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# PharmGenEd™: Bridging the Gap Between Science & Practice

APHA Meeting (Philadelphia, 11/10/09)

Grace M. Kuo, PharmD, MPH

Associate Professor of Clinical Pharmacy

Associate Professor of Family & Preventive Medicine



# Presenter Disclosures

**Grace M. Kuo, PharmD, MPH**

**The following personal financial relationships with commercial interests relevant to this presentation existed during the past 12 months:**

- **Category of Relationship:**
  - **Stock Ownership or Options**
    - **Grace M. Kuo, PharmD, MPH is President of Med Info Service, Inc.**

# Background

- Pharmacogenomics aims to increase the response rate of drug therapy and decrease the events of adverse drug reactions
- Need for pharmacogenomics education
  - Currently, pharmacogenomics education materials are not readily available to healthcare professionals
  - There is a gap between healthcare providers' knowledge and available evidence

# PharmGenEd™ Program

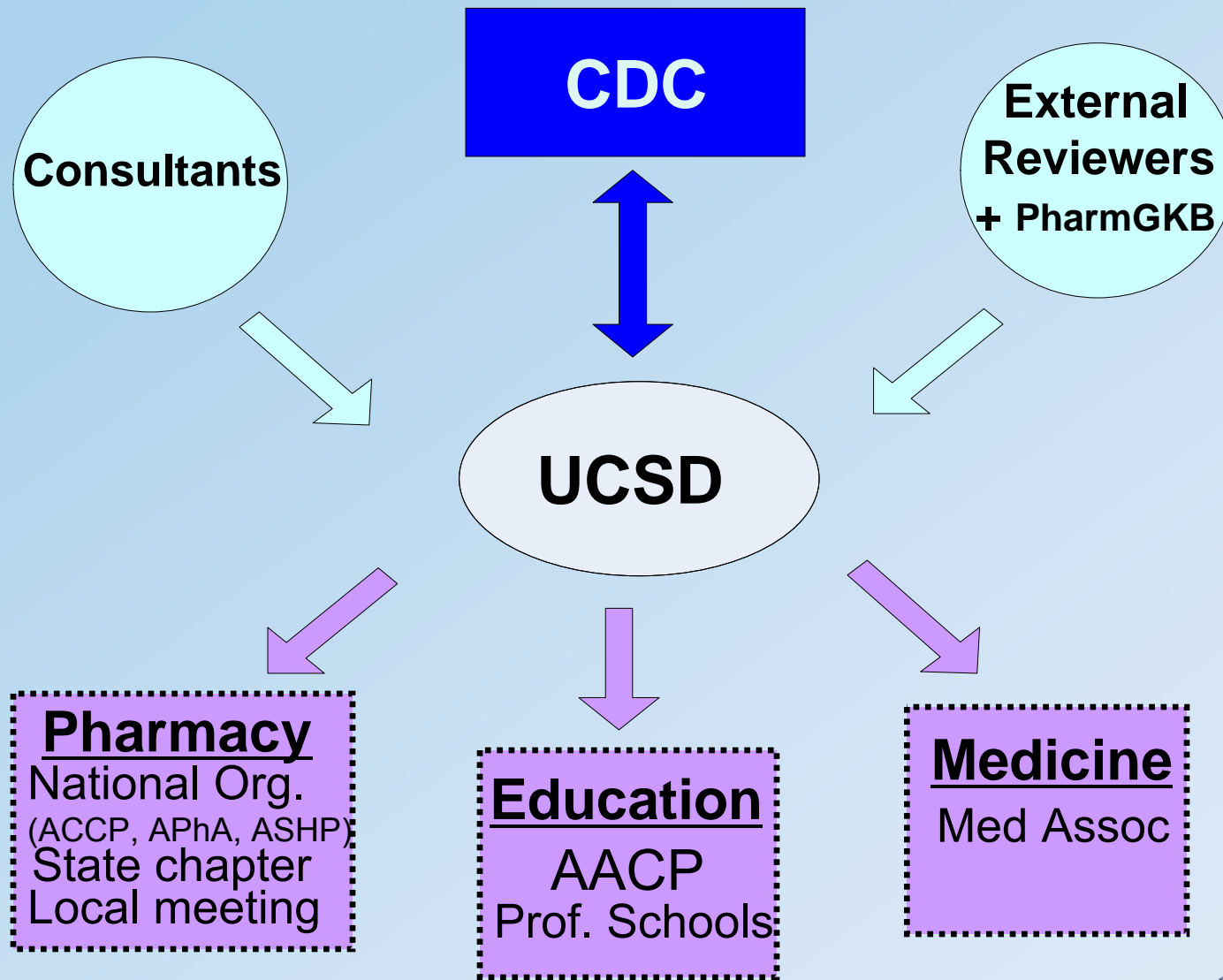
## Objective and Aims

- The objective is to increase awareness about current knowledge of pharmacogenomic tests and the potential implications of use of the tests
- Specific Aims:
  - Develop educational curriculum focusing on pharmacogenomics concepts and clinical applications in concentrated therapeutic areas
  - Disseminate the educational curriculum to pharmacists, students, and other healthcare professionals using live and online methods
  - Evaluate outcomes and processes of the education program

# PharmGenEd™ Program

- Target Audience >100,000 healthcare professionals
  - Pharmacists
  - Physicians
  - Students / trainees
- PharmGenEd™ provides:
  - Continuing education materials for healthcare professionals
  - A shared curriculum platform for students
    - Free access to materials for teaching, in-service, grand rounds, or professional meetings
- Funded by the CDC (*Grant Number IU38GD000070*)
- Timeline: 2008 - 2011

# PharmGenEd™



# PharmGenEd™

## Program Delivery Methods

- Live presentations
  - National meetings
  - Regional meetings
  - Local meetings
- Online resources
  - Web-based lecture materials
  - Shared curriculum platform
  - Use of SciVee for pubcasts & videocasts
    - *The “YouTube™ and Facebook™” for scientists*
  - Website
    - <http://pharmacogenomics.ucsd.edu>
  - To join the virtual community
    - <http://www.scivee.tv/node/7981>



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# Live Presentations





# PharmGenEd™ Year 1

## Live Presentations

- Live presentations (10 times) (n ≈ 979)
  - Program overview (4 times)
  - CE presentation on pharmacogenomics concepts and therapeutic applications (4 times)
    - CE surveys (n = 317)
  - CE presentation on shared curriculum (1 time)
  - Poster presentation (1 time)

# PharmGenEd™ Survey Evaluations (n=317)

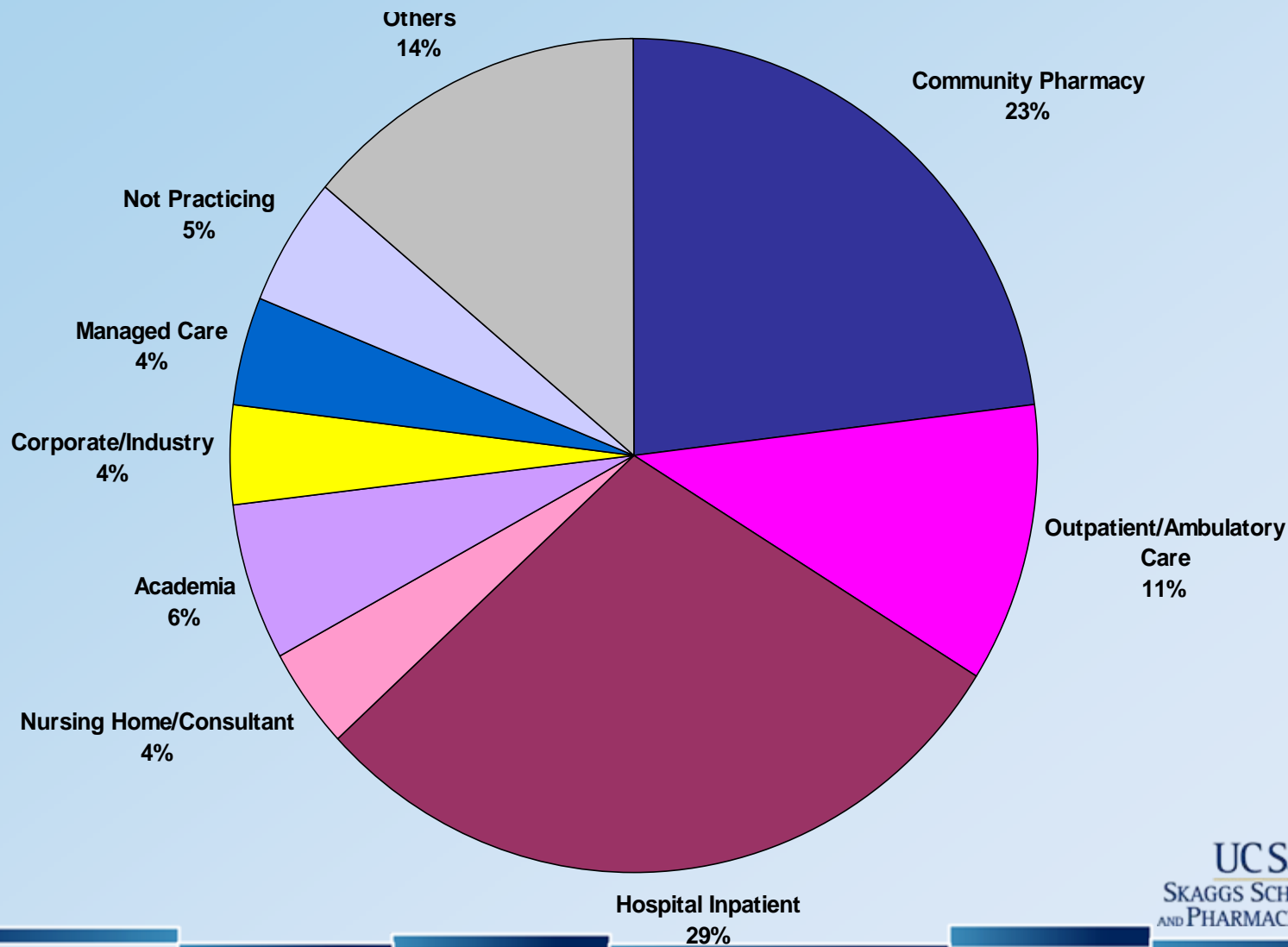
Age: 48 ± 12 (20 – 87) years old

- Years practiced as a licensed pharmacist: 22 ± 13 (0 – 54)
- Practice site
  - CA (15%); MI (42%); Others (32%); Not practicing (11%)
- Sex of survey participants
  - Male: 40%
  - Female: 60%
- Ethnicity of survey participants
  - Hispanic or Latino: 5%
  - Not Hispanic or Latino: 95%
- Race of survey participants
  - White, Caucasian: 83%
  - Black, African America: 4%
  - Asian: 11%
  - Native Hawaiian / Other Pacific Islander: 1%
  - American Indian / Alaska Native: 0%
  - Other: 1%

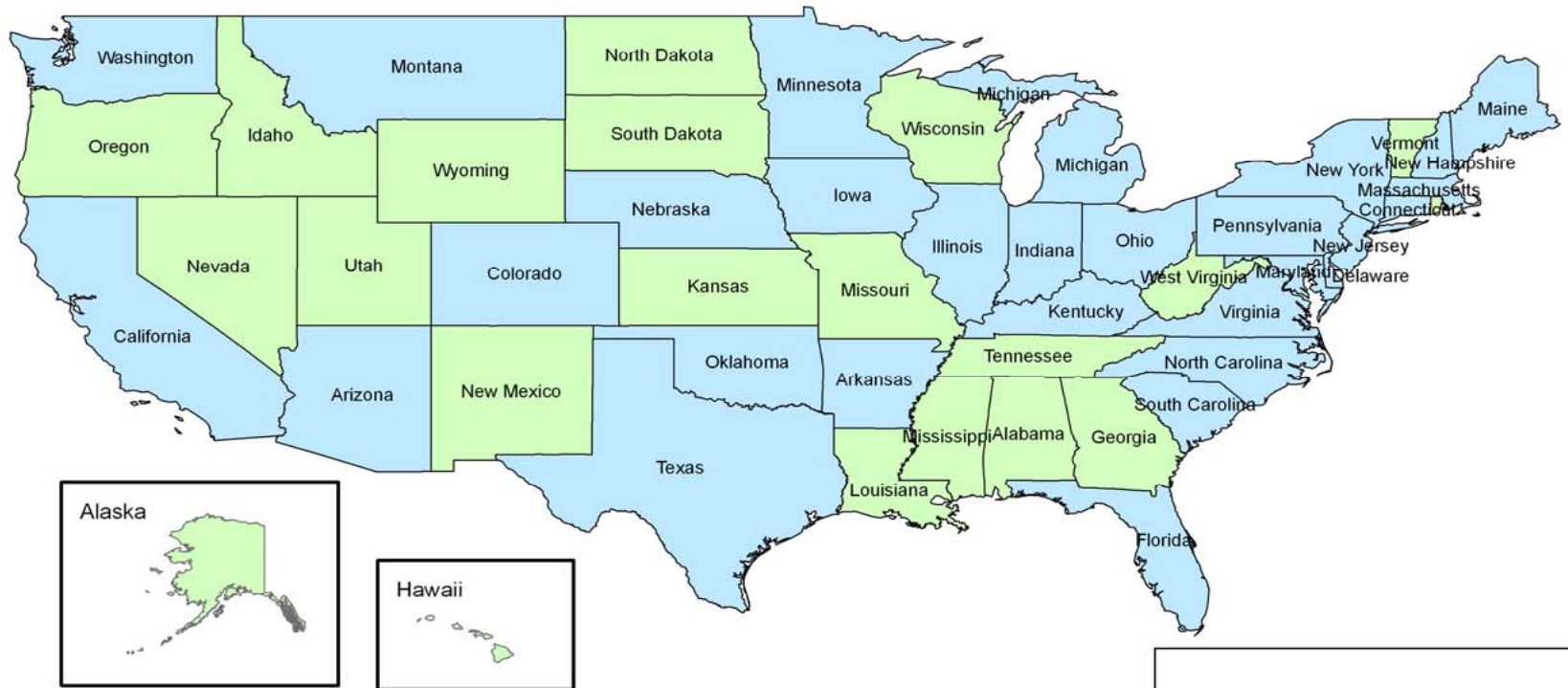
# PharmGenEd™ Survey

## Evaluations (n=317)

Question 15: Please describe your practice setting



# PharmGenEd™ Outreach Map (n=317)



Other Participating Countries: Canada, Germany, China, & Iraq

**Legend**

- Participating States
- United States

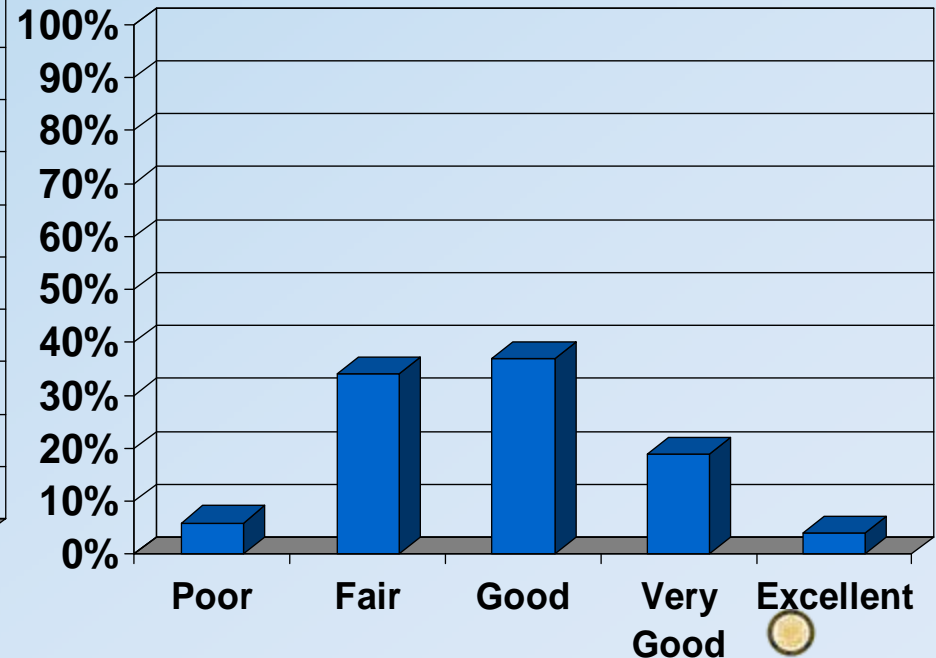
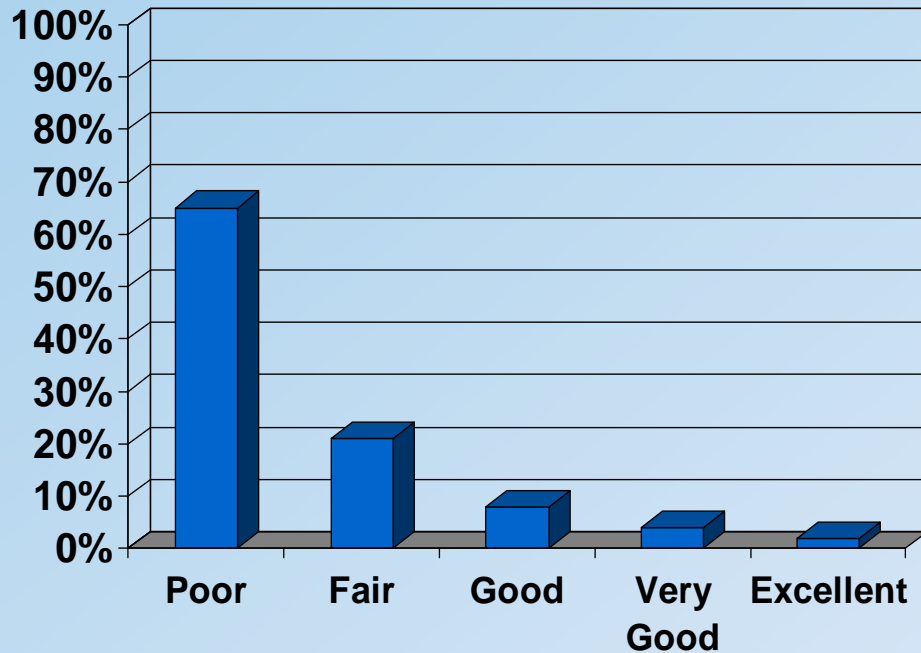
# PharmGenEd™ Survey Evaluations (n=317)

**Question:** Rate your overall ability to address pharmacogenomic testing with patients

**Pre-CE**

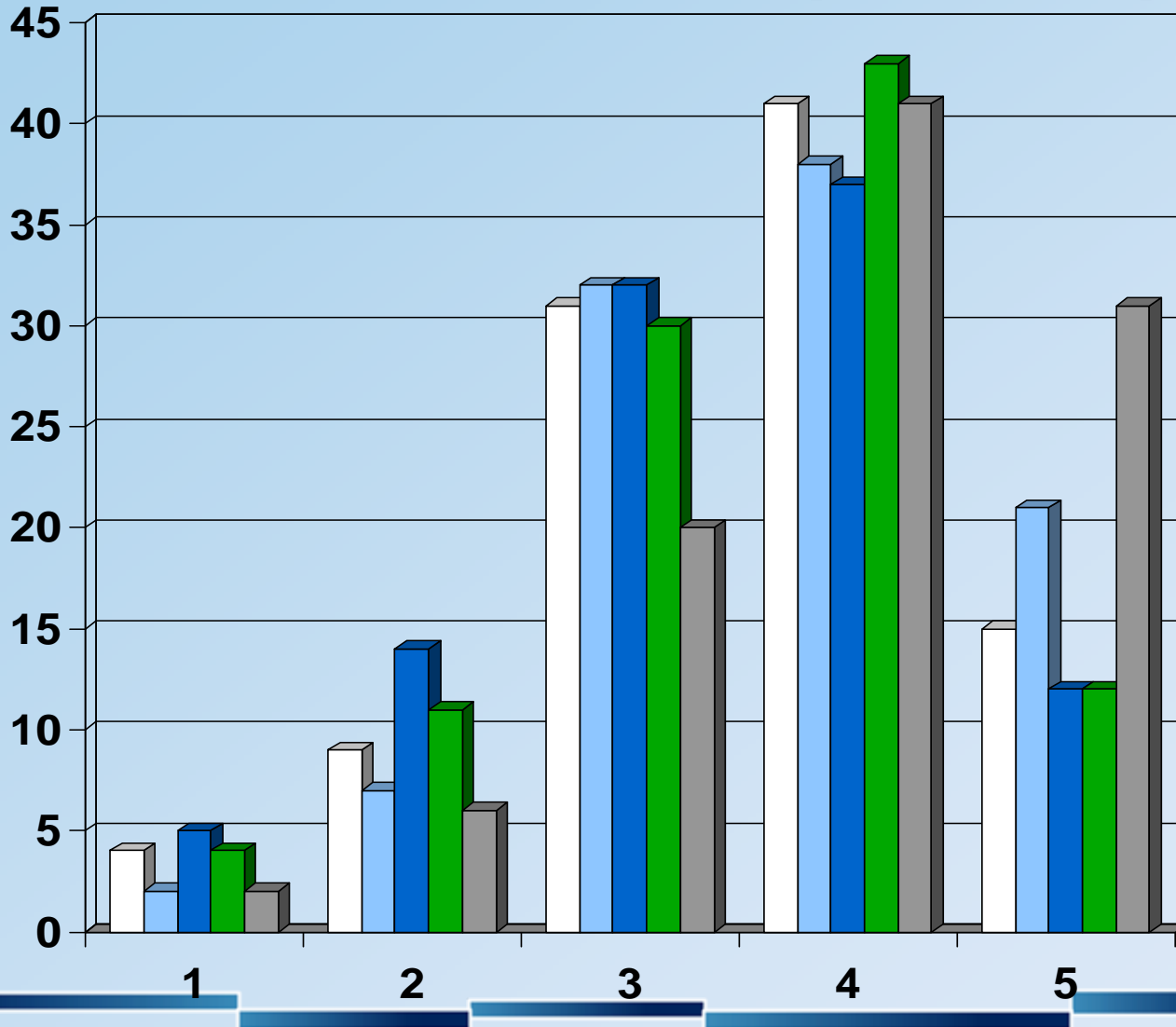
*p* < 0.0001\*

**Post-CE**



\*Wilcoxon matched-pairs signed rank test

# PharmGenEd™ Survey Evaluations (n=317)



**Question:** As a results of this session, how likely will you be able to:

- Rationale
- Literature
- Recommend
- Risk/Benefit
- PharmGenEd

# PharmGenEd™ Survey Evaluations (n=317)

- A knowledge question about increased adverse drug reaction related to genetic variation pre vs. post ( $p < 0.001$ ).
- 81% Pharmacist participants agree that the pharmacy profession should be more active in educating patients and other healthcare professionals about pharmacogenomic testing (4 & 5 based on a 5-point Likert scale).



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# Online Resources







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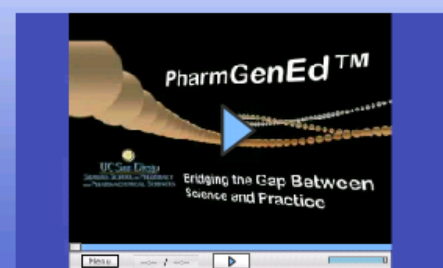
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Bridging the Gap Between  
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Today [←](#) [→](#) **Sunday, November**

- Sunday, November 8**
  - American Public Health Assoc
- Monday, November 9**
  - American Public Health Assoc
- Tuesday, November 10**
  - American Public Health Assoc

## What is PharmGenEd™?

"Pharmacogenomics Education Program: Bridging the Gap between Science and Practice" (*PharmGenEd™*) is an evidence-based pharmacogenomics education program designed for pharmacists and physicians, pharmacy and medical students, and other healthcare professionals. This program is supported by the Centers for Disease Control and Prevention (CDC, Grant Number *IU38GD000070*). The program team at UCSD Skaggs School of Pharmacy and Pharmaceutical Sciences is collaborating with national

## News Feed

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[Novel insights into the etiology of diabetes from genome-wide association studies.](#)

Related Articles

Novel insights into the etiology of diabetes from genome-wide association studies.

...

## Educational Resources

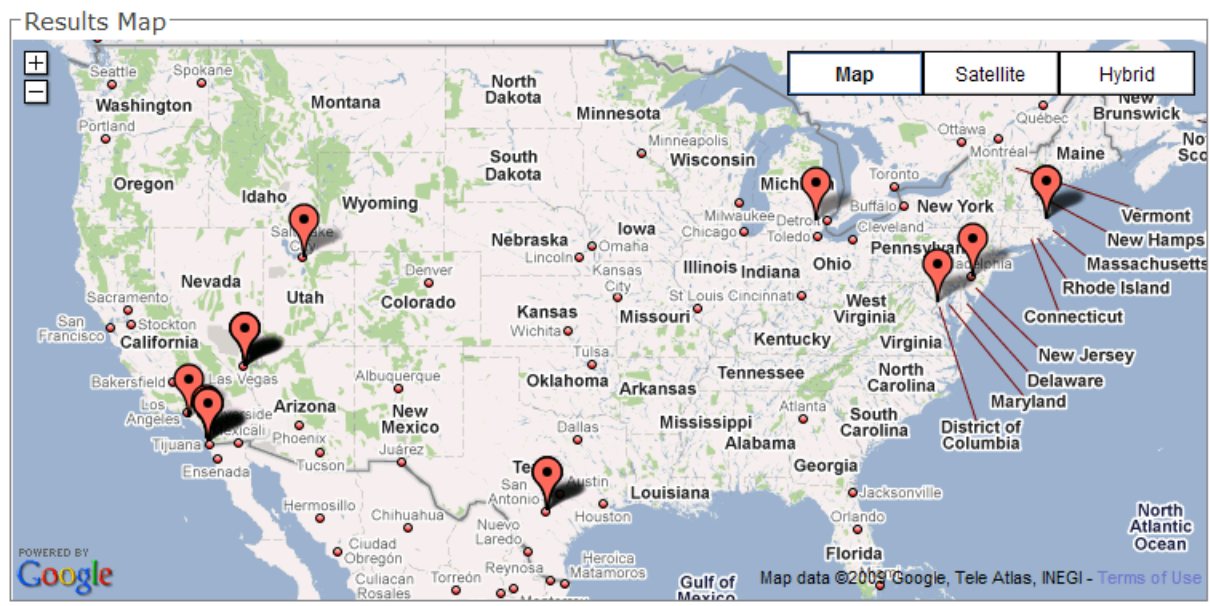
The objective of PharmGenEd™ is to increase awareness about current knowledge of the validity and utility of pharmacogenomic tests and the potential implications of their therapeutic use. The curriculum related to pharmacogenomics concepts and clinical applications will be disseminated via:

- Web-based or live CPE/CME presentations
- Evidence-based pubcasts and videocasts
- A shared curriculum platform to

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Use the filtered items section below to sort the results section.



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Presenter:  Location:  Organization:  Author:  Education Type:

Results

Presenter	Topic	Location	Organization	Author	Education Type
Grace M. Kuo, PharmD, MPH	Pharmacogenomics Education (PharmGenEd) Program: Bridging the Gap between Science and Practice	San Antonio, Texas	American Pharmacists Association (APhA)	Kuo GM, Lee KC, Ma JD	CPE/CME

2009



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# Pharmacogenomics

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### CPE/CME

- Module I:  
Pharmacogenomic Principles and Concepts
- Module II:  
Evidence-Based Pharmacogenomic Recommendations for Clinical Practice: an Overview
- National Speakers Bureau

### CPE/CME

The objective of *PharmGenEd*<sup>™</sup> is to increase awareness about current knowledge of the validity and utility of pharmacogenomic tests and the potential implications of benefits and harms from use of the tests. Our target population exceeds 100,000 healthcare professionals and students. Materials developed from *PharmGenEd*<sup>™</sup> will be accessible to healthcare professionals who have participated in the *PharmGenEd*<sup>™</sup> train-the-trainer program and are capable of presenting the *PharmGenEd*<sup>™</sup> CPE/CME materials to pharmacists and physicians.

We openly share our materials with others at no cost; however, all persons who receive any component of the [PharmGenEd<sup>™</sup> Program](#) must complete an online registration process which includes acceptance of our [End-User Licensing Agreement](#). *PharmGenEd*<sup>™</sup> materials can be used only for non-commercial teaching and research purposes and cannot be used for profit. To gain access to downloadable program materials from the *PharmGenEd*<sup>™</sup> Internet site, please [register here](#).

If you have completed the *PharmGenEd*<sup>™</sup> train-the-trainer program for CPE/CME and are interested in becoming a member of the National Speakers Bureau for *PharmGenEd*<sup>™</sup>, please contact us at [pharmacogenomics@ucsd.edu](mailto:pharmacogenomics@ucsd.edu).



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### Topics

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Tests](#)[Clinical Applications](#)[Ethical, Social, &  
Legal Issues](#)[Economic  
Perspectives](#)

### Shared Curriculum

Because the field of pharmacogenomics is developing rapidly, it is critical that clinicians and students learn to appropriately interpret emerging data on pharmacogenomic tests and become familiar with resources applicable to their practice.

*PharmGenEd* prepares shared curriculum, open-access educational materials to train future healthcare providers about the various pharmacogenomic tests and their applications to clinical practice. *PharmGenEd* collaborates with the American Association of Colleges of Pharmacy (AACP) and uses a "Train-the-Trainer" approach to disseminate educational materials to faculty from all colleges of pharmacy in the U.S. The content materials will also be available to schools of medicine faculty members.

The *PharmGenEd* materials can be used in the classroom, for students in the health professions, or as training for licensed clinicians. Modules related to specific therapeutic areas will be developed in the coming months. We openly share our materials with others at no cost; however, all persons who receive any component of the [PharmGenEd Program](#) must complete an online registration process which includes acceptance of our [End-User Licensing Agreement](#). *PharmGenEd* materials can be used only for non-commercial teaching and research purposes and cannot be used for profit.

To gain access to downloadable program materials from the *PharmGenEd* Internet site, please [register here](#).



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## Resources

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Adverse Drug  
Reactions](#)[Drug Response](#)[Drug Transporter](#)

## Resources

### Drug Toxicity and Adverse Drug Reactions

Hirata K, Takagi H, Yamamoto M, Matsumoto T, Nishiya T, Mori K, Shimizu S, Masumoto H, Okutani Y. Ticlopidine-induced hepatotoxicity is associated with specific human leukocyte antigen genomic subtypes in Japanese patients: a preliminary case-control study. *Pharmacogenomics J*. 2008 Feb;8(1):29-33. Epub 2007 Mar 6

PMID: 17339877

Ingelman-Sundberg M. Pharmacogenomic biomarkers for prediction of severe adverse drug reactions. *N Engl J Med*. 2008 Feb 7;358(6):637-9.

PMID: 18256400

Mallal S, Phillips E, Carosi G, Molina JM, Workman C, Tomazic J, Jagel-Guedes E, Rugina S, Kozyrev O, Cid JF, Hay P, Nolan D, Hughes S, Hughes A, Ryan S, Fitch N, Thorborn D, Benbow A; PREDICT-1 Study Team. HLA-B\*5701 screening for hypersensitivity to abacavir. *N Engl J Med*. 2008 Feb 7;358(6):568-79.

PMID: 18256392

SEARCH Collaborative Group, Link E, Parish S, Armitage J, Bowman L, Heath S, Matsuda F, Gut I, Lathrop M, Collins R. SLCO1B1 variants and statin-induced myopathy--a genomewide study. *N Engl J Med*. 2008 Aug 21;359(8):789-99. Epub 2008 Jul 2

PMID: 18650507

Simon T, Verstuyft C, Mary-Krause M, Quteineh L, Drouet E, Meneveau N, Steg



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### Pubcasts

- [Pharmacogenomic Principles and Concepts](#)
- [Evidence-Based Pharmacogenomic Recommendations for Clinical Practice: an Overview](#)
- [Oncology I](#)
- [Oncology II](#)
- [Psychiatry](#)
- [Cardiology](#)
- [Anticoagulation](#)
- [Neurology](#)
- [Infectious Diseases](#)
- [Other](#)

### Pubcasts

*PharmGenEd™* works with SciVee to present evidence-based pharmacogenomic information to healthcare professionals and the general public. SciVee™ ([www.scivee.tv](http://www.scivee.tv)) is a YouTube™ for scientists but much more. The SciVee™ features allow the author(s) to describe scientific findings using narrative or animated video features. The video content is then integrated with the open access published article. Through SciVee™, the audience can simultaneously read and listen to pharmacogenomic information.

#### Pubcast Releases:

1. Introduction of the Pharmacogenomics Education Program, PharmGenEd. (by PharmGenEd Team at UCSD). <http://www.scivee.tv/node/13485>
2. The Importance of Teaching Pharmacogenomics in Pharmacy and Medical Schools (by Dr. Palmer Taylor). <http://www.scivee.tv/node/13480>
3. Ingelman-Sundberg M. Pharmacogenomic biomarkers for prediction of severe adverse drug reactions; *N Engl J Med.* 2008 Feb 7;358(6):637-9. PMID: 18256400. <http://www.scivee.tv/node/10761>





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## Pharmacogenomics Education Program

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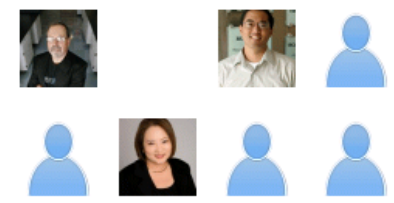


Manager: [gmkuo](#) | [send a message](#)

Description: Program Description: The field of genomics and its scientific discoveries are developing at a dazzling pace. Pharmacogenomics has a promising potential to increase the response rate of drug therapy and decrease the events of adverse drug reactions. It may help us focus on safe and effective drug management to provide personalized medicine by delivering therapy with the right drug at the right dose to the right patient. Currently, however, pharmacogenomics education materials are not readily available to healthcare professionals. Furthermore, there appears to be a gap between healthcare providers' knowledge and the expectations of patients regarding pharmacogenomics testing. The "Pharmacogenomics Education Program: Bridging the Gap between Science and Practice" (PharmGenEd) is an evidence-based pharmacogenomics education program designed for pharmacists and physicians, pharmacy and medical students, and other healthcare professionals. The program team at UCSD Skaggs School of Pharmacy and Pharmaceutical Sciences is collaborating with national pharmacy and medical associations (e.g., the American Association of Colleges of Pharmacy, the American College of Clinical Pharmacy, the American Medical Association, the American Society of Health-System Pharmacists, the American Pharmacists Association) to promote the PharmGenEd educational campaign to more than 100,000 pharmacists, physicians, and Healthcare Professionals.

The objective of the proposed PharmGenEd program is to increase awareness about current knowledge of the validity and utility of pharmacogenomic tests and the potential implications of benefits and harms from use of the tests. The program team will work closely with the Centers for Disease Control and Prevention (CDC) and incorporate Evaluation of Genomic Applications in Practice and Prevention (EGAPP) Working Group recommendations. Specifically, proposal aims are to: 1) Develop a two-module educational curriculum focusing on pharmacogenomics primer concepts and clinical applications in concentrated therapeutic areas; 2) Disseminate the educational curriculum to pharmacists and physicians, pharmacy

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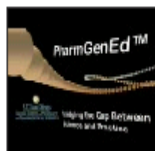


#### [Pharmacogenomic Biomarkers for Prediction of Severe...](#) by [trhuynh](#)

Dr. Magnus Ingelman-Sundberg presents his recent paper on "Pharmacogenomic biomarkers for prediction of "severe adverse drug reactions" published in the New England Journal of Medicine on Feb 2008.

### Community Videos

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#### [Pharmacogenomics Education Program Introduction](#) by [KuoOffice](#)

PharmGenEd™: Bridging the Gap Between Science and Practice. This video provides a brief introduction about the CDC-funded pharmacogenomics education program, PharmGenEd(TM). The PharmGenEd faculty team at UCSD explains the different components about the program and the importance of learning...



#### [The Importance of Teaching Pharmacogenomics in Pharmacy...](#) by [KuoOffice](#)

Pharmacogenomics relates to how genes control expression and structure of drug targets. Understanding pharmacogenomics and drug action are essential prerequisites for fully mastering the concepts of this emerging discipline. Case examples of pharmacogenomic concepts is provided by Dr. Taylor.





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### Pharmacogenomic Biomarkers for Prediction of Severe Adverse Drug Reactions

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**Submitted by:** [trhuynh](#)  
**DOI:** 10.4016/10761.01  
**Description:** Dr. Magnus Ingelman-Sundberg presents his recent paper on "Pharmacogenomic biomarkers for prediction of severe adverse drug reactions" published in the New England Journal of Medicine on Feb 2008.  
**Abstract:** The accumulating knowledge of human genomic variation is being used for the development of personalized medicine, with the aims of decreasing the number of adverse drug reactions and increasing the efficacy of drug treatment. Considerable pharmacogenomic research has focused on understanding the molecular mechanisms behind adverse drug reactions and finding biomarkers that identify people at risk. Serious adverse drug reactions have been shown to cause or contribute to 6 to 7% of all hospitalizations, a 2-day increase in the average length of hospitalization, and 100,000 deaths annually in the United States — and may, according to some estimates, cost about...  
**Conference:** University of California, San Diego  
**Rating:** ★★★★★  
You must be logged in to rate a video.  
**Uploaded:** Friday, April 10, 2009  
**Views:** 1068  
**Comments:** 2  
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# PharmGenEd™ Year 1 Outreach – Activities Other Than Live Presentations

- Website
  - 750 visitors; 15,078 page views
- Press release
  - UCSD news release (10/23/08)
  - Media Newswire Press Release Distribution (10/24/08)
  - PNN Pharmacotherapy Line News Watch (10/24/08)
  - Medical News Today (10/24/08)
  - SciVee (10/24/08)
  - The American Society of Health-System Pharmacists NewsLink email (11/4/08)
  - ReachMD (1/2/09): > 250,000 unique listeners a week
    - 60,000 physicians, 169,000 nurses, and >20,000 other advanced degree healthcare professionals
- Manuscripts
  - *Am J Pharmaceutical Education* (Murphy et al; in press)
  - *Pharmacy Today* 2.0 CPE; in press (140,000 circulations)
  - *JAPhA*; in press (40,000 circulations)

# PharmGenEd™ Team (Year 1)

- **UCSD Faculty**

- Grace M. Kuo, PharmD, MPH (PI)
- Kelly C. Lee, PharmD, BCPP
- Joseph D. Ma, PharmD
- James R. Halpert, PhD
- Theodore Ganiats, MD
- Philip E. Bourne, PhD
- Palmer Taylor, PhD

- **26 Peer Reviewers**

- 11 PharmD's
- 9 MD's
- 6 PhD's

- **Consultants**

- Magnus Ingelman-Sundberg, PhD (Karolinska Institute, Sweden)
- Karen S. Hudmon, DrPH, MS, RPh (Purdue University)

- **Assistants**

- Roberto Altieri
- Jessica Bryan, MPH
- Trina Huynh
- WeiWei Qin, MS
- Ashley To, BA
- Lilian Wong, PharmD, MBA

The program is 100% funded by the CDC \$1,047,991  
(Grant Number IU38GD000070)



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# PharmGenEd™ Contact

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- Website: <http://pharmacogenomics.ucsd.edu>

