

ARPA-H pioneers game-changing cancer care designed to adapt throughout treatment



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Selected performer teams will use predictive models to match treatments with changing tumor biology and prevent disease progression

The Advanced Research Projects Agency for Health ([ARPA-H](#)), an agency within the U.S. Department of Health and Human Services, today announced the teams receiving contract awards from its [Advanced Analysis for Precision Cancer Therapy \(ADAPT\)](#) program. The agency's commitment is up to \$142 million to revolutionize personalized cancer care by dynamically tracking tumor changes through multiple lines of treatments. If successful, ADAPT's new tools and protocols will save American lives and reduce the massive economic burden of cancer nationwide.

Approximately two million Americans are diagnosed with cancer each year, and over 600,000 of those individuals are diagnosed with metastatic and treatment resistant cancers. Mutations and changes in cancer can occur over time causing resistance to cancer therapy making it difficult for doctors to identify the next most effective treatment. The ADAPT program seeks to integrate powerful computational models, novel biomarkers, and an evolutionary clinical trial to allow for early detection of tumor changes. As tumors

evolve, the information gathered would allow for informed adjustments in treatments and improved patient outcomes.

“The ADAPT program is unique, as we are, in near real-time, developing, testing and implementing new biomarkers within an adaptable clinical trial to more accurately predict a patient’s cancer trajectory and identify the best next therapy for survival,” said ADAPT Program Manager [Andrea Bild, Ph.D.](#) “This advanced approach to oncology brings together researchers, clinicians, bleeding-edge computational technologies, and innovative trial designs. Through these advances, we will provide more accurate treatment strategies that benefit each patient. The ADAPT program will serve as the gold-standard science for rapid and effective cancer management through its highly personalized approach.”

Instead of measuring a few data types at a single timepoint with limited predictive ability, the ADAPT program will take many measurements of diverse data over time and through multiple lines of treatments. These novel insights will help identify newly acquired resistant traits in tumors, predict the right therapies at each point in a patient's treatment course, and identify strategies that provide better long-term prognoses.

ADAPT covers three collaborative areas: 1) advancing therapy recommendation techniques, 2) an evolutionary clinical trial design, and 3) development of a treatment and analysis platform. The program is initially focused on breast, lung, and colon cancers. The following teams have been selected.

Technical Area I: Therapy Recommendation Techniques

- Arizona State University: The team will perform tumor ecology-based and evolution-based modeling to identify key resistance traits that change over time, including gene activity, oncogenic state, cancer cell evolvability, immune evasion, and signaling network activity.
- Stanford University: The team will use interpretable artificial intelligence models to identify complex relationships between tumor features, drug response, and survival times using longitudinal pathological, radiological and molecular data.
- University of California, San Diego: The team will build dynamic biomarkers that anticipate tumor evolution with predictions of drug response that can be updated frequently with new data to enable adaptive treatment for patients.
- Massachusetts Institute of Technology: The team will develop machine learning algorithms that can utilize genetic, molecular, imaging, and electronic health record data to recommend optimal therapy strategies.
- Brigham & Women’s Hospital: The team will develop tools for fusing clinical and genomic data into foundational models that the therapy recommendation teams will use to identify cancer resistance traits and create treatment response biomarkers.

Technical Area 2: Evolutionary Clinical Trial Design

- University of North Carolina at Chapel Hill (breast cancer): The team will develop an evolutionary trial for breast cancer patients using new statistical approaches that maximize the likelihood of treatment success for each individual patient using biomarker-driven therapies.
- Beckman Research Institute of the City of Hope (lung cancer): The team will create a biomap of immunotherapy resistance mechanisms in non-small cell lung cancer and validate new biomarker-guided therapy in near real-time to improve the success of patient treatments.
- UT MD Anderson Cancer Center (colon cancer): The team will undertake a novel two-phase umbrella clinical trial for patients with colon cancer that quickly identifies and targets emergent resistant traits through integration of drug response biomarkers and resistance-targeting drugs.

Technical Area 3: Treatment and Analysis Platform

- DNAnexus: The team will develop a Treatment and Analysis Platform (TAP), a secure cloud-based data ecosystem that enables collaboration among clinicians and multidisciplinary researchers.
- Washington University: The team will augment and extend the ADAPT TAP by integrating their Multi-modal Analysis with XNAT (eXtensible Neuroimaging Archive Toolkit) (MAX) system, providing additional state-of-the-art tools to manage, analyze, and explore clinical and imaging data.

The first patients are expected to be enrolled in the ADAPT clinical trial within 12 months. Algorithms and aggregate datasets developed under the program will be made publicly available, allowing anyone to analyze and visualize trends, implications, and insights. Continued ARPA-H funding depends on research teams meeting aggressive research milestones.

For more on ADAPT, visit the [program page](#).

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