

Optimizing Oncology Care With Germline Pharmacogenomics:

Case-Based Education for Oncology Practitioners

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Several regulatory agencies acknowledge the impact of germline pharmacogenomics on chemotherapy.



Initiate a reduced dose of irinotecan for patients homozygous for *UGT1A1* *28.

Patients with DPD deficiency are at increased risk of severe and even fatal toxicity from fluorouracil or capecitabine.

Initiate a significantly reduced dose of 6-mercaptopurine for *TPMT* or *NUDT15* poor metabolizers.



Guidelines for Localised Colon Cancer

Patients should be tested for DPD deficiency prior to starting fluorouracil or capecitabine.

Practice guidelines for germline PGx for chemotherapy and supportive care

Chemotherapy

- *TPMT* and *NUDT15*: 6-mercaptopurine and thioguanine
- *DPYD*: 5-fluorouracil and capecitabine
- *CYP2D6*: Tamoxifen
- *UGT1A1*: Irinotecan

Supportive Care

- *CYP2D6*: 5HT3 Inhibitors
- *CYP2C19*: Anti-infectives
- *CYP2C19* and *CYP2D6*: Anti-depressants
- *G6PD*: Rasburicase
- *CYP2D6*: Pain Medications
- *RYR1* and *CACNA1S*: Anesthesia
- *CYP2C19*: Proton Pump Inhibitors

Providers often do not know how to alter prescribing based on PGx results.

75% of physicians in a community health-system did not feel confident in modifying medications based on pharmacogenomic results (n=312).

Only 7% of pediatric oncology providers felt their training prepared them to use pharmacogenomics clinically (n=29).

28% of adult GI oncologists were uncomfortable or very uncomfortable in applying pharmacogenomic results to chemotherapy dosing (n=16).

Pharmacogenomic education is needed for effective implementation.

- The majority of clinicians see the value of pharmacogenomics but are uncomfortable with incorporating it into practice.
- Pharmacogenetic results are increasingly available in the electronic medical record.
- Clinical decision support is helpful, but is only available at certain institutions and may contribute to alert fatigue.

Germline Pharmacogenomics in Oncology Education

Why

- Widespread implementation is limited.
- Lack of education is a barrier.

Who

- Oncology clinicians
(Physicians, Nurse Practitioners, Physician Assistants, Pharmacists)

What

- Online interactive modules
- Case-based

Design Process: ADDIE Model



Analysis

Background of the learners

- Familiar with medications used in oncology settings
- Varying levels of genetics background

Needs of the learner

- Problem-based learning

Platform

- Online platform that allow for interactivity and quizzes
- Leverage the path the ISCC-PEG PGx subgroup has forged for publishing modules

Hosted online with the other ISCC-PEG PGx modules



NHGRI ISCC-PEG

Six modules

[Learn more](#)

Pause Autoplay

Explore courses

 **Continuing Education**
3 courses

 **Free**
3 courses

 **Instructor-Led**
16 courses

 **Interactive**
6 courses

 **Self-Paced**
16 courses

 **Use of real data**
9 courses

Design

Learning objectives

- Derived from competency statements

Educational frameworks

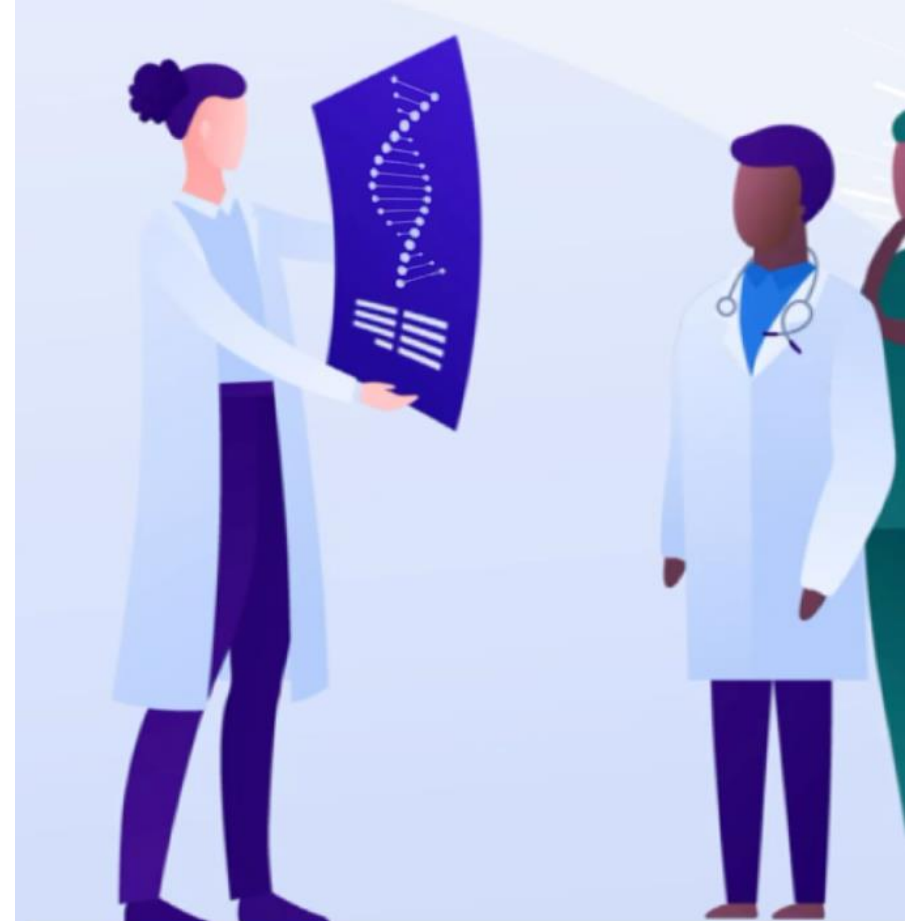
- Problem-based learning
- Scaffolding
- Formative assessments
- Final summative assessments

Design elements needed

- Interactivity
- Variety of text, images, videos

Objectives:

- Recognize chemotherapy agents that have pharmacogenomic dosing recommendations.
- Describe the impact of pharmacogenomics on the safety and efficacy of fluoropyrimidines, 6-mercaptopurine, and tamoxifen.
- Identify opportunities to optimize supportive care regimens with pharmacogenomics.
- Determine appropriate dosing for a patient's medication regimen based on a patient's germline pharmacogenomics.



Educational Frameworks

- Problem-based Learning
- Scaffolding
- Formative Assessments
- Summative Assessments

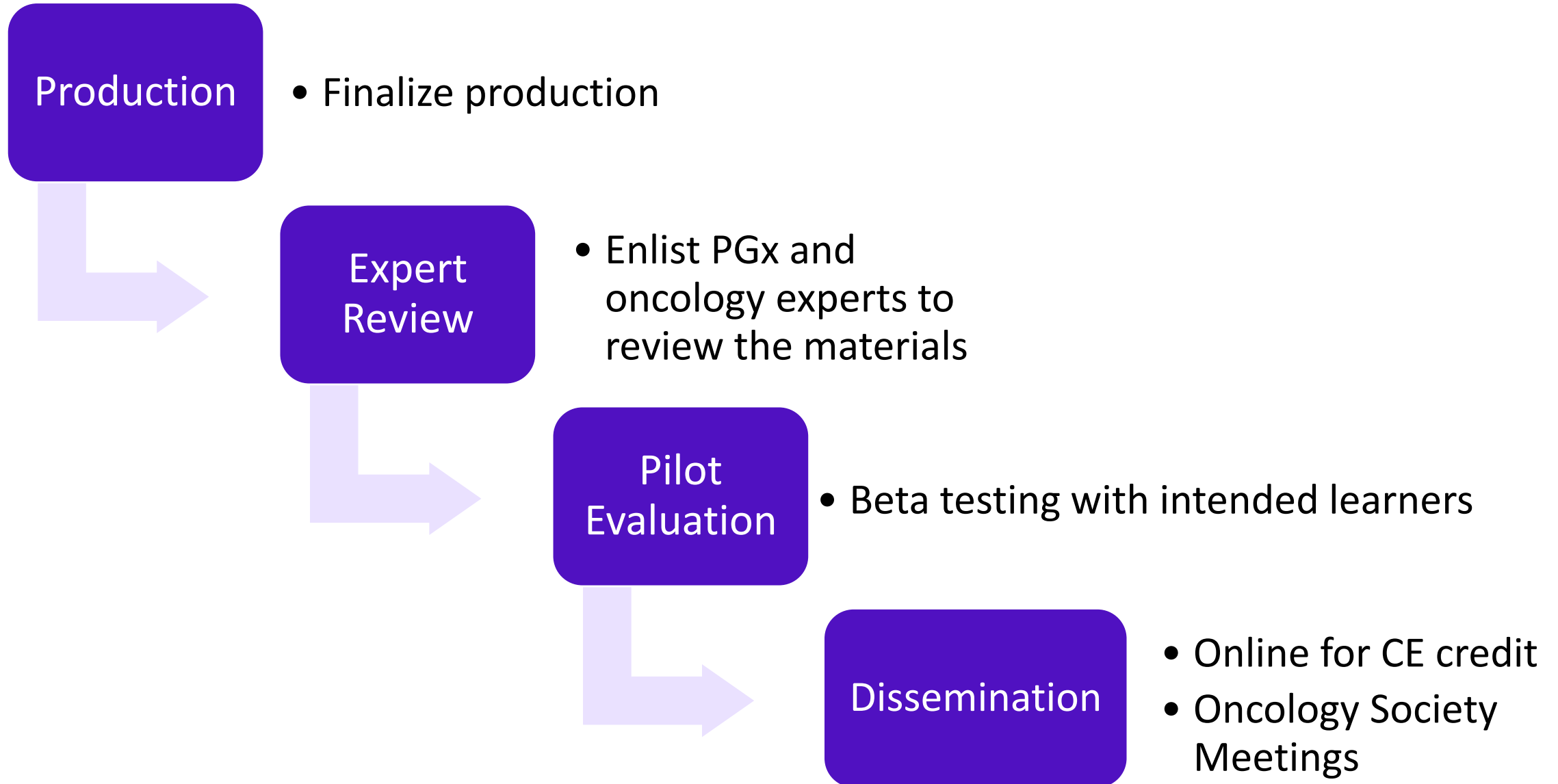
KR Katherine Robinson

Utilizing Germline Pharmacogenomics to Optimize Chemotherapy

START COURSE

This course is designed to empower oncology clinicians to incorporate germline pharmacogenomics into their clinical practice. At the end of this course, oncology practitioners should be able to determine which genes are impactful for their patients' planned pharmacotherapy, to assign a phenotype based on genotype and other clinical factors, and to utilize the patient's phenotype to modify pharmacotherapy appropriately.

Next Steps



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