What are the possible outcomes of a SNP array?

Examples of findings that will be reported include:

NO IMBALANCE DETECTED – this means the test did not identify a genetic copy number change that explains the patient's clinical features. Further testing may be required for a diagnosis.

VARIANT OF UNKNOWN SIGNIFICANCE – this means that a chromosomal change has been found that may be clinically significant, but currently there is insufficient evidence to be completely sure. Further information from parents or published research may be needed.

LIKELY PATHOGENIC IMBALANCE (or CHROMOSOME IMBALANCE) – this means a copy number change was found that is likely to be significant but it is not possible to be completely sure that it has caused the patient's clinical features. This may include incomplete penetrance and susceptibility loci, as explained above.

PATHOGENIC IMBALANCE – this is a significant result which explains the patient's clinical features and will be discussed in more detail with you, or an incidental finding as previously explained. Pathogenic imbalances usually affect well-characterised syndrome regions or genes with clear links to particular clinical features.

What are the limitations of a SNP array?

A SNP array does **not** detect:

- Some very small copy number changes
- Changes to the DNA sequence itself (sequence variants or 'mutations')
- Balanced chromosome rearrangements
- May not detect low-level mosaicism

I've already had a microarray

If you have had a normal microarray result in the past, you may still benefit from a SNP array, as the ability to detect smaller imbalances and different types of abnormality has improved.

Further information

If you have a significant medical problem out of hours, contact your GP in the first instance. In an emergency, call 999.

CONTACT US
email: gst-tr.hellogenomics@nhs.net
website: https://southeastgenomics.nhs.uk/

UNIQUE
Offers support and information for families diagnosed with rare chromosome disorders.
t: 0188 372 3356 w: https://rarechromo.org

NHS 111
Offers medical help and advice from fully trained advisers supported by experienced nurses and paramedics, 24 hours a day:
t: 111 w: https://111.nhs.uk

NHS
South East
Genomic Laboratory Hub

SNP array

Information for patients and families

This leaflet provides information about SNP (single nucleotide polymorphism) array. It should be read before you sign a consent form agreeing to this test. If you have any further questions, please speak to a doctor or healthcare professional caring for you.

What are chromosomes?

Chromosomes are structures made of DNA which carry genes. Genes are instructions which tell the body how to develop and function. Each cell in the body has 46 chromosomes in pairs, numbered 1 to 22. In addition, we have a 23rd pair of sex chromosomes: most girls have two X chromosomes (XX) and most boys have an X and a Y chromosome (XY). We inherit one of each chromosome pair from each parent. Most people therefore have a copy number of two for most genes.

What is a copy number change?

While most regions and genes have a copy number of two, some regions and genes can exist in different copy number states. Not all genes are sensitive to copy number and having just one copy or extra copies may simply be normal variation between one healthy individual and another.

Some regions and genes, however, cannot tolerate copy number change so having one copy ('a deletion' or loss) or three or more copies ('a duplication/amplification' or gain) may cause problems with physical and/or intellectual development.

What is a SNP array?

A single nucleotide polymorphism is a position in the genome where the specific base pair of the DNA varies from one healthy person to another. A SNP array uses approximately 1.1 million probes targeting these variable regions across all 46 chromosomes to look for copy number changes which may be relevant to the patient's clinical features. The use of probes targeting the variable regions can gives us some extra information about a copy number change of interest, such as which parent it was inherited from.

Why has a SNP array been offered to you?

Your clinical team may have identified unexplained problems with physical development, or with learning and behaviour. SNP array is a useful test to try to find the underlying cause of these issues which may also include birth defects, delayed growth as well as medical problems such as seizures.

What else may a SNP array tell us?

Incidental findings

A SNP array may occasionally reveal unexpected information which could have implications for the patient and/or their family.

It may identify a chromosome change which is not related to the patient's clinical features, but which may have implications for their future health, and possibly for other family members. For example, it may indicate an increased risk of cancer later on in life. This chromosome change may or may not have been inherited from a healthy parent.

Carriers of these types of chromosome changes could benefit from screening to detect cancer earlier and improve the success of treatment. This may not be relevant at the time of diagnosis but if there is an incidental finding this will be discussed with the geneticist.

Variants of unknown significance

A SNP array may detect changes called 'variants of unknown significance' (VUS). This means there is not yet enough information available to know if these are clinically significant or not. Where there is a lot of uncertainty, these variants may not be reported because it will not give any useful information. This is in line with national guidelines.

Incomplete penetrance or susceptibility loci

A SNP array might detect copy number changes which are susceptibility factors or which have incomplete penetrance for some medical or developmental issues. This means that someone with a particular copy number change is more likely to have (or develop in future) a particular clinical feature, but that some people with that same change will never have it. These changes can be difficult to understand; they can be inherited from a completely unaffected parent, or from a very mildly affected parent.

Why are parental samples sometimes requested?

Sometimes the SNP array results can be difficult to interpret. In these cases, it can be helpful to test the parents to see if the genetic change we have found in the patient was inherited from one of their parents. This may help us decide if the genetic change is the cause of the findings. Testing parents will also confirm their relationship to the patient and may identify instances where one or both parents is not related to the patient (for example in the case of sperm or egg donation).