PGx Education LLC:
Pharmacogenomics Certificate Program

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PHARMACOGENOMICS

Pharmacogenomics
The scientific and clinical basis for the application of pharmacogenomics (PGx) is presented. Pharmacogenomics will be presented in the context of pharmacokinetics (PK) and pharmacodynamics (PD). Clinical application will be presented by examining patient cases and utilizing resources including PGx databases, clinical guidelines, and primary literature.

Six Lessons

Overall objectives:
Pharmacogenomics (PGx) is the study of the genes involved in an individual's response to medications. This course will cover the following topics:

1. Current state of personalized/precision medicine with an emphasis on pharmacogenomics.

2. Composition of deoxyribonucleic acid (DNA) and ribonucleic acid (RNA).

3. The biological process starting with DNA and ending with a protein.

4. Types of genetic variations including single nucleotide polymorphisms (SNPs "snips"), insertions & deletions (indels), gene duplication, gene deletion.

5. Types of pharmacogenes, genes related to response to medication, including those related to pharmacokinetics (PK) and pharmacodynamics (PD).

6. Resources useful in the clinical application of pharmacogenomics.

7. Pharmacogenomics testing.

8. Implementation of pharmacogenomics.

9. Patient case examples to bring the different topics together

There is an assessment of knowledge comprehension for each of the six lessons

LESSON 1
Current State of Precision Medicine

This lesson will present the current state of personalized/precision medicine (PM) with emphasis on pharmacogenomics (PGx). This includes PGx relative to drug inefficacy and adverse reactions/events, the benefits of PM, the barriers to and facilitators of PGx implementation/uptake, and PGx terms standardization.

Lesson Objectives

1. Differentiate the terms "personalized medicine" and "precision medicine".
2. Define the terms "pharmacogenetics" and "pharmacogenomics".
3. Describe the benefits of PGx.
4. Recognize the current challenges to implementation of PGx.
   • Barriers
   • Facilitators/Solutions

LESSON 2
Science Foundations of Pharmacogenomics

This lesson will look at basic biochemistry and molecular biology that serves as the scientific basis for pharmacogenomics.

Lesson Objectives

1. List the nucleoside bases that comprise DNA and RNA, respectively.
2. Explain the continuum from DNA to the protein product.
3. Describe the types of DNA variants.
4. Differentiate the terms, genotype, diplotype, haplotype, and phenotype.

LESSON 3
Pharmacogenes: Pharmacokinetics, and Pharmacodynamics

This lesson will cover the relationships between genetics and pharmacokinetics, or the time course of drug absorption, distribution, metabolism and excretion (ADME). This lesson will also relate genetics to the pharmacologic effect (pharmacodynamics).

Lesson Objectives

1. List the categories of pharmacogenes.
2. Explain how genetic variation results in altered pharmacokinetics.
3. Explain the continuum from genetic variation to altered pharmacokinetics to altered drug dosage.
4. Provide examples of genetic influence on pharmacodynamics.

LESSON 4
Pharmacogenetic/Pharmacogenomic Testing

This lesson will discuss pharmacogenetic/pharmacogenomic testing. A broad overview of categories of genetic testing will be reviewed. Sample collection will be discussed. Single gene testing, and the standard approach of panel testing will be presented. Whole exome sequencing and whole genome sequencing will be discussed with specific contexts. Typical panels will be discussed and compared and a direct-to-consumer panel will be compared to a typical clinical panel.

Lesson Objectives

1. Distinguish between categories of genetic testing.
2. Differentiate/compare between single gene, panel, whole exome and whole genome testing.
3. Describe a typical pharmacogenomics testing panel.
4. Describe a rationale for inclusion of genes/variants on a pharmacogenomics testing panel.

LESSON 5
Pharmacogenomics Implementation

This lesson will discuss implementation of pharmacogenomics. Implementation science will be discussed and examples of implementation of different components of pharmacogenomics will be presented.

Lesson Objectives

1. Identify the key stakeholders in pharmacogenomics implementation.
2. Discuss pharmacogenomics implementation relative to laboratory services.
3. State the performance indicators that can be used to evaluate a pharmacogenomics service.

LESSON 6
Pharmacogenomics - Putting it all together

Through the exploration of three (3) patient cases, many of the concepts presented in lessons one (1) through five (5) will be "connected" to provide a broad view of the application of pharmacogenomics.

Lesson Objectives

1. Connect the basic science, applied science, PGx testing, and PGx implementation information..

COST: $350/per person

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