GMLPC
Supporting Community Pharmacy in Greater Manchester

NHS
North West
Genomic Medicine Service Alliance

What is Genomics?

Put simply, genomics is the study of an organism's genome – its genetic material – and how that information is applied.

In humans, this is all our DNA, including genes that act as instructions to build and repair our bodies and the non-coding sequences of DNA.

Genetics refers to the study of single genes and their roles in inheritance. Genomics, broadly speaking, represents a shift towards thinking of the whole genome – including genes and non- coding regions of the genome. This change has been influenced by advances in technologies that can read the whole genome, meaning that testing is both cheaper and faster than ever before.

Every person's genome is around **99.9% the same as everyone else's**, but that 0.1% equates to around 3 million differences. Genetic changes (variants) can lead to the proteins they code for not working properly, or not being formed. So far, most functional variants in the genome that have been identified as causing rare diseases are within genes.

Some differences in our DNA determine physical characteristics, such as eye colour. Others can **influence our susceptibility to develop a health condition**, like cystic fibrosis or certain types of cancer. We can now **sequence and analyse genomic information to inform healthcare**, helping to better diagnose, treat and even prevent disease.

What are the applications of genomics?

The clinical applications of genomic technologies are vast and offer opportunities to improve healthcare across the breadth of medical specialities. Personalised medicine describes the use of genetic information to tailor health care intervention to individual need. Applications of genomics include:

1. Gene discovery and diagnosis of rare monogenic disorders
2. Identification and diagnosis of genetic factors contributing to common health conditions
3. Pharmacogenetics and targeted therapy
4. Prenatal diagnosis and testing
5. Infectious diseases
6. Gene therapy
7. Genome editing

What are the benefits of Genomics?

There are many benefits of using genomics within healthcare, including

- Personalising medicines choices from novel treatments to optimising existing treatments through shared decision making approaches.

- Reduced time to patient therapeutic response,
- Improved patient safety through a reduction in adverse effects of medicines and
- Thereby reducing pressures on healthcare systems.

It is vital that the pharmacy workforce is prepared and builds the knowledge and skills required to confidently lead and support at the forefront of PGx in the coming years.

The role of Pharmacists and Pharmacy teams

From system leadership to implementation of services, pharmacists can tailor and personalise the prescribing of medicines based on genetic information. Pharmacists, as experts in medicines, will have an important role to play in the coming years. As genomic testing becomes more widespread, pharmacy professionals must ensure they have the necessary competence to apply genomics in their area of practice. Read the joint position statement on Pharmacy professionals and Genomic Medicine.

According to researcher and clinician Prof William Newman at the Manchester Genomic Medicine Centre. “In the future, Pharmacists will be using [genomic] information when they see a patient on the ward, or passing through, who has been prescribed a certain medication, to find out if the patient has had the right genetic test and has the pharmacist got the right genetic information, which means that a medication is appropriate for the patient.

What is happening now?

Pharmacy teams around the country are already using genomics to determine the appropriate targeted treatment for patients with conditions like cancer and monogenic diabetes, to identify patients at high risk of toxicity before starting treatments like abacavir for HIV, or to determine the most appropriate antibiotic regimen for infections such as TB.

The NHSE Genomic Medicines Service has funded the PROGRESS programme to explore the feasibility of delivering pharmacogenetic panel testing in primary care, which will see a small cohort of patients tested for changes in multiple genes and monitor how this information is used to inform prescribing in general practice.

How can Pharmacy staff get involved?

If you want to learn more, there are introductory learning resources for the Pharmacy workforce here:

For individuals who are interested in learning more about genomics in healthcare, the Health Education England Genomics 101 course is a great place to start as an introduction to the basics of genomics.

A full list of resources is available from the North West Genomic Medicines Service Alliance website

Pharmacogenomics :: North West Genomics Medicine Service Alliance (nw-gmsa.nhs.uk)

To keep up to date, there is a North West network for pharmacy staff with an interest in genomics, which publishes a quarterly newsletter with updates and signposting to educational opportunities. To join, email **contactus@nw-gmsa.nhs.uk**