

# Genetic testing in the NICU

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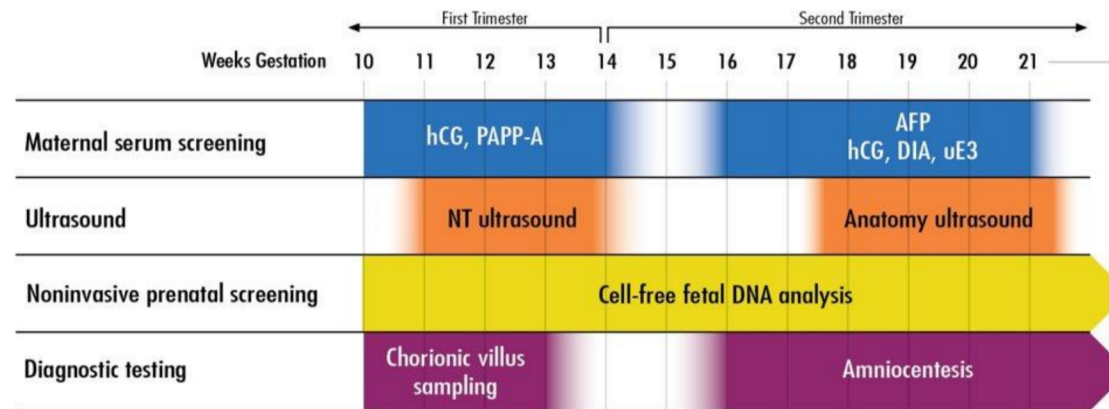
# Outline

- Discuss different testing options in the NICU
  - Overview, benefits and limitations
- Review variant types identified on testing
- Identify logistical considerations for testing
- Discuss factors influencing genetic test selection



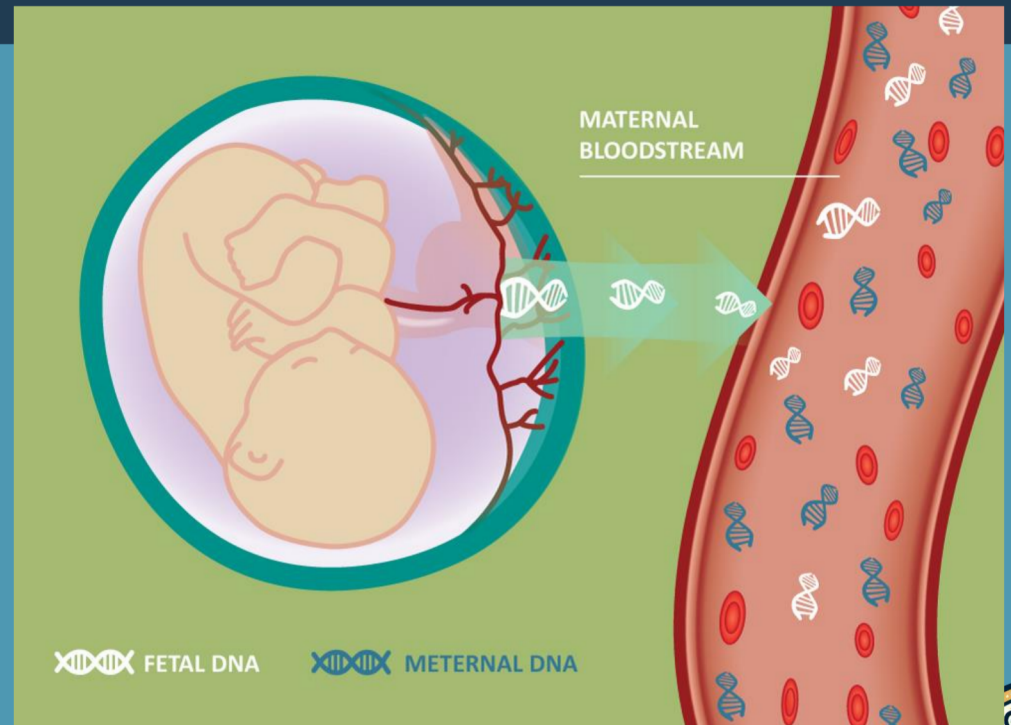
# Prenatal screening

## Prenatal Screening and Testing Options for Chromosome Conditions



# Prenatal screening – cell free DNA

- Can screen for chromosomal abnormalities
- Commonly assesses for Trisomies 13, 18, 21
- Can assess for smaller microdeletions

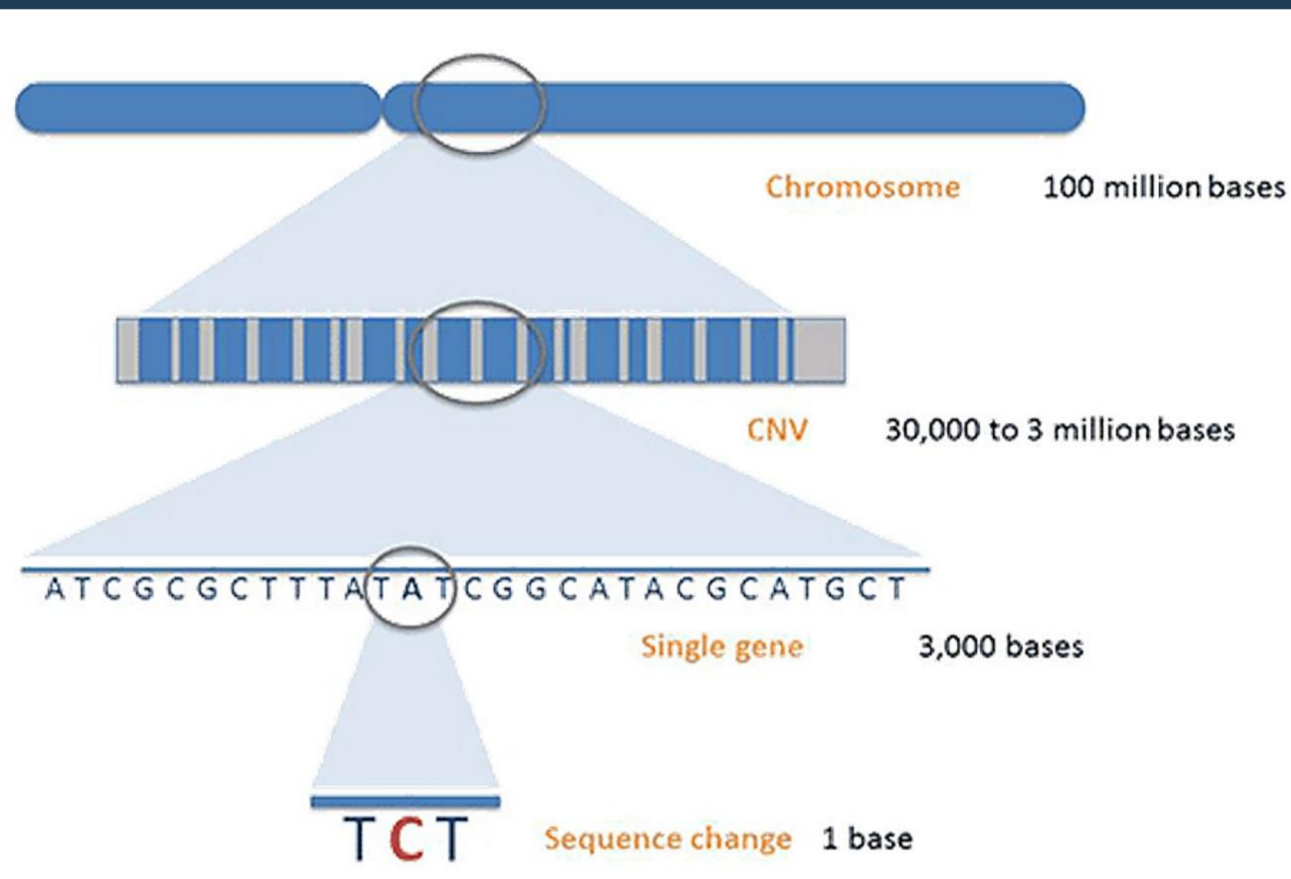


# Postnatal genetic testing

- Cytogenetics
  - Chromosome analysis/karyotype
  - FISH
  - Chromosome microarray
- Molecular genetic testing (sequencing)
  - Single gene sequencing
  - Known Familial Variant
  - Multigene panels
  - Exome Sequencing
  - Genome Sequencing



# Layers of Genetic Testing

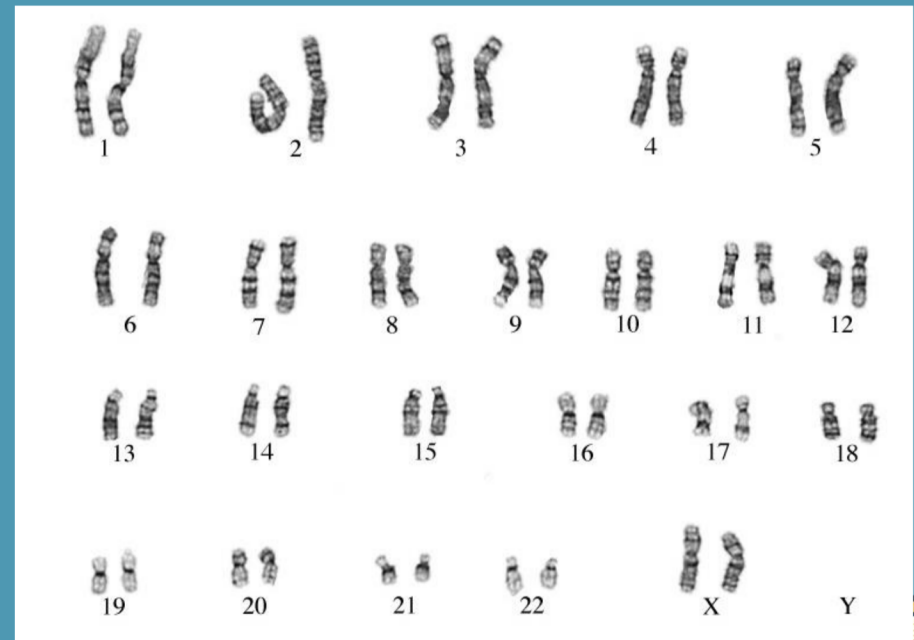
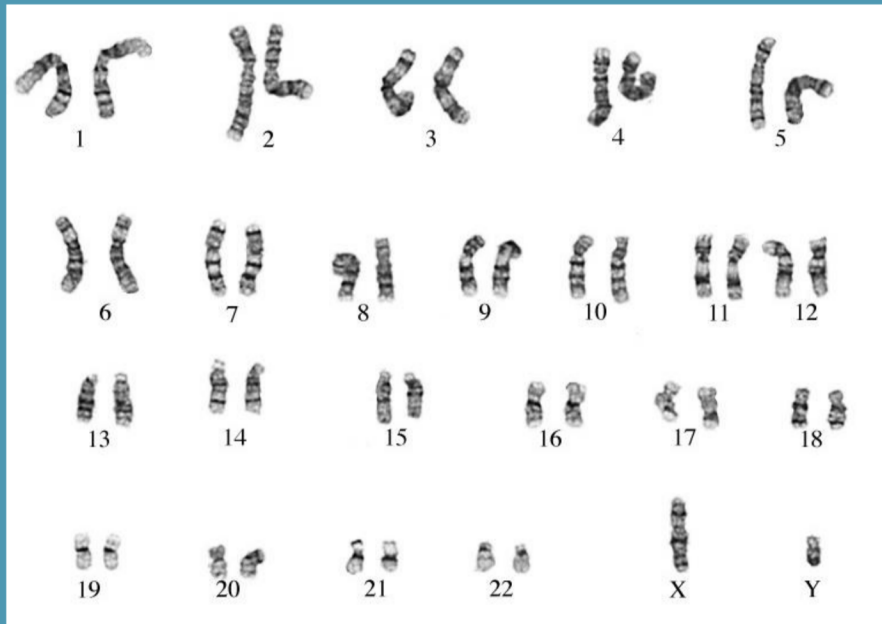


Cytogenetic

Molecular

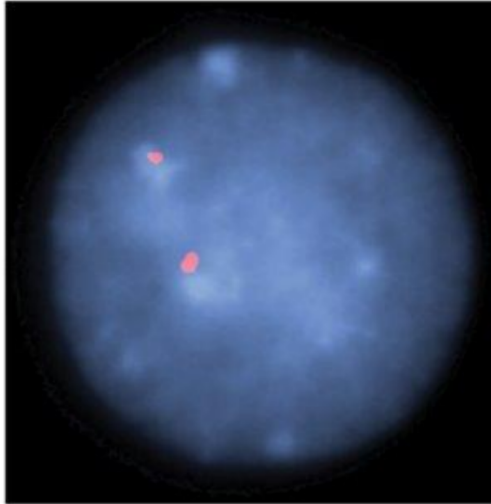


# Karyotype



# FISH

Normal Interphase

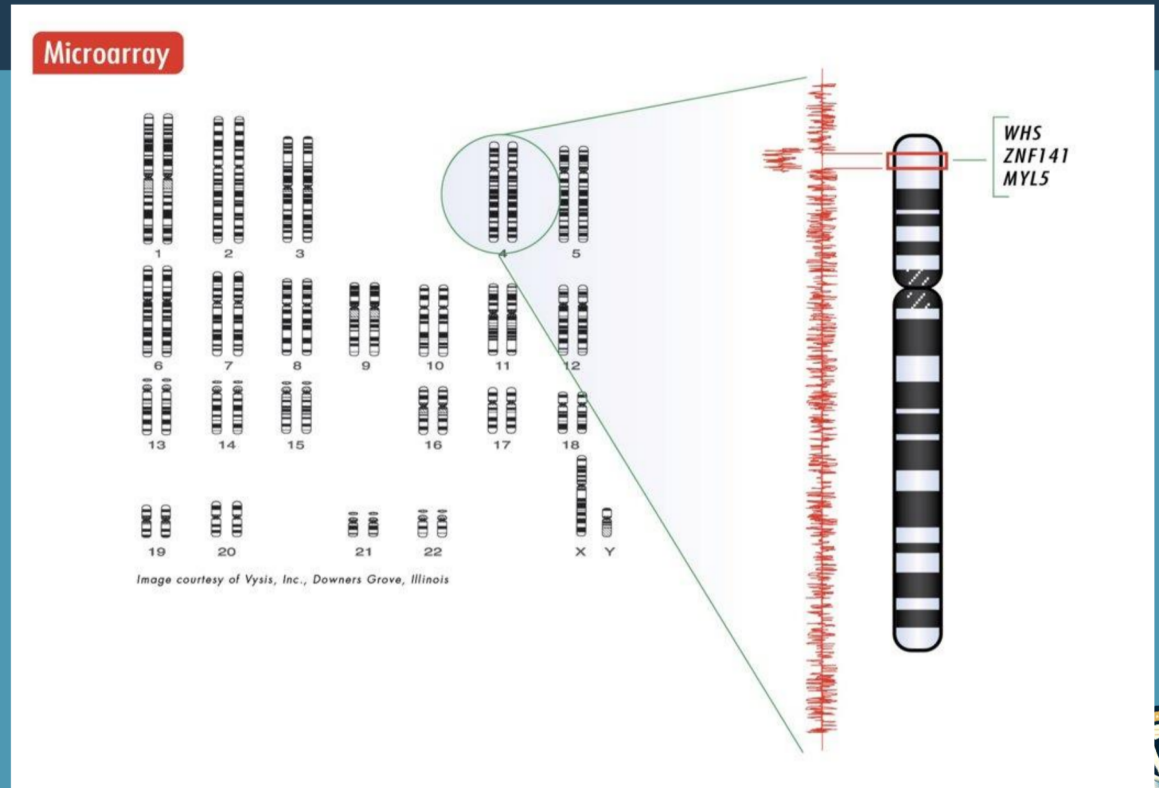


Normal Metaphase



# Chromosome Microarray

- Can assess for smaller deletions and duplication



# Sequencing- Known Familial Variant

- When a parent or family member has a known diagnosis
- Assessing for a single genetic condition with a known, single cause



# Panels

- Used when there is a specific phenotype or specific type of genetic condition as a concern



## Hereditary Hearing Loss and Deafness Panel

### Summary and Pricing ▾

#### Test Method

Exome Sequencing with CNV Detection



New York State  
Approved Test

PANEL AVAILABLE VIA  
**PGnome Sequencing**



Reflex to **PGxome**  
AVAILABLE FOR THIS PANEL



| Test Code | Test<br>COPY GENES | Panel CPT Code | Gene CPT Codes<br>COPY CPT CODE                                                                                               | Base Price |                           |
|-----------|--------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------|------------|---------------------------|
| 5063      | Genes x (234)<br>▼ | 81479          | 81252(x1), 81324(x1),<br>81325(x1), 81403(x1),<br>81404(x5), 81405(x5),<br>81406(x6), 81407(x7),<br>81408(x5),<br>81479(x436) | \$1290     | ORDER OPTIONS AND PRICING |



## Noonan Spectrum Disorders/RASopathies Panel

### Summary and Pricing ▾

#### Test Method

Exome Sequencing with CNV Detection



New York State  
Approved Test

PANEL AVAILABLE VIA  
**PGnome Sequencing**



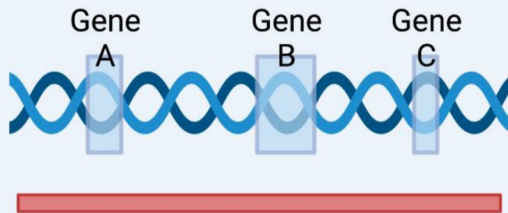
Reflex to **PGxome**  
AVAILABLE FOR THIS PANEL



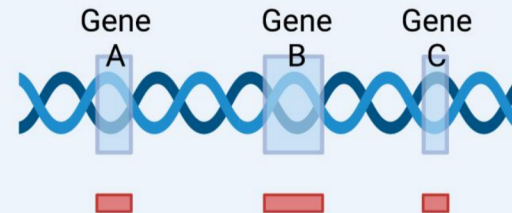
| Test Code | Test<br>COPY GENES | Panel CPT Code | Gene CPT Codes<br>COPY CPT CODE                              | Base Price |                           |
|-----------|--------------------|----------------|--------------------------------------------------------------|------------|---------------------------|
| 10327     | Genes x (23)<br>▼  | 81442          | 81404(x1), 81405(x3),<br>81406(x6), 81408(x1),<br>81479(x35) | \$990      | ORDER OPTIONS AND PRICING |



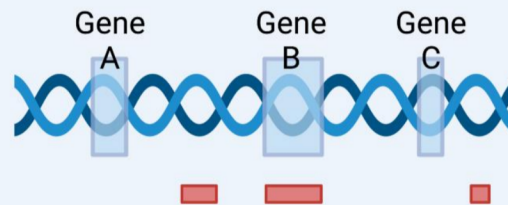
### Whole Genome Sequencing



### Whole Exome Sequencing



### Targeting Sequencing

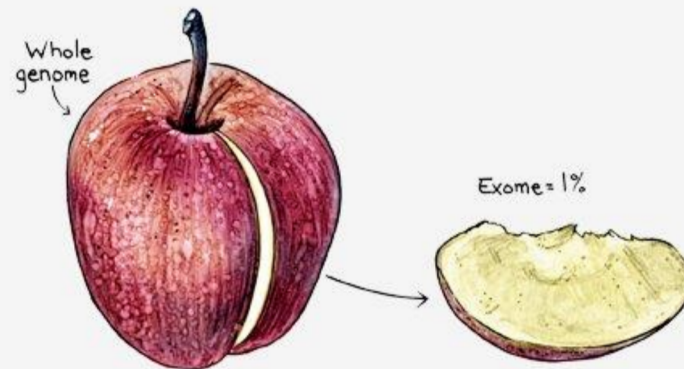
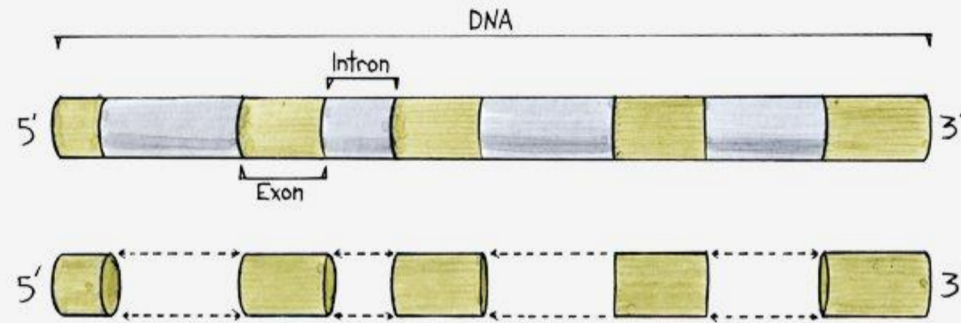


# Exome Sequencing/Genome Sequencing

- Increase in the number of genes assessed (technically all of the genes are sequenced)
- Run when phenotype is not specific to a single system or condition type
- Includes potential for incidental or secondary findings



# Postnatal – ES vs GS data

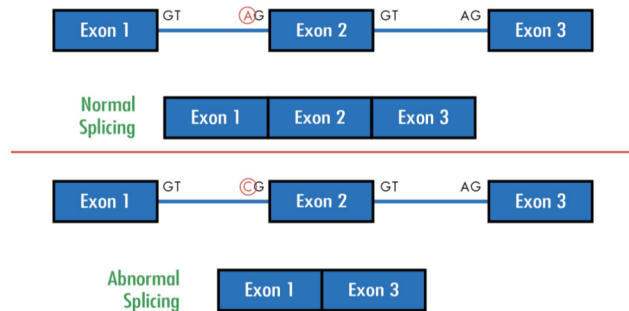


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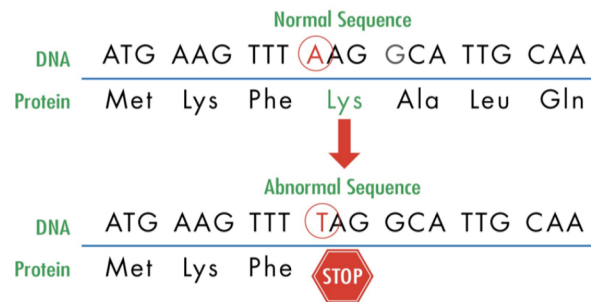


# Types of sequencing results

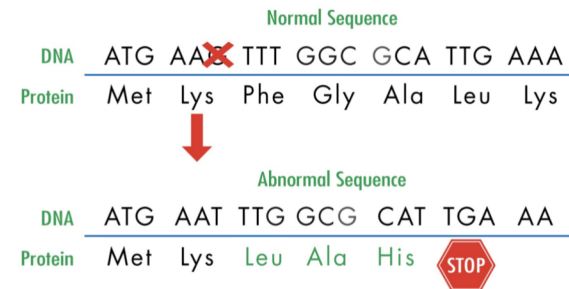
## Splice Site Mutation



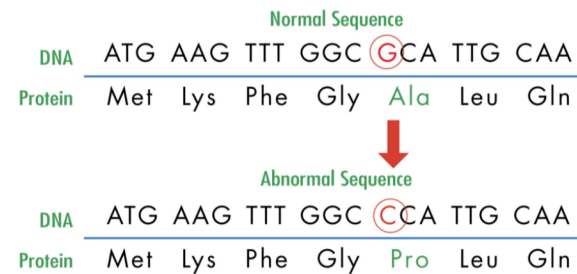
## Nonsense Mutation



## Frameshift Mutation



## Missense Mutation



# Postnatal - monogenic testing comparison

|                       | Multigene Panel                         | Exome Sequencing (ES)                              | Genome Sequencing (GS)                                                               |
|-----------------------|-----------------------------------------|----------------------------------------------------|--------------------------------------------------------------------------------------|
| Coverage              | High coverage                           | Lowest coverage                                    | Uniform and better than ES                                                           |
| Gene evaluated        | Curated list for differential diagnosis | All "Manageable" data                              | All<br>Also detects non-coding DNA variants, regulatory regions, structural variants |
| Utility of reanalysis | Was the new gene/etiology captured      | Useful if original analysis was recently completed | Infinite                                                                             |
| Copy number variants  | Reliable detection                      | Less robust than genome                            | Reliable detection                                                                   |
| Cost                  | Usually less than ES/GS                 | Less than GS                                       | Most expensive                                                                       |

