Have you ever taken the same medication as one of your family members or friends and found that the drug had a quicker or longer-lasting effect on them? Or did you ever experience a side effect from the same drug whilst the other person had no such effect at all? This is where pharmacogenomics comes in to play.

What is pharmacogenomics?
Everyone is made up differently in terms of genetics and this can have a significant part in how we respond to drugs. Pharmacogenomics is therefore the study of how genes affect a person’s individual response to drugs [3]. This new and evolving field combines the science behind how drugs work (pharmacology) with the study of genes and their functions (genomics) in order to help scientists and doctors develop effective and safe medications for each unique individual [3].

How do doctors determine which drug is right for me?
There are a number of comprehensive pharmacogenomics tests currently available primarily at academic centres and independent testing facilities [7]. Such clinical tests help predict how patients will respond to a drug based on their unique individual genetic makeup [6]. One of the most common test being carried out prior to a drug being prescribed is one which identifies CYP2C19 polymorphism.
How is all of this influencing the future of healthcare?

In my opinion, I believe pharmacogenomics is currently having a significant influence on prescribing habits as it allows doctors to identify how a drug will affect an individual based on pharmacogenomics testing. This in turn allows them to determine what dosage of a drug would be appropriate or if the drug needs to be replaced with another, more effective and safe alternative. With technology continuously progressing and research being conducted, I believe pharmacogenomic testing will become more widespread and doctors will become more well-informed on how to appropriately prescribe medicine to each individual.

What is CYP2C19 polymorphism?

CYP2C19 is a gene found in our body which belongs to a class of enzymes known as ‘Cytochrome P450 (CYP450) enzymes’. CYP2C19, in particular, is of great importance as it is responsible for metabolising a great percentage of drugs on the market, including clopidogrel (sold under the brand name Plavix) and omeprazole (sold under the brand name Losec). [6]. Polymorphism of CYP2C19 involves the occurrence of a variety of different forms of the gene found amongst individuals [8]. For example, some people may have variable enzyme function so that they metabolise the drug too slowly, too quickly, or not at all [10]. As a result, the drug may not have the desired effect or it may remain in their system too long, leading to unwanted side effects [10].

How do we test for CYP2C19 polymorphism?

Genetic screening for CYP2C19 polymorphism is readily available and costs $300-$400 in the United States, which is covered by most insurance companies [11]. However, these tests are continuously being researched and new proposals are being improved on how to improve their accuracy. A recently proposed test known as PGx-S is being encouraged with the aim of providing a more holistic in-depth understanding of the effects of CYP2C19 and other genetic polymorphisms on individual variations in drug responses [9].

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**Figure 2:** Schematic of PGx-S methodology [9]
References


