On April 23, “Partners in Medicine,” Stanford Medicine’s new leadership society, hosted a reception at the Bently Reserve in San Francisco for annual donors to Stanford Hospital & Clinics, Stanford University School of Medicine, and Stanford Cancer Institute (SCI). The program focused on advancing innovation through Stanford’s state-of-the-art facilities and collaborative research.

Beverly Mitchell, MD, director of SCI and the George E. Becker Professor of Medicine, welcomed guests and thanked them for empowering Stanford to transform the patient experience by pursuing innovation. She noted that the construction of a new hospital is just one of the developments that will position Stanford to deliver leading-edge, coordinated care to patients in general and cancer patients in particular.

Describing today as “one of the most amazing points in time” in cancer research since the National Cancer Act was signed in 1971, Dr. Mitchell highlighted new approaches to both prevention and diagnosis. The genomic revolution has opened up new ways to assess risk, she explained, which may allow physicians to intervene earlier with those at increased risk. “If we can prevent cancer, we will have done something very special,” Mitchell said. She also described how physician-researchers are using molecular diagnostics to identify cancers more precisely than ever before. Combined with novel imaging techniques, Mitchell explained, precision diagnostics let us look at cancer cells “at the molecular level, before they are deadly.”

Dr. Mitchell emphasized the critical role that clinical trials and research play in translating these insights into new therapeutics—and looking systematically at outcomes. “Are there survivorship characteristics? Over one million people have survived. We need to learn more from them.”

Dr. Mitchell credited the Cancer Discovery Fund (CDF) and its seed grant program in particular with empowering SCI to fund researchers with promising ideas that are not developed enough to get outside support. The focus is collaboration, she emphasized, “in particular, bringing together clinical investigators and basic researchers.”

Dr. Mitchell introduced the evening’s keynote speaker—and past CDF seed-grant recipient—Joel Neal, MD, PhD, and assistant professor of medicine. Noting that Dr. Neal is a co-principal investigator on multiple clinical trials involving non-small cell lung cancer (NSCLC), Dr. Mitchell described him as “an incredible asset to the institution.”

In his presentation, Dr. Neal provided an overview of lung cancer epidemiology, types, and research and then described a revolutionary intersection between “big data” and medical research that promises to speed the development of new insights, diagnostics, and/or therapeutics.

Even with decreases in smoking, Neal reported, lung cancer continues to be the second most frequently diagnosed cancer among both men and women and the mostly deadly, accounting for more than 25 percent of annual cancer deaths among women and more than 30 percent among men.

The goals of lung cancer research are ambitious: to improve existing treatments, find markers of response and resistance to treatment, and detect cancer earlier.

Before describing the clinical trials he is directing, Dr. Neal noted the importance of maintaining critical information on the entire patient population at Stanford—a goal now being pursued through Dr. Mitchell’s recently launched Stanford Cancer...
“In the past, we were losing information on patients we treated but who didn’t participate in clinical trials,” Dr. Neal explained. Now Stanford can “capture and analyze treatments and outcomes” among the entire patient population.

Dr. Neal set the stage by describing a traditional clinical approach to NSCLC: one diagnosis, one treatment (chemotherapy). “Chemotherapy has improved,” he acknowledged, “with more kinds that are less toxic. And outcomes are improving.” But the range of outcomes is still large enough to make it difficult to give patients a clear prognosis.

In contrast to the “one diagnosis, one treatment” approach, Dr. Neal described the promise of genotype-directed therapy, which is “working to improve outcomes even more dramatically.” In this approach, physicians identify the genetic subtypes within the NSCLC, or the specific mutations driving the cancer cell. “Many have become more targetable and therefore more treatable over the past four years,” he said. Most importantly, progress is tangible. “About every year we find a new subtype along with therapies that might work against them.”

Dr. Neal noted. Rather than sampling tissue repeatedly to check if new interventions are blocking tumor growth, physicians can now draw blood and use highly sensitive testing to detect the presence (if any) of tumor DNA “signatures.” Less invasive for the patient, blood-based detection also accelerates the feedback loop between treatment and evaluating outcomes—making therapies more efficient for patient and physician alike.

Dr. Neal concluded by describing a revolutionary collaboration with Stanford data scientist Atul Butte, MD, PhD, chief of systems medicine and associate professor of genetics. Dr. Butte and his team are mining biomedical databases to identify drugs that may oppose or encourage the development of specific disease tissue. Dr. Neal said Dr. Butte approached him after the Butte lab discovered a negative correlation between small-cell lung cancer (SCLC)—a particularly aggressive form—and tricyclic antidepressant drugs (TCAs). Although TCAs are no longer commonly prescribed for treating depression, the biological data suggested they might inhibit the development of SCLC tumors. On the basis of these promising insights, Dr. Neal created a small clinical trial to test the possibility of repurposing these nearly forgotten drugs.

The trial is still in progress, but Dr. Neal stressed the impact of the bioinformatics process itself. Exploring the influence of drugs with known safety profiles both speeds up the drug development timeline and reduces development costs. “Identifying a potentially effective drug normally takes six years,” Dr. Neal said. “We did it in one.”

Dr. Neal then opened the floor to questions, which included queries about lung cancer diagnosis, the status of cancer vaccines, and what kinds of tissue databases might be mined.

In her closing remarks, Dr. Mitchell called Dr. Neal’s work “a tremendous example of what makes Stanford special.” She thanked donors for investing not only in new approaches to cancer but “in Stanford Medicine overall, which is known for this kind of innovation and bringing new approaches to disease states.”

For more information about what is happening at the Stanford Cancer Institute, please visit our website at: cancer.stanford.edu.