

“WASTEFUL” RESEARCH? LOOKING BEYOND THE ABSTRACT

A Congressional Exhibition and Reception



April 13, 2016
5:00 - 7:00 pm
Kennedy Caucus Room
325 Russell Senate Office Building
Washington, DC

EPR

Coalition to Promote Research

Organizations Committed to Promoting Public Health, Innovation
and Fundamental Knowledge Through Scientific Research

CNSF

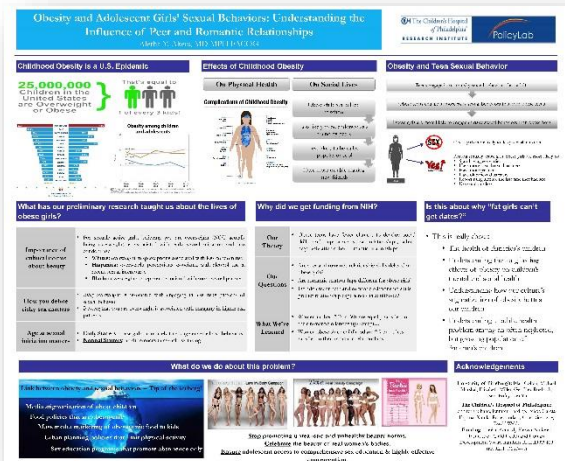


COALITION FOR
NATIONAL SCIENCE FUNDING


EXHIBITORS

Aletha Akers, MD, MPH, FACOG – Children’s Hospital of Philadelphia. Dr. Akers is medical director of Adolescent Gynecology Consultative Services in the Craig Dalsimer Division of Adolescent Medicine at The Children's Hospital of Philadelphia. Her research focuses on improving adolescent reproductive health outcomes and understanding the contextual and health system factors that influence adolescents’ sexual and healthcare decisions. Her research is funded by the *Eunice Kennedy Shriver* National Institute for Child Health and Human Development.

Poster Summary: Studies have consistently shown that obese adolescent girls engage in more sexual risk-taking behaviors compared to non-obese girls. Few studies have examined the mechanisms underlying this association. Using secondary data analysis of data from two large, longitudinal cohorts of US adolescent girls, this research examines whether differences in the development of interpersonal social skills or differences in the intimate relationship experiences of obese and non-obese girls explains the higher rates of sexual risk taking among obese girls. Dr. Akers’ research on the *Role of Romantic Relationships in the Sexual Behavior of Obese and Non-obese Girls* was targeted in the media with the headline, “Feds Wonder Why Fat Girls Can’t Get Dates.”




Jeff Leips, PhD — University of Maryland Baltimore County (UMBC). Dr. Leips' research is focused on understanding the genetic basis of natural variation in life history traits using the fruit fly, *Drosophila melanogaster*, as a model organism. He is particularly interested in identifying genes that control age-specific changes in traits that directly contribute to senescence and ultimately limit life span. These traits include age-specific reproduction, immune response and energy storage. He is also co-director of a new undergraduate training program in Biology and Mathematics at UMBC supported by the National Science Foundation.



Using the fruitfly, *Drosophila melanogaster* to Understand the Genetic Basis of Aging

Dr. Jeff Leips¹, Dr. Michelle Starz-Gaiano¹, Dr. Peter Abadir, MD²

¹Dept of Biological Sciences, University of Maryland Baltimore County, Baltimore MD 21250
²Johns Hopkins Bayview Medical Center, Baltimore, MD 21224




Introduction

- All organisms deteriorate with age
- Aging decreases the quality of life of the elderly
- In human populations, individuals differ in rates of physiological decline with age
- Individual differences in aging is partially attributable to genetic differences among individuals
- The causal genes that are responsible for these differences among individuals are largely unknown and so limiting our ability to design treatments

Why Use *Drosophila*?

- Flies show similar age-related declines to that of humans
- Decline in physical strength with age
- Decline in walking speed or endurance with age
- Decline in ability to fight infection with age
- Many fully sequenced genomes
- > 80% of fly genes shared with humans
- Efficient and Economical Model Organism
- Short life span (~50 days), a low measurement of genetic influences on age-related decline across entire life span
- Insensitive to disease and resistant to large populations (minimizes statistical power to detect genetic effects)
- Genomic mapping techniques in *Drosophila* genomes contribute to variation in aging well developed
- 1000's of genetic resources allow experimental manipulation genes to validate genetic effects on aging
- Excellent organism for training the next generation of scientists



Drosophila as a model to understand the genetics of age-related decline in immune function


- Age-related decline in immune response is substantial burden on the health-care system; infection-related hospital admission is among the most costly and the most common in the elderly

Immune immune response


- Two main components: Phagocytosis
- Production of Antimicrobial Proteins
- Conservation of Gene/Signaling Pathways in flies and humans

Measuring the Immune Response: Infection Assay


M. luteocola Bacteria



Measure Infection Level 24 hours after infection

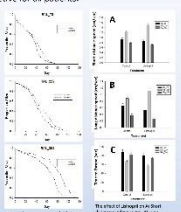


Genome wide expression experiment identified 250 genes that contribute to individual variation in age-specific ability to fight infection.



Using *Drosophila* to understand individual variation in response to drug treatment

- Individual differences in response to drug treatment is often related to genetic differences among individuals
- We are examining the genetic basis of the response to Lisinopril (a commonly prescribed drug to lower age-related changes in blood pressure - drug not effective for all patients)
- Effects of Lisinopril treatment in flies generally mirrors effects in humans
- Genotypes differ in their response to drug treatment
- Mapping efforts underway to identify genes that contribute to individual differences in drug response.



References


1. High mortality infection as a result of age related mortality in mice. *Ageing Research Reviews* 2004, 3(1): 21-31
2. Park TW, et al. *PLoS ONE* 2011, 6(10): e26111. doi:10.1371/journal.pone.0026111
3. Coulter J - 2011. Talking to the hearing: pharmacogenetics. *Pharmacology* 2011, 92(4): 41-48.


Funding

This research was supported by National Institutes of Health grants: R01AG023950 and 5K01DK082350-02

Poster Summary: *Drosophila melanogaster* (the fruit fly) is a scientifically significant model for research. This research has produced important knowledge about genes that cause declines as individuals age. Dr. Leips' research has not been directly targeted, but research with fruit flies was labeled wasteful in the 2008 presidential campaign and in a subsequent 2012 wastebok.

Richard Nakamura, PhD – National Institutes of Health. Dr. Nakamura directs NIH's Center for Scientific Review (CSR), the division of NIH that organizes peer review groups or study sections that evaluate the majority (75%) of the research grant applications sent to NIH. Before accepting the directorship of CSR, Dr. Nakamura had a 32-year career at the National Institute of Mental Health (NIMH), where he served as both its Scientific Director and Deputy Director. He also was Acting Director of the NIMH from 2001 to 2002.





NIH Peer Review and How the Stars of U.S. Science and Health Are Born


Richard Nakamura, Ph.D.
CSR Director
Don Lockett
CSR Communications Director

NIH... Turning Discovery Into Health

NIH is the world's largest medical research agency. It is the primary source of funding for biomedical research in the United States. NIH's research is the foundation for many of the medical advances that have improved the lives of millions of Americans.

How Does NIH Find the Stars of Science?

NIH uses a peer review process to evaluate research grant applications. This process involves scientists from the scientific community who are experts in their field. They review the applications and recommend whether they should be funded.




The NIH Center for Scientific Review Evaluates the Majority of NIH Grant Applications

The CSR is responsible for reviewing the majority of NIH grant applications. It is the largest of the four centers within the NIH. The CSR is located in Bethesda, Maryland.

How NIH Peer Review Works

NIH has a two-stage review process. In the first stage, the CSR reviews the applications. In the second stage, the applications are sent to the study sections, which are made up of scientists from the scientific community. The study sections review the applications and recommend whether they should be funded.




Who Gets NIH Funding?

NIH funding is distributed across a wide range of scientific disciplines. The most common areas of funding are in the fields of cancer, heart disease, and mental health.

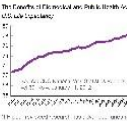
How NIH Peer-Reviewed Research Pays Off

NIH funding has led to many important medical advances. For example, NIH funding has led to the development of many new drugs and medical devices. It has also led to the discovery of many new genes and proteins.



Scientific and Health Advances

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Taking Risks and Discovering Great Possibilities

NIH funding is not just for the most established scientists. It also funds research in emerging fields and by early career scientists. This helps to ensure that the most innovative ideas are funded.


Shaping a Field on the Early Researcher Transition Rejuvenation Program

The ERT program is designed to help early career scientists transition from postdoctoral fellowships to independent research. It provides them with the resources and support they need to succeed.




Microscopy Reinvented Round 2 Begins

The Microscopy Reinvented program is designed to help scientists develop new microscopy techniques. It provides them with the resources and support they need to succeed.



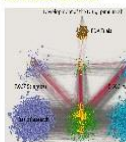
Geneticist Advances Autism and Schizophrenia Research

NIH funding has supported research in the fields of autism and schizophrenia. This research has led to a better understanding of these complex disorders and has helped to identify potential treatments.



Big Advancements Are Built on Lots of Unfunded NIH Reviews and Grants

Many of the most important medical advances were funded by NIH. However, many other important advances were not funded by NIH. This highlights the importance of having a robust and transparent review process.




Discovery Drugs

NIH funding has led to the discovery of many new drugs. These drugs have helped to improve the lives of millions of Americans. However, many other important drugs were not funded by NIH.

The Bottom Lines

NIH funding has led to many important medical advances. However, many other important advances were not funded by NIH. This highlights the importance of having a robust and transparent review process.



Poster Summary: The Center for Scientific Review holds over 1,500 review meetings a year, involving about 17,000 outside reviewers from the scientific community. In efforts to fine-tune the peer review system in order to identify the best science, NIH recently adopted new guidelines to improve transparency, reproducibility and rigor in scientific applications.

Sheila Patek, PhD – Duke University. A professor of biology, Dr. Patek leads a laboratory that studies the dynamic interplay between evolutionary processes and physics. Dr. Patek studies the evolution of the biomechanical properties of extremely fast motion and underwater bioacoustic systems. Her NSF-funded research is producing new knowledge about how mantis shrimp generate and store extreme force, uncovering basic biomechanical principles that apply across species. The lab also has a grant from the Army Multidisciplinary University Research Initiative.

Poster Summary: Understanding the systems that allow organisms to produce extremely fast motion enables researchers to apply that knowledge to human-engineered systems. In fact, the mantis shrimp has already inspired a new design structure for composite materials, one more impact resistant and tougher than the standard currently used on airplanes. Dr. Patek’s research was labeled wasteful in the draft FY 2017 House budget resolution and in a recent wastebok that called it a “Shrimp Fight Club.”

Biological ultrafast systems surpass current engineered systems in:

- 1. Size:** The best biological performance is found at the smallest scales. The best engineered systems are orders of magnitude larger.
- 2. Repeatability:** Many biological impulsive systems can be used repeatedly, resistant to wear and tear. Engineered impulsive systems are primarily self-destructive.
- 3. Efficiency:** Biological systems are lightweight, robust and efficient. Most engineered systems are energetically costly, relying on explosives.

Ultrafast biological systems became visible to biologists primarily in the past 15 years, because of advances in lower light extreme high-speed videography. This is an area of intensive discovery of previously invisible systems and processes.

Duke UNIVERSITY
Discovery and applications of ultrafast biological systems
 Prof. Sheila Patek - Department of Biology - Duke University - www.thepateklab.org

Mantis shrimp strike so quickly that the water cavitates at impact, generating heat equivalent to the surface of the sun, light and sound.

Cavitation sounds and destructive energy are the bane of propeller design and fast underwater motion.

Mantis shrimp do not cavitate during rotation - only during impact.

Mantis shrimp fluid mechanics provide key information for how engineered systems could avoid cavitation during impact, but suppress it during fast rotation.

Ultrafast movements use extreme energy storage and release to enhance power output.

Most engineered ballistic systems self-destruct after one use. Biological mechanisms provide novel insights for engineering design of repeatable, efficient impulsive systems.

Mantis shrimp fracture snail shells at bullet-like accelerations using a potent sequence of high peak, transient forces.

This discovery led to the synthesis of novel lightweight, fracture resistant materials.

Mantis shrimp use a lightweight appendage (~ mass of two toothpicks) to fracture ceramic materials. This is a fundamentally different approach than used by big jaws and heavy hammers.

Animals with lethal weapons have evolved non-lethal mechanisms to resolve disputes.

Mantis shrimp strike specialized armor on the opponent's tail. Size-matched fights are won by the maximum number of strikes.

The armor absorbs energy similarly to a punching bag.

The impact dynamics resemble the energy exchange of a baseball and ash bat.

The energy exchange scales with the animal's body size. Mantis shrimp may be able to assess size based on impact dynamics.

Engineers have developed new materials that dissipate impact energy, based on biological materials that resist impact fracture, with the goal of improving armor and protective sports gear.

Narayan Sastry, PhD – University of Michigan (UM). A research professor at UM's Survey Research Center and Population Studies Center and adjunct senior social scientist at the Rand Corporation, Dr. Sastry studies the social and spatial dimensions of health, development, and well-being of children and adolescents in the United States and in less developed countries. He is one of the principal investigators of the NSF-funded *Panel Study of Income Dynamics*.

Poster Summary: Since 1968 NSF has supported *The Panel Study of Income Dynamics (PSID)*, a longitudinal study of a representative sample of U.S. individuals and the family units in which they reside. The study's long-term span, innovative genealogical design, and comprehensive content have been critical to the fundamental understanding of a wide variety of key social science issues, including those involving life course effects. While Dr. Sastry's research has not been singled out, data from the PSID was featured in a 2011 wastebok article titled "Exactly How Much Housework Does a Husband Create?"

PSID

A national study of socioeconomic and health over lifetimes and across generations

PSID.org

@umpsid

THE PANEL STUDY OF INCOME DYNAMICS

PSID is the world's longest running, nationally-representative household panel survey. Started in 1968 with a sample of about 5,000 families and 18,000 individuals, PSID has collected data on the same families and their descendants annually from 1968–2011, and biennially since 1997.

PSID gathers data on the family as a whole and on individuals residing within the family, encompassing the dynamic and interactive aspects of family economics, demography, and health. With low attrition and high success in following young adults as they form their own families, the sample has grown steadily. Over nearly 50 years, PSID has collected data on more than 75,000 individuals.

THE PSID SAMPLE

PSID follows more than 21,000 families and about 22,000 sample individuals as of 2013.

- **Long-term Representative** — PSID originally consisted of a nationally-representative sample and an oversample of low-income families to investigate poverty-related issues.
- **The PSID "Core"** — All 18,000 sample members in 1968 had the PSID "core," and have been followed in all subsequent waves across their entire lives, regardless of where they resided.
- **Self-representing Genealogical Sample** — All individuals born to or adopted by someone with the PSID "core" acquire the core themselves, and are followed by the study. When these PSID children grow up and form their own households, they join the sample as primary respondents and are interviewed in each wave.

• **Immigrant Subsamples** — In 1987 and 1995, 511 immigrant families were added to enhance representativeness. The groups grew to nearly 200 families by 2013. A new respondent sample of post-1997 immigrants is underway.

• **Recent Representation** — Using weights, PSID continues to closely represent the national population even after nearly 50 years of interviewing.

INCOME, POVERTY, & OPPORTUNITY

PSID has collected detailed information on family income for nearly 50 years.

- **Basic Income** — Pensions, interest, rent, trust funds, and royalties
- **Business and Farming Income** — Expenses, receipts, profits, losses, financial interest, and ownership
- **Family Income** — Total family income, Census Bureau standards, and poverty status
- **Labor Income** — Minutes, overtime, tips, commissions, hours, wages, and salaries
- **Transfer Income (Private)** — Alimony, child support, borrowed or loaned from family or friends, large sum payments, and non-government sources
- **Transfer Income (Public)** — Social Security, Supplemental Security Income, temporary assistance for needy families (TANF), unemployment compensation and other welfare payments

PSID has been an important data source for examining occupational, educational, and earnings mobility, and other socioeconomic outcomes.

• **Because PSID measures consumption as well as income**, researchers can compare trends in income and consumption in detail by race, ethnicity, and metropolitan area. Economic review, 2012 find that consumption inequality increased less rapidly than income inequality from 2000 to 2010.

WEALTH

PSID collected a detailed snapshot on assets in 1984, 1989, 1994, and in every wave 1999–2013. Information includes:

- Value of checking and savings accounts, money market funds, certificates of deposit, savings bonds, Treasury bills, and IRAs
- Home equity and net value of real estate other than main home
- Net value of shares of stock in publicly held corporations and mutual funds or investment trusts, including stocks in IRAs
- Net value of vehicles of all types
- Value of debts other than mortgages, credit cards, student loans, medical or legal bills, and personal loans
- Value of other investments in stocks or mutual funds, bonds, commodities, annuities, and special collection funds
- Net value of forms of business assets

SIGNIFICANCE & IMPACT

PSID data used in over 6,000 peer-reviewed scientific publications, including over 700 economic observations.

• The number of publications has increased over time from about 90 per year in the 1970s to about 110 per year since 2010.

• The highest-ranking social science journals regularly publish research using PSID, including *American Economic Review*, *Journal of Marriage & Family*, and *Demography*.

Recent important research:

- **Consumption and Inequality** — Richard Dardoff, Luis P. Ferrer & Ilya Szeftel-Duker. 2016. "Consumption Inequality and Family Labor Supply." *American Economic Review*.
- **Childhood and Education** — Anil Kulkarni, Rebecca Ryan & Lise Cho. 2014. "Time Investment in Children across Family Structures." *Annals of the American Academy of Political and Social Science*.
- **Effectiveness of Government Programs** — Henry Hoynes, Glenn Lohmeier, Katherine M. Donaldson, & Donaldson. 2016. "Using Data Impacts of Childhood Access to the Safety Net." *American Economic Review*.
- **Health** — Anna Casanova, Jennifer A. Dowd, Robert J. Schoeni & Robert L. Wallace. 2016. "Employment and Income Losses among Cancer Survivors: Estimates from a National Longitudinal Survey of Household Health." *Health Affairs*.

PSID is used by government and non-government organizations to inform policy and decision-making, and to assist in the following areas:

DATA ACCESS — WWW.PSID.ORG

- All 24 Waves of PSID 1968–2013 and survey supplements are freely accessible.
- The PSID Data Center provides:
 - Automatic merges of all waves of data
 - Customized codebooks and datasets in a variety of formats
 - Instructional webinars and tutorials, bibliographies, technical papers, and user documentation
- Annually, there are about 1.5 million hits to the PSID website and approximately 120,000 unique visitors.

UNIVERSITY OF MICHIGAN

PSID is sponsored by the National Science Foundation, the U.S. Social Science Research Council, the U.S. Department of Education, and the U.S. Department of Housing and Urban Development.

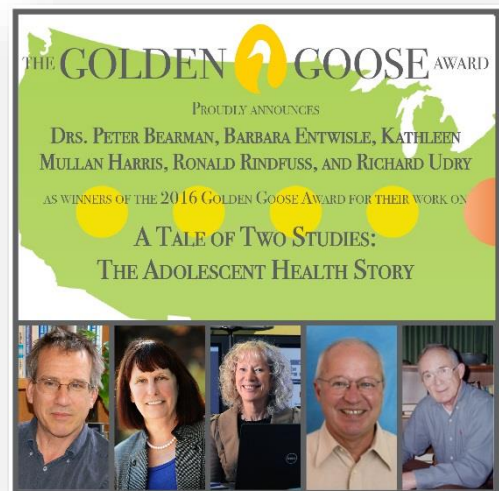
ISR INSTITUTE FOR SOCIAL RESEARCH

David Scholnick, PhD – Pacific University, Oregon. Dr. Scholnick is professor and chair of biology and teaches undergraduate courses in General Biology, Animal Physiology, and Marine Biology for both science and non-science majors. His research has focused on understanding the consequence of bacterial infections in marine organisms and the pathophysiology of malarial infections in lizards.

Poster Summary: Dr. Scholnick's research examines how recent changes in the oceans could potentially affect the ability of marine organisms to fight infections. Building a treadmill and teaching shrimp to run on it (without NSF funds) allowed him to study the shrimp's immune response during activity. This research was included in a 2011 wastebook article entitled, "How Long Can a Shrimp Run on a Treadmill?" The study was part of a larger project examining the physiological impacts of pollution and warming oceans on marine life. The project was significant because it showed that the health of important marine species is tightly linked to opportunistic bacteria that are responding to environmental changes in the oceans.

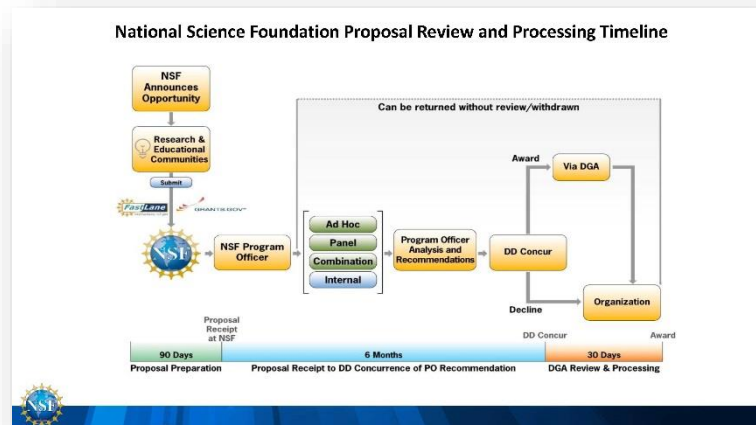
Joshua Shiode, PhD – American Association for the Advancement of Science (AAAS). Dr. Shiode is a Senior Government Relations Officer at AAAS. He is one of the leaders of the Golden Goose Award Steering Committee made up of individuals from the Founding Sponsors of the Award, Benefactors of the Award, and universities who helped launch the Award in 2012: AAAS, Association of American Universities, Association of Public and Land-grant Universities, Breakthrough Institute, Elsevier, Progressive Policy Institute, Richard Lounsbery Foundation, The Science Coalition, Task Force on American Innovation, United for Medical Research, University of Pennsylvania, and Vanderbilt University.

Poster Summary: The brainchild of U.S. Representative Jim Cooper (D-TN), the *Golden Goose Award* recognizes the enormous and often unanticipated impacts that obscure or odd-sounding federally funded research has had on society—from life-saving medical treatments to game-changing social and behavioral insights to major technological advances. Awardees are announced throughout the year and honored at an award ceremony each fall in Washington, DC. The *Golden Goose Award* is supported by generous donations from professional societies, colleges, universities, and corporations; it enjoys bipartisan support from Members of Congress in the House and Senate.



Alan Tomkins, PhD – National Science Foundation. Dr. Tomkins is the Acting Director of the NSF's Social and Economic Sciences Division in the Social, Behavioral and Economic Sciences Directorate (SBE). Before joining NSF, Dr. Tomkins was Founding Director of the University of Nebraska Public Policy Center and professor in the University of Nebraska—Lincoln Law/Psychology Program. Dr. Tomkins' research interests include trust and confidence in public institutions and public engagement to inform governmental policy and increase trust in government. He received his JD and PhD in Social Psychology from Washington University in St. Louis.

Poster Summary: NSF funds research and education in most fields of science and engineering via grants and cooperative agreements. Awards are made to approximately 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations, and other research organizations throughout the US. The agency funds approximately 11,000 of the 50,000 proposals it receives each year for research, education, and training projects. NSF also receives more than 15,000 applications for graduate and postdoctoral fellowships annually. NSF recently adopted guidelines to ensure that the importance of the research it funds is conveyed in summaries for the public.



Megan Tracy, PhD – James Madison University. Dr. Tracy is an associate professor of anthropology where she teaches undergraduate courses in Cultural Anthropology, Peoples and Cultures of East Asia, The Anthropology of Food, and Anthropology in Business. Her research has focused on the transmission of food safety standards and the governance of food and health risks amidst increasingly globalized food production and distribution.

Poster Summary: In 2008, approximately 300,000 children in the People’s Republic of China were suspected of having melamine-related illnesses; six children died. Tracy’s research examines the meaning of transparency and the transformation of China’s food safety system following the global dairy scandal sparked by the “distribution of milk adulterated with the industrial chemical melamine.” China’s food product and safety troubles directly affect American public health and food security when problematic Chinese products reach US supermarket shelves. Her research on the food safety regulation system in China was called into question

during a 2013 House Science Committee hearing along with an additional request for extensive information from NSF.

Reconfiguring Accountability and Transparency in China's Dairy Industry
MPCAN TRACY
Department of Sociology and Anthropology, James Madison University (tracydm@jmu.edu)

THE PROBLEM

Between July 2008 and August 2008, over 300,000 children in the People's Republic of China were suspected of having melamine-related illnesses; six children died. This scandal led to a loss of trust in the Chinese government's ability to regulate the food safety system. The 2008 melamine scandal led to a loss of trust in the Chinese government's ability to regulate the food safety system. The 2008 melamine scandal led to a loss of trust in the Chinese government's ability to regulate the food safety system.

TRANSPARENCY IN REGULATORY PRACTICE: A MULTIMODAL APPROACH

- Transparency is a widely produced concept that has a number of meanings in the regulatory field.
- The movement of information, technology and practices that are used to observe the process of production for milk.
- How to use technology to observe the process of production for milk.
- The application of technology to observe the process of production for milk.

OBJECTIVES

- Understand the meaning of transparency in the regulatory field.
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- Understand the meaning of transparency in the regulatory field.

WHAT WE DID & WHERE WE DID IT

Completed ethnographic and archival research primarily in Beijing & Chengde in the Dongting Autonomous Region in the north of Shaanxi, China. Then, Guangzhou & the US (2009-2013).

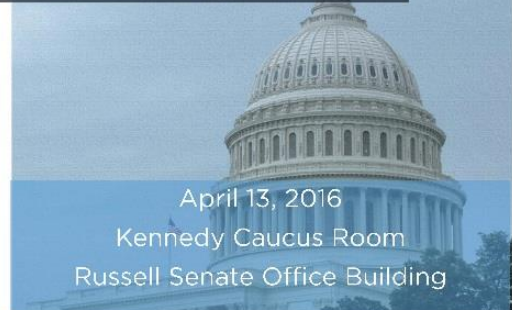
WHY THIS MATTERS

- China's food safety system and industry structure are still in flux and are subject to significant change and uncertainty.
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