What else could this test reveal?

It is possible that the results of the SNP array may reveal additional and/or unexpected information about a child, parents, and/or other family members. This information could include risks for different genetic diseases with symptoms that may not be present at this time.

What should you do with an abnormal SNP array result?

For patients with an abnormal microarray result, genetic counseling is generally recommended. Genetics providers offer detailed interpretation, clinical correlation, as well as management recommendations. They can counsel and explain to families the clinical features, etiology and implications of an abnormal array result. A genetics consultation can be scheduled at MSU by calling 517-364-5860.

Does insurance cover the cost of this test?

Coverage varies from plan to plan and depends on whether the MSU Clinical Genetics Laboratory participates with various insurance carriers throughout Michigan. Often, preauthorization is required and co-pays and deductibles will apply despite preauthorization.

Please contact the MSU Clinical Genetics Laboratory at 517-353-2032 or go to our website at http://phd.msu.edu/Divisions/HumanGenetics.aspx to obtain a comprehensive list of insurances throughout the state and test-specific requirements for each. If there is any doubt regarding a patient’s coverage, it is generally recommended that the ordering physician provide the patient the CPT codes along with patient-specific diagnosis codes so they can contact their insurance company. It is important to ensure the patient is aware of any potential out-of-pocket costs prior to the test being done.

The MSU Clinical Genetics Laboratory has made every effort to make the preauthorization/verification process as simple as possible. We have a number of resources including the following:

- Preauthorization letter templates
- Template patient letter with CPT and diagnosis codes for independent patient verification
- Comprehensive chart with all Michigan insurances including Medicaid HMOs and pre-test requirements
- Payment plans are available

What if I have more questions?

If you have additional questions or would like more information about SNP array testing, contact the MSU Clinical Genetics Laboratory genetic counselor at 517-432-3870.
**What is a SNP ("snip") array test?**

- Chromosomal microarray is a relatively new technology combining molecular and cytogenetic techniques to evaluate patients for a variety of indications. The test can identify genetic abnormalities previously undetectable by conventional chromosome analysis.
- Because there is coverage of the entire genome, chromosomal microarray can essentially replace all syndrome-specific FISH and subtelomere FISH tests with a single, comprehensive analysis.
- The SNP array detects duplications and deletions, also known as copy number variants (CNVs), much like traditional oligonucleotide or "oligo" arrays.
- SNP array also has the added advantage of single nucleotide polymorphism probes (SNPs) which can identify uniparental disomy and regions of homozygosity.
  - Uniparental disomy (UPD) occurs when both chromosomes or a portion of the chromosomes in a particular pair come from a single parent. There are a number of disorders that can be caused by UPD including some cases of Prader-Willi, Angelman, Beckwith-Wiedemann and Russell-Silver syndrome among others.
  - Regions of homozygosity (ROH) within the genome have identical SNPs on both chromosomes in a particular pair. Multiple ROH scattered throughout the genome can suggest consanguinity, or relatedness, between the patient’s parents or a shared distant ancestry. While such a patient may have no identifiable copy number variants, ROH may unmask various autosomal recessive conditions.

**How is the test done?**

Two vials of blood are required (one sodium heparin green top and one purple top EDTA) which are sent to the MSU Clinical Genetics Laboratory where DNA is extracted. Fluorescently labeled control and patient samples are mixed and fixed onto a microchip. A complex computer and software system analyzes the data and can detect CNVs based on the presence and amount of fluorescent probes.

**Who should have this testing?**

Any patient with:
- Unexplained developmental delay
- Intellectual disability
- Cognitive impairment
- Autism spectrum disorder
- Dysmorphic features
- Congenital anomalies

Approximately 15-20% of such patients will have an abnormal finding by this test.

**What is the benefit of identifying an abnormality on SNP array?**

Microarray results lead to medical management changes in up to 70% of patients tested when a CNV is identified. Alterations to medical care may include any of the following:

- Referrals to other specialists
- Requests for additional diagnostic imaging and laboratory testing
- Alterations to previously established treatments
- Initiation or cessation of various screening protocols
- Discontinuing of further diagnostic evaluations
- Accurate recurrence risk assessments
- Targeted genetic counseling and identification of support groups
- Closure for families, many of whom have gone decades wondering the cause of their child’s condition

**What are the limitations of the SNP array?**

This test cannot rule out ALL underlying genetic conditions. Single gene disorders due to mutations or changes within a gene cannot be identified by this testing. For example, fragile X, Marfan syndrome, tuberous sclerosis and neurofibromatosis type 1 require additional molecular testing for proper analysis. Low level mosaicism may also be undetected.

Additionally, balanced structural chromosome rearrangements cannot be identified by the SNP array. This includes translocations, inversions and insertions among others. In these cases, karyotype remains the test of choice.

Not every CNV is pathogenic. There are a number of benign duplications and deletions throughout the genome. Some have been clearly identified as benign. Others, however, are rare or have not been previously reported in the medical literature and therefore their clinical significance is unclear. These are known as variants of unknown significance (VUS). In these cases, parental studies are recommended.