Message from the Founder

January 2009

From an economic crisis to an historic, uplifting election, the United States witnessed a year of both triumph and tragedy in 2008. Similarly, in the world of cancer research, while advances offered encouragement, disappointments also occurred. During the year, we continued to make progress in our march toward developing an early detection industry. Yet, we lost our friend Paul Newman and others to this insidious disease.

We achieved our major objectives for 2008. As reported in past newsletters, the teams have projects for blood and imaging tests in all four cancers. The prostate team launched our first clinical trial to position us for a new biomarker test in the future. The January issue of WIRED magazine gives a superb overview of our challenges, team members, and approach. The “Science Update” section of this newsletter contains a full report of our scientific progress.

We also inked the partnership and lease with Stanford University for the Canary Center at Stanford, with the doors expected to open in January and scientific operation to commence in the second quarter. Look for the Grand Opening announcement in April.

We are grateful for your ongoing support. Pledges over the last four years have now exceeded $29 million toward our initial goal of $50 million. Our Canadian leaders continue to expand our operation in Canada, and we expect to achieve self-funding for our Canadian teams in 2009. In addition, our first major corporate partnership with Orchard Supply Hardware (OSH) has allowed us to build fundraising capacity.

This year promises to bring great opportunities and challenges to Canary Foundation. The fiscal landscape is uncertain, and financial resources are tight globally. A new administration appears ready to increase investments in scientific research, but these will take years to come to fruition. Thus, we must rely on our friends, supporters, and partners to continue to make progress.

Our strategy is straightforward: Maintain key initiatives, but do not expand programs. Also look for leverage. We will reach out to foundations to support and leverage our programs. We will expand our grant-seeking programs to focus more National Cancer Institute (NCI) money on our early detection teams. And we will partner with institutions such as Stanford and the Fred Hutchinson Cancer Research Center to bring leverage to our programs.
Message from the Founder (continued)

These are the 2009 Canary Foundation goals:

1. **Bring one molecular diagnostic test to clinical trial for a high-risk community.** It is important that we continue to drive the technology through the translational pipeline. Our goal is to bring the ovarian panel and imaging test to women in high-risk clinics.

2. **Bring Canary Center at Stanford online.** This center will serve as a major hub of investment and activities for the next five years and beyond. The Canary Center at Stanford is one of very few programs moving forward at Stanford. Achieving complete scientific capability is the core goal.

3. **Win a major grant through NCI for one of our programs.** Leverage will be critical for the next three years. Many of our teams have applied for NCI grants in support of our programs. We hope to win one or more such grants.

4. **Establish three additional partnerships for our programs.** Partnerships with foundations such as Lustgarten Foundation for Pancreatic Cancer Research, The Thomas G. Labrecque Foundation, and OSH are vitally important to continued scientific investment. It is our goal to establish three additional partnerships.

5. **Establish a Canary leadership council to expand our reach.** We must expand our fundraising capacity. It is our intent to institute a Canary advisory board that will support our introductions and network of support.

This will be a challenging year on a global level, but adversity can provide opportunity. Many supporters and organizations are looking for ways in which to partner. Many cancer organizations are seeing the opportunity in early detection. Canary Foundation provides a unique platform to deliver a substantial change to the cancer landscape in the next five to seven years.

Thank you for your continued support and enthusiasm.
Canary Canada is Expecting an Exciting 2009

January 2009

Canary Foundation of Canada may only be one year old this month, but a lot is already being accomplished in Canada.

The province of British Columbia, Canada, will be participating in the CAD$42 million Canadian Partnership for Tomorrow (CPFT) project, thanks in part to the Canary Foundation’s gift of US$110,000 to fund Dr. Rick Gallagher’s and Dr. Marilyn Borugian’s I-HELP pilot project. The CPFT project is a study of 300,000 Canadians that explores how genetics, environment, lifestyle, and behavior interact in the development of cancer. The largest of its kind in Canada, the study will track randomly selected Canadians (ages 35 to 69) for at least the next 20 to 30 years. It will gather information on health and lifestyle through questionnaires and the collection of blood and other specimens. This information will help researchers, policymakers, and others understand how different combinations of risk factors lead to cancer. Read more about the project.

There will be back-to-back soapbox derbies in British Columbia in 2009 after two successful Canary Derbies in 2008. Our newer Canary Derby in Vancouver will kick off the exciting weekend with the Second Annual Vancouver Canary Derby on Saturday, June 27. The winner of that derby will be able to test his or her skills against the Victoria soapbox crowd the very next day—Sunday, June 28—on Vancouver Island for the Fourth Annual Victoria Canary Derby. We anticipate faster times, zanier style competitors, and astronomical fundraising—at least according to the very enthusiastic derby committees.

The month of June also brings the Ride to Conquer Cancer to Vancouver, BC, June 19–21. Canary is excited to be a part of this new event. As their website so aptly states, “Think of it as a history-making opportunity for you to do something big about cancer, something epic. Like cycling for two days from Vancouver to Seattle on June 20 and 21, 2009. Sure, it sounds like a lot ... and it’s meant to be. The conquest of cancer is a monumental task and won’t be easy. But make no mistake—this event isn’t just for athletes or cycling enthusiasts. The Ride to Conquer Cancer is for anyone who wants to challenge themselves for a great cause—even people who haven’t ridden since they were twelve. All you need is motivation, a bike, and a helmet. The rest is history. Be part of it.” Canary Foundation
Canary Canada is Expecting an Exciting 2009 (continued)

will be a recipient of U.S. based rider contributions and will put those funds to work on Seattle-based Canary research.

And if that weren’t enough, there’s the Alberta Ride to Conquer Cancer, June 27 and 28, 2009, which will benefit the Alberta Cancer Foundation. Patients and families at the Tom Baker Cancer Centre in Calgary, the Cross Cancer Institute in Edmonton, and 15 other cancer centers in Alberta will ultimately benefit from the donations. Alberta scientists and physicians receiving Alberta Cancer Foundation grants will put Ride to Conquer Cancer dollars to immediate use in the fight against cancer. Canary Foundation is working with the Alberta Cancer Foundation to become a recipient of U.S. based rider contributions. Canary would then utilize those donations to fund early detection research in Alberta.

That’s all just in the first six months of the year. Stay tuned (vehicular pun intended) as Canary Canada kicks it into high gear in 2009.

Contact Pat McCowan for more information at pat@canaryfoundation.org.
The Mullin Family Turns Pain into Action: The James A. Mullin Golf Classic

January 2009

Losing a loved one to cancer is a difficult experience for family, friends, neighbors, and colleagues. Turning grief into a vehicle for making a difference is what the Mullin family decided to do when they lost their beloved Jim, Marilyn’s husband and Steve’s father. Together with family members, they decided to hold the first annual James A. Mullin Golf Classic in Iowa in fall 2007 and the second in fall 2008. To date they have raised close to $13,000 for cancer early detection.

Steve Mullin shares the story behind the James A. Mullin Golf Classic

I recalled reading about early detection in the Wall Street Journal; then I did some brief research and found the article about Don Listwin. I also read some educational articles written by Andy Grove of Intel on early detection and prostate cancer. The low overhead and targeted approach of the Canary Foundation was very important to us. We did not want to be wasting donor funds with charities that have become too complex to manage. My father had pancreatic cancer, which is deadly because it is normally detected far too late for effective treatment. These things played into our decision, but we felt detecting any type of cancer early is a very intelligent way to tackle the disease.

My father was diagnosed with stage IV pancreatic cancer. He received a three-month death sentence, but fought it out for a year. Considering the circumstances, he made the best of that year. His body gave up in the last month. He wanted to prevent others from having to endure the suffering associated with the disease. He only had time for clinical trials and surveys. The golf outing is an extension of his desire to help. He golfed for the last time around his 69th birthday and, while playing in pain, he was more concerned about getting the ball over the water. Most of his friends also enjoy the game. The tournament gives us the opportunity to reunite with them on an annual basis.

It is through these friendships that we originally networked to hold the tournament in his name. My father was a retired mortgage banker and had hundreds of relationships...
The Mullin Family Turns Pain into Action: The James A. Mullin Golf Classic (continued)

in the Iowa mortgage and real estate community. Many of those business relationships turned into friendships that remained with my mother. We had a condolence book with 300 names, so between their friends, the condolence book, and my friends we were able to reach a fairly large number of people to ask if they would participate. We sent a mass email and used postcards for those without email. Some old-fashioned phone calls were made as well. We had a great response and held the first one in September 2007 and then the second one in fall 2008.

We wanted the tournament to be in the spirit of my dad. So the outing isn’t very serious. He was serious when it came to somebody locking in a mortgage rate, but beyond that he was pretty laid back. I passed out some exploding golf balls to make the round a little more interesting. It does get a little competitive between various foursomes, especially for the placing in the top three foursomes. We usually give out a gag prize to someone we want to embarrass in front of their friends.

My father did a lot of business on the golf course and enjoyed playing in retirement. He and my mom would attend the Senior PGA events held in Des Moines and make a trip to watch the younger players if they were visiting me in Chicago. It seemed like the natural thing to do to create the James A. Mullin Golf Classic to honor him and to raise funds for cancer early detection.

A good friend remembers Jim

Larry Sheldon, a good family friend, shares a few words about Jim Mullin and his reasons for supporting the golf classic:

Jim and I met in 1957 while students at Northwest Missouri State College in Maryville, Missouri. We became fraternity brothers and Jim and I shared a basement apartment with four other young men while at college. There are certainly a number of stories that originated from that group of six young men living together, but space does not permit talking about them here. Suffice it to say that Jim liked people and people liked Jim.
The Mullin Family Turns Pain into Action: The James A. Mullin Golf Classic (continued)

After college, we met up again when my wife and I moved to Des Moines, where Jim and Marilyn also lived. As couples, we became even closer as we raised our families there. My career took our family out of Des Moines for a number of years; however, when we ultimately moved back to Des Moines in 1989, our friendship with the Mullin family picked up right where it had left off. We have many happy memories of times spent with Jim, Marilyn, and their family.

When Jim learned he had cancer, we were all, naturally, very concerned. We watched Jim and his family deal with this ultimate challenge over a period of several months. I have never seen a family pull together and provide support to a loved one so much as did the Mullin family during this period of time. Subsequent to Jim’s passing, Steve and Marilyn raised the idea of an annual golf outing in Jim’s honor and to help raise funds for the Canary Foundation. My wife, Judy, and I wholeheartedly supported this idea and are glad to be able to help his family keep Jim’s memory alive and at the same time be able to support the very worthy efforts of the Canary Foundation.

Thank you to the supporters of the James A. Mullin Golf Classic

Canary Foundation would like to extend a heartfelt thank you to all who participated in the tournament to remember their friend and family member, Jim Mullin. Your efforts have helped advance cancer early detection. The list includes:

Steve Mullin
Stefanie Mullin
Marilyn Mullin
Terry Aikin
Steven Dresner
Larry Sheldon
David Wood
Science Update

January 2009

We have made great progress this year in all Canary Foundation scientific programs. This update highlights many of this year’s accomplishments; click a link to the left for individual programs, or start here with the Ovarian Cancer Program.
Science Update: Ovarian Cancer Program

January 2009

Canary’s mission is to detect cancer early, before it becomes lethal. To accomplish early detection of ovarian cancer, we are developing a two-step screening process—a blood or fluid test for cancer biomarkers followed by molecular imaging. The ovarian program has a complex and diversified research portfolio to achieve both steps of this screening process and is beginning to translate it into clinical application.

Ovarian cancer biomarker discovery

• To date, our biomarker discovery efforts have focused on measuring DNA methylation, gene expression, DNA copy number variation, and detection of proteins in ovarian cancer cell lines and primary tumors. Our next focus will be integration of the results with emerging data from Canary’s Baseline Program to predict biomarkers with low background signal in healthy people.

• We will pursue a discovery pilot project to identify pathognomonic biomarkers, proteins found in cancer but not in healthy tissues. With virtually no background noise, these biomarkers would be ideal for early detection.

Ovarian cancer biomarker validation

• Earlier in 2008, Canary researchers published findings on 14 ovarian candidate biomarkers. Several of them were included in a larger validation study (including a Canary investigator) managed by the NCI’s Early Detection Research Network (EDRN). The performance of blood-based biomarkers showing the greatest potential will be evaluated in a prospective clinical trial, with Canary support and participation.

• Canary is proud to announce the addition of Dr. Muneesh Tewari of the Fred Hutchinson Cancer Research Center to its ovarian team. Dr. Tewari studies the role of microRNAs (small RNA molecules that are transcribed from DNA but not translated into protein) in cancer and their potential for early detection. He has identified several ovarian candidate microRNA biomarkers and will validate them in blood from ovarian cancer patients.

Biomarker assay development pipeline

• Early in 2009, Canary will add several new ovarian candidate biomarkers (identified by the biomarker discovery efforts) to our pipeline and begin generating assays.

• The ovarian team will also embark on a pilot project to compare several new technologies that measure proteins in complex mixtures, such as blood, to help improve and expedite the choice of biomarkers to add to our pipeline.
Science Update: Ovarian Cancer Program (continued)

Molecular imaging

• The ovarian team is currently pursuing PET and targeted ultrasound imaging strategies. Developing imaging probes against specific cancer biomarkers represents a critical need for 2009. Thus, we will step up our efforts for that purpose, using several technologies in parallel to ensure rapid progress.

• We have successfully developed imaging probes against two biomarkers suitable for targeted ultrasound (VEGFR-2 and $\alpha_\text{v}\beta_3$ integrin). With support from Canary, our investigators are moving toward clinical trials to evaluate targeted ultrasound in humans.

Models of ovarian cancer

• Canary investigators have recently established two ovarian cancer models. The first asks what size tumor we need to detect to affect survival rates and has been submitted for publication. It predicts that detecting a 5mm tumor with annual screening could reduce mortality by 50%. The second model, published in 2008, estimates the minimum tumor size detectable by blood-based biomarkers. It can be applied to many biomarkers and help determine which should be the focus of our greatest efforts.

• In the future, we will integrate these modeling approaches to augment an existing ovarian cancer model that evaluates the effectiveness and economics of various cancer-screening strategies.

Collaborator projects

• The ovarian team has been collaborating with several other ovarian cancer investigators to augment its core research program. One of these projects involves the collection of proximate fluids, for example, those obtained by vaginal lavage, also geared at biomarker discovery, which we hope to continue in 2009.

• A second collaborator project determined that ovarian cancer subtypes behave as different diseases on a molecular level, which has practical implications for early detection and treatment.

• A third project found that even though ovarian hormones influence mammographic breast density, there is no significant association between breast density and risk for ovarian cancer.
Science Update: Lung Cancer Program

January 2009

The objective of the Canary Lung Cancer Program is to develop tests to specifically detect early stages of lung cancers destined to be lethal. This year was both formative and productive for the Canary Lung Cancer Program. We assembled our team of expert scientists and clinicians, rapidly solidified the key program components, distributed our first research awards, and initiated projects aimed at developing effective and cost-effective blood biomarker and molecular imaging tests. Later this year, we launched additional research projects focusing on lung cancer occurring in nonsmokers and formed a major new partnership with NCI, putting us on track for another groundbreaking year in 2009.

Lung cancer biomarker discovery

- We have created an online database of specimens in the CARET repository, available on the CARET website. The online version allows the research community to access all available information about samples of interest and facilitates searching by multiple features to find the samples appropriate for their studies.

- In-depth proteomic analyses on plasma from mouse models identified several candidate proteins that were found in different levels in cancer versus control plasma. We have also identified proteins whose levels decrease in response to tumor regression in these mice. In addition, observations made with plasma from these mice have been used to interrogate plasma samples from patients with lung cancer. Through comparison of our results from mouse and human samples, we are identifying the affected proteins that show the most promise as biomarkers for early detection of lung cancer.

- We have approved plans for a large-scale project in partnership with the EDRN aimed at discovering molecular differences in lung cancer among never smokers compared with lung cancer that develops among smokers. The results of this research may provide a basis for biomarker tests for early detection of lung cancer applicable to all patients, regardless of smoking status.

Blood biomarker validation

- We have found promising candidate genes that are modified by methylation in tumors of lung cancer patients but not in corresponding normal lung tissues. We have also further assessed the performance of these candidate biomarkers in additional tissue samples and are pleased to report that these candidates have withstood validation testing in the independent sample set. We are now in the process of fine-tuning our technique for testing methylation of these genes in blood samples.

- The most promising candidates from our studies, as well as any promising candidates from the literature, are being thoughtfully prioritized for development of assays for validation, which will begin early next year.
Science Update: Lung Cancer Program (continued)

Molecular imaging of lung cancer

• We developed a new image resolution recovery strategy for PET to visualize tracer uptake in small lung lesions, and testing of this new strategy is under way.

• We engineered a new tracer for lung cancer and began testing in mouse models of lung cancer. Our initial studies with this probe have been very successful, with the tumors showing specific signal in mice by PET-CT. We are in the process of confirming the findings on the PET-CT by testing the tumors removed from the mice for presence and quantity of the targeted probe.

Epidemiology and modeling

• We are completing a mathematical model for predicting the size at which lung tumors make the transition that will lead them to spread and become lethal. The findings from this model are encouraging because they suggest that otherwise lethal lung tumors can be found within feasible limits of detection, whether by imaging or by blood tests, to allow for cure. Manuscripts for publication of this work are in preparation.

• To better understand the natural history of lung cancer and its impact on screening practices, we have begun a comprehensive examination of cases from patients who received yearly CT screening for lung cancer. We have found that some patients died despite the yearly CT screening, suggesting that the window of opportunity may be smaller than that interval to catch aggressive tumors. Our preliminary findings have already resulted in a publication this year, and we are reviewing additional data from multiple centers so that we can confirm our results.

• We have approved funding for a new epidemiological study that will address the need to identify risk factors for lung cancer among never smokers.
The vision of the Canary Prostate Cancer Program is to accurately identify and isolate otherwise lethal prostate cancer at an early stage, when the likelihood of cure is greatest. During the past year, the prostate team has focused on building the resources needed to enable discovery and validation of biomarkers of lethal prostate cancer and has been extremely successful in that regard. The two resources on which the team focused are initiation of the Prostate Active Surveillance Study (PASS) clinical trial and creation of a tissue microarray resource. In addition, the team initiated the process of testing our first set of candidate blood biomarkers and began work on several strategies for molecular imaging of prostate cancer.

**Prostate Active Surveillance Study clinical trial**

- Six participating institutions (Stanford University; University of California, San Francisco; University of Washington; Veterans Affairs Puget Sound Health Care System; University of Texas at San Antonio; University of British Columbia) have developed the PASS protocol, as well as a Manual of Operations, to be used across all institutions. All sites filed and obtained the necessary human subjects’ permissions to allow implementation of the protocol.

- To date, five of the six participating institutions have begun patient enrollment. With interest high and enrollment strong since this fall when enrollment began, we are already nearly two-thirds of the way to our accrual goals for the study’s first year.

- Canary formalized a partnership with the EDRN to leverage their experience in data management. As part of the Canary-EDRN collaboration, the EDRN is providing critical support for the data management and specimen tracking required in PASS.

- We have established a central specimen repository at the Fred Hutchinson Cancer Research Center to allow ready access and distribution of the rich biospecimen resource created in PASS.

**Canary Retrospective Tissue Microarray (TMA) study**

- We have successfully defined a set of common data elements for TMA annotation, identified a pathologist to lead construction at each site, completed an inventory of specimens available for TMA use, and developed a multi-institutional protocol for all sites. The EDRN has agreed to contribute its data management and coordinating center for this study, and we have established the means to allow data sharing online through the Stanford TMA database. Some sites have already begun to evaluate candidate markers using existing TMAs and in doing so have piloted our protocol for data analysis.
Blood biomarker assay development and validation

- Our dedicated assay development team has begun to tackle an initial set of five candidate blood biomarkers of lethal prostate cancer. We have carefully designed our test sets and have already initiated an evaluation of a commercially available biomarker blood test. All commercial and custom assays will be tested on common serum sets so that performance of both individual biomarkers and biomarker combinations can be readily evaluated.

Molecular imaging of prostate cancer

- Molecular imaging allows us to "see" tumors based on specific, unique, molecular characteristics. We are pursuing several different molecular imaging approaches in our prostate cancer molecular imaging program, including PET-CT imaging of tumor cellular metabolism probes. Synthesis of probes, the first step to generate a molecular imaging agent, can be a difficult and time-consuming process, but our synthesis of the metabolic agent, FACBC, is now nearly complete. In previous studies, this agent has shown good tumor specificity and little background in the bladder (unlike traditional metabolic probes like FDG), so it is a promising molecular imaging agent for prostate cancer. Next, we will radiolabel the agent to produce 18F-FACBC and will proceed to pilot testing in mouse models of prostate cancer toward the eventual goal of obtaining RDRC/FDA approval to test in patients.
Science Update: Pancreatic Cancer Program

January 2009

Canary’s Pancreatic Cancer Program supports projects aimed at the early detection of pancreatic cancer through a combination of blood-based biomarker tests and molecular imaging. Our program has gained great momentum this year through focusing on our biomarker discovery and validation projects as well as building critical biospecimen resources. In addition, we initiated a new project in molecular imaging and formed a partnership with The Lustgarten Foundation for Pancreatic Research to develop blood-based assays for candidate pancreatic cancer biomarkers.

Pancreatic cancer biomarker discovery

- We have developed a protein extraction protocol that allows us to extract proteins from paraffin-embedded, fixed tissues. The development of this technique not only allows us to assess a vast number of clinically valuable tissue samples, but it also provides us with a tool to perform proteomics experiments with better defined samples for biomarker discovery.

- We have completed large-scale quantitative global protein profiling experiments using different quantitative proteomics techniques. We have also compared pancreatic intraepithelial neoplasia (PanIN, which represents early-stage disease), pancreatic cancer, pancreatitis, and healthy control samples. We are still in the process of analyzing the large amount of quantitative proteomics data generated from our most recent profiling studies but have already assembled a list of candidate pancreatic cancer biomarkers that are being prioritized for verification and validation.

- We are now enhancing our discovery process by selectively enriching for classes of proteins among which we are more likely to identify biomarkers that will work well in blood and imaging tests. Such classes include secreted and glycosylated proteins. We have developed a quantitative proteomics pipeline to achieve this enrichment and measure biomarker concentration within these protein classes. Our Pancreatic Team is currently evaluating the robustness of the platform and has prepared all the needed samples for the study.

Biospecimen resources

- We have assembled validation blood sets from patients who are referred to a gastrointestinal clinic for evaluation of the pancreas, in which all patients and clinic controls underwent evaluation of the pancreas by endoscopic ultrasound. The population tested is derived from a setting that would be similar to the clinical setting in which a biomarker might be used.

- All our biomarker candidates must be rigorously tested against large numbers of age- and gender-matched controls to ensure that the specificity of the biomarker is high. The Canary team is collaborating with researchers at University of California, Irvine, to collect the hundreds of required disease-free control samples.
Science Update: Pancreatic Cancer Program (continued)

Blood biomarker assay development and validation

• Canary and The Lustgarten Foundation for Pancreatic Research are jointly supporting assay development for pancreatic cancer biomarker candidates—20 in total—at our Victoria, British Columbia, facility. Because the process is very time and labor intensive, we expect that it will be the end of 2009 before these 20 assays are completed and we can definitely assess their performance.

• We are implementing alternative approaches to ELISA assay development to evaluate our candidate proteins in serum or plasma. We have established a mass spectrometry-based targeted protein quantification technology and selected four priority candidate proteins that have no ELISA available for analysis. We have synthesized a total of 14 stable isotopically labeled reference peptides for the four biomarkers, which will serve as internal standards for the serum samples tested for those selected candidate proteins.

• We have tested 13 biomarker candidates using commercial ELISA assays, and four candidate biomarkers have completed several rounds of progressively larger validation sets. We have now shown that proteomic analysis of tissue specimens is a valuable strategy for the identification of candidate biomarkers in serum, which may provide the basis for an early detection blood test based on a panel of biomarkers.

Molecular imaging of pancreatic cancer

• We are pursuing a molecular ultrasound approach for early detection of pancreatic cancer. We have engineered microbubbles to bind to specific biomarkers found in the blood vessels that feed tumors and are using ultrasound to image the labeled vessels. We have begun pilot testing of these targeted microbubbles in mice bearing subcutaneous tumors derived from human pancreatic cancer. We are pleased to report promising preliminary results, whereby we can see early-stage (1–2mm) tumors with a very specific signal using a dedicated, high-resolution small animal imaging system. We plan to move into further preclinical testing with mouse models of pancreatic cancer. The long-term goal of this work is to translate molecular ultrasound into a highly sensitive clinical imaging modality for detection of early-stage pancreatic cancer using targeted microbubbles in patients.
Science Update: Baseline Program

January 2009

Our Baseline Program is designed to study the molecular characteristics of the healthy human body. This knowledge is key to selecting biomarkers for early detection. Canary is actively pursuing the collection of healthy tissues and quantifying gene expression and protein levels in these samples.

Blood sample collection

- The blood collection pilot project from healthy women in British Columbia has enrolled 402 women, exceeding the initial goal of 100. The project secured CAD$6 million to continue its efforts as part of the Canadian Partnership for Tomorrow (CPFT).

Gene expression in the healthy human body

- Our goal is to establish a map of gene expression in more than 60 human tissues, with each tissue supported by four independent sample profiles. We have accomplished a quarter of this effort and will pursue the remaining samples in the coming year. In addition to samples from surgeries, we are exploring rapid autopsies as a source for the required samples.
- Other Canary teams are already using the preliminary results to identify promising biomarkers.

Profiling the healthy blood proteome

- Our investigators have quantified the variation of 75 proteins in blood from healthy women. The conclusion of this study was that biomarkers tend to vary between individuals but remain constant within one person over time. Therefore, cancer screening should rely on an individual's biomarker baseline levels rather than using a common threshold applied to the screening population.
- In the coming year, the baseline team will also begin to assign concentration ranges to proteins observed in healthy blood, as such quantitative data is currently very sparse. This, together with the above variation results, will help define the background noise a cancer biomarker will need to exceed for successful early detection.
- Other Canary teams are already using data from proteomics experiments to select biomarkers with the greatest potential.
Science Update: Collaboration Program

January 2009

Canary Foundation believes that a collaborative, coordinated approach is necessary to achieve our goals. Our multidisciplinary, multi-institutional Early Detection Program provides an example of this philosophy in action. We created our Collaboration Program to foster this collaborative approach among the broader community of cancer researchers. The specific collaboration programs that we support include national and international workshops and symposia, a postdoctoral scientist training program, an online scientific journal, joint projects with government and foundations, and a software standardization initiative.

Early Detection and Intervention (EDI) Symposium
• The keynote speaker was Dr. John Niederhuber, director of the National Cancer Institute.
• One hundred and ninety-two scientists, doctors, administrators, industrialists, and philanthropists attended.
• Randy Scott, CEO of Genomic Health, spoke on bringing diagnostic tests to market.
• Planning is underway for the Fifth Annual Early Detection and Intervention Symposium to be held May 4–6 at the Arrillaga Alumni Center at Stanford University.

International Cancer Biomarker Consortium
• The International Cancer Biomarker Consortium (ICBC) meeting supported by Canary Foundation was held February 20–22, 2008, in Honolulu, Hawaii.

Canary Journal
• Canary Foundation launched an online journal to aggregate scientific papers and news articles about early detection of cancer.

Partnerships with foundations and government
• Canary Foundation’s partnerships with the William K. Bowes Jr. Foundation, Stanford University School of Medicine, the Stanford Department of Radiology, and the Stanford Comprehensive Cancer Center launched the Canary Center at Stanford for Cancer Early Detection.
• Canary Foundation and the EDRN of the NCI formed a partnership for statistical and data management support to the Canary Foundation PASS trial.
• Canary Foundation and the EDRN formed a partnership on a study for the early detection of lung cancer among never smokers.
• Canary Foundation and The Thomas G. Labrecque Foundation partnership launched the Lung Cancer Program.
Science Update: Collaboration Program (continued)

- Canary Foundation and the Lustgarten Foundation for Pancreatic Cancer Research partnered to jointly support the development of blood-based tests for the early detection of pancreatic cancer.

- Canary Foundation and the American Cancer Society (ACS) jointly awarded four postdoctoral fellowships in early detection research and renewed the postdoctoral fellowship program for 2009.

Software and standards: Computational Proteomics Analysis System Awards

- In May 2007, the Canary Foundation awarded $225,000 to key labs around the world to customize and expand the Computational Proteomics Analysis System (CPAS), an open source proteomics data analysis and data management platform developed by LabKey Software and the Fred Hutchinson Cancer Research Institute. By encouraging labs to adopt CPAS software, Canary Foundation attempted to develop a standard bioinformatics platform for proteomics analysis. While CPAS software was successfully deployed by awardees, adoption in the larger scientific community was not as rapid as Canary Foundation had hoped. At this time, there are no plans for additional funding in this area.

Software and standards: Genologics

- Canary Foundation partnered with Genologics to develop a Biomedical Informatics Suite for the Translational and Outcomes Research (TOR) laboratory at the Fred Hutchinson Cancer Research Center.

- Biomedical Informatics Suite may be exported to other Canary-supported labs.

- Canary Foundation tested a pilot Biomedical Information Suite for the Canary Center at Stanford.