

## GEORGETOWN UNIVERSITY MEDICAL CENTER GEORGETOWN DATABASE OF CANCER

*“Through G-DOC, we are going to have an unprecedented opportunity to collect vast amounts of information about patients we treat. The question we are answering is how do we turn this information into knowledge? And then how do we convert knowledge into power?”*

— Louis M. Weiner, M.D., director of the Georgetown Lombardi Comprehensive Cancer Center

In this age of biomedical and genomic information, cancer researchers are generating large-scale data sets at a dizzying pace. The Georgetown Lombardi Comprehensive Cancer Center is leading the way, moving steadily towards an era of targeted drug discovery and predictive, personalized medicine.

Under the leadership of Director Louis M. Weiner, M.D., Lombardi’s efforts embody Georgetown University Medical Center’s overall vision of systems medicine. This emerging approach to health care seeks to integrate clinical, behavioral, molecular and environmental information to guide disease prevention and treatment. Howard J. Federoff, M.D., Ph.D., executive vice president for health sciences at the Medical Center and executive dean of the School of Medicine, is spearheading the shift in research and education that will ultimately revolutionize patient care.

Realizing the full potential of systems medicine will require a sophisticated medical research informatics infrastructure to organize the extensive body of molecular and clinical information in a way that respects patients’ right to privacy.

### **CHALLENGING THE ‘ONE-SIZE-FITS-ALL’ CANCER TREATMENT MODEL**

For this reason, Lombardi is developing the Georgetown Database of Cancer (G-DOC), a rich repository of clinical and molecular information that paves the way for personalized therapies for cancer patients. G-DOC combines clinical information — such as family history, physical examination and laboratory tests — with a detailed molecular analysis of the individual to obtain a nuanced understanding of the disease.

In short, G-DOC challenges the existing “one-size-fits-all” cancer treatment model, which does not consider the individual biological, genetic and environmental factors that underlie the malignancy. The hope is that researchers will be able to access enormous amounts of biomedical data from heterogeneous sources that have been integrated into a user-friendly, Web-based portal.

The objectives are mainly two-fold: to enrich clinicians’ practice according to systems medicine principles and to generate accessible and searchable information to seed Georgetown’s Drug Discovery Program, led by Milton Brown, M.D., Ph.D.

With more than 500,000 cancer deaths occurring annually, physician-scientists need user-friendly tools in their hands now that will help them generate new hypotheses for their research. Further, if the tools are too hard to use, busy clinicians will not take the time to adopt them into their practice.

Subha Madhavan, M.S., Ph.D., the first director of clinical research informatics for the Medical Center and one of the key architects of the G-DOC infrastructure, says: “We are in a data-rich but information-poor environment. Integrative data portals like G-DOC [have] become an absolutely indispensable part of biomedical research.”

**PILOT STUDIES: EMPOWERING RESEARCHERS THROUGH KNOWLEDGE**

Madhavan and her team are working with researchers to coordinate data from three pilot studies to test the G-DOC program:

- The Familial Cancer Registry
- A translational breast cancer program combining two large data sets
- A colorectal cancer study involving roughly 100 tissue samples

STUDY	OBJECTIVE	STATUS
Familial Cancer Registry (FCR)	Led by Claudine Isaacs, M.D., this pilot provides investigators access to one of the nation’s largest collections of individuals from high-risk breast cancer families.	The FCR has enrolled more than 2,200 participants, most of whom have undergone BRCA1/2 testing and can be genetically characterized. The FCR has also begun to recruit participants with hereditary predisposition to colorectal cancer.
Translational Breast Cancer Program	Led by Robert S. Clarke, Ph.D., D.Sc., and Minetta Liu, M.D., this program combines two large data sets to establish the role of endocrine resistance in breast cancer patients.	A collaborative study with Edinburgh, Scotland, has generated genomic data on over 200 patient samples, which have been imported into the G-DOC database. A correlative preoperative study is collecting data on breast cancer patients at Georgetown University Hospital and will be entered into the database for future prognostic purposes.
Colorectal Cancer Program	Lombardi Director Louis M. Weiner, M.D., is heading this project, which entails generating multiple data sets (regarding transcriptomics, metabolomics, methylation) based on roughly 100 stage 2 colorectal tissue samples to assess why certain patients are more likely to relapse than others.	Georgetown has partnered with the Germany-based research and bio-banking company Indivumed GmbH, which is providing tissue samples to be analyzed and entered into G-DOC by Georgetown research staff.

## **MAXIMIZING GEORGETOWN'S EXPERTISE**

These pilot studies leverage the Medical Center's multi-layered expertise in breast and gastrointestinal cancer research.

- **Lombardi's Nina Hyde Center for Breast Cancer Research**, led by Claudine Isaacs, M.D., is one of the world's largest and most respected centers of its kind, with nearly 50 scientists and physicians devoted to finding potential cures for the disease. Building on the momentum of G-DOC, researchers are making strides to uncover the biological bases of the many forms of the disease, working towards its prevention and cure by delving into the multifaceted risk factors.
- **Lombardi's new scientific director, V. Craig Jordan, OBE, Ph.D., Ds.C.**, brings to the Medical Center a long list of achievements, including having revolutionized breast cancer prevention and therapy through his development of the estrogen-blocking drug tamoxifen.
- **Lombardi researchers and clinicians are generating novel genetic information** about gastrointestinal cancers – the most common and fatal cancer category – with an emphasis on colorectal and pancreatic cancers. As a specialist in gastrointestinal oncology, Dr. Weiner has introduced the use of functional genomics at Lombardi to identify the specific genes responsible for resistance to several major colorectal drugs. Lombardi's Gastrointestinal Cancers Program is led by John Marshall, M.D., one of the world's leading gastrointestinal cancer-focused medical oncologists.

## **OPPORTUNITIES ABOUND**

Situated at the crossroads of government, policy making and scientific discovery – and in close proximity to the National Institutes of Health (NIH) and the National Cancer Institute (NCI) – Georgetown University Medical Center is uniquely positioned to usher in an era of personalized cancer therapy through sophisticated tools such as G-DOC.

Private philanthropic gifts in support of such initiatives ensure the Medical Center will remain at the vanguard of research and care, and will continue to attract and retain the most gifted and promising researchers. These gifts also help researchers tap into more federal funds, as they become eligible for more matching grants from the NIH and NCI. The Medical Center and Lombardi are committed to working with partners who recognize the promise of personalized cancer therapies and who are interested in helping develop strategies for prevention and cure.