

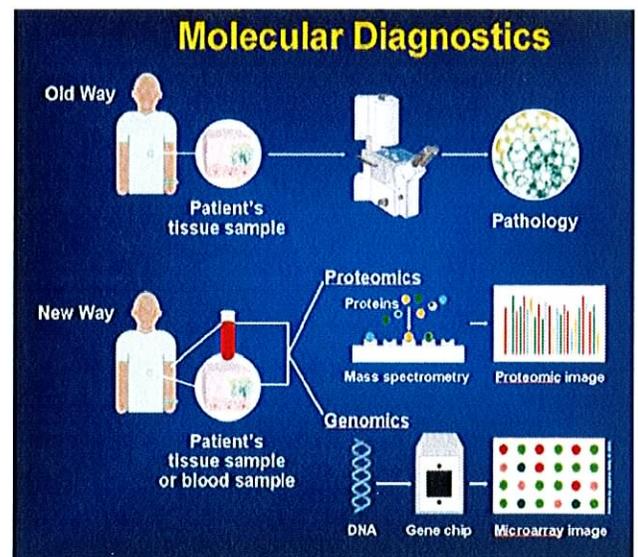
Hollings Cancer Center: Enhancing Molecular Cancer Diagnostics Research in South Carolina

Requested Action

The Hollings Cancer Center at the Medical University of South Carolina is requesting support to significantly enhance infrastructure capabilities so that scientists across the state can become leaders in the latest frontier of cancer research--molecular diagnostics. The Hollings Cancer Center has invested significantly into recruiting nationally recognized researchers with expertise in genetics, lipidomics and proteomics, and these researchers have already demonstrated leadership in identifying and defining the functionality of genes, lipids and proteins in the development and spread of cancer. The study of molecular diagnostics is already quickly evolving from what was a labor intensive endeavor to one that is now driven by high throughput technology. In order to become leaders in the field of molecular diagnostics and to attract biotech/industry partners, the Hollings Cancer Center, on behalf of the state, needs resources to finance a statewide cancer tissue and specimen repository, the acquisition of essential shared research resource equipment and a statewide network of bioinformatics specialists. All equipment and infrastructure will be established and managed by the Hollings Cancer Center as a statewide shared resource.

Need

Before molecular diagnostics, physicians categorized cancer cells according to their pathology or according to their appearance under a microscope. Borrowing from two new disciplines, genomics (study of genes) and proteomics (study of proteins), molecular diagnostics determines how genes and proteins are interacting and focuses upon patterns in different types of cancers cells. Molecular diagnostics uncovers these sets of changes and captures this information. Also called “molecular signatures” these expression patterns are improving the physician’s ability to diagnose cancer. Soon all cancers may be diagnosed this way. Physicians are quickly realizing that molecular diagnostics has many uses beyond just the creation of diagnostic tools. The benefits of molecular diagnostics include creating new cancer screening tools, informing the design of new treatments, monitoring treatment’s effectiveness and predicting a patient’s response to treatment. To enhance the South Carolina scientists to be leaders in molecular diagnostics, the state needs key infrastructure support in five areas described below.



Statewide Cancer Tissue and Specimen Repository: The Hollings Cancer Center in collaboration with the University of South Carolina, Clemson University and other leading medical centers in South Carolina would like to establish a tissue and specimen repository that supports cancer research throughout South Carolina by making cancer samples as well as pertinent clinical data available to scientists. Patients at participating facilities would be asked about donating tissue and/or specimens that would normally be discarded after surgery or the diagnostic processes are complete. Donated tissue are then rapidly frozen and then stored in liquid nitrogen freezers where it can be kept for decades. These specimens and tissues are the essential resources needed to perform molecular diagnostic research. The personnel managing this repository will be highly training in the effective techniques of procuring, fixing, storing and distributing tissue for the purposes of molecular analysis. As part of the development of this repository, a comprehensive statewide database with extensive data sharing capabilities would also be employed.

Bioinformatics: Bioinformatics is the recording, annotation, storage, analysis, and searching/retrieval of nucleic acid sequence (genes and RNAs), protein sequence and structural information. This includes databases of the sequences and structural information as well methods to access, search, visualize and retrieve the information. Bioinformatics concern the creation and maintenance of databases of biological information whereby researchers can both access existing information and submit new entries. Function genomics, molecular diagnostics, proteome analysis, cell metabolism, and drug and vaccine design are some of the areas in which Bioinformatics is an integral component. With the increased capacity to perform molecular diagnostics, the Hollings Cancer Center would like to support the integration of bioinformatics resources across the three major universities (MUSC, USC and Clemson) to support cancer researchers.

Flow Cytometry & Cell Sorting: Flow cytometry is a powerful technique for simultaneously analyzing multiple characteristics of individual cells within a population in a relatively short period of time. The LSR II from BD Biosciences is a benchtop flow cytometer that can be configured to detect up to 18 colors or parameters. This instrument has a high degree of flexibility, versatility and ease of use making the LSR II a state of the art instrument that allows scientists to do multiparametric analyses on single cells across a wide range of advance research applications, including clinical and basic science. It would be the only such instrument in the state of South Carolina.

Cell and Molecular Imaging: The FluoView FV1000 MPE next-generation imaging system is designed for high resolution intravital confocal/multiphoton imaging. The FluoView FV1000 MPE allows the imaging of organs and tumors in living animals and provide the ability to evaluate *in vivo* tumor growth, metabolism and cell biology in response to genetic manipulations, pharmacologic agonists and antagonists and cancer chemotherapy agents. If acquired, this would be a southeastern U.S. resource for cancer scientists.