Protea Biosciences, Inc.
955 Hartman Run Road,
Morgantown, WV 26507
P: 304.284.2600
F: 304.292.7101
C: 301.606.0840
www.proteabio.com
stephen.turner@proteabio.com

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The MBRCC-Protea Cancer Research Project

What is the goal of the project?

The joint research collaboration will apply a new technology developed by Protea , known as LAESI, to analyze leukemia cells and the chemical environment they live in to identify specific biomolecules that will help to explain why some of these cells are resistant to treatment with chemotherapy.

Researchers believe there is something in the bone marrow cellular environment, where most of our white blood cells are made, that if identified can help us to understand and better treat cancers like leukemias.

Because of LAESI's unique capacity, this will be the first time where we can look at metabolic changes in leukemic cells simultaneously with changes in the fluids surrounding these cells. Ultimately we now have an ability to analyze all cancer cells, in order to understand the many biochemical changes that occur when a normal cell becomes a cancer cell, and even what causes it to become resistant to treatment.

The goal of this research project is to find new points of intervention to improve treatment for leukemia and other forms of cancer.

What is leukemia?

Leukemia is a form of cancer caused by the uncontrolled multiplication of different types of white blood cells. Most white blood cells are produced in our bone marrow, and some types in our lymph nodes. Leukemia is one of the most common forms of cancer particularly for children.

How is leukemia currently treated and what are some of the problems with current treatment?

Treatment depends on the type of white blood cell involved in the cancer, but it is largely treated using very potent medications called chemotherapy. Chemotherapy agents are designed to kill rapidly dividing cells. Unfortunately, normal cells as well as cancer cells are killed in the process, leading to a high incidence of undesirable side effects. Chemotherapy often compromises the patient's immune system, making them much more vulnerable to infection.

What is LAESI and why is it so special?

LAESI is a completely new analytical instrument, invented in the laboratory of Akos Vertes, PhD, Professor of Chemistry, George Washington University, and exclusively licensed to Protea Biosciences, here in Morgantown, West Virginia.

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LAESI uses a laser to create tiny gaseous plumes of samples of a tissue or cells, and processes the particles in the plume in such a way that allows rapid and simultaneous identification of the biomolecules from the sample. LAESI, in conjunction with a mass spectrometer, can literally identify thousands of different biomolecules in a matter of seconds. Importantly, the biological sample is not destroyed, so a researcher can see exactly where in the sample that the specific biomolecule is present.

After several years of development, the world's first integrated LAESI instruments are now operating at Protea, thus the MBRCC will be the first Cancer Center in the world to have the opportunity to apply this new technology to their cancer research.

What are biomolecules?
The cells of our bodies are producing many types of chemical entities, known as "biomolecules", to fulfill their specific function, and to regulate our normal processes to sustain a healthy life. Biomolecules include proteins (the products of our genes), lipids, metabolites and other families of molecules.

Where could all this lead?
This collaboration, and future ones like it, will allow us to finally "drill down" into the machinery of cancer cells, and identify specific events that cause the cancer cell to form, and to be resistant to treatment.

This precise base of knowledge will help usher in a new era of cancer diagnosis and treatment, based upon the precise, molecular events that cause a cancer cell population to be formed and to grow in our bodies.

What is Protea's business?
- Go to website www.proteabio.com

Protea is a leader in developing new technology to improve the identification of biomolecules – the products of living cells and organisms. "Bioanalytics" is the analysis of the products of all living cells and organisms. It is a foundational science for all medical research.

Protea develops new bioanalytical technology for the direct analysis of proteins and other biomolecules – the products of living cells and organisms. We apply our capabilities to develop new pharmaceuticals, products and services.