



## Geisinger Leads Marcellus Shale Initiative

Coalition explores the potential health effects of natural gas mining in the region

The growth of hydraulic fracturing gas wells in Pennsylvania in the past few years has been nothing short of explosive. In 2008 there were fewer than 200 wells drilled. As of June of 2011, there were more than 7,000 well permits and more than 1,500 wells in production. While there is no lack of gas production and productivity, there is a lack of agreement as to the consequences of this development.

There are some facts about the Marcellus Shale play that are not in dispute. Marcellus Shale covers about two-thirds of Pennsylvania. The Marcellus Shale gas play represents a significant previously untapped reservoir of gas. The presence of an enormous volume of potentially recoverable gas in the eastern United States can be a key factor in our nation's long-term energy strategy. In order to access the Marcellus resources, a mining technique using horizontal drilling and hydraulic fracturing (fracking) is used. Hydrofracking involves pumping millions of gallons of a mixture of water, sand and chemicals under high pressure deep into the ground. Much of this water mixture returns as wastewater, or "flowback" water.

*(see "Shale Initiative" on page 2)*



## Partnerships Enhance Marcellus Shale Initiative

Research of the magnitude of the Marcellus Shale initiative requires a multi-faceted, broad-based consortium to appropriately address the myriad issues raised. As David Carey, PhD—Associate Chief Research Officer and Director of Geisinger's Weis Center for Research and the lead on the Marcellus initiative at Geisinger—states, "We realized early on that this was too big a project for us to do on our own."

Geisinger first reached out to other organizations in the autumn of 2011 when planning an organizational meeting. In January of 2012, more than 40 people representing 16 different organizations—including universities, government agencies, health organizations, funding organizations and gas industry representatives—were assembled for the organizational meeting in Washington, DC.

*(see "Partnerships" on page 3)*

“As we approach Geisinger's centennial celebration, we remain as committed to the health of the Central Susquehanna population as Abigail Geisinger was at the hospital's very beginning. Although unconventional gas extraction has been practiced elsewhere for many years, there is no rigorous unbiased study of the effects, if any, on health. I believe that it is our responsibility to lead a scientifically appropriate project that will allow us and our collaborators to understand how the health of the region might be impacted, to prepare for those impacts, and to draw general conclusions applicable to other energy-producing regions.”

Glenn D. Steele Jr, MD, PhD  
Geisinger President and CEO

## Shale Initiative *(continued)*

While those facts are agreed upon, there are many health, environment, and community issues regarding Marcellus Shale gas mining that are not known. Are there health effects that are directly attributable to the mining? What are the effects, if any, on groundwater and air quality? David Carey, PhD—Associate Chief Research Officer and Director of Geisinger's Weis Center for Research and the lead on the Marcellus Shale initiative at Geisinger—points out, "There is a lot of fear and concern (about hydraulic fracking), but almost no reliable data on which to base scientifically sound conclusions. However, that hasn't led to a shortage of opinions."

Geisinger—as a major healthcare provider in the region—is in a unique position to analyze relevant health data that can provide reliable information for policy makers. Dr. Carey states, "We want to do this in a scientifically rigorous and unbiased way. We're not going into this with any preconceived notions. To determine the long term outcomes, we need solid data that can be used to guide rational policies, propose mitigations where they are needed, and reduce exposures."

Geisinger has organized a multi-disciplinary, collaborative research program to investigate the health of our population, including the potential health effects of natural gas mining in the Marcellus Shale region of central Pennsylvania and southern New York state. Geisinger is joined by a coalition of stakeholders and experts from academia, healthcare systems, government, and the energy industry to explore the impact of this mining on this region (see article in this issue).

A major aim of this project is to create a cross-disciplinary, integrated, and sharable repository of environmental, health and community data that will drive scientifically rigorous, hypothesis-driven investigations. A unique aspect of



Members of the Marcellus Shale initiative team met at Geisinger's Foss Home on November 12, 2012.

the study is the plan to utilize health data obtained through the electronic health records of regional healthcare systems, augmented by direct data collection and the collection of samples for genomic analysis. The Keystone Beacon Community project (see article in this issue) has created a model for how to store data from a variety of sources

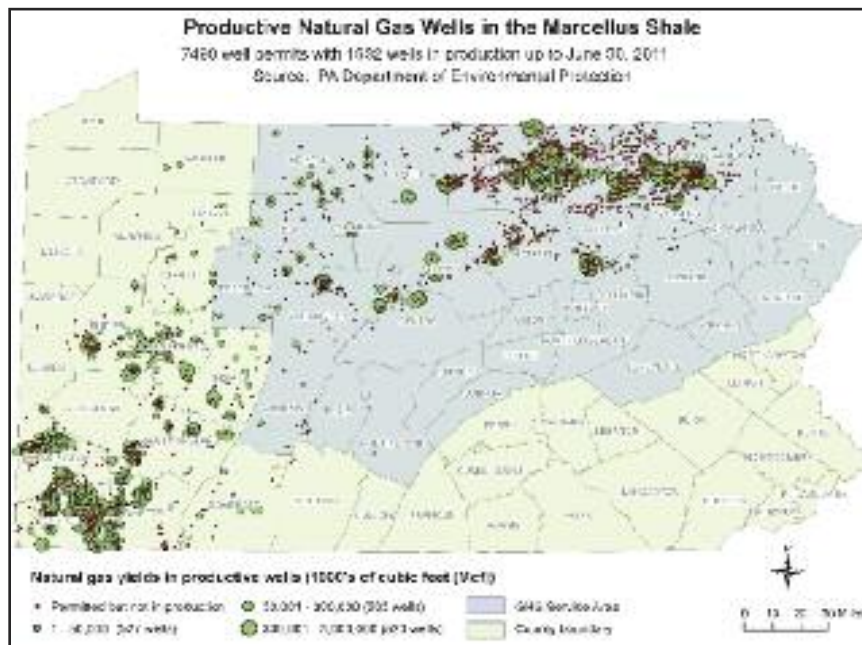
- Initiating one or two focused pilot studies to identify if links exist between drilling activities and health, environment or socio-economic outcomes.

The pilot studies in Phase I will focus on plausible, short latency outcomes that can be easily identified, such as potential changes in air quality and the impact on asthma, effects on perinatal outcomes such as birth weight or prematurity, or occurrence of motor vehicle trauma .

In subsequent phases the initiative will continue to collect data on environmental exposures, health, and community impacts. The availability of longitudinal data will further enhance the ability to identify trends in these parameters. The longitudinal data will allow researchers to identify additional areas for subsequent in-depth

investigation through focused, hypothesis-driven approaches. These data will be made available to support research projects to the broader scientific community.

To examine issues such as possible health effects will require decades of research. Timing right now is critical for this study. As Dr. Carey says, "If we wait too long, it will be hard to get baseline data. There are a lot of places interested in studying this. We've already put a stake in the ground and we've gotten some attention and credit for that, but we've got to move to where we're actually collecting data and doing some analysis."



in a community data warehouse, segregated from Geisinger's clinical data but accessible by researchers.

The Marcellus Shale initiative is expected to unfold in a series of phases. Phase I covers the short term (3-5 years). The aims of Phase 1 include

- Creating an inventory of existing data sources related to the environment, health, and communities within the affected region
- Identifying gaps in existing data
- Creating a data collection infrastructure to fill the gaps
- Analyzing data to identify trends in the status of the environment, health and communities



## Partnerships *(continued)*

In addition to collaborations with researchers at academic and government research institutions, collaborative agreements have been signed with Guthrie Health and Susquehanna Health. The three healthcare organizations—Geisinger, Guthrie and Susquehanna—will combine information from their electronic health records in a community data warehouse (see article in this issue). “As Geisinger, Guthrie Health and Susquehanna Health all serve patient populations that live in areas affected by Marcellus Shale gas drilling, it is appropriate that we join forces to investigate the health of the population we serve,” says Dr. Carey. “We look forward to a productive and collaborative relationship.”

Guthrie Health is an integrated health system located in north central Pennsylvania and Upstate New York serving patients from an 11-county service area. Guthrie is comprised of the Guthrie Research Institute; three hospitals in Sayre, Pa., Corning, N.Y., and Troy, Pa.; as well as a multispecialty group practice of more than 260 physicians and 130 mid-level providers in a regional office network encompassing subspecialty and primary care sites in 23 communities throughout Pennsylvania and New York. Guthrie Health offers a wide range of services and programs designed to enhance the health and well-being of those it serves.

Susquehanna Health is an integrated health system that provides healthcare services to patients throughout an 11-county region in north central Pennsylvania. Susquehanna Health employs more than 100 physicians and more than 20 advanced practice professionals and includes both primary care and specialty physician services. Susquehanna Health admits more than 13,000 patients annually and performs more than 7,500 outpatient surgeries and more than 4,400 inpatient surgeries each year.

As the initiative begins to move from the planning phase to the action phase, an Executive Steering Committee is currently being formed. This committee is charged with setting the overall strategic direction of the initiative as well as evaluating the progress being made toward that vision. Geisinger representatives to the Executive Steering Committee include: Glenn D. Steele Jr, MD, PhD, President and Chief Executive Officer; David Carey, PhD,

Associate Chief Research Officer and Director of the Weis Center for Research; Andrew M. Deubler, Executive Vice President, Office of Resource Development; and James Walker, MD, Chief Health Information Officer. Guthrie representatives to the Executive Steering Committee include Laura Fitzgerald, Director of Research and Clinical Innovation; and David Channin, MD, Chairman of Radiology. Susquehanna representatives to the Executive Steering Committee include Greg Harrison, Vice President, Marketing and Communications; and George Manchester, MD, CMSL, Senior Vice President and Chief Medical Officer.

The Marcellus Shale initiative requires the participation of scientists from a variety of institutions, each of whom brings a national or international level of expertise to the group. They represent a multitude of research approaches, as well as technical fields. Many of these individuals have been involved in the planning and feasibility phases of the project. They complement the expertise at Guthrie Health, Susquehanna Health, and Geisinger. Among the scientific members of the initiative are:

Robert Jackson, PhD is the Nicholas Chair of Global Environmental Change at the Nicholas School of the Environment, Duke University, a professor in the Biology Department, and Director of Duke's Center on Global Change. His research examines how people affect the earth, including studies of the global carbon and water cycles, biosphere/atmosphere interactions, energy use, and global change.

David Savitz, PhD is Professor of Community Health, Epidemiology Section, and Obstetrics and Gynecology at Brown University. His research focuses on the risks of environmental exposures and problems associated with pregnancy and fertility.

Brian Schwartz, MD, MS is Professor of Environmental Health Sciences, Epidemiology and Medicine, Johns Hopkins Bloomberg School of Public Health and Director and Senior Investigator of the Environmental Health Institute, Geisinger Center for Health Research. His research applies the methods of occupational, environmental, and molecular epidemiology to studying the health effects of chemicals. Recently he has studied how land use and energy use are contributing to global climate change, ecosystem degradation, biodiversity and species losses, and ultimately, posing important risks to individual and population health.

Christopher J. O'Donnell, MD, MPH is a Clinical Associate Professor of Medicine, Harvard Medical School, Senior Investigator of the National Heart, Lung and Blood Institute (NHLBI) and Associate Director of NHLBI's Framingham Heart Study. His major research focus is the epidemiology and genetic epidemiology of clinical and subclinical cardiovascular disease.

Martin Raniowski is the Deputy Secretary of Health Planning and Assessment, the Pennsylvania Department of Health (DOH). This area of the DOH monitors, tracks and analyzes the health status of Pennsylvania communities. The office oversees the state laboratories and licenses independent clinical labs; supervises emergency medical services; and ensures epidemiological data collection, dissemination and analysis. Previously he served as a Senior Director of the American Heart Association and a Policy Analyst to the Pennsylvania House of Representatives.

Alan Krupnick, PhD is the Director, Quality of the Environment Division for Resources for the Future, a Washington, DC policy and think tank. His research has focused on analyzing environmental issues, in particular the benefits, costs, and design of air pollution policies, both in the United States and in developing countries. His recent research addresses the valuation of health and ecological improvements, risk prioritization, particularly in food safety, introducing uncertainty into benefit-cost analysis, and environmental policy design in developing countries.

Geisinger has also forged connections with local universities, such as Bucknell and Bloomsburg. In one of the initial collaborative projects with these universities, Heather Feldhaus, Chair, Department of Sociology, Bloomsburg University; Christopher Podeschi, Assistant Professor of Sociology, Bloomsburg University; and other faculty members will be working with investigators to conduct community focus group studies to assess local knowledge and attitudes about Marcellus Shale drilling activities.

“The coalition we have formed will enable us to study this issue in a multidisciplinary way,” says Dr. Carey. “Our aim is to create a cross-disciplinary and sharable repository of data on environmental exposures, health outcomes, and community impacts. We will continue to seek out partners who can provide insight and expertise into this complex and multifaceted research issue.”

## Stephen Sellers, MAT, MA

Director of Research Project Management for Marcellus Shale Initiative



Stephen Sellers, MAT, MA, assumed duties as the Director of Research Project Management for the Marcellus Shale initiative in mid-November. Sellers brings with him a wealth of experience working with electronic health records (EHR), project management, and finance and budget in a research setting. He worked for the University of Chicago Hospitals in a variety of positions for almost 15 years. Sellers will take over administrative duties for the initiative, including coordinating with the numerous outside organizations involved with the initiative as well as tracking all the budgeting and finance aspects of the project.

Sellers believes that his diverse skill set will serve him well as the chief administrator for the Marcellus Shale initiative, and is energized by the opportunities the initiative presents. "I am not aware of another instance where researchers are able to study the effects of a new industrial process from the beginning," Sellers says. "We are getting in at ground zero and we will be able to conduct a longitudinal study of the impact of an industrial process on the health and welfare of communities. In the past this has always been conducted in hindsight."

For Sellers, working on the initiative is a "once in a lifetime opportunity. To be able to be a part of this research," he says, "is extremely exciting."

## Beacon's Community Data Warehouse a Model for Multiple Source Data Collection

In 2010, Geisinger Clinic received a \$16 million, three year award from the Office of the National Coordinator of Health IT (US Department of Health and Human Services) to establish and lead the Keystone Beacon Community, a consortium of hospitals, doctor's offices, nursing homes, and home health agencies devoted to coordinating patient care and improving patient outcome, facilitated through the use of health information technology. The Keystone Beacon Community, concentrated in five central Pennsylvania counties (Columbia, Montour, Northumberland, Snyder and Union), is one of 17 Beacon Community sites nationwide.

In order to coordinate patient care across all the participating providers and to have data for evaluating the project's impact, the Keystone Beacon Community team created a model for receiving, storing and sharing digital information safely and effectively between these disparate organizations. The Community Data Warehouse (CDW) —

created for the Keystone Beacon Community project—sits inside of the Geisinger firewall but is secured with its own IT infrastructure, creating a quarantined and secure area for storage and analytics. Access is limited to only project-specific business needs. One of the biggest struggles in creating the warehouse was to effectively and efficiently store data from disparate organizations, each of which uses a wide variety of hardware and software. In the Keystone Beacon Community project, the CDW collects information from hospital bills, the care coordination team, patients, and the Keystone Health Information Exchange® (a regional, Geisinger-led health information exchange). That information is securely transported, and then the data is extracted so that it is stored in a uniform manner. Outputs from the CDW include automated reports back to participating organizations, such as

*(see "Data Collection" on next page)*

## Environmental Health Institute

### Studying links between land use and health

The Environmental Health Institute (EHI) was formed in 2007 as a joint collaboration between the Geisinger Center for Health Research (CHR) and the Johns Hopkins University Bloomberg School of Public Health (JHBSPH) Department of Environmental Health Sciences and the Center in Urban Environmental Health. Brian S. Schwartz, MD, MS, Professor, JHBSPH and Senior Investigator at CHR, serves as the Director of the EHI. The mission of the EHI is to understand links between land use, ecosystem health, community health and human health, and to translate knowledge into changes that promote sustainable, healthy communities.

According to Dr. Schwartz, the EHI is well situated at Geisinger. "Pennsylvania provides an enormously rich research environment for the EHI given its many differences in agricultural, environmental, land use and mining conditions and practices across communities," says Dr. Schwartz. In addition to these interesting differences, Geisinger offers unique resources with its electronic health record

(EHR) and its geographic information system (GIS) laboratory which allow for research that cannot be duplicated elsewhere.

Regarding agriculture, Pennsylvania is home to a number of concentrated animal feeding operations, known as CAFOs. The EHI is currently conducting research into the role that CAFOs may play in the increase of methicillin-resistant *Staphylococcus aureus* (MRSA) infections in the region, which can be very serious and costly. The doctoral (PhD) thesis research of Joan Casey, JHBSPH, examines whether the widespread use of antibiotics in CAFOs has contributed to dramatic increases in MRSA cases over the past decade.

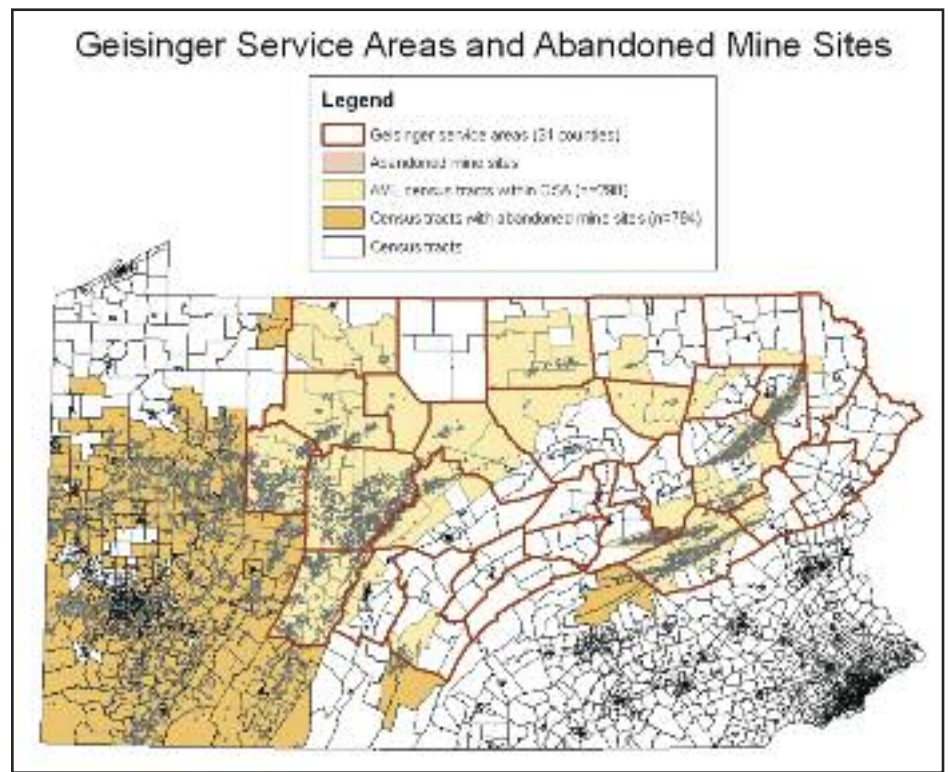
Regarding mining, Pennsylvania is home to three quarters of all abandoned coal mines in the United States, carrying the biggest burden of any state. Issues related to coal abandoned mine lands (AMLs) include: acid mine drainage, debris piles, open mine shafts and open strip mines, all



of which contribute to degradation in communities. Ann Liu, a doctoral student at JHBSPH, completed her thesis research on the community and individual-level impacts of coal AMLs. Her first paper, published in the journal *ISRN Public Health*, found that the greater the burden of AMLs in communities, the higher the community socioeconomic deprivation. Her second paper, being prepared for publication now, found that higher AML burden was associated with worse diabetes early in the disease course and worse progression over time in 28,000 Geisinger patients with diabetes, using hemoglobin A1c levels, a biomarker of diabetes severity and control.

The EHI serves as a resource to the Marcellus Shale initiative. The EHI has worked over the past four years to geocode all Geisinger patients. In addition, for the past year and a half they have worked to geocode Marcellus Shale information such as locations of wells and locations of pipelines and compressors. With this information, researchers can begin by overlaying where the wells and patients are and—using data from the EHR—in turn evaluate whether Marcellus Shale development can be linked to specific adverse health outcomes.

The EHI is evaluating the relation of the food, land use, media, physical activity, and social environments, measured as features of communities, with childhood body mass index by studying more than 260,000 children who visit a Geisinger primary care provider. The first study on this subject was published in the *American Journal of Preventive Medicine* last year. The EHI has funding from the National Institutes of Health as part of the Johns Hopkins systems-oriented childhood obesity center.



Annemarie Hirsch, PhD, an epidemiologist specializing in health services research, serves as site principle investigator, and Lisa Bailey-Davis, MA, a specialist in childhood obesity, food systems and prevention research, serves as site co-investigator for the "Dynamics of Childhood Obesity in Pennsylvania from Community to Epigenetics" study. This study applies mathematical modeling methods often

used in engineering, such as complex dynamic systems and agent-based models, to the obesity epidemic in the region. This approach to analysis is novel and will likely lead to new insights about the drivers of the obesity epidemic in the region. In Phase 2 of this work, the EHI will complete more detailed measurements in both children and communities.

To learn more about the Environmental Health Institute, visit [www.geisinger.org/research/centers\\_departments/environmental](http://www.geisinger.org/research/centers_departments/environmental)

## Data Collection *(continued)*

hospital leadership reports and care management reports as well as reports to the funding agency.

James Walker, MD, Chief Health Information Officer and Director of the Keystone Beacon Community project, explains that the CDW model worked because there was give and take. "If we had just asked organizations to connect up their information system, even for the purposes of the Beacon project, they would have said, 'you're nuts.' Instead we asked for a minimal data set, we conducted analytics on it, and delivered back actionable information that they would never get in any other way," says Dr. Walker. "In Beacon, we found that organizations loved that."

Although the Marcellus Shale initiative has a different project scope and objectives, the CDW and other aspects of Keystone Beacon Community's IT framework will serve as a model for collating data from multiple sources for this initiative. Lessons learned during the Keystone Beacon Community project will help the Marcellus Shale initiative team create a safe data warehouse for health, environmental, community and socioeconomic data.

# Geographic Information System Laboratory

The Geographic Information System (GIS) laboratory integrates hardware, software and data for capturing, managing, analyzing and displaying all forms of geographically-referenced information. Geisinger's GIS effort collects environmental, land use, transportation, agricultural, mining, food and physical activity establishments, and other community data (e.g., population, population density) from government and

other sources. Government data also includes US Census Bureau information about socioeconomic conditions in our communities. Other information in geospatial databases characterize everything from abandoned coal mines and natural gas wells in the Marcellus Shale, to restaurants, grocery stores and fitness centers. The GIS laboratory uses "address geocoding" to locate addresses or events on a digital map.

Maps created by the GIS laboratory examine relationships of interest, for example, the distribution of these community and environmental conditions over space, over time, or in relation to other factors such as health outcomes. Once these relationships are recognized, the underlying causes and processes can be more thoroughly studied.

As Geisinger strives to promote clinical and translational research across the system, a coordinated infrastructure that will encourage and support research is being created. The goal of a realignment of resources in research is to provide comprehensive research support to all investigators — experienced and new, clinical, epidemiological, and basic science — across the entire system and further position Geisinger to make significant national contributions toward linking scientific advances with improved health care.

Three offices linking a number of important but distinct services—project development, project management, data access and biostatistics—have been established or reestablished. These services are led by individuals who have already demonstrated the ability to work with researchers across the system and to contribute to the success of the research enterprise.

## Clinical Research Project Development Office

Led by Jove Graham, PhD, this office will work with clinical investigators to develop research questions and ideas, design studies, and guide investigators and their staff in the conduct of the studies. Jove will also continue his work with the Virtual Data Warehouse (VDW), leading the development, refinement, expansion and maintenance of the VDW to support Geisinger's active role in the national HMO Research Network for population-based healthcare research.

## Office of Clinical Research Support Services

Led by Liza Behrens, MSN, RN, CCRC, this office will work with clinical departments and service lines to develop and expand clinical research programs facilitating a mix of investigator initiated research, federal grant, and industry-supported clinical trials. Support services will be accessible to investigators systemwide for regulatory affairs, study budgeting, subject recruitment and retention, clinical research conduct, data collection, research quality control and research staff development. This office will also work with others across Geisinger to enhance the public's understanding and support of clinical research.

## Biostatistics Core and Biostatistics Section

Directed by H. Lester Kirchner, PhD, the Biostatistics Core, a redesign of the Biostatistics & Research Data Core, comprises all non-faculty biostatisticians and data analysts. The Biostatistics Core will provide biostatistical support and various aspects of data management, including database development and extraction of electronic health record data to clinical researchers throughout the health system. The Biostatistics Core will work closely with the Biostatistics Section, which comprises the faculty-level, PhD biostatisticians. The Biostatistics Section will provide assistance on analysis, study design, grant and manuscript assistance, and sample size to researchers across the system.

## Staff Publications

These publications feature Geisinger employees as authors – or former employees who conducted the relevant research while at Geisinger – with publication dates from April 2012 through September 2012. The Geisinger author's name is bolded. The listings below follow National Library of Medicine format.

**Adilakshmi T, Sudol I, Tapinos N.** Combinatorial Action of miRNAs Regulates Transcriptional and Post-Transcriptional Gene Silencing following in vivo PNS Injury. *PLoS One.* 2012;7(7):e39674. Epub 2012 Jul 6.

**Ambler DR, Golden AM, Gell JS, Saed GM, Carey DJ, Diamond MP.** Microarray expression profiling in adhesion and normal peritoneal tissues. *Fertility & Sterility.* 2012 May. 97(5):1158-1164.e4.

**Antohe JL, DeVecchio B, Harrington TM.** An unusual presentation of acute calcium pyrophosphate dihydrate arthropathy of the sternoclavicular joint in a patient with systemic lupus erythematosus. *JCR: Journal of Clinical Rheumatology.* 2012 Apr. 18(3):162.

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Congratulations to **Dr. Gilliam** and one of his prior research fellows - **Pierro Perucca** – on their invitation by the prestigious *Lancet Neurology* to write this review article based on their work in recent years. *Lancet Neurology* is the top journal in clinical neuroscience, with an impact factor of 24. A podcast interview with Dr. Gilliam is also presented to *Lancet Neurology's* readership, and may be accessed here: [www.thelancet.com/laneur-audio-2012/](http://www.thelancet.com/laneur-audio-2012/).

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# Recent Awards

This list includes new awards and competitive renewals from external agencies and Geisinger's Clinic Research Fund from April 2012 through September 2012. To protect sponsors' confidential information, we omit dollar amounts for clinical trials and industry-sponsored agreements and some clinical trial listings. If an award is inadvertently overlooked, please forward the information to Richard Fogaley (rafogaley@geisinger.edu) for inclusion in the next issue.

**Anne Moon, MD, PhD**

Weis Center for Research  
The Role of FGF8 During  
Cardiovascular Development  
National Institutes of Health  
\$644,870

**Margaret Rukstalis, PhD**

Center for Health Research  
Encouraging young adults to make  
effective nutrition choices: Manu Gen Y  
Henry Ford Health Services/National  
Institutes of Health  
\$60,747

**Annemarie Hirsch, MPH, PhD**

Center for Health Research  
Dynamics of childhood obesity in  
Pennsylvania from community to  
epigenetics  
Johns Hopkins University  
\$68,099

**Thomas R. Graf, MD**

Geisinger Community Health Services  
Comparative survey in structured  
diabetes care  
The Commonwealth Fund  
\$25,000

**David H. Ledbetter, PhD**

Genomic Medicine  
Comprehensive phenotypic  
characterization of the  
17q12 deletion syndrome  
Simons Foundation Autism Research  
Initiative  
\$250,000

**Victor G. Vogel, MD, MHS**

Hematology/Oncology  
NCI Community Cancer Centers  
Program (NCCCP 2)  
SAIC-Frederick, Ins./National Institutes  
of Health  
\$978,945

**William F. Hess, MD**

Orthopaedics  
Spinal Bifida  
Pennsylvania Department of Health  
\$60,000

**Matthew T. McElroy, DO**

Orthopaedics  
Ultrasonography versus MRI in the  
diagnosis of tibial stress fracture  
Clinic Research Fund  
\$10,900

**David J. Carey, PhD**

Marc S. Williams, MD  
Weis Center for Research  
eMerge-PGX Supplement  
National Institutes of Health  
\$357,752

**Tooraj Mirshahi, PhD**

Weis Center for Research  
Functional selectivity in MC4R  
signaling  
National Institutes of Health  
\$427,402

**Janet Robishaw, PhD**

Weis Center for Research  
GNG5 function in neural progenitors  
National Institutes of Health  
\$81,750

**Wannian Yang, PhD**

Weis Center for Research  
Induction of prostate cancer cell death  
by coupling activation of MYC  
transcription to apoptosis  
Department of Defense  
\$122,597

**James Walker, MD**

Direct Grant: to connect healthcare  
providers with DIRECT e-mail and a  
Digital Certificate to ensure patient  
safety and confidential sharing of  
health information  
Pennsylvania Department of Health  
\$5,000 to \$2 million

**Radhika Gogoi, MD**

Obstetrics & Gynecology  
Microsatellite instability in patients  
with recurrent early stage endometrial  
cancer  
Clinic Research Fund  
\$19,928

**Eric Newman, MD**

Rheumatology  
Improving the delivery of care using a  
theory-based decision support tool  
Yale University/American College of  
Rheumatology  
\$64,679

**David J. Carey, PhD**

Marc S. Williams, MD  
Weis Center for Research  
eMerge Genomic Medicine IV  
Conference – Supplement 2  
National Institutes of Health  
\$119,730



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