

## Activity Announcement

### Pharmacogenomics Certificate

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**ACPE Activity Number(s):**

- 0204-0000-21-747-H04-P
- 0204-0000-21-748-H04-P
- 0204-0000-21-749-H04-P
- 0204-0000-21-750-H01-P
- 0204-0000-21-751-H01-P
- 0204-0000-21-752-H04-P
- 0204-0000-21-753-H04-P
- 0204-0000-21-754-H04-P

**Release Date:** June 9, 2021

**Expiration Date:** June 9, 2024

**CE Credit Hour(s)** 20 hours/8 activities (see below for details)

**Activity Fee:** \$445.00/\$545.00 member/non-member

### Accreditation for Pharmacists

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The American Society of Health-System Pharmacists is accredited by the Accreditation Council for Pharmacy Education as a provider of continuing pharmacy education.

### Target Audience

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This continuing pharmacy education activity is intended for pharmacists seeking to expand their knowledge and skills in using and implementing pharmacogenomics in their practice to ultimately improve medication use.

### Activity Overview

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This self-guided, online certificate will provide 20 hours of ACPE continuing education for pharmacists, incorporating recorded presentations, skill-focused activities, and supportive readings.

These 8 modules are designed for participants to increase the knowledge and skills necessary to use pharmacogenomics to improve medication use in a variety of patient care settings. The curriculum addresses the rationale and process for applying pharmacogenomics in practice and covers the key considerations and challenges when implementing pharmacogenomics in a health system. Upon completion of all the modules, participants should be proficient in interpreting pharmacogenomics results, recommending appropriate patient-specific pharmacotherapy, and proactively identifying the challenges associated with pharmacogenomics implementation.

## Learning Objectives and Schedule of Activities

Activity CE Information	Title, Description, and Learning Objectives
<p>ACPE #: <b>0204-0000-21-747-H04-P</b></p> <p>Credit Hours: <b>2.0</b></p> <p>Activity Type: <b>Knowledge-based</b></p>	<p><b>Title: Getting Started in Pharmacogenomics</b></p> <p>This activity describes the rationale and key concepts associated with using pharmacogenomics to improve medication use and introduces important terminology.</p> <p><b>Faculty:</b></p> <ul style="list-style-type: none"> <li>• <b>Cyrine-Eliana Haidar, Pharm.D., BCOP, BCPS, DPLA</b></li> <li>• <b>James M. Hoffman, Pharm.D., M.S., FASHP</b></li> </ul> <p><b>Learning Objectives:</b></p> <ol style="list-style-type: none"> <li>1. Discuss the rationale for using pharmacogenomics to optimize medication use.</li> <li>2. Identify key concepts, trends, and resources that enable pharmacogenomics to be used to optimize drug therapy.</li> <li>3. Discuss how this certificate program will increase your knowledge and skills in implementing pharmacogenomics in your practice.</li> <li>4. Describe how this certificate program will improve your knowledge and skills in providing patient care using a patient's pharmacogenomics profile.</li> <li>5. Define basic genomic terminology.</li> <li>6. Explain general genomic concepts.</li> <li>7. Define important pharmacogenomic terminology.</li> <li>8. Describe pharmacogenomic testing methods.</li> </ol>
<p>ACPE #: <b>0204-0000-21-748-H04-P</b></p> <p>Credit Hours: <b>2.0</b></p> <p>Activity Type: <b>Knowledge-based</b></p>	<p><b>Title: Resources, Evidence, and Important Pharmacogenes</b></p> <p>This activity discusses methods to evaluate pharmacogenomic evidence and identifies important pharmacogenes.</p> <p><b>Faculty:</b></p> <ul style="list-style-type: none"> <li>• <b>Gillian Bell, Pharm.D.</b></li> <li>• <b>Cyrine-Eliana Haidar, Pharm.D., BCOP, BCPS, DPLA</b></li> <li>• <b>Laura B. Ramsey, Ph.D.</b></li> </ul> <p><b>Learning Objectives:</b></p> <ol style="list-style-type: none"> <li>1. Illustrate the process to assess clinical actionability of specific gene-drug pairs using medical evidence.</li> <li>2. Identify appropriate frameworks to evaluate pharmacogenomic information.</li> <li>3. Describe the most common pharmacogenes involved in drug metabolism.</li> </ol>

	<ol style="list-style-type: none"> <li>4. Explain the relationship between genetic polymorphisms and enzyme activity.</li> <li>5. Discuss gene-specific differences when interpreting pharmacogenomic results related to drug metabolism.</li> <li>6. Recognize the effect of <i>SLCO1B1</i> genotype on transporter function.</li> <li>7. Recognize phenotype carrier status as it relates to <i>HLA</i>, <i>RYR1</i>, <i>CACNA1S</i> and medications.</li> </ol>
<p>ACPE #: <b>0204-0000-21-749-H04-P</b></p> <p>Credit Hours: <b>2.75</b></p> <p>Activity Type: <b>Knowledge-based</b></p>	<p><b>Title: Guidelines and Informatics</b></p> <p>This activity covers guidelines and other resources available to assist practitioners in applying pharmacogenomics in practice and introduces how informatics supports pharmacogenomics implementation.</p> <p><b>Faculty:</b></p> <ul style="list-style-type: none"> <li>• <b>Henry “Mark” Dunnenberger, Pharm.D., BCPS</b></li> <li>• <b>Cyrine-Eliana Haidar, Pharm.D., BCOP, BCPS, DPLA</b></li> <li>• <b>Dyson T. Wake, Pharm.D., BCPS</b></li> </ul> <p><b>Learning Objectives:</b></p> <ol style="list-style-type: none"> <li>1. Discuss sections of the CPIC® guidelines and their relevance to practice.</li> <li>2. Describe major pharmacogenomics guideline writing groups.</li> <li>3. Identify various pharmacogenomics resources.</li> <li>4. Describe the role of the various pharmacogenomics resources.</li> <li>5. Apply appropriate pharmacogenomics resources to clinical cases.</li> <li>6. Explain the importance of informatics to support the implementation of pharmacogenomics in clinical practice through clinical decision support.</li> <li>7. Describe common informatics terms, concepts and resources for their use in pharmacogenomics.</li> </ol>
<p>ACPE #: <b>0204-0000-21-750-H01-P</b></p> <p>Credit Hours: <b>3.75</b></p> <p>Activity Type: <b>Application-based</b></p>	<p><b>Title: Clinical Application of Pharmacogenomics Part I</b></p> <p>This activity discusses the clinical application of pharmacogenomics in cardiology, oncology, and pain.</p> <p><b>Faculty:</b></p> <ul style="list-style-type: none"> <li>• <b>Cyrine-Eliana Haidar, Pharm.D., BCOP, BCPS, DPLA</b></li> <li>• <b>James C. Lee, Pharm.D., BCACP</b></li> <li>• <b>Laura B. Ramsey, Ph.D.</b></li> <li>• <b>D. Max Smith, Pharm.D., BCPS</b></li> </ul>

	<p><b>Learning Objectives:</b></p> <ol style="list-style-type: none"> <li>1. Describe the utility and considerations for pharmacogenomic testing in the selection and management of antithrombotic medications.</li> <li>2. Interpret evidence-based guidelines for <i>CYP2C19</i> and <i>CYP2C9</i>, <i>VKORC1</i>, and <i>CYP4F2</i> to guide antiplatelet agent selection and warfarin dosing.</li> <li>3. Apply <i>CYP2C19</i> genotyping to individualize antiplatelet agent selection in patients with acute coronary syndromes undergoing percutaneous coronary intervention.</li> <li>4. Employ available dosing tools to start anticoagulation therapy with warfarin in patients with <i>CYP2C9</i>, <i>VKORC1</i>, and <i>CYP4F2</i> genotyping.</li> <li>5. Interpret evidence-based guidelines for <i>SLCO1B1</i> to guide simvastatin dosing.</li> <li>6. Describe the role of germline polymorphisms and somatic mutations in oncology.</li> <li>7. Interpret genotype test results to individualize chemotherapy regimen and dosing selection.</li> <li>8. Apply genotype results to individualize supportive care management in oncology patients.</li> <li>9. Describe the utility and considerations for pharmacogenomic testing in the selection and management of pain medication.</li> <li>10. Interpret <i>CYP2D6</i> and <i>CYP2C9</i> genotype results to individualize pain medication selection.</li> <li>11. Recognize emerging genetic variations that may be informative for pain medication selection.</li> </ol>
<p>ACPE #: <b>0204-0000-21-751-H01-P</b></p> <p>Credit Hours: <b>2.5</b></p> <p>Activity Type: <b>Application-based</b></p>	<p><b>Title: Clinical Application of Pharmacogenomics Part II</b></p> <p>This activity covers the clinical application of pharmacogenomics in psychiatry, neurology, infectious disease, transplant, cystic fibrosis, and in allopurinol therapy.</p> <p><b>Faculty:</b></p> <ul style="list-style-type: none"> <li>• <b>Cyrine-Eliana Haidar, Pharm.D., BCOP, BCPS, DPLA</b></li> <li>• <b>Laura B. Ramsey, Ph.D.</b></li> <li>• <b>Dyson T. Wake, Pharm.D., BCPS</b></li> <li>• <b>D. Max Smith, Pharm.D., BCPS</b></li> </ul> <p><b>Learning Objectives:</b></p> <ol style="list-style-type: none"> <li>1. Describe the utility and considerations for pharmacogenomic testing in the selection and management of neuropsychiatric medications.</li> </ol>

2. Interpret evidence-based guidelines for *CYP2D6* and *CYP2C19* to guide antidepressant therapy, including selective serotonin reuptake inhibitors and tricyclic antidepressants.
3. Apply *CYP2D6* and *CYP2C19* genotyping to individualize antidepressant dosing and selection.
4. Describe patient populations where testing for *HLA-B\*15:02*, *HLA-A\*31:01*, or *CYP2C9* may be best used to guide therapeutic decision making.
5. Recognize how the results for *HLA-B\*15:02* and *HLA-A\*31:01* may differ in presentation from those of *CYP2C9*.
6. Propose evidence-based recommendations for patients with *HLA-B\*15:02*, *HLA-A\*31:01*, or *CYP2C9* genetic results considering antiepileptic therapy.
7. Describe the utility of and considerations for pharmacogenomic testing in the selection and dosing of select antimicrobial agents.
8. Interpret evidence-based guidelines to guide voriconazole therapy.
9. Apply evidence-based guidelines to guide HIV drug selection.
10. Interpret evidence-based guidelines for *CYP3A5* to guide tacrolimus dosing.
11. Recommend dosing adjustments for azathioprine in solid organ transplant recipients based on *TPMT* and *NUDT15* polymorphisms.
12. Describe the utility and considerations for pharmacogenomics testing in the treatment selection for cystic fibrosis patients.
13. Discuss evidence-based recommendations for patients with *HLA-B\*58:01* genetic results considering allopurinol therapy.

<p>ACPE #: <b>0204-0000-21-752-H04-P</b></p> <p>Credit Hours: <b>3.0</b></p> <p>Activity Type: <b>Knowledge-based</b></p>	<p><b>Title: Building a Pharmacogenomics Program</b></p> <p>This activity discusses the most important strategic considerations at every level when implementing pharmacogenomics in a health system.</p> <p><b>Faculty:</b></p> <ul style="list-style-type: none"> <li>• <b>Henry “Mark” Dunnenberger, Pharm.D., BCPS</b></li> <li>• <b>James M. Hoffman, Pharm.D., M.S., FASHP</b></li> </ul> <p><b>Learning Objectives:</b></p> <ol style="list-style-type: none"> <li>1. Explain strategic decision points to evaluate when implementing pharmacogenomics in a health system.</li> <li>2. Identify the key components and steps required for the successful implementation of pharmacogenomics in clinical practice.</li> <li>3. Describe clinical pharmacogenomics service models.</li> <li>4. Discuss reimbursement strategies for various care models.</li> <li>5. List criteria for evaluating commercial pharmacogenomic testing laboratories.</li> <li>6. Compare and contrast approaches to clinical laboratory testing in pharmacogenomics.</li> <li>7. Identify essential information needed when interpreting commercial laboratory reports in pharmacogenomics.</li> <li>8. Describe the key steps to incorporate pharmacogenomic information into the electronic health record with clinical decision support.</li> <li>9. Discuss various approaches to use electronic tools to deliver pharmacogenomics data that enables consistent and appropriate use of results.</li> <li>10. Discuss the economic value of pharmacogenomics and current perspectives of payers on preemptive pharmacogenomics.</li> </ol>
<p>ACPE #: <b>0204-0000-21-753-H04-P</b></p> <p>Credit Hours: <b>1.75</b></p> <p>Activity Type: <b>Knowledge-based</b></p>	<p><b>Title: Taking a Real Look at Building a Program</b></p> <p>This activity describes experiences and important lessons learned during pharmacogenomics implementations at various practice settings.</p> <p><b>Faculty:</b></p> <ul style="list-style-type: none"> <li>• <b>Henry “Mark” Dunnenberger, Pharm.D., BCPS,</b></li> <li>• <b>Cyrine-Eliana Haidar, Pharm.D., BCOP, BCPS, DPLA</b></li> <li>• <b>Laura B. Ramsey, Ph.D.</b></li> <li>• <b>D. Max Smith, Pharm.D., BCPS</b></li> </ul>

	<p><b>Learning Objectives:</b></p> <ol style="list-style-type: none"> <li>1. Describe the implementation of pharmacogenomics at Cincinnati Children’s Hospital Medical Center.</li> <li>2. Describe the implementation of pharmacogenomics at St. Jude Children's Research Hospital.</li> <li>3. Identify strategies for implementing pharmacogenomics in an academic medical center.</li> <li>4. Describe the state of pharmacogenomic implementation at NorthShore University HealthSystem.</li> <li>5. Identify strategies for implementing pharmacogenomics in a community health system.</li> </ol>
<p>ACPE #: <b>0204-0000-21-754-H04-P</b></p> <p>Credit Hours: <b>2.25</b></p> <p>Activity Type: <b>Application-based</b></p>	<p><b>Title: Pulling It Together: Education, Ethics, and Next Steps</b></p> <p>This activity covers the importance of provider and patient education as well as the ethical considerations associated with implementing pharmacogenomics to optimize medication use.</p> <p><b>Faculty:</b></p> <ul style="list-style-type: none"> <li>• <b>Cyrine-Eliana Haidar, Pharm.D., BCOP, BCPS, DPLA</b></li> <li>• <b>James M. Hoffman, Pharm.D. M.S. FASHP</b></li> <li>• <b>Dyson T. Wake, Pharm.D., BCPS</b></li> </ul> <p><b>Learning Objectives:</b></p> <ol style="list-style-type: none"> <li>1. Assess the level of genetic literacy of the intended audience training.</li> <li>2. Choose the appropriate level of depth for the education.</li> <li>3. Identify potential opportunities for further pharmacogenomics training.</li> <li>4. Describe the importance and potential content of pre- and post-test counseling for pharmacogenomics.</li> <li>5. Assess potential questions and areas of confusion for patients that require educational reinforcement.</li> <li>6. Identify key ethical and legal implications associated with pharmacogenomic testing.</li> <li>7. Summarize future directions for the pharmacist’s role in pharmacogenomics.</li> </ol>

## Faculty Information

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## Disclosures

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In accordance with ACCME and ACPE Standards for Commercial Support, ASHP requires that all individuals in a position to control the content of this activity disclose financial relationships with ACCME-defined commercial entities. An individual has a relevant financial relationship if he or she (or spouse/domestic partner) has a financial relationship, in any amount, occurring in the past 12 months with a commercial entity whose products or services will be discussed in the activity.

ASHP staff, faculty, reviewers, and subject matter experts report no financial relationships relevant to this activity.



## Methods and CE Requirements

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This online activity consists of a combined total of 8 learning modules. Pharmacists are eligible to receive a total of 20 hours of continuing education credit by completing all 8 modules within this certificate.

Participants must participate in the entire activity, complete the evaluation and all required components to claim continuing pharmacy education credit online at ASHP eLearning Portal (<http://elearning.ashp.org>). Follow the prompts to claim credit and view your statement of credit within 60 days after completing the activity.

### **Important Note – ACPE 60 Day Deadline:**

Per ACPE requirements, CPE credit must be claimed within 60 days of being earned – no exceptions! To verify that you have completed the required steps and to ensure your credits have been reported to CPE Monitor, we encourage you to check your NABP eProfile account to validate your credits were transferred successfully before the ACPE 60-day deadline. After the 60 day deadline, ASHP will no longer be able to award credit for this activity.

## System Technical Requirements

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Courses and learning activities are delivered via your Web browser and Acrobat PDF. Users should have a basic comfort level using a computer and navigating websites.

View the minimum [technical and system requirements](#) for learning activities.