ENABLING THE ADVANCEMENT OF
PRENATAL GENETIC TESTING

SERASEQ® REFERENCE MATERIALS FOR REPRODUCTIVE HEALTH

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Complex NGS NIPT assays require sophisticated, ground-truth reference materials

Non-invasive prenatal test (NIPT) based on cell-free DNA in the maternal blood circulation continues to be widely adopted by clinical laboratories around the world. Thanks to continuous technology advancement, they allow screening for not only the most common fetal aneuploidies such as trisomy 21 (Down Syndrome) but also other autosomal and sex chromosome aneuploidies as well as some microdeletions, large copy number variants, and monogenic disorders.

Due to low incidence of some chromosome aberrations (1:50,000 for rare microdeletions), it is often difficult for laboratories to find positive patient samples to robustly evaluate their test performance characteristics. Inadequately validated NIPT assays may result in false results, which can lead to anxiety, invasive diagnostic tests, and difficult decisions for future parents. Moreover, the existence of various testing platforms (chromosome counting, SNP frequencies, microarray etc.), different bioinformatic pipelines and sensitivity of the technology make the development, validation, and comparison of NIPT assays even more challenging.

A critical component of a robust molecular assay is the reference material, which ensures the test is performing as expected and delivers confidence in results used to guide pregnancy outcomes. Not all reference materials are created equal, and selection of the provider and quality standards is a key consideration when a new assay is developed, validated, and monitored.

Reference materials from LGC SeraCare are the industry gold standard

As the leading provider of off-the-shelf and custom reference materials, we support NIPT assay development, validation and routine monitoring; leading to increased confidence in the clinical deployment of these assays and ensuring the highest quality and safety for patients.

Expert-designed reference materials to support the entire assay lifecycle

DEVELOPMENT

Designing clinical assays that are highly specific, sensitive and robust is crucial.

Seraseq reference materials support the development and validation of new assays by providing a patient-like solution to hard-to-source, low volume and rare clinical samples.

Assay variability is reduced thanks to lot-to-lot consistency, long-term stability and the sustainable source of our reference materials.

ANALYTICAL VALIDATION

When first implemented in a clinical setting, an assay must be validated to ensure that the test is suitable for its intended purpose.

It is essential for providing a safe and useful service to clinicians and patients.

With the extremely low availability and stability of clinical samples; Seraseq reference materials are the perfect surrogate solution.

PERFORMANCE MONITORING

To ensure a method is working consistently, internal quality controls (IQC) should be implemented. Not only can they improve the consistency of assay performance; QC gives the laboratory confidence in results – in other words, decide whether a clinical test result can be trusted and is reliable before being reported to patients.

Given the clinical implications of the test result, it is critical that NIPT assays report back presence or absence of aneuploidies accurately and consistently.

TROUBLESHOOTING

Strong quality control measures are required in each step of the workflow to identify, monitor, and mitigate errors. NGS workflows have many complex steps that need to be tracked and controlled carefully to achieve consistency.

Appropriate reference materials formulated to mimic patient samples support quality assurance programs. They can highlight suboptimal performance and help in identifying and correcting the root cause.

PERSONNEL TRAINING

As per regulatory requirements, all procedures must be performed exclusively by trained and skilled employees.

Personnel on-the-job training should not only be offered frequently, but also accurately and in real-case scenarios.

It is therefore essential to have quality reference materials to ensure adequate training.

COMPLIANCE

Establishments that comply with CLIA, CAP and certain ISO standards require participation in external quality assessment (EQA) or proficiency testing (PT) which represent an external comparison of clinical, analytical, and interpretation performance between laboratories and against international standards.

They are essential to ensure result concordance and accuracy. It is especially important as NIPT is delivered using a variety of methodologies.

EQA performance can be utilized as a tangible measure of the quality of a laboratory's performance.

Seraseq reference materials are used by international leaders of EQA schemes and proficiency testing exercises.

Seraseq® Innovative Design Process

Seraseq® NIPT reference materials are manufactured from cfDNA extracted from plasma of pregnant patients carrying a known and confirmed aneuploidy. First, the cfDNA is isolated and amplified via a proprietary patent-pending method. This manufacturing process maintains natural cfDNA size profiles of both fetal and maternal cfDNA of approximately 170bp on average, the fetal fraction of the original sample, the single-nucleotide polymorphism (SNP) content of mother and fetus, as well as the size difference of the cfDNA.

This DNA is then innovatively stabilized via encapsulation and introduced into a dilution of simulated plasma matrix. This makes our materials look and perform like the real patient samples they were derived from.

Source plasma consisting of material and fetal cfDNA

Extract cfDNA

Amplified libraries

Encapsulated

Mixed in plasma-based matrix

It is important that quality-control materials be as similar to patient specimens in order to monitor the quality of all analytical steps of the testing process.

As close to a patient sample as technologically feasible

Patient-matched

Seraseq reference materials are the only patient-derived and patient-matched reference materials available on the market. They are derived from real clinical samples rather than cell-lines thus avoiding the inherent limitations of artificially made genomic DNA.

Mechanisms responsible for the characteristics of circulating nucleic acids are still poorly understood. However, it is known that mechanical shearing of DNA produces fragments which differ in size distribution from those found in maternal serum, with less small DNA fragments present. This is due to the lack of nucleases which are involved in the fragmentation of plasma cfDNA.

This is extremely important as some NIPT bioinformatics pipeline are based on different maternal and fetal cfDNA representations (multivariate machine learning methods, SeqFF for fetal fraction estimation, single-nucleotide polymorphism (SNP)-based methods, etc.).

NIPT Platform Agnostic

Compatible with all NGS NIPT on the market, including SNP-based fetal fraction estimation methods assays.

High-Quality

Produced in ISO 13485 certified, cGMP compliant, US-FDA audited facilities, Seraseq reference materials are traceable from sourcing through processing and delivery to provide you with the highest level of confidence. They provide lot-to-lot consistency and long-term stability of up to 4 years.

Further quality checks are established by an external NIPT laboratory to ensure accuracy.

Full-process

Quality control in NIPT should evaluate every stage of the procedure. Supplied in our in-house artificial plasma, SeraCon Matribase, Seraseq mimic clinical samples and allow monitoring of an entire NIPT workflow: from DNA extraction to reporting of test results including sample registration.

NIPT Product List

Patient-derived Reference Materials

Condition	Material Number	Product	Size	Concentration and Fetal Fraction
T21	0720-0167	Seraseq® Trisomy 21 Male – Matched Reference Material	1 vial x 1 mL	Please refer to the Technical Product Report for more information.
	0720-0168	Seraseq® Trisomy 21 Female – Matched Reference Material		
Euploid	0720-0169	Seraseq® Euploid Male – Matched Reference Material		
	0720-0170	Seraseq® Euploid Female – Matched Reference Material		
T18	0720-0171	Seraseq® Trisomy 18 Male – Matched Reference Material		
	0720-0172	Seraseq® Trisomy 18 Female – Matched Reference Material		
22q11	0720-0173	Seraseq® 22q11 Male – Matched Reference Material		
T13	0720-0779	Seraseq® Trisomy 13 Male – Matched Reference Material		
Sex Chromosome Aneuploidies	0720-0952	Seraseq® Turner Syndrome (XO) Reference Material		
	0720-0953	Seraseq® Klinefelter Syndrome (XXY) Reference Material		
	0720-0954	Seraseq® Jacobs Syndrome (XYY) Reference Material		

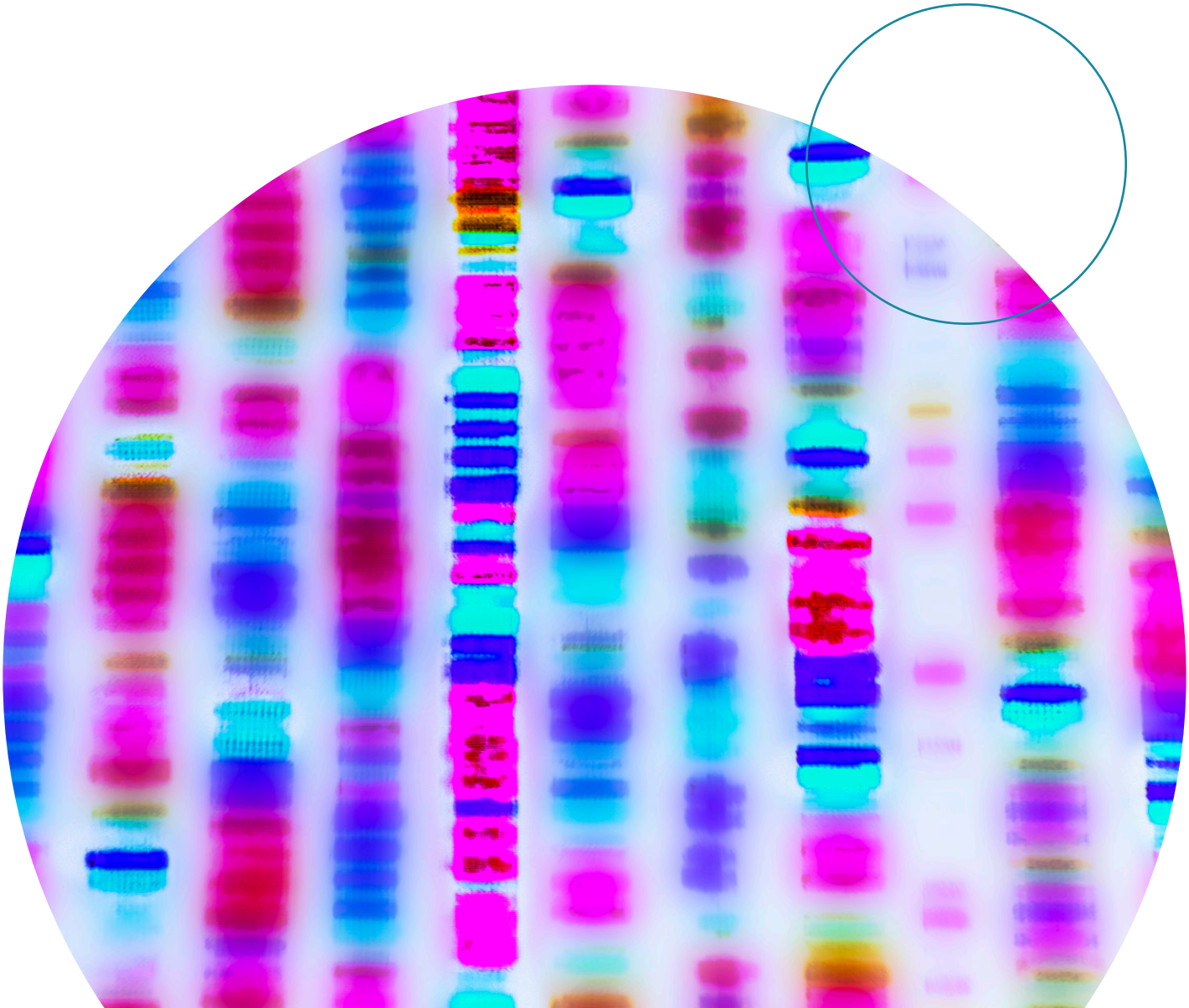
Compatible with all NGS platforms including SNP-based fetal fraction estimation methods assays which determine the chromosomal copy number by looking for specific patterns in allelic measurements/targeted MPS methods analyze enriched regions on specific chromosome selectively. For rolling-amplification assays, such as the Vanadis® NIPT platform (PerkinElmer, Inc) we offer cell-line based reference materials. Please contact us for more information.

Our Custom Offering

We design and produce sophisticated, high quality reference materials tailored to your specifications.

With our custom services, you have a high degree of flexibility, access to our technical and scientific experts, and a rapid turnaround time for your unique requirements and complex biomarkers.

Our NIPT and PGT-A products can be customized with regard to concentration, fetal fraction ratio, format, volume or blending to create mosaicism samples.



Preimplantation Genetic Testing for Aneuploidies (PGT-A)

Assay validation and daily-run QC material

Pre-implantation Genetic Testing (PGT) is a genetic test performed on embryos produced by in vitro fertilization (IVF). The aim of the testing is to screen embryos for genetic anomalies and improve the odds of a successful pregnancy.

PGT for chromosomal aneuploidies (PGT-A) is the most commonly used screening method.

LGC SeraCare offers PGT-A reference materials for the most common trisomies 21, 18 and 13 along with euploid material which can be used as a negative reference.

PGT-A Product List

Material Number	Product	Size
0720-0775	Seraseq® PGT-A Trisomy 21 Reference Material	1 vial x 10 uL
0720-0776	Seraseq® PGT-A Trisomy 18 Reference Material	
0720-0777	Seraseq® PGT-A Trisomy 13 Reference Material	
0720-0778	Seraseq® PGT-A Euploid Reference Material	

These products **can be customized** with regard to concentration, volume or blending to create mosaicism samples.

Reliable, consistent reference material

Seraseq PGT-A Reference Materials are produced from gDNA extracted from a fetal source sample with confirmed Trisomy (or Euploid status) and provided in a 1 mM Tris / 0.1 mM EDTA pH 8.0 buffer.

Developed under cGMP compliance in ISO 13485 certified facilities, our products provide a consistent source of reference material for your PGT assay. This not only ensures a reliable supply which is consistent from lot-to-lot; it also eliminates the need to obtain, characterize, blend, and document your own mixes of cell lines, saving you time and resources in your assay development and validation efforts.

- Ideal for introduction to the PGT-A workflow at the WGA (amplification) step
- Compatible with NGS as well as array-based PGT-A assays
- Eliminate the need to find, source and maintain remnant samples
- Can be used for PGT-A assay development, validation or routine QC
- Conveniently formatted for ease of use
- Save time, cost and increase QC consistency

About LGC SeraCare, Part of LGC Clinical Diagnostics

LGC SeraCare offers a comprehensive portfolio of reference materials for oncology and reproductive health, designed and manufactured to meet the precision demanded by NGS assays. The portfolio includes high quality ground-truth RNA, ctDNA and genomic DNA-based reference materials that are NGS platform agnostic for tumor profiling, immuno-oncology, liquid biopsy, NIPT and germline cancer assay workflows.

LGC SeraCare is now part of LGC Clinical Diagnostics, Inc. LGC Clinical Diagnostics develops and manufactures over 3,650 catalog and custom-developed diagnostic quality solutions and component materials for the extended life sciences industry. We partner with IVD assay developers, and pharmaceutical, CRO and academic institutions in commercialization activities across the entire diagnostic pipeline - from concept and early stage research, through expedited product development and onwards into routine clinical use. Laboratory and diagnostic professionals across disciplines of clinical chemistry, immunochemistry, serology, molecular diagnostics, and clinical genomics rely on LGC's products to support accurate and reliable diagnostic results.

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