Diagnostic Tool and Treatment for Breast Cancer

A potential “first-line” diagnostic test for triple negative breast cancer and related therapeutic

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Inventors
Nazarius Lamango, Ph.D.

Key Features
• First-line diagnostic tool for triple negative breast cancer
• Demonstrate that PMPM Esterase inhibitors kill cancer cells

Technology
A number of proteins that play key roles in biological regulatory events undergo a post-translational modification called prenylation, in which a hydrophobic molecule is attached to the C-terminus of the protein and enables its attachment to the plasma membrane. The prenylation pathway consists of three enzymatic steps with the fully processed protein being isoprenoid-modified, truncated by three amino acids, and methylated at its carboxy terminus. This protein modification pathway plays a significant role in cancer biology because many oncogenic proteins undergo prenylation. Methylation of the C-terminus by Prenylated Protein Methyl Transferase (PPM Transferase) is the final step in the prenylation pathway. This last step is balanced by the action of polyisoprenylated methylated protein methyl esterase (PMPM Esterase), which removes the methyl group. Methylation of the carboxyl group neutralizes the negative charge of the group, enabling interaction with the negatively charged plasma membrane phospholipids. Thus it is assumed that PPM Transferase promotes membrane targeting of prenylated proteins, and the PMPM Esterase counters that targeting.

Subtypes of breast cancer are typically diagnosed based on the expression of three different antigens: estrogen receptors (ER), progesterone receptors (PgR), or human epidermal growth factor receptor (HER2). Approximately 15% of all breast cancer cases test negative for all three receptors and are referred to as triple negative breast cancer (TNBC).

The inventors have developed two technologies based upon PMPM Esterase activity. First, they have established that PMPM Esterase is hyperactive in breast cancer tissue (relative to normal tissue) and even more active in TNBC. Based on this information, they have developed a first-line assay for determining if a tissue sample is triple negative. The inventors have also demonstrated that PMPM Esterase inhibitors induce cancer cell death in cell-based assays.

Potential Application
The first technology has potential as a “first-line” diagnostic test for triple negative breast cancer. The second invention could have therapeutic effects on various types of cancer.

Opportunity
In 2009, an estimated 192,730 new cases of breast cancer were diagnosed and 40,170 women died from breast cancer. Since early detection improves the survival rate of cancer patients, there is a market for additional diagnostic tools and related therapeutics.
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## Field
Pharmaceutical

## Technology
Diagnostic test for breast cancer & Therapeutic cancer treatment

## Stage of Development
Pre-clinical development

## Status
Seeking research & development and/or licensing partner

## Patent Status
US App 2009/0253640  
US App 2010/0087526  
Pending App. for assay

## INVENTORS
Dr. Nazarius Lamango is currently an Associate Professor of Medicinal Chemistry at Florida A&M University.

## EDUCATION
Nazarius S. Lamango, Ph.D.  
B.S. Agricultural Chemistry, University of Leeds  
Ph.D. University of Leeds  
Postdoctoral, Louisiana State University Medical Center

## SPECIALTY
Dr. Lamango has focused on the design, synthesis, and analysis of specific substrates and inhibitors of Polyisoprenylated Methylated Protein Methyl Esterase (PMPM Esterase). He has also studied the role of polyisoprenylated protein metabolism in neurodegenerative disorders.

## RECENT PUBLICATIONS
- Aguilar B., Amissah F., Duverna R., and Lamango N.S. Polyisoprenylation Potentiates the Inhibition of Polyisoprenylated Methylated Protein Methyl Esterase and the Cell Degenerative Effects of Sulfonyl Fluorides. (2011) PMID 21599633

## Patents