloba*, and RNA fragments**) that act at the cellular level selectively on destabilized DNA.

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