

The Phrontier of Pharmacy: How pharmacogenomics is enhancing the healthcare field

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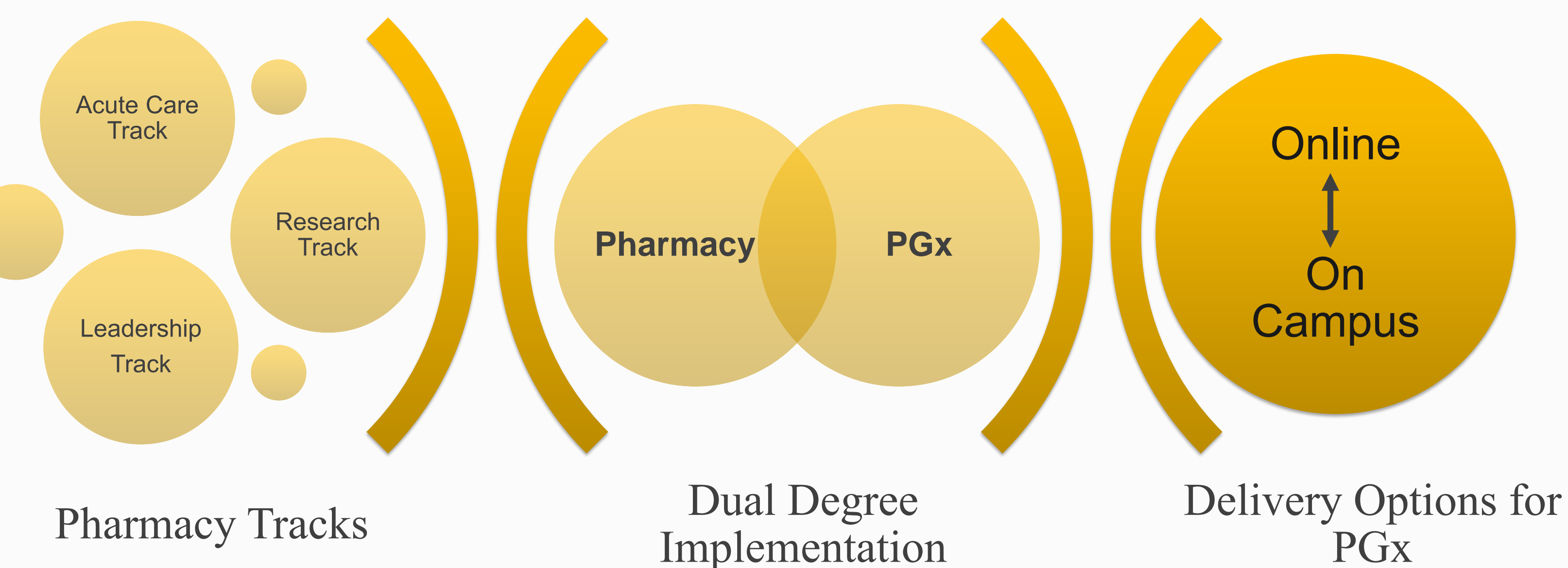
ABSTRACT

Pharmaceutical science programs have incorporated pharmacogenomics (PGx) into research well before the Human Genome Project (HGP) was completed in 2003. The completion of the HGP not only enhanced PGx knowledge, but it was the start of incorporating precision medicine into healthcare. The 2016 ACPE standards require all pharmacy schools to implement PGx into the curriculum. Therefore, it can be assumed that all future pharmacists will not only be the drug-drug interaction experts, but also the drug-gene interaction experts.


To integrate PGx into pharmacy, several enhancements to the curriculum can be implemented. For example, purposeful design and assessment of integrated pharmacotherapy (IPT) courses can offer unique opportunities to maximize the impact of PGx on student learning. Mock patient cases involving polypharmacy, and complex pharmacogenomic interactions can be presented. These PGx-informed patient cases can then be leveraged to incorporate advanced precision medicine concepts into interprofessional education events. PGx holds great promise for providing students with the framework to succeed in an interprofessional setting.

Another avenue to integrate PGx into Pharmacy is through a lab-based elective. Through the lab-based elective, pharmacy students are offered the ability to generate PGx panel reports on themselves, which reinforces learning. One final implementation is to provide a dual degree program in which Pharmacy students can master the PGx curriculum. By offering this exclusive opportunity, future pharmacists will lead the healthcare field in precision medicine.

Graphical representation



PATIENT CASE



PATIENT INFORMATION	SPECIMEN DETAILS
NAME: Patient 72168	SPECIMEN TYPE:
ACC #: 72168	COLLECTION DATE: 1/1/1900
DOB: 1/1/1900	RECEIVED DATE: 1/1/1900
SEX:	REPORT DATE: 1/15/2018

FOR ACADEMIC PURPOSES ONLY - NOT FOR CLINICAL USE

* Therapeutic area: Cardiology ✓

* Case Type: Antiplatelet ✓

* Case: Case 1 ✓

Case details: BT is a 58-year-old Caucasian male who has just undergone percutaneous coronary intervention with coronary artery stent placement. BT has a history of diabetes and hypertension. BT is placed on dual-antiplatelet therapy, including aspirin and prasugrel. Pharmacogenetic (PGx) testing was performed and the results report is available. The primary care prescriber wishes to change prasugrel to clopidogrel and you are consulted on this case. What is your recommendation for BT?

* Report: 72168 ✓

Report details: 72168.pdf

* Relevant gene(s): CYP2C19 *1 *2 ✓

* Phenotype: Intermediate Metabolizer (IM) ✓

Gene 2 (optional): None

Phenotype: Select...

Gene 3 (optional): None

Phenotype: Select...

* Recommendation: As the patient is an IM, the risk of adverse cardiovascular events is increased relative to clopidogrel use in this setting. Therefore, prasugrel or ticagrelor would be a consideration here. ✓

Notes:

Source: <https://cpicpgx.org/guideline>

* Instructor: David Kisor ✓

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LAB BASED LEARNING

- From Swab to Full Genetic Report
- Identification of Variants in Drug Metabolizing Enzymes, transporters and receptors (pharmacogenes)
- Bioinformatic Application to Genomic Data



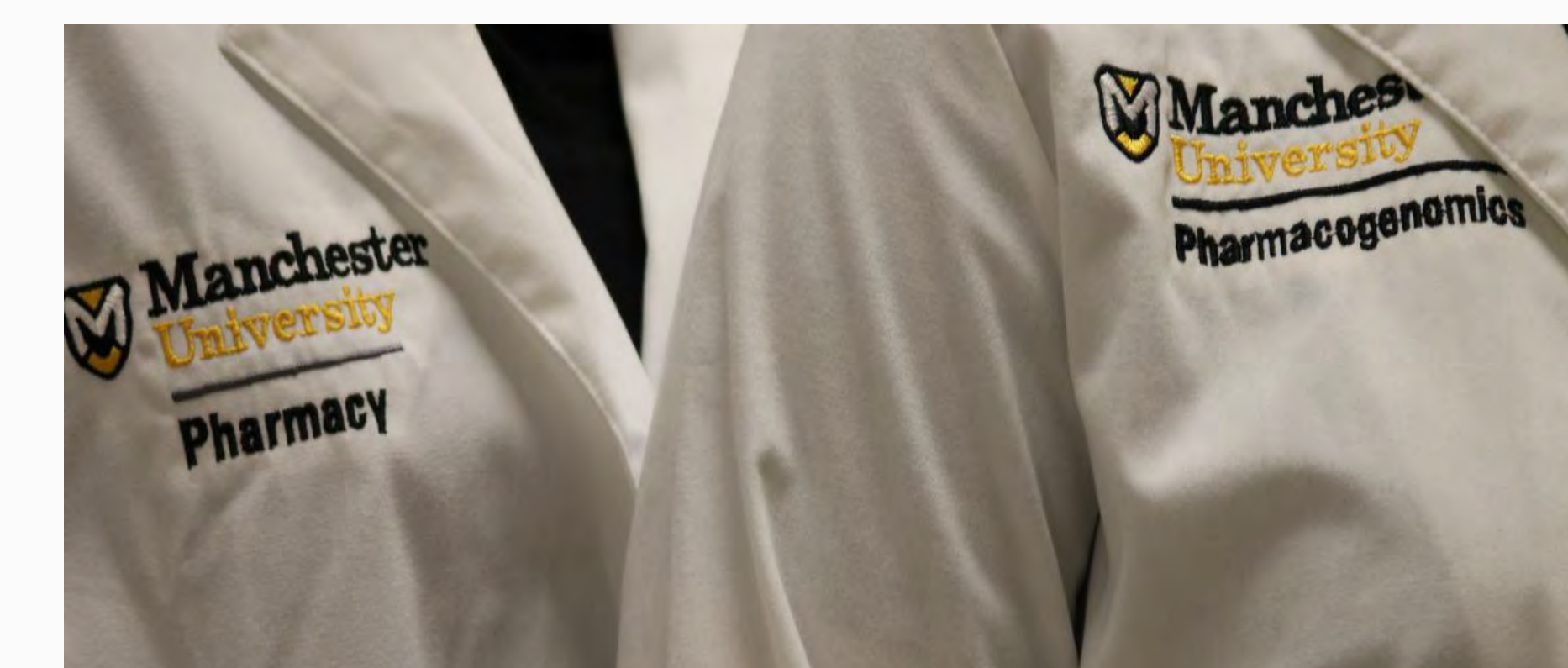
CURRICULAR INTEGRATION



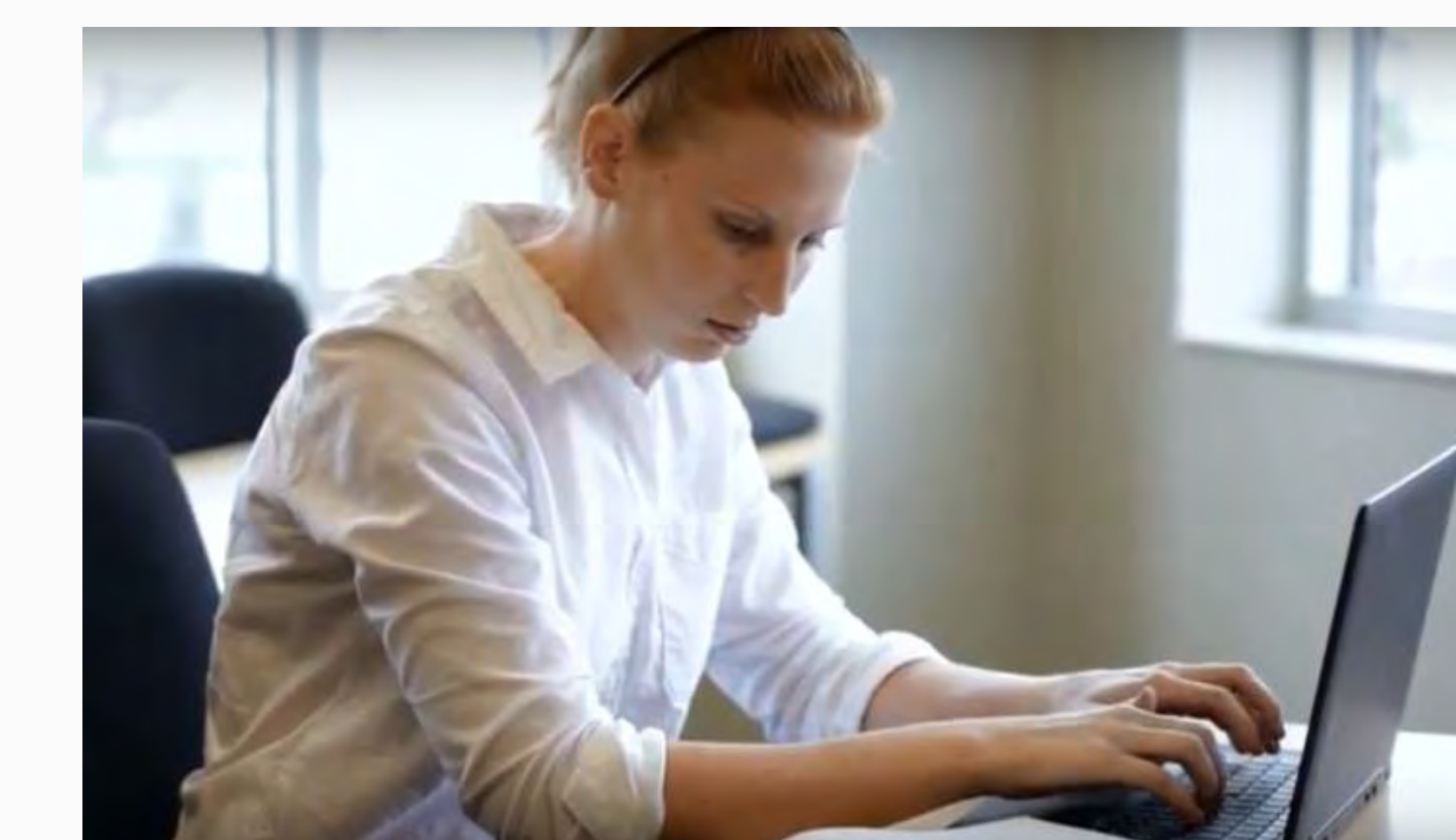
- Unique feature of program
- Tools given to faculty to use in curriculum
 - Automated PGx case system
 - CPIC guidelines
- Material is in a consistent format, so it is recognizable by students and serves as an element of integration.

DUAL-DEGREE

"79% of pharmacy leaders expect that at least one academic medical center will have a pharmacy based PGx service within the next five years."
-ASHP



ONLINE DEGREE



- Earn degree where you live and work
- Complete at part-time pace, in as little as 2 years
- Current Pharmacy Students may be eligible to apply