GENOMICA
Next Generation Genetics

Preimplantation Genetic Testing for Chromosomal Structural Rearrangements

An advanced PGT solution designed for carriers of structural chromosome rearrangements

PGTADVANCE SR

PGTADVANCE SR

Advanced detection of chromosomal rearrangements in embyos

WHAT IS A BALANCED STRUCTURAL REARRANGEMENT?

A **balanced structural rearrangement** is a chromosomal alteration in which chromosomal segments are rearranged without an overall gain or loss of genetic material. Common forms include **reciprocal translocations**, **Robertsonian translocations**, **inversions**, **insertions**, **deletions**, and **duplications**.

Although carriers of balanced rearrangements are usually phenotypically normal, they are at increased risk of producing embryos with **unbalanced chromosomal content**, resulting in gain and/or loss of chromosomal segments. Such imbalances may be associated with **infertility**, **implantation failure**, **miscarriage**, or the **birth of a child with congenital anomalies**, **developmental delay**, or **intellectual disability**.

1 in 500

Approximately **1 in 500 individuals** carries a balanced chromosomal structural rearrangement.

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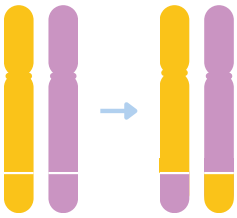
TYPES OF STRUCTURAL REARRANGEMENTS

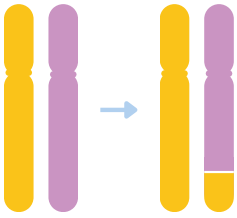
Balanced Reciprocal translocation

Occurs when segments from two chromosomes break and exchange positions without net gain or loss of chromosomal material.



Balanced

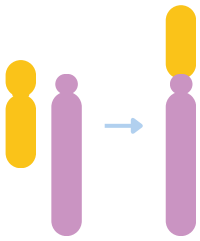
When chromosomal exchange results in extra or missing genetic material, the rearrangement is unbalanced and may have significant clinical consequences.



Unbalanced

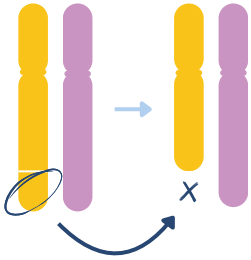
Robertsonian translocation

A specific type of rearrangement involving fusion of the long arms of two acrocentric chromosomes, typically chromosomes 13, 14, 15, 21, or 22. This may lead to gametes with unbalanced chromosomal content.



Deletion

Loss of a chromosomal segment resulting from DNA breakage.



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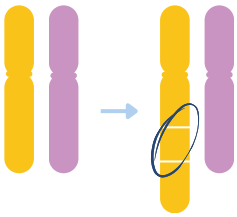
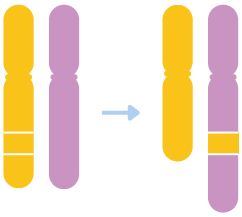
Duplication

Gain of an additional copy of a chromosomal segment.



Insertion

An insertion occurs when a fragment from one chromosome is inserted into another chromosomal location.

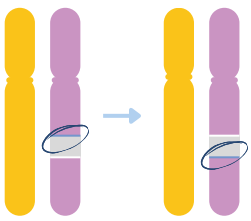


Inversion

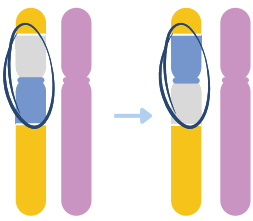
Occurs when a chromosomal segment breaks in two places, rotates, and reinserts in the opposite orientation. Inversions may be classified as:

- **Paracentric inversions**, when the inverted segment does not include the centromere
- **Pericentric inversions**, when the inverted segment includes the centromere

During meiosis, inversions may give rise to gametes carrying duplicated and/or deleted chromosomal regions.



Paracentric inversion



Pericentric inversion

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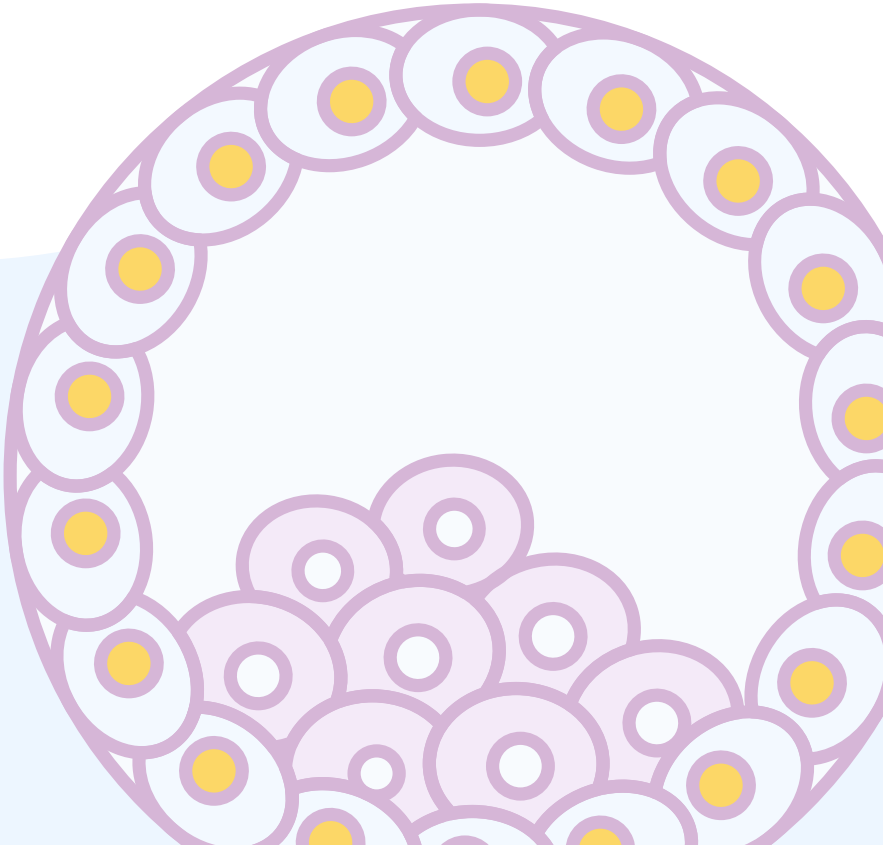
WHAT IS PGT-SR?

In individuals carrying a **balanced structural chromosomal rearrangement**, such as a chromosomal translocation, a substantial proportion of the gametes produced may be **chromosomally unbalanced**, and the same may consequently apply to the embryos derived from them. In these situations, reproductive risk is increased both in terms of **reduced fertility**, associated with a high incidence of chromosomally unbalanced embryos, and the possibility of conceiving a child affected by a chromosomal abnormality.

Within this context, **Preimplantation Genetic Testing for Structural Rearrangements** (**PGT-SR**) enables the identification and selection of embryos free from chromosomal imbalance, thereby contributing to improve reproductive outcomes and reducing the risk of **miscarriage**, as well as pregnancies or live births affected by severe chromosomal abnormalities.

PGT-SR can be applied across a broad range of structural chromosomal rearrangements, including:

- **reciprocal translocations**
- **Robertsonian translocations**
- **inversions**
- **deletions**
- **duplications**



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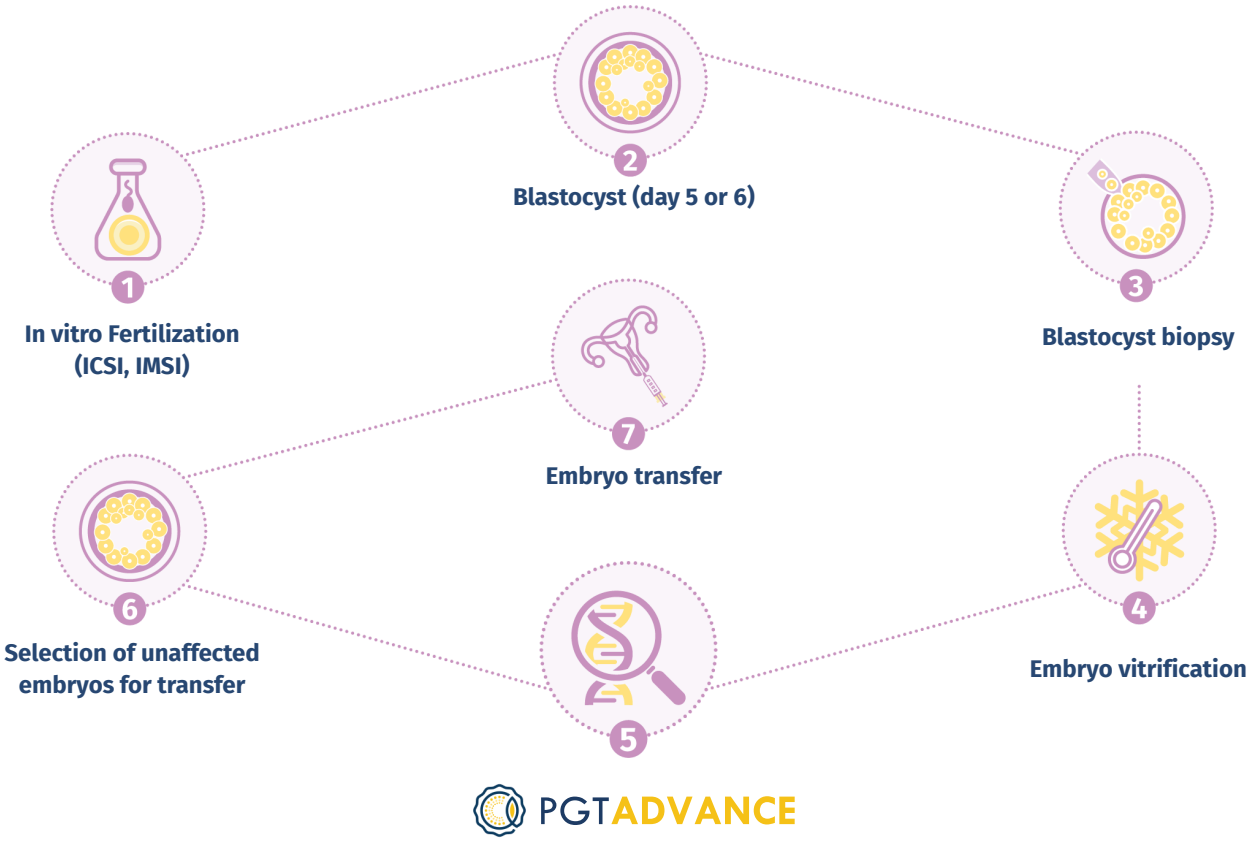
PGT-SR PROCEDURE



PGT-SR combines **in vitro fertilization** (**IVF**) techniques with the most advanced applications of molecular genetics, providing a sophisticated approach to embryo genetic assessment before transfer. The process begins with a medically assisted reproduction treatment cycle **(1)**, aimed at retrieving oocytes, which are then fertilized with paternal sperm to generate embryos in vitro.

Once the embryos reach the **blastocyst** stage **(2)**, they undergo **trophectoderm biopsy (3)**, a procedure that allows a small number of embryonic cells to be collected for genetic analysis. The embryos are subsequently **cryopreserved (4)** while awaiting the test results. The DNA from each embryo is then analyzed using the **PGT-SR** approach **(5)**. Embryos found to be **unaffected** by the specific genetic condition under investigation are subsequently selected **(6)** for **uterine transfer (7)**, with the aim of achieving a pregnancy unaffected by the disorder being tested.

PGTADVANCE SR

Advanced detection of chromosomal rearrangements in embyos

ADVANCED DETECTION OF CHROMOSOMAL REARRANGEMENTS IN EMBRYOS

PGTADVANCE-SR is GENOMICA's advanced **PGT-SR platform**, developed for couples in which one or both partners carry a structural chromosome rearrangement.
The assay analyzes embryos generated through IVF to distinguish embryos that are **normal or balanced** for the parental rearrangement from those with **unbalanced chromosomal content**, thereby reducing the risk of miscarriage and chromosomally abnormal pregnancy.

High-confidence detection of chromosomal imbalance

PGTADVANCE-SR is performed using **next-generation sequencing** (**NGS**) combined with **SNP-based analysis**, enabling a dual-assessment strategy that provides greater robustness than copy-number analysis alone and supports more informed embryo transfer decisions.

In addition to detecting imbalances associated with the parental rearrangement, **PGTADVANCE-SR** also includes assessment of **aneuploidies**, thereby **incorporating the analytical scope of PGT-A into the PGT-SR workflow**.

PGTADVANCE SR → **>99%**
accuracy for detecting chromosomal imbalances and aneuploidy.

PGTADVANCE SR

Advanced detection of chromosomal rearrangements in embyos

WHY CHOOSE PGTADVANCE-SR?

Unlike conventional PGT-SR methods based primarily on DNA quantity assessment alone, **PGTADVANCE-SR** uses the proprietary **Dual-Seq** technology, which integrates two distinct analytical methods:

1. **Copy-number assessment by NGS**
   High-resolution sequencing of the embryonic genome using NGS technology, which enables **DNA** quantification across millions of genomic positions on each chromosome, allowing highly accurate determination of chromosomal copy number.

2. **SNP-based B-Allele Frequency (BAF) analysis**
   Analysis of thousands of **single nucleotide polymorphisms (SNPs)** through evaluation of **B-Allele Frequency (BAF)**, aimed at providing orthogonal confirmation of the copy-number results and enhancing the interpretive power of the test.

THE BENEFIT OF DUAL ANALYSIS

In addition to quantifying DNA copy number across the genome, **PGTADVANCE-SR** examines thousands of genomic loci at which the DNA sequence may vary between individuals — variations known as **single nucleotide polymorphisms** (**SNPs**). These variations provide an additional, independent layer of information that strengthens result interpretation.

Supported by **advanced bioinformatic tools** and **machine-learning algorithms**, this dual strategy delivers embryo chromosomal assessment with superior accuracy and reliability compared with conventional approaches based solely on quantitative copy-number analysis, increasing confidence in result interpretation and supporting more precise embryo selection.

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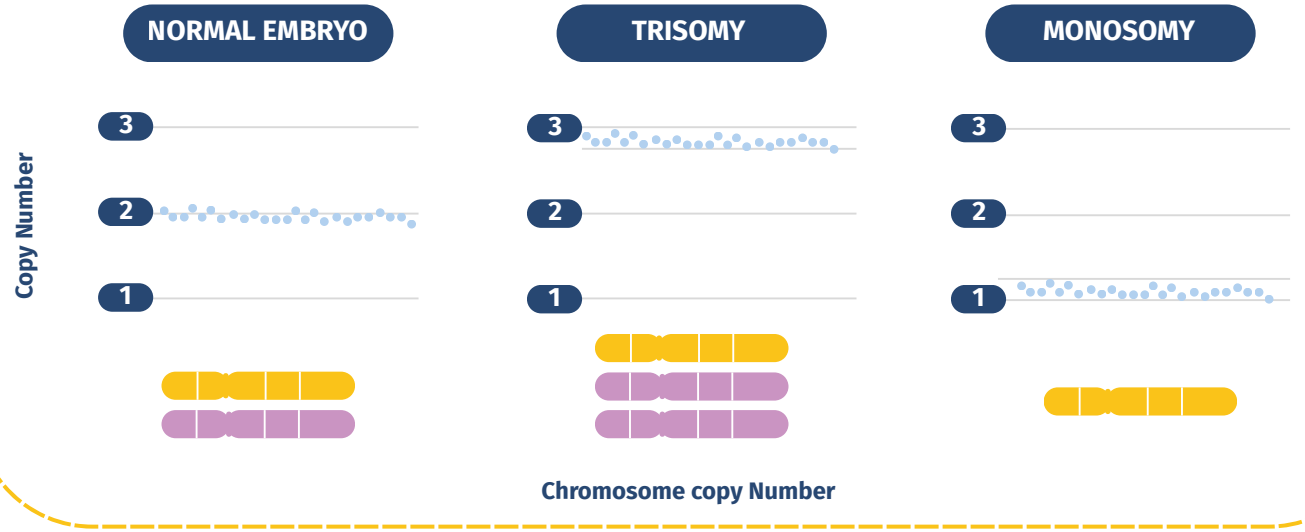
Advanced detection of chromosomal rearrangements in embryos

TWO TECHNOLOGIES. ONE HIGHLY CONFIDENT RESULT

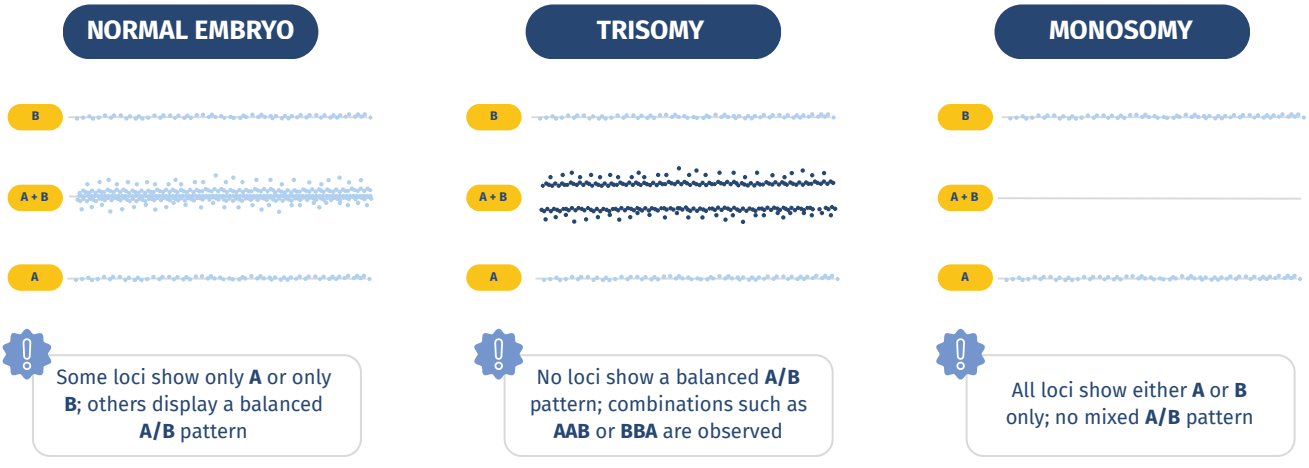
1 NGS-based copy-number assessment

Next-generation sequencing quantifies DNA across millions of genomic positions on each chromosome, enabling highly accurate estimation of chromosome copy number.



2 SNP-based BAF analysis

Thousands of SNP loci are analyzed in parallel to identify characteristic allele patterns that distinguish euploid, monosomic, trisomic, haploid, and triploid states — each displaying distinct SNP signatures.



At each locus, the sequence may be represented by one of two possible forms, conventionally referred to as **A** or **B**. The allelic distribution follows characteristic patterns in different chromosomal states, enabling more accurate differentiation between **euploid**, **trisomic**, and **monosomic** embryos.

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Advanced detection of chromosomal rearrangements in embyos

TWO TESTING OPTIONS TAILORED TO YOUR CLINICAL NEEDS

PGTADVANCE SR

GENOMICA's advanced in-house PGT-SR solution for highly accurate detection of chromosomal structural imbalances in IVF-derived embryos from carriers of balanced rearrangements.

PGTADVANCE SR *Plus*

GENOMICA's most comprehensive PGT-SR workflow, expanding beyond standard PGT-SR to provide additional diagnostic and quality-control features to address more complex clinical scenarios.

PGTADVANCE-SR Plus is particularly suitable for detection of **very small chromosomal imbalances (>1 Mb)** resulting from a parental structural rearrangement.

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Advanced detection of chromosomal rearrangements in embyos

WHAT PGTADVANCE-SR DETECTS

Chromosomal structural imbalance

Gain or loss of chromosomal segments resulting from a parental structural rearrangement.
PGTADVANCE-SR typically supports detection of structural imbalance **>6 Mb**.

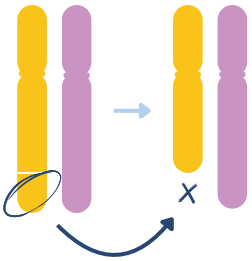
Whole-Chromosome Aneuploidy

Gain or loss of one or more entire chromosomes.

Segmental Aneuploidy

Gain or loss of a chromosomal segment.

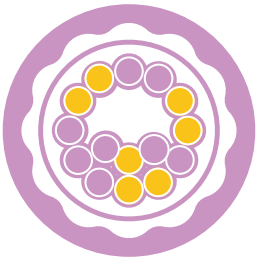
PGTADVANCE-SR supports detection of segmental abnormalities typically **>6 Mb.**



Mosaicism

Presence of both chromosomally normal and abnormal cell lines within the same embryo biopsy sample.

- **High-degree mosaicism**: approximately **50–80%** abnormal cells
- **Low-degree mosaicism**: approximately **30–50%** abnormal cells



Mosaic findings are associated with reduced implantation potential and increased miscarriage risk, although healthy live births from mosaic embryo transfer have been reported.

PGTADVANCE SR Plus

Advanced detection of chromosomal rearrangements in embyos

BEYOND STANDARD DETECTION OF CHROMOSOMAL REARRANGEMENTS

To further enhance the clinical performance of PGT-SR, **GENOMICA** has developed and validated a parallel **SNP-based NGS strategy** that complements conventional chromosome copy-number analysis and enables the identification of abnormalities not detected by standard workflows alone.

Single nucleotide polymorphisms (**SNPs**) — single-base sequence variations distributed throughout the genome — provide characteristic inheritance patterns that can be leveraged to detect ploidy abnormalities, contamination, and genetic relatedness between samples.

This integrated dual assessment strategy substantially expand the diagnostic reach of embryo testing and forms the foundation of **PGTADVANCE-SR Plus**.

PGTADVANCE-SR Plus is designed for clinics requiring the most comprehensive embryo genetic assessment available within a PGT-SR workflow, delivering a new standard of care through broader diagnostic insight and greater confidence in embryo selection.

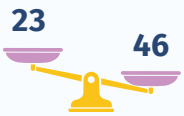
PGTADVANCE SR Plus

Advanced detection of chromosomal rearrangements in embyos

KEY ADVANCED FEATURES OF PGTADVANCE-SR Plus

Microdeletion / Microduplication Syndromes

Detection of clinically relevant chromosomal microdeletions and microduplications associated with well-characterized genetic syndromes. These abnormalities frequently arise ***de novo*** and may carry significant clinical consequences, including structural malformations, neurodevelopmental impairment, and intellectual disability.



Ploidy Detection

Identification of **haploidy** and **triploidy** — including forms not reliably captured by standard NGS-only workflows — helping minimize the risk of transferring embryos with clinically significant ploidy abnormalities

Uniparental disomy (UPD)

Detection of uniparental disomy, a clinically relevant condition in which both copies of a chromosome are inherited from the same parent.

Origin of Aneuploidy

Insight into the **gametic origin** of chromosomal abnormalities, supporting clinical counseling and informing future reproductive decisions, including the consideration of donor gametes.

Cohort Check

Confirmation of expected **genetic relatedness** among embryos within the same tested cohort, a quality-control measure aimed at providing an additional layer of reassurance against the risk of accidental sample mix-up and supporting laboratory traceability.

DNA Fingerprinting

When parental samples are provided, **genetic concordance** between embryo biopsies and parental DNA can be confirmed, reducing patient concerns regarding sample identity and gamete origin.

DNA Contamination Detection

Dedicated measures to identify both **external contamination** and **maternal** or **cumulus cell contamination**, substantially reducing the risk of misclassification and increasing overall confidence in reported results.

PGTADVANCE SR

Advanced detection of chromosomal rearrangements in embyos

CHOOSE THE PGT-SR SOLUTION THAT FITS YOUR CLINICAL NEEDS

COMPARATIVE FEATURE OVERVIEW

Feature	PGTADVANCE-SR	PGTADVANCE-SR Plus
Core technology	NGS + SNP-based analysis	NGS + SNP-based analysis
Chromosomal structural imbalance detection	>6 Mb	>1 Mb
Whole-chromosome aneuploidy	✓	✓
Mosaicism detection	✓	✓
Segmental imbalance detection	>6 Mb	>1 Mb
Microdeletion/microduplication syndromes	–	✓
Ploidy detection (haploidy / triploidy)	–	✓
Uniparental disomy	–	✓
Genetic PN Check	–	✓
Origin of aneuploidy assessment	–	✓*
Cohort check (embryo sibling QC)	–	✓
DNA fingerprinting	Optional*	Optional*
Accuracy	~99%	~99%

** Requires parental samples*

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Advanced detection of chromosomal rearrangements in embyos

CLINICAL INDICATIONS

PGTADVANCE SR

PGTADVANCE-SR is intended for couples in which one or both partners are known carriers of a structural rearrangement.
Types of rearrangement that can be tested include:

- **reciprocal translocations**
- **Robertsonian translocations**
- **deletions**
- **pericentric inversions**
- **paracentric inversions**
- **insertions**

PGTADVANCE-SR is indicated for any couple in which one or both members carry a balanced structural rearrangement and wish to reduce the risk of transferring an embryo with an unbalanced chromosomal profile.

PGTADVANCE SR *Plus*

PGTADVANCE-SR Plus is especially recommended for:

- detection of **very small** (**>1 Mb**) chromosomal segments resulting from a parental structural rearrangement;
- rescue testing of morphologically high-quality embryos derived from abnormally fertilized oocytes (**0PN, 1PN, 2.1PN/3PN**)
- previous or recurrent **triploid pregnancy**
- **recurrent or sporadic miscarriage following conventional PGT-A**
- **severe male factor infertility** or elevated sperm diploidy rates

PGTADVANCE SR

Advanced detection of chromosomal rearrangements in embyos

BENEFITS FOR CLINICS AND PATIENTS

Broad, accurate chromosome analysis
NGS and SNP integration delivers highly reliable assessment of embryo chromosomal status

Two independent analytical layers
Orthogonal copy-number and SNP-based data for more robust interpretation

Reduced misclassification risk
Advanced analytics minimize over-calling and unnecessary exclusion of viable embryos

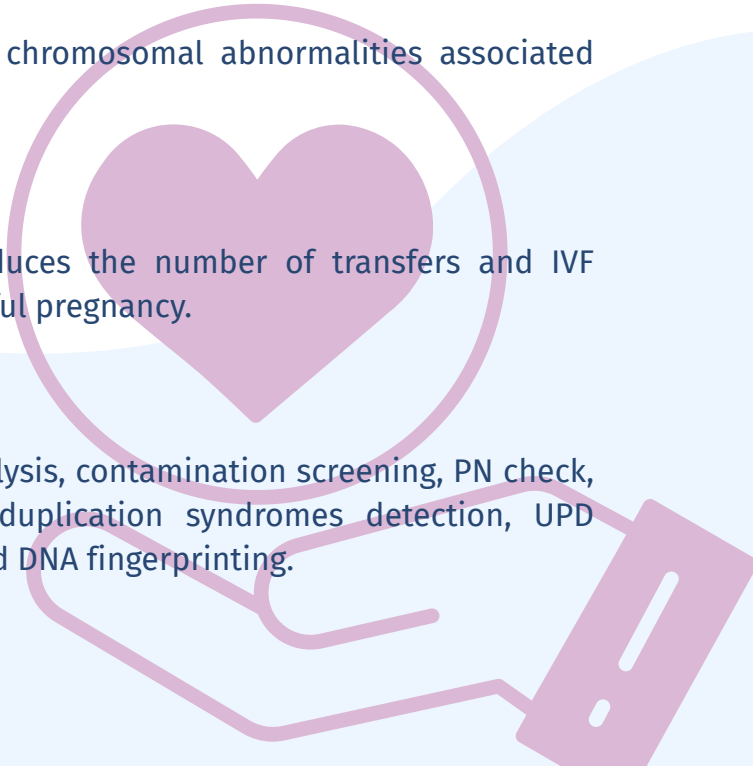
Improved embryo selection
Supports prioritization of embryos with the highest reproductive potential

Support for single embryo transfer
Facilitates SET, reducing the risk of multiple pregnancy and associated complications

Reduced miscarriage risk
Prevents transfer of embryos with chromosomal abnormalities associated with pregnancy loss

Faster time to pregnancy
Improved embryo prioritization reduces the number of transfers and IVF cycles required to achieve a successful pregnancy.

Expanded clinical insight
PGTADVANCE-A Plus adds ploidy analysis, contamination screening, PN check, cohort QC, microdeletion / microduplication syndromes detection, UPD assessment, origin of aneuploidy and DNA fingerprinting.



PGTADVANCE SR

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WHAT MAKES PGTADVANCE-SR DIFFERENT

A Proprietary Platform Developed for Superior Embryo Assessment

1. **Custom-developed in-house assay**
   Proprietary platform designed to overcome key limitations of off-the-shelf PGT-SR solutions.

2. **NGS + SNP dual strategy**
   Two independent genomic assessments for greater confidence and accuracy.

3. **Advanced bioinformatics and machine learning**
   Proprietary algorithms minimize analytical subjectivity and support objective, high-quality interpretation.

4. **Detection of very small (>1Mb) structural imbalances**
   Particularly suited for the detection of small chromosomal imbalances resulting from a parental structural rearrangement.

5. **Detection of segmental abnormalities and mosaicism**
   Clinically relevant detection of segmental gains / losses and mosaic chromosomal patterns.

6. **Ploidy and UPD detection**
   Identification of UPD, haploidy and triploidy, including forms not captured by NGS-only workflows.

7. **Genetic PN Check**
   Molecular fertilization assessment that may expand the pool of embryos eligible for transfer.

8. **Cohort embryo sibling QC**
   Confirms expected genetic relatedness within an embryo cohort.

9. **DNA contamination detection**
   Identifies external and maternal contamination to reduce the risk of misdiagnosis.

10. **DNA fingerprinting capability**
    Optional parental matching to confirm embryo identity and gamete origin.

11. **Extensive validation**
    Rigorous analytical and clinical validation for evidence-based embryo testing.

PGTADVANCE SR

Advanced detection of chromosomal rearrangements in embyos

CLINICAL PATHWAY

A Simple five-Step Process from referral to embryo transfer

To assess whether PGT-SR can be provided, GENOMICA first reviews the **karyotype** and, when necessary, performs a preliminary feasibility assessment. Once suitability has been confirmed, embryo biopsy samples may be submitted for PGT-SR and concurrent assessment of numerical chromosome abnormalities by NGS.

TAT - 10 working days*

A detailed genetic report is typically issued **within 10 working days** from receipt of biopsy samples.

FIVE EASY STEPS

1. **Referral & Specialist case review**
   Genetic documentation, including the karyotype report, is received and assessed for technical feasibility by the PGT specialist team.
2. **IVF cycle & embryo biopsy**
   The IVF clinic initiates ovarian stimulation and fertilization according to its clinical protocols. Embryos are generated, and trophectoderm biopsy samples are collected at the blastocyst stage.
3. **Shipment of biopsied samples**
   Biopsy samples are transported to GENOMICA under validated shipping conditions.
4. **PGTADVANCE-SR and results reporting**
   Embryonic DNA is analyzed using the **PGTADVANCE-SR** assay to detect unbalanced structural chromosomal rearrangements and associated chromosomal abnormalities. A formal genetic report is issued to the referring IVF team.
5. **Transfer planning**
   Embryos classified as normal or balanced are considered eligible for transfer according to the clinical treatment plan.

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WHY GENOMICA

A Proven Legacy in Reproductive Genetics

GENOMICA builds upon the collective expertise of specialists with more than **25 years of experience in preimplantation genetic testing**, combining established scientific knowledge with advanced molecular technologies to support accurate and clinically meaningful embryo assessment.

This longstanding commitment reflects a continuous dedication to innovation in reproductive genetics and to the ongoing refinement of PGT methodologies for clinical practice.

High Accuracy. Greater Confidence.

Improved genome coverage, optimized analytical workflows, and case-specific assay design contribute to highly reliable PGT results and increased confidence in embryo classification.

Through the integration of advanced laboratory methodologies, specialist clinical interpretation, and individualized case management, GENOMICA delivers a high standard of service for both clinicians and patients.

Genomica's commitment includes:

- **specialist genetic counseling support** at all stages of the testing process;
- **advanced nucleic acid amplification** and **analytical technologies**;
- **high quality laboratory** and **clinical service standards**;
- strong focus on analytical **accuracy**, result **reliability**, and individualized **patient care**.

GENOMICA
Next Generation Genetics

Excellence in Reproductive Genetics

GENOMICA is a highly specialized diagnostic laboratory and a recognized center of excellence in **reproductive genetics**, active in both **clinical diagnostics** and **scientific research**. Supported by a team with more than **25 years of experience in molecular diagnostics**, GENOMICA combines scientific expertise, advanced technology, and a strong commitment to continuous innovation to provide high-quality reproductive genetic services to IVF clinics worldwide.

Over **100.000 genetic tests/year**

Dedicated **R&D Team**

Personalized genetic counseling with genetic counselors experts in discussing genetic test results and familial risks

Laboratories with **groundbreaking technologies** and high quality standards

ISO 9001 certified laboratory

Rapid Turnaround Time

PGTAdvance_PGT-SR ENG rev.00

LABORATORIES

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Visit the website dedicated to the test