NEWS FROM THE ADVANCED TECHNOLOGY PROGRAM

ATP Update

AUGUST 15, 2009

VOLUME 3 NO. 3
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Director's Point of View

Enterprise-Level Computing Support Now Necessary

Tim Harris, Ph.D., Chief Technology Officer

The use of molecular diagnostics in cancer treatment is now a reality. It is common practice to check the mutation status of the EGF receptor in patients with lung cancer (especially female nonsmokers); knowing the status of KRAS (either mutant or wild type) is essential for those being treated with expensive monoclonal antibodies that target the EGF receptor because they do not work in patients with mutations.

It is gratifying to be working in the ATP, where we use many of the same techniques as those used to make these discoveries, which are now in clinical practice. In particular, we make high-throughput sequencing and gene expression analysis available to the NCI investigators. Sooner or later, some of the proteomics and metabolomics technologies that we employ will also help find protein or other markers (or sets of markers) that will be used to aid diagnosis and prognosis for certain cancers (e.g., ovarian cancer). Not only that, but the imaging technologies that are becoming ever more sophisticated, and are also available to the NCI through the ATP, may one day be used in a clinical setting to draw conclusions about the nature of the proliferative drive in different cancer cells.

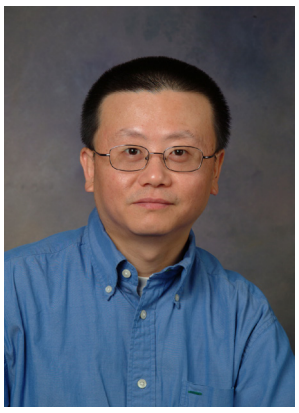
The data-handling issues must not be underestimated, and the refocusing of the Information Systems Program to provide enterprise-level computing support across the contract will be fundamental to our success. More information about this effort will be forthcoming in the weeks ahead.

In This Issue

Congratulations to Our Outstanding Contributors

The following people were recognized as outstanding contributors for their respective groups in the second quarter 2009:

Genetics and Genomics Group
Zuoming Deng, Ph.D., Senior Scientist



Zuoming Deng, Ph.D., joined the Bioinformatics and Analysis Group of the Core Genotyping Facility (CGF) in June 2008 to lead efforts in addressing the growing analytical needs of next-generation sequencing technology. Next-generation sequencing is used at CGF to rapidly follow up significant findings from genome-wide association studies (GWAS). Dr. Deng conceptualized and led the development of both automated quality control (QC) and genotype-calling pipelines. Working on his own and with collaborators at other genomic centers, Dr. Deng has fine-tuned the genotype-calling algorithms to produce high-quality genotype calls and has developed the capability to genotype insertion/deletion polymorphisms (indels). Dr. Deng has generated genotype calls for several high-profile regions, which has resulted in fine-mapping experiments and high-impact publications. Dr. Deng also works hard to stay informed about new

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Congratulations continued

developments in the next-generation sequencing field, which is a daunting task due to the rapid evolution of these platforms, and he quickly adopts new technologies and resources when appropriate. Dr. Deng's continued hard work has contributed substantially to the success of CGF.

Imaging and Nanotechnology Group Kimberly Peifley, Research Associate

Kimberly Peifley, Research Associate, joined the Optical Microscopy and Analysis Laboratory (OMAL) in February 2009. She provides outstanding confocal microscopy support to users, and manages and maintains the confocal microscopes at very high standards. Additionally, Ms. Peifley supports technical development activities by investigating new optical microscope technologies and by drawing on her expertise, knowledge, and contacts gained from previous work experience.

Recently, Ms. Peifley worked with Denise Johnson, Ph.D., of the Nanotechnology Characterization Laboratory, who is advised by Stephan Stern, Ph.D. Dr. Johnson's research focuses on the biologic and toxic effects of fullerenol (a nanoparticle) on renal cells. Through confocal imaging, cytoskeletal proteins and mitochondria have been identified as potential in vitro targets of fullerenol. Ms. Peifley provided training on how to use the confocal microscope used in these studies, the LSM510 microscope. She also assisted Dr. Johnson in image acquisition and interpretation of acquired data.

Ms. Peifley also worked with Natalia Mercer, Ph.D., of the Laboratory of Experimental and Computational Biology to follow the internalization of a specific labeling technique by live confocal microscopy.

Information Systems Program Nancy Roche, Ph.D., Clinical Trials Management Systems Workspace Technical Lead, Cancer Biomedical Informatics Grid (caBIG®)

Nancy Roche, Ph.D., demonstrates exceptional leadership skills in her role as Clinical Trials Management Systems (CTMS) Workspace Technical Lead, Cancer Biomedical Informatics Grid (caBIG®). Dr. Roche and her team provide direct oversight to more than 15 development and services subcontracts, totaling more than $12 million in revenue, for developing new health information system architectures and tools that support translational research and new clinical trials. Since assuming her position a little more than a year ago, Dr. Roche has been instrumental in SAIC-Frederick's ever-increasing role in developing caBIG® CTMS Workspace programs and technologies.

An example of her contributions and their importance is her role in helping to define and provide oversight to the Transcend Project. This project involves applying the caBIG® software tools to the ISPYII breast cancer clinical trial. Dr. Roche worked with all stakeholders, including both technologists and clinicians, to provide strategies for caBIG® technologies to be best adapted through service-oriented approaches to meet the needs of this important clinical trial. Dr. Roche has continued to provide guidance as the project has proceeded.

Dr. Roche is a critical resource to the Center for Biomedical Informatics and Information Technology (CBIIT) in helping implement new strategies to meet the center's overall goals of providing interoperable infrastructure and tools for translational clinical research. She works closely with Enterprise Architecture Specification Teams and CTMS CBIIT leadership to bridge the gap between new computer architectures and realizable projects.

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Congratulations continued

Proteins and Proteomics Group
Lakshman Bindu, Research Associate II

Lakshman Bindu has worked in the Protein Chemistry Laboratory (PCL) for more than five years and is responsible for analyzing molecular interactions using surface plasmon resonance (SPR) biosensors. Recently, PCL beta tested a new biosensor platform from Silicon Kinetics called the SKi Pro (see related article on this page). Ms. Bindu did an outstanding job learning to operate this new instrument and conducted a series of experiments to evaluate its performance. This beta test was not without several technical problems, and Ms. Bindu did an excellent job coordinating with the company to resolve these problems. She presented a poster at the Spring Research Festival on this work and was recognized with an outstanding poster award. In addition to this special project, Ms. Bindu was able to continue work on other experiments without a change in productivity. Ms. Bindu's dedication to her work and her cheery personality make her a pleasure to work with in PCL.

Visual Communications and Support Services Group
Tammy Schroyer, Senior Illustrator

Tammy Schroyer has been a Senior Illustrator in Scientific Publications, Graphics & Media (SPGM) for more than 23 years. Ms. Schroyer uses her expertise in graphic design, document layout, and technical and scientific illustration, and her background in biology and chemistry to produce posters, scientific figures, flyers, and much more.

She was recently named lead designer for the *ATP Update* quarterly newsletter. In addition, she is the lead designer for the NCI-Frederick *Poster* newsletter, which is also published quarterly and can range from 24 to 32 pages. The *Poster* has received awards for layout, photography, and writing. In 2008, Ms. Schroyer produced a new design for the newsletter, which was unveiled in the March 2009 edition. Even with tight deadlines, she remains calm and creates an exceptional newsletter.

In addition to her duties as an illustrator, Ms. Schroyer is the leader of SPGM's 508 Team. This team was formed to learn as much as possible about the requirements of Section 508 of the Americans with Disabilities Act. Section 508 states that the government's electronic information must be accessible to people with disabilities. Ms. Schroyer has led the team in teaching staff members about these requirements and working with customers to make their documents more accessible. She is skilled in creating accessible documents in graphic layout software, such as Adobe InDesign and Acrobat.

Ms. Schroyer is always willing to lend a hand—whether it's to a co-worker swamped with other projects or to a customer wondering how to make an electronic document accessible.

PCL: SKi Pro Is Still a "Work in Progress"

By Andrew Stephen, Ph.D.

As part of the Advanced Technology Partnerships Initiative, the Protein Chemistry Laboratory (PCL) provides early testing of new technology to evaluate potential uses for the research specific to NCI-Frederick. In April, the PCL completed a six-month evaluation of the SKi Pro, a biosensor from Silicon Kinetics, and found the new technology to be similar to the biosensors currently used in the laboratory.

With SKi Pro, molecules are attached within pores in a nanoporous silicon surface. An interacting molecule is flowed over the surface. If the two molecules interact, a change will occur in the interference pattern of light reflected back from the surface, in a process known as optical interferometry.

This detection process is different from that of the PCL's surface plasmon resonance (SPR)–based biosensors. The SKi Pro was reported to be more sensitive and also to measure faster association and dissociation rate constants as compared with traditional SPR-based biosensors.

In evaluating an antigen–antibody interaction, PCL researchers found the results comparable to those

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SKi Pro continued

obtained from SPR-based biosensors. Moreover, they were unable to measure the kinetics of biotin binding to streptavidin, which has a very fast association rate. Based on their experience, the PCL believes that the SKi Pro would not provide any increased capabilities over their current biosensors. However the PCL has agreed to beta test the next generation of this biosensor platform when it is available from Silicon Kinetics.

The results of this evaluation were presented at the Spring Research Festival in a poster by Lakshman Bindu, Research Associate II, PCL (see article on page 3).

The SKi Pro biosensor from Silicon Kinetics was recently evaluated by the Protein Chemistry Laboratory.

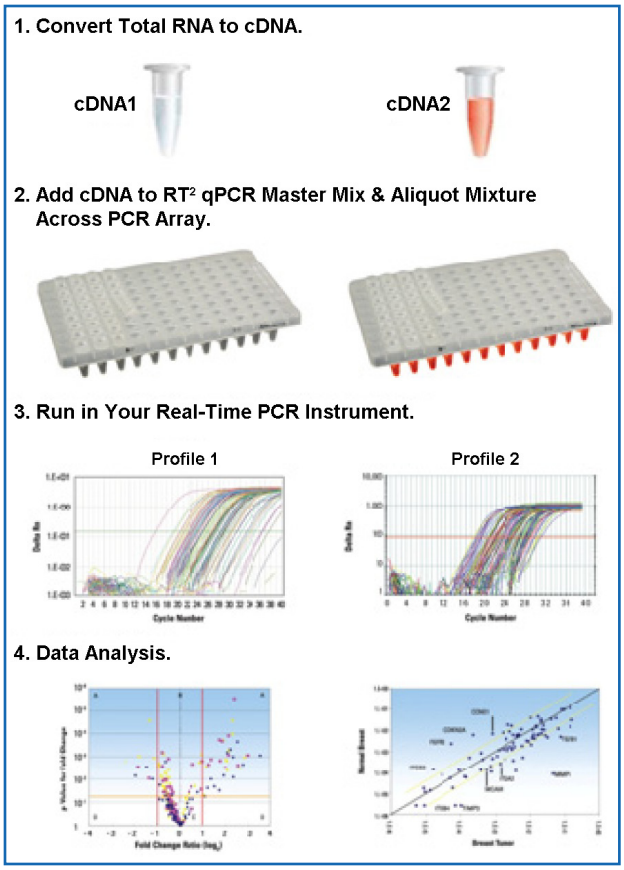
MDG Offers New Line of PCR Arrays for Gene Expression Research

By Rachel K. Bagni, Ph.D

The Molecular Detection Group (MDG) in the Protein Expression Laboratory (PEL) is pleased to offer the full line of PCR arrays from SABiosciences (SAB) for investigators interested in focusing their gene expression research.

In a recent technology seminar hosted by the PEL and the ATP Office of Business Development, SAB scientist Sam Rulli, Ph.D., provided an overview of the company's RT2 Profiler, miRNA and Methyl-Profiler™ PCR arrays, the SureSilencing™ siRNA arrays, and Cignal™ Cell-based reporter systems. SAB products cover approximately 100 different pathways for human, mouse, and rat. Genes are selected based on published associations with biological or disease pathways, and panels include genes that are regulated at the mRNA level.

PCR arrays are sensitive, specific, and highly reproducible, and allow the researcher to focus on a specific pathway of interest. They are used to study gene expression associated with a biological pathway or disease such as cancer, apoptosis, inflammatory response, stem cells, or development. PCR arrays can also be used for ChIP qPCR, and for epigenetic analysis of micoRNA expression and DNA methylation associated with cancer, development, and environmental impacts.



PCR-array workflow. Image reproduced with kind permission from SABiosciences and Sam Rulli, Ph.D.

SAB PCR arrays complement the custom whole-virus genome PCR array services currently offered by the MDG. The arrays from both SAB and MDG utilize similar workflow processes and quality control metrics to ensure consistent, superior data are returned to client investigators.

The MDG is experienced in developing tools to aid in the study of viral gene expression in in vitro, in vivo, and clinical samples. For more information on custom PCR array development and SABiosciences PCR arrays, please contact Rachel K. Bagni, Ph.D., bagnir@mail.nih.gov; 301-846-5469.

On Effective Communication

Presentation Is Teaching

By Ken Michaels

In the Effective Oral Presentations workshop that is offered on the NCI-Frederick campus, I usually introduce one of my segments with three major principles:

1. Always show respect for your audience.
2. Remember that presentation is teaching.
3. Remember that it's all about the message.

I'd like to address the second of these principles: Presentation is teaching. What does that mean? Essentially, it means that if the audience doesn't fully understand the message(s) being delivered, the presentation is a failure.

It's both common and natural for those with relatively little public speaking experience to experience a bit of nervous "jitters" as they prepare to give an oral presentation. They find themselves thinking, *Will I sound like I know what I'm talking about? Do I, in fact, really know what I'm talking about? Will they know that I'm nervous about giving this talk? What if I forget what I want to say? What if my mind goes blank?*

Notice that all of these notions are focused on you, and how well you will perform. But it's not about you. An information-rich presentation is not about the performance; it's about whether the audience understands the message.

Most audiences assume that the speaker knows what he or she is talking about. After all, the audience wouldn't be there if they thought the speaker knew nothing about the subject. You know your topic; that's a given. What you're there to do is to share what you know in a way that gives your audience a better understanding of the topic. When getting up to present, remember that you need to put on your teaching hat; focus on making sure your audience is getting the message, not on impressing them with your knowledge.

I don't mean to say that a good presenter pays no attention to performance. On the contrary, effective speakers pay a lot of attention to how they get their messages across. They take the time to consider how to use tools such as tone of voice, volume, pace, facial expressions, and hand gestures to best effect.

What I do mean to say, though, is that the attention to delivery is not rooted in the desire to come off looking good, but rather to be certain that the audience gets the point. As they "read" the audience, good speakers are not looking for evidence that they're scoring points; they're looking for signs of understanding—that the message is getting through.

On the flip side are those speakers who pay no attention at all to delivery. You've probably been to presentations where the speaker takes the platform, picks up the remote in one hand, the laser pointer in the other, turns to the screen, and holds forth for 20 minutes or more, rarely, if ever, turning to see if the audience is even still in the room, much less getting the message (and the likelihood is that they're not).

Every parent knows that when you counsel a child about looking both ways before crossing the street, you don't just toss that message over your shoulder while doing something else. You bend down, look the child in the eye, and deliver your message in simple, emphatic terms, watching the child's face for signs of understanding. It's not about you and your performance as a speaker; it's about whether the child is getting it.

And that's what really effective presenters do; they don't just talk to their audience. They teach.

Working with the Advanced Technology Program

The expertise of the Advanced Technology Program may be accessed through a variety of funding, contractual, and partnership mechanisms. For further information, please contact:

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On-line requests for services from ATP may be made through the ATP/LASP Accession System (CSAS), at: http://web.ncifcrf.gov/rtp/csas/requestor/help.asp.

ATP Mission

To partner with NCI-Frederick to provide highly specialized support in a complex biomedical research environment, using a broad spectrum of advanced technologies.

ATP Update is an electronic publication published quarterly by the Scientific Publications, Graphics & Media department for the Advanced Technology Program of SAIC-Frederick, Inc., Operations and Technical Support Contractor for the National Cancer Institute at Frederick in Frederick, Maryland. The content of this publication does not necessarily reflect the views or policies of the Department of Health and Human Services, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government.

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