Abstract
An individual's genetic profile is becoming an increasingly important parameter in healthcare decisions. This small group activity was developed to introduce first year medical students in the Molecules to Cells and Tissues course to the concept and significance of Pharmacogenomics and personalized medicine. Additionally, this activity provided students with an opportunity to work with a large dataset and use the information to impact clinical decision making.

This activity has two cases, takes student groups approximately 2 hours to complete, and requires internet access. Case materials are available through the learning management system Canvas, and include open-ended questions to guide students through the cases. In these cases students explore the functional significance of different alleles of a panel of cytochrome P450 genes. The group activity has the students examine a large data set of cytochrome P450 genes and cognate alleles to determine their prevalence in the local population and calculate the individuals' gene scores. The students are then asked to explain the impact of the genotype (or gene score) on the resulting patient phenotype (i.e. the functional significance of the genotype).

Materials & Methods
This activity has two cases, takes student groups approximately 2 hours to complete, and requires internet access. Case materials are available through the learning management system Canvas, and include open-ended questions to guide students through the cases. In these cases students explore the functional significance of different alleles of a panel of cytochrome P450 genes. The group activity has the students examine a large data set of cytochrome P450 genes and cognate alleles to determine their prevalence in the local population and calculate the individuals' gene scores. The students are then asked to explain the impact of the genotype (or gene score) on the resulting patient phenotype (i.e. the functional significance of the genotype).

Facilitated Group Discussion
1. Why does the patient consider taking Taxol? Discuss lack of adequate pain relief from opioids and the functional significance of the genotype.
2. The first case involves a patient presenting with recurrent stroke-like symptoms despite being on the anticoagulant medication clopidogrel. The patient is initially suspected to be non-compliant, but is later determined to be a poor metabolizer of the anticoagulant clopidogrel which is active form thus decreasing its efficacy.
3. What is the relation of the Cytochrome P450 genes to the drug interaction database available through IUSM Clinical Pharmacology (The Flockhart Table™; https://drug-interactions.medicine.iu.edu)?

Student Feedback
Pre-work was difficult to understand – requesting a lecture before the small group. Many admitted they didn't do the pre-work and were therefore confused during the small group session.

Summary
This small group session has been delivered twice. Adjustments made after the first iteration involved logistics: shortening the pre-work, providing more guidance on calculating raw data, and providing an example of how to calculate gene scores. Facilitators felt the session was too short for the time allotted so a second case was created. Since small group sessions in the pre-clerkship courses provide an opportunity to introduce concepts with direct applications to patient care the second case was built around a concern over patient compliance. Based upon student and facilitator feedback from the second iteration of the case, modifications to the session are to remove the emphasis on the biochemistry of Cytochrome P450, which will be integrated into an earlier session on enzymes. Second, in collaboration with the IUSM Personalized Medicine pillar we will increase the emphasis on the pharmacogenomics and personalized precision medicine.

Conclusions
This small group activity was developed to introduce first year medical students in the Molecules to Cells and Tissues course to the concept and significance of Pharmacogenomics and personalized medicine. Additionally, this activity provided students with an opportunity to work with a large dataset and use the information to impact clinical decision making.

Introduction
An individual’s genetic profile is becoming an increasingly important parameter in healthcare decisions. The cost of generating an individual’s genetic profile is steadily declining, and thus is becoming more affordable. Challenges facing the integration of omic data into clinical practice span ethical considerations, cost effectiveness and a fundamental level how well the biological processes are understood. This small group activity is meant to provide an introduction into the value of genomic information. Future iterations of the session need to address equally important aspects of ethics and health care costs.

Goals
An individual’s genetic profile is becoming an increasingly important parameter in healthcare decisions. The cost of generating an individual’s genetic profile is steadily declining, and thus is becoming more affordable. Challenges facing the integration of omic data into clinical practice span ethical considerations, cost effectiveness and a fundamental level how well the biological processes are understood. This small group activity is meant to provide an introduction into the value of genomic information. Future iterations of the session need to address equally important aspects of ethics and health care costs.