Chromosome Analysis for the Evaluation of Developmental Delay/Mental Retardation (DD/MR), Multiple Congenital Anomalies (MCA), and Autism Spectrum Disorders (ASD)

Description

Chromosome analysis is a study of the number and general structure of all 46 chromosomes; it is also known as a karyotype. In a standard karyotype, chromosomes from cultured cells (usually white blood cells) are counted to ensure that the cells evaluated have the correct number of chromosomes, and their structure is evaluated to ensure that there are no large pieces of material that are missing (deleted), extra (duplicated), or rearranged in any way.[1]

Chromosomal microarray (CMA) uses molecular techniques to examine chromosomes for copy number changes (deletions or duplications) that are 5-10 times smaller than can be detected by a standard karyotype. In patients with DD/MR CMA has a 2-3 fold increased yield compared to standard karyotype. Many different testing platforms have been used. In this Gene Information Sheet, CMA refers to all types of array-based genomic copy number analyses, including array-based comparative genomic hybridization (aCGH) and single nucleotide polymorphism (SNP) arrays.

Recommendations

1. Genetic testing should not be performed until patients have been clinically evaluated according to the recommendations of the AAP.[2]
2. CMA should be the first test performed if a clinical diagnosis is not suspected.[3,4]
3. Current evidence does not support routine use of CMA for patients with ASD or Asperger syndrome unless the patient also has developmental delay, mental retardation and/or congenital anomalies with or without abnormalities of growth.[5]

See flow chart on next page for suggested approach to work up.

Resources:

1. Standard Chromosome Analysis http://genetics.emory.edu/pdf/Emory_Human_Genetics_Chromosome_Analysis.PDF
2. Moeschler JB, Shevell M, and the Committee on Genetics Clinical Genetic Evaluation of the Child with Mental Retardation or Developmental Delay. Pediatrics 117:2304-16, 2006 http://aappolicy.aappublications.org/cgi/reprint/pediatrics;117/6/2304.pdf.
3. Miller DT et al. Consensus Statement: Chromosomal Microarray Is a First-Tier Clinical Diagnostic Test for Individuals with Developmental Disabilities or Congenital Anomalies. Am J Hum Genet 86:749–764, 2010. https://www.iscaconsortium.org/images/stories/isca/docs/miller.pdf.
4. Manning M, Hudgins L. Array-based technology and recommendations for utilization in medical genetics practice for detection of chromosomal abnormalities. Genet Med 12:742–745, 2010. http://www.acmg.net/StaticContent/PPG/Array_based_technology_and_recommendations_for.13.pdf.
5. Shen et al. Clinical genetic testing for patients with autism spectrum disorders. Pediatrics 125(4):e727-35, 2010. http://pediatrics.aappublications.org/content/125/4/e727.full.pdf+html.

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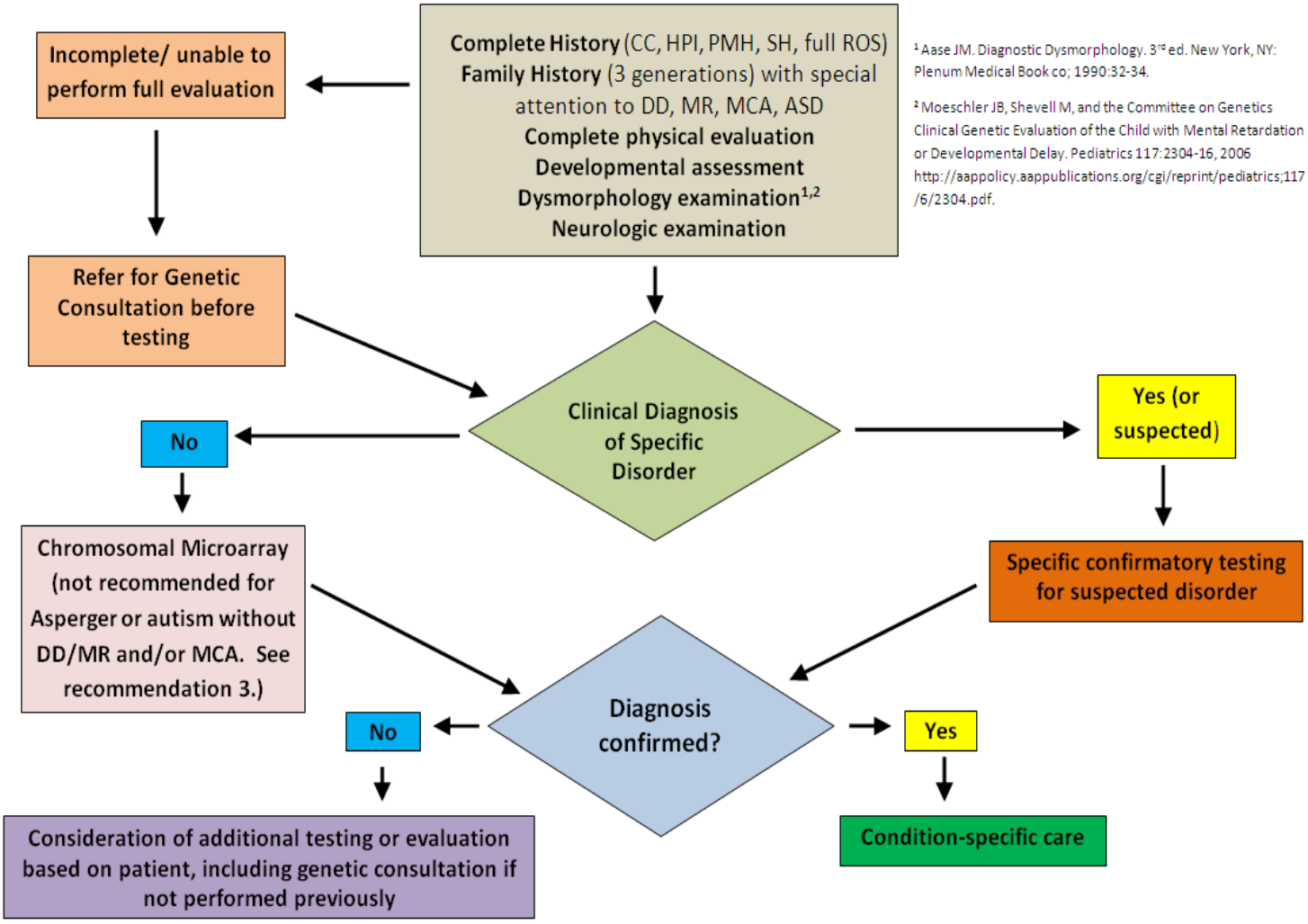

[1] Aase JM. Diagnostic Dysmorphology. 3rd ed. New York, NY: Plenum Medical Book co; 1990:32-34.

[2] Moeschler JB, Shevell M, and the Committee on Genetics Clinical Genetic Evaluation of the Child with Mental Retardation or Developmental Delay. Pediatrics 117:2304-16, 2006 http://aappolicy.aappublications.org/cgi/reprint/pediatrics;117/6/2304.pdf.