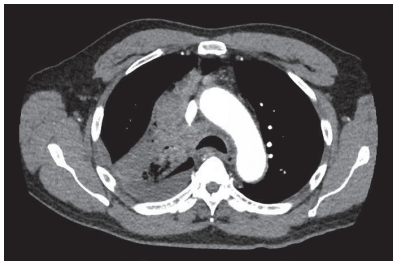
Biodesix Lung Reflex®
Case Study

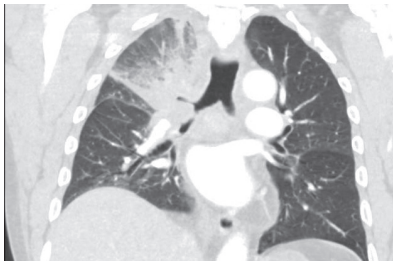
Non-Smoker Identified with Rare, Aggressive Cancer Mutation

Case Presentation:

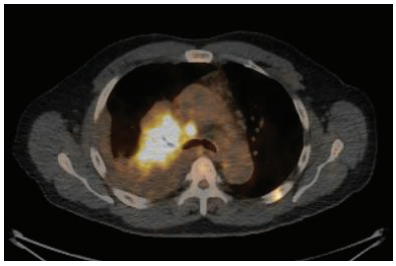
- 67-year-old male, non-smoker
- Productive cough with hemoptysis
- Treated with antibiotics for pneumonia without improvement
- CT scan showed 6.7 x 2.9 cm mass in the right upper lobe (RUL), mediastinal and hilar adenopathy, mild mass effect on the super vena cava, and occlusion of the RUL pulmonary artery, right superior pulmonary vein, and multiple segmental bronchi of the RUL.
    - Paratracheal lymph nodes measured up to 18 mm. The subcarinal lymph node was 17 mm.
    - A moderate right-sided pleural effusion was also identified.
- PET scan showed a large, hypermetabolic RUL mass, focal areas of fluorodeoxyglucose avidity along the right pleura, and diffuse hypermetabolic activity in the mediastinal lymph nodes, right lateral abdominal soft tissues, bilateral ribs, spine, and pelvis.
- MRI of the brain was negative for metastatic disease. Malignant cells were identified on thoracentesis.



Axial CT



Coronal CT



PET Scan

Diagnosis:

- T3N3M1c Stage IVB lung adenocarcinoma

Molecular Testing and Test Results:

- GeneStrat® result: BRAF V600E mutation positive
- VeriStrat® result: Good
- Insufficient specimen for in-house NGS testing. PD-L1 85%.

Patient Treatment Plan:

- Initiated concurrent radiation treatment and targeted therapy with dabrafenib and trametinib.

Patient Outcome:

- Patient is currently on a targeted therapy plan.

Key Considerations

- Biodesix Lung Reflex results identified an actionable mutation, BRAF V600E, which helped direct a standard of care therapy plan.

OVERCOMING MULTIDISCIPLINARY BARRIERS TO LIQUID BIOPSY INTEGRATION

Jonathan Kurman, MD

Director, Interventional Pulmonology at
Froedtert & the Medical College of Wisconsin

Can you tell us a bit about your practice?
I'm the Director of Interventional Pulmonology at the Medical College of Wisconsin. I recently completed an Interventional Pulmonology (IP) fellowship at the University of Chicago with Drs. Septimiu Murgu, Laura Frye and Kyle Hogarth. At the Medical College of Wisconsin, I see a significant number of lung cancer and lung transplant patients. My practice is primarily procedural-based. I spend approximately two full-days in the bronchoscopy suite and two half-days in clinic. One half-day is at the Froedert Cancer Center where I exclusively see lung cancer patients, and the other half-day is at the Center for Advanced Care, where I see patients with benign and malignant disease.

How many IPs are in your group?
I'm the only IP at my academic medical center. There are three pulmonologists at my facility that perform advanced bronchoscopy procedures such as endobronchial ultrasound (EBUS) and navigational bronchoscopy.

How many oncologists are in your practice?
At our center, there are two thoracic oncologists and numerous sub-specialty oncologists. There are about twenty providers in total in our pulmonary division.

How do you integrate liquid biopsy into your practice?
If I have a known lung cancer patient, I introduce the concept of liquid biopsy since they usually have never heard of it before. I explain the rationale behind the Biodesix Lung Reflex® (BLR) testing strategy and the information it provides to help inform their treatment decision. Patients are grateful for the explanation and are usually eager to have the test performed.

In addition, I incorporate the BLR data into our Thoracic Tumor Board discussion. It has completely altered the discussion we have had on certain patients— especially those who are particularly young or who have had refractory disease. The BLR results are also scanned into the electronic medical record for future reference.

How do you share the diagnosis and prognosis with your patients? Do you talk about potential treatments?
If the patient is set up to see the oncologist in a timely manner, I have the oncologist convey the liquid biopsy results to the patient. If not, then I call the patient and explain the results in a basic manner but defer therapy and other management decisions to their oncologist.

How do you convey the VeriStrat Good and VeriStrat Poor result?
My patients know I'm very upfront, which they appreciate. Before I draw the test, I tell them that there is a prognostic component and a mutational component. I explain that the prognostic component is a binary test, which is either rated Good or Poor. If the results are VeriStrat Poor, I let them know that their form of cancer may be more aggressive, so we should be aggressive in our initial treatment recommendations if they can tolerate it. I also explain how the VeriStrat test is prognostic of their disease independent of classic prognostic indicators such as ECOG performance status, mutation status and treatment choice.

Does the VeriStrat result change how you refer your patients?
I have two oncologists that I refer to regardless of a patient's VeriStrat result. If a patient tests VeriStrat Poor, I contact the oncologist directly to make them aware of the results and help expedite them seeing the patient and initiating treatment. I also remind them that even if the patient is ECOG 0, it doesn't mean that they should treat the VeriStrat Poor results lightly. The beauty of the VeriStrat test is that it looks beyond the façade of a patient's performance status and gives you a true indication of how a patient is going to do— which is what patients want to know and what oncologists, as treating providers, should want to know.

Do you refer 100% of your patients directly to oncologists or some to radiation oncologists or thoracic surgeons depending on staging?
I refer all my lung cancer diagnoses to a thoracic oncologist. I refer a subset to the radiation oncology physicians or thoracic surgeons based on their disease stage.

Can you tell me more about your institute's weekly tumor board?
We have a multidisciplinary tumor board attended by oncology, surgery, radiology, interventional pulmonology, radiation oncology, and pathology. We review our complex cases and come to a consensus on the optimal management strategy. This helps facilitate timely and coordinated care.

Walk me through your Biodesix Lung Reflex workflow.
I have the BLR blood drawn on a Tuesday so in most cases I have the results in time for the Thursday Tumor Board meeting scheduled that week. Once the test results are received, my nurses automatically scan the BLR results into the EMR. I bring the BLR test results to the meeting and incorporate the data into the Tumor Board discussion to make it more meaningful. The attendees are impressed with the speed of the BLR test results as tissue results are often not available for another few weeks.

Does your institute act on the mutation results from the liquid biopsy or wait for tissue confirmation?
Our practice uses the liquid biopsy results for tumor treatment decisions since the BLR results are highly sensitive and specific. This allows us to get the ball rolling for targeted therapy medication approval. It's also being incorporated at many different points along the treatment spectrum and becoming an integral part of our lung cancer work flow and treatment algorithm. We're using

the test results in patient discussions, our pharmacists are using it for medication approval, and our thoracic oncologists are using the results to determine treatment strategies.

Can you elaborate a bit further on time to treatment?
Time to treatment is one of the most critical aspects of general and thoracic oncology. I think that the delay between diagnosis or suspected lung cancer and initiation of treatment is unacceptably long, but we're moving in the right direction. The incorporation of the liquid biopsy, specifically the BLR testing strategy, into our workflow has greatly improved our time to treatment. We now have data on the six most common actionable mutations in 48 to 72 hours as opposed to 3 or 4 weeks. That time differential saves lives. It's as simple as that. It delays progression and improves overall survival.

When you were trying to implement the BLR testing strategy into your practice, did you face any barriers? What are you doing to overcome them?
The initial barrier I faced was opposition to adoption of the BLR testing strategy from administrators and other physicians. Despite explaining the value it adds, I failed to change some mindsets initially, which was a bit discouraging.

However, after a few cases where the BLR test directly impacted the management plan, it has now become a standard component of our diagnostic and treatment algorithm.