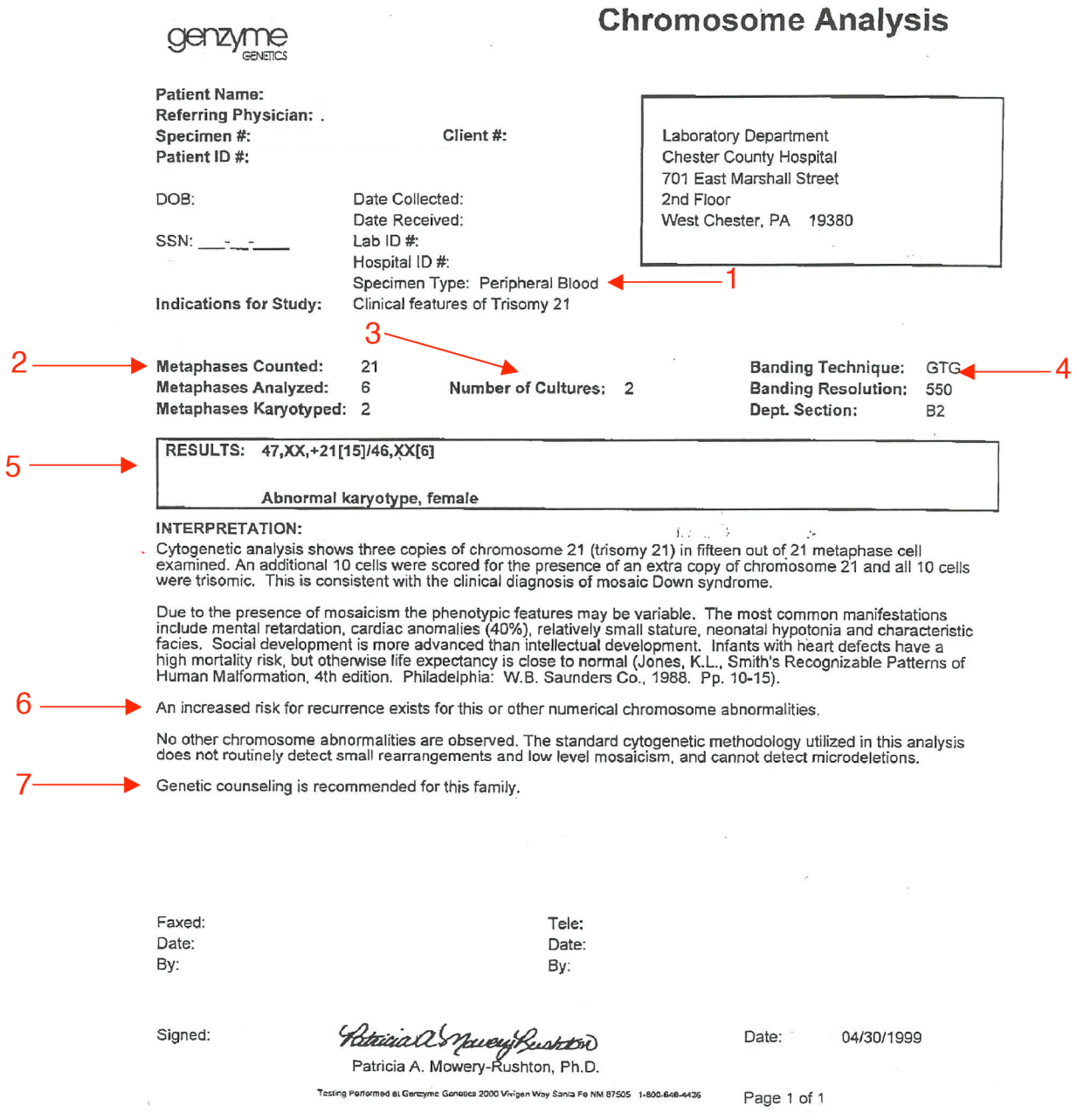
Explaning Test Results/Karyotypes to Parents

This is a sample test result form that may look familiar to you if someone you love has been diagnosed with mosaic Down syndrome. Our goal is to help you interpret these results.



genzyme GENETICS

Chromosome Analysis

Patient Name:
Referring Physician: .
Specimen #: **Client #:**
Patient ID #:

Laboratory Department
Chester County Hospital
701 East Marshall Street
2nd Floor
West Chester, PA 19380

DOB:
Date Collected:
Date Received:
SSN: ___-__-____
Lab ID #:
Hospital ID #:
Specimen Type: Peripheral Blood
Indications for Study: Clinical features of Trisomy 21

1

2

3

4

Metaphases Counted: 21
Metaphases Analyzed: 6
Metaphases Karyotyped: 2
Number of Cultures: 2
Banding Technique: GTG
Banding Resolution: 550
Dept. Section: B2

5

RESULTS: 47,XX,+21[15]/46,XX[6]

Abnormal karyotype, female

INTERPRETATION:

Cytogenetic analysis shows three copies of chromosome 21 (trisomy 21) in fifteen out of 21 metaphase cell examined. An additional 10 cells were scored for the presence of an extra copy of chromosome 21 and all 10 cells were trisomic. This is consistent with the clinical diagnosis of mosaic Down syndrome.

Due to the presence of mosaicism the phenotypic features may be variable. The most common manifestations include mental retardation, cardiac anomalies (40%), relatively small stature, neonatal hypotonia and characteristic facies. Social development is more advanced than intellectual development. Infants with heart defects have a high mortality risk, but otherwise life expectancy is close to normal (Jones, K.L., Smith's Recognizable Patterns of Human Malformation, 4th edition. Philadelphia: W.B. Saunders Co., 1988. Pp. 10-15).

6

An increased risk for recurrence exists for this or other numerical chromosome abnormalities.

No other chromosome abnormalities are observed. The standard cytogenetic methodology utilized in this analysis does not routinely detect small rearrangements and low level mosaicism, and cannot detect microdeletions.

7

Genetic counseling is recommended for this family.

Faxed:
Date:
By:

Tele:
Date:
By:

Signed: Patricia A. Mowery-Rushton

Patricia A. Mowery-Rushton, Ph.D.

Date: 04/30/1999

Testing Performed at Genzyme Genetics 2000 Virigen Way Santa Fe NM 87505 1-800-848-4436

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1. The **specimen type** indicates that this particular test looked only at blood cells and not at cells of any other tissues (for example, skin cells). Because these cell types have different origins, they could have different percentages of cells with trisomy 21. For example, a child with MDS may have an extra chromosome 21 in 60% of their skin cells but only 30% of their blood cells. Research studies are being done to determine what these different percentages mean.

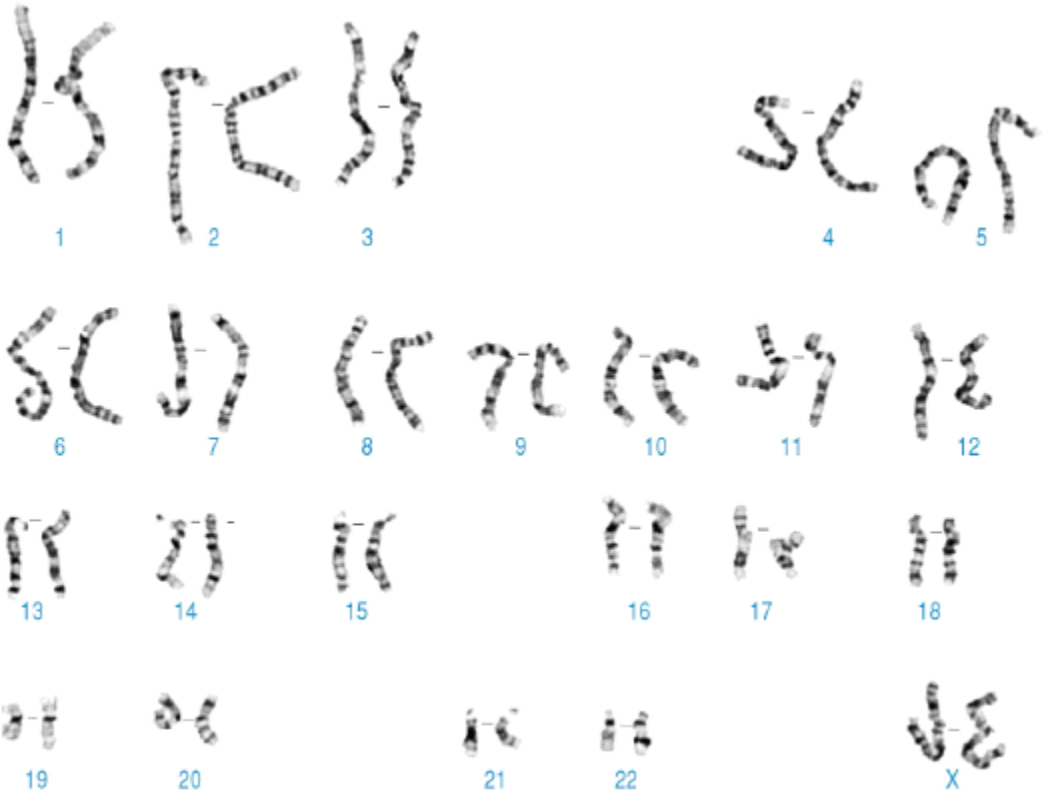
2. Metaphase occurs when cells are dividing. Since the DNA condenses at this stage, it is possible to count the number of chromosomes present. **Metaphases Counted** means that the technician actually counted the number of chromosomes in 21 cells but did not look at them in great detail. **Metaphases Analyzed** means that the technician looked closely at the chromosomes to look for small amounts of extra or missing genetic information. In this case the technician looked closely at 6 cells. **Metaphases karyotyped** means that an even more thorough analysis was done where the chromosomes were lined up as seen in the explanation of karyotypes (see #5).

3. The **number of cultures** shows that cells were grown in more than one dish. This is to prevent errors due to sample contamination. In this case, two dishes were used. That way if something goes wrong with one dish, there is still another one that can be used. Results from two dishes are more reliable than results from one dish.

4. The **banding techniques and resolution** describe the methods used for these studies. For mDs or Ds, it is not necessary to have high resolution because we are dealing with an entire extra chromosome. Higher resolutions are necessary when looking at smaller amounts of extra or missing information.

5. All of the organs (heart, liver, pancreas, etc.) in our body are made up of cells. Each cell contains the genetic information (an instruction manual) our body needs to grow and develop. The genetic information is packaged into chromosomes. There are 23 pairs of chromosomes, and each contains a different set of genetic instructions. Since our blood is also made up of cells, our chromosomes can be found there too.

When most of us are conceived we get one copy of each chromosome from our mom in the egg and one copy of each chromosome from our dad in the sperm. Since there are 23 pairs of chromosomes and we get 2 copies of each, we wind up with a total of 46 chromosomes. Below is a picture of all the chromosomes in an individual cell- this picture is also called a KARYOTYPE.



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The first 22 chromosomes are the same in males and females. It is the 23rd chromosome, known as the sex chromosomes, that determines whether the person is male or female. Females have two Xs and males have one X and one Y. Since the above figure shows two X chromosomes, this karyotype is from a typical female. **However, you will rarely see such a picture for your child. It is much more likely that your test results will look something like this:**

46, XX

This is just shorthand for the karyotype results we saw above. The number 46 indicates that there were 46 chromosomes present, and the XX indicates there were two X chromosomes so the person is female. If the individual was a boy, it would say 46, XY.

If your child has been diagnosed with Down syndrome, the karyotype image would have an extra copy of chromosome 21 as seen below.

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This would be written out as **47,XX +21** because this child has a total of 47 chromosomes, including two X chromosomes (which makes her a girl) and one extra copy of chromosome 21 as seen in the blue circle.

Mosaic Down syndrome results can be even more confusing because there are two different karyotypes present in the child's body- one cell type has a typical karyotype and the other cell type has an extra chromosome 21. For example, your child may have received results that look something like this:

47, XX +21/46, XX (45%/55%)

In this case, the two different karyotypes are separated by a slash (/). They are followed by percentages that indicate the amount of cells with each karyotype.

47, XX +21/46, XX (45%/55%)

By focusing on the BLUE color we can see that 45% of the cells tested have a karyotype that is the same as seen in people with Down syndrome- 47, XX+21, and by focusing on the GREEN color we can see that 55% of the cells have a karyotype that would be expected in an unaffected person- 46, XX. If this were a boy the results would look like:

47, XY +21/46, XY (45%/55%)

In some cases, the brackets will contain the actual number of cells with the karyoptype, instead of the percentages.

For example, the Genzyme results show the following results:

47,XX +21 [15]/46,XX [6]

This means that 15 cells had an extra chromosome 21 and 6 cells had a typical karyotype.

What we would really like to know is **WHAT DOES A MOSAIC KARYOTYPE MEAN FOR MY CHILD'S DEVELOPMENT??** Unfortunately, we don't currently have the answer to that question. That is why IMDSA strongly supports research so that we can better interpret such test results and predict what it means for management of individuals with mosaic Down syndrome.

6. Many parents would like to know what the chances are of having another child with mDs. The "increased risk" listed on this results form is based on studies of children with Down syndrome. There are not any studies done specifically on the recurrence risk of mDs. The studies on Ds indicate that the chance of having a second child with Ds is about 1%. This is greater than the population risk of about 1 in 800.

7. A genetic counselor works with the genetics team to coordinate care for individuals with genetic conditions. The team will tell you what is known about the causes of mDs and explain what you can expect based on current research. They will also make sure that you have all of the referrals you need to ensure your child is getting the right medical care and early intervention services. Often times genetic counselors are the ones who provide support group information and inform people of research studies that are ongoing for the condition of interest. They will also talk to you about recurrence risks for future pregnancies.