VA Merit Award grant supports research into biomarkers for metastatic prostate cancer

April 06, 2023 2:00 PM Melanie Cross
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Victoria Belancio, PhD, was recently awarded a Department of Veterans Affairs Merit Award Grant to support her team's work to identify possible biomarkers and genetic variations associated with a higher risk for aggressive metastatic prostate cancer. (Photo provided by Tulane Cancer Center)

Despite recent progress in the development of new drugs and treatment options for prostate cancer, metastatic disease mortality remains a major concern, highlighting a critical need for the discovery of biomarkers and the development of tests that can identify men who are at a highly elevated risk for developing metastatic disease before they are ever diagnosed.

Victoria Belancio, PhD, associate professor of structural and cellular biology and associate director for cancer education at Tulane Cancer Center, and her team are working on just such a test, and she was recently awarded a four-year, $1.032 million Department of Veterans Affairs Merit Award Grant to support her investigations.

"This idea is very similar to BRCA1, BRCA2 and other genetic tests that identify elements already present in the genome," said Belancio. "Such a test could be administered at any point during a man's life — even prenatally — to identify the presence of a particular biomarker and locations of genetic variations in the genome that might be associated with aggressive metastatic disease. Those at increased risk could then be more proactive about being screened."

The biomarker Belancio is targeting is a mobile element called polymorphic L1 — or pL1. Mobile elements are segments of DNA that can jump around within the genome, reshuffling genetic material as it copies and reinserts itself randomly.

"L1 contributes to genomic instability," said Belancio. "It's known to cause mutations that can either initiate tumorigenesis or contribute to the progression of cancer."

Belancio's preliminary analysis of Whole Genome Sequencing datasets and sample tissues from our Prostate Cancer Research Program biorepository — a collection of tissue specimens from Tulane's unique cohort of prostate cancer patients maintained by Dr. Oliver Sartor and Dr. Elisa Ledet — shows that specific pL1s are enriched in the genomes of patients with metastatic disease, meaning this genetic variable could be a potential new and powerful biomarker of aggressive prostate cancer.

In this project, Belancio's team is also aiming to identify novel genetic variations to determine whether the number and/or composition of pL1s in patient genomes — alone or in combination with identified variations — is positively associated with aggressive disease.

But whole genome sequencing is time-consuming, very expensive, and impractical for high throughput clinical use. "And so what we've done is develop a technique for which Tulane has filed a patent that would allow us to determine the presence of both pL1 and targeted genetic variations through a simple blood test," said Belancio.

Her team's short-term goal is to generate through this project proof-of-principle pre-clinical data that show applying this technique can potentially distinguish patients who will develop aggressive metastatic prostate cancer from those who will not. And the long-term outcome of the success of this proposal would be a reliable genetic blood test that is cheap, effective, accurate, fast and easy to administer in the clinic.

"Many men will develop prostate cancer as they age," said Belancio. "The lack of reliable genetic biomarkers to understand who will progress to aggressive metastatic disease has led to many cases of over treatment. And the ways in which these patients are treated can have very devastating physical and psychological effects. If our work can change this, it will have very important implications for disease management."