PIPADOR REVISION

MRCOG Part 1 Revision Notes

Cytogenetics and Molecular Genetics Results

DATA INTERPRETATION • LECTURE 444

VISUAL EXAMINATION REVISION NOTES

2026 Edition

444

MRCOG PART 1 REVISION NOTES | DATA INTERPRETATION

Cytogenetics and Molecular Genetics Results

Definitions, genetic tests, notation and worked cases in prenatal diagnosis and recurrent miscarriage

QF-PCR	Microarray	Karyotype	NIPT
Rapid aneuploidy (24–48 h)	CNVs — first-line for anomalies	Translocations	Screening, not diagnosis

■ KEY FACTS: Learning objectives

- Define karyotype, aneuploidy, translocation (Robertsonian and reciprocal), mosaicism, CNV, VUS and NIPT.
- Read karyotype and microarray notation.
- Choose and interpret genetic tests in prenatal diagnosis and recurrent miscarriage.

444.1 Key definitions

Term	Definition
Karyotype	Picture and count of all chromosomes (number and large structural changes)
Aneuploidy	An abnormal number of chromosomes (e.g. trisomy 21, monosomy X)
Robertsonian translocation	Fusion of two acrocentric chromosomes (13, 14, 15, 21, 22) — carrier has 45 chromosomes but a balanced genome
Reciprocal translocation	Exchange of segments between two chromosomes — balanced in carrier, may cause unbalanced offspring/miscarriage
Mosaicism	Two or more cell lines with different chromosome make-up in one person/placenta
Confined placental mosaicism (CPM)	Abnormal cell line in the placenta only — can cause false-positive CVS/NIPT
Copy number variant (CNV)	Deletion or duplication of a chromosome segment detected by microarray
VUS	Variant of uncertain significance — clinical meaning unknown
NIPT (cfDNA)	Screening test analysing placental DNA fragments in maternal blood
Fetal fraction	Proportion of cfDNA from the placenta (needs ≥ ≈ 4%)

■ IN PLAIN ENGLISH: Genetic tests

Think of the genome as a library: **karyotype** counts the books (chromosomes), **microarray** checks for missing or duplicated chapters, and **exome sequencing** reads individual sentences (genes). **NIPT** is a screening test that must be confirmed.

444.2 Tests

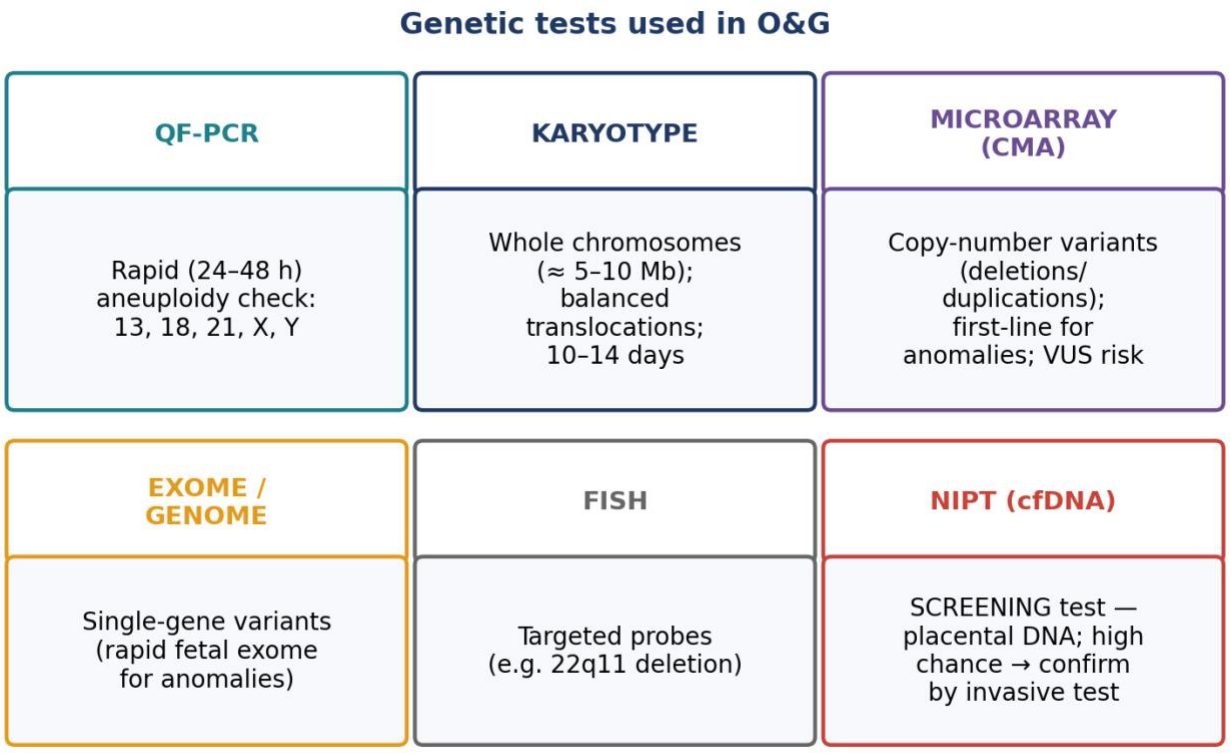


Figure 444.1 — Genetic tests used in O&G

444.3 Reading results

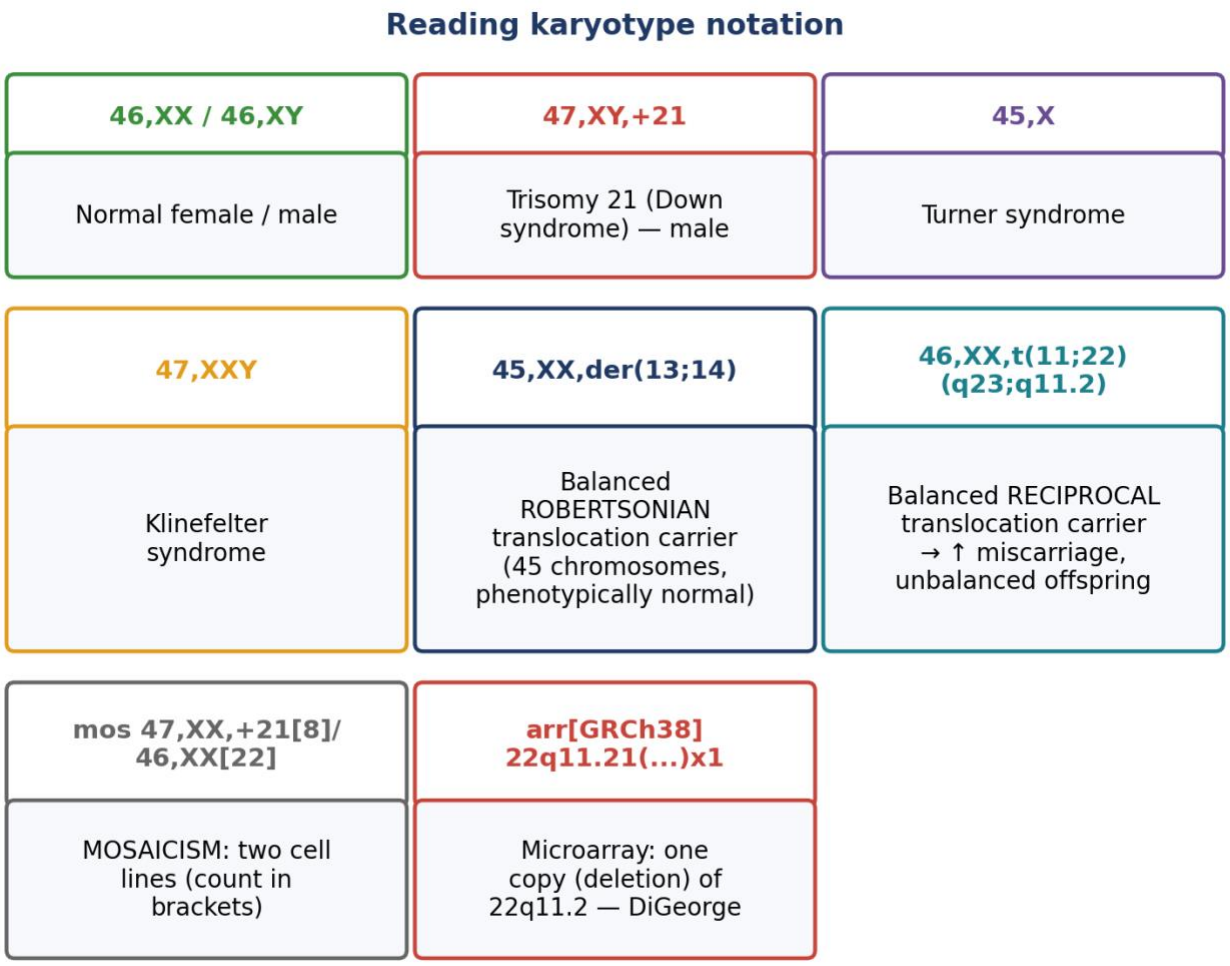


Figure 444.2 — Karyotype and microarray notation

444.4 Worked cases

■ WORKED EXAMPLE

Case 1 — NIPT 'high chance trisomy 21' at 12 wk → screening, not diagnostic (false positives from CPM) → offer **CVS or amniocentesis** with QF-PCR before any decision.

Case 2 — fetal cardiac defect on scan, QF-PCR normal → **microarray**: arr 22q11.21 deletion → **22q11.2 deletion (DiGeorge)** → genetics counselling; test parents.

Case 3 — recurrent miscarriage, pregnancy tissue shows unbalanced translocation → parental karyotype: mother **46,XX,t(11;22)** balanced carrier → genetic counselling (options: natural conception, PGT).

Case 4 — CVS: 47,XX,+18 mosaic in placenta; amniocentesis 46,XX → **confined placental mosaicism** → monitor growth (FGR risk).

■ COMMON PITFALLS

Acting on NIPT without confirmation.

Over-interpreting a VUS.

Forgetting maternal cell contamination or CPM in CVS samples.

444.5 Must-know summary

■ EXAM TIP

- QF-PCR (rapid 13/18/21/X/Y) → microarray (CNVs; first-line for anomalies) → exome (single genes).
- Karyotype detects balanced translocations (recurrent miscarriage — parental karyotype if unbalanced in pregnancy tissue).
- Notation: 47,XY,+21; 45,X; 45,XX,der(13;14); t(11;22).
- NIPT is screening — confirm by invasive test; CPM causes discordance.

■ MNEMONIC / MEMORY AID

Test resolution — 'Count (karyotype), Copy (array), Code (exome)'.