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PRENATAL Screening

With MFine Diagnostics

SCREENED 7 LAKHS+ PREGNANCIES

Prenatal screening is essential in every pregnancy, it provides an accurate assessment of the risk of carrying a fetus with a chromosomal disorder

ACOG SMFM

American College of Obstetricians and Gynecologists (ACOG) and Society of Maternal-Fetal Medicine (SMFM) recommends that all pregnant women, regardless of their age and risk factors, be offered aneuploidy screening before 20 weeks.

Universal prenatal screening is advisable for common genetic disorders and congenital anomalies such as Down syndrome, beta-thalassaemia and neural tube defects. *[Phadke SR, Puri RD, Ranganath P. Prenatal screening for genetic disorders: Suggested guidelines for the Indian Scenario. Indian J Med Res. 2017;146(6):689-699.]*

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What is
Prenatal Screening?

Prenatal screening allows early identification of any possible risk of chromosomal conditions in the fetus, including Down syndrome, Edwards syndrome, Patau syndrome, and open neural tube defects (ONTDs).

It includes a routine blood test, along with medical history and age, and an ultrasound scan to identify the risk. Early screening is particularly important because it gives parents and doctors more time to consider the next steps in managing the pregnancy if the risk is high.

THESE ARE SIMPLE TESTS AND REQUIRE A FEW ML OF MATERNAL SERUM

Quick | Non-invasive | Simple | Safe

PRENATAL Screening

- Fetal risk assesment
- Helps the couple make an informed decision; based on further confirmatory diagnostic tests
- Helps ensures necessary medical care and support during pre & post pregnancy
- It reassures expectant parents when the test results are normal

SCREENING TESTS ARE DONE DURING 1ST & 2ND TRIMESTER OF PREGNANCY

Clinical Utility of
Prenatal Screening

- Every human has 23 pairs of chromosomes, one from the mother and one from the father.
- Chromosomal abnormalities may occur if there are changes in the number (extra or missing chromosome) or structure of the chromosome (deletion or duplication in a part of a chromosome).
- Chromosomal abnormalities are **common**, present in approximately 1 in 150 live births *[Nussbaum R L, McInnes R R, Willard H F. Philadelphia, PA: Elsevier; 2016. Principles of clinical cytogenetics and genome analysis.]*
- **They may be present irrespective of clinical history or age.** Though the risk increases with age, it is found that more than 80% of Down's syndrome babies are born to younger mothers. *[Ref. https://www.cdc.gov/ncbddd/birthdefects/downsyndrome.html]*
- Prenatal screening for common genetic disorders and congenital disabilities with a poor prognosis allows **identification of at risk fetuses** for further prenatal diagnostic testing.
- Prenatal Screening **reduces the number of invasive procedures**, thereby reducing the number of miscarriages of healthy fetuses.
- Prenatal Screening is a globally accepted strategy for reducing the burden of genetic disorders in a **preemptive and cost effective manner.**

1st Trimester SCREENING

(11–13 weeks, 6 days)

The advantage of First Trimester testing is that it offers a higher Detection Rate and more time for counseling, consideration, and action if the risk of an abnormality is found to be high.

Combined Screening

Clinical Utility:

Identifies pregnancies with higher risk of chromosomal

Risk Score Is Calculated Based On:

Levels of PAPP-A and free B-HCG in maternal blood sample; Nuchal translucency (NT) and nasal bone measurement obtained by ultrasound and maternal medical history and maternal age

TEST DETAILS:

Performed between 11 to 13+6 weeks GA OR for CRL value bet 45-84 mm

- Detection Rate (DR) - 90%
- False Positive Rate - 5%
- Software & Platform - Lifecycle or Astraia on Autodelfia (TRFA) | Prisca Ver.5 on CLIA

Applicable for Singleton and Twin Pregnancy

Reference: Screening for fetal chromosomal abnormalities: ACOG Practice Bulletin Summary, No. 226. Obstet Gynecol. 2020;136(4):859-867.

First Trimester Quad Screening (1T QUAD)

Clinical Utility:

Enhanced Screening to assess the risk of Chromosomal aneuploidy (T13, T18, T21) and Preeclampsia at one go!

- Preeclampsia is a serious pregnancy complication affecting 8-10% pregnancies. *[Fox R et al. 2019, J Clin Med.]* Screening in the first trimester as per the FMF algorithm offers a reliable way to access the risk and offer intervention to prevent it.
- Moveover, the additional markers, serum placental growth factor (PlGF) and alpha fetoprotein (AFP), improve detection rates and reduce the need for invasive testing.

Risk Score Is Calculated Based On:

- Maternal medical history assessment along with maternal age, height and weight
- PAPP-A, free B-HCG, PlGF and AFP
- Uterine artery Pulsatility Index (UTPI) and nuchal translucency (NT) and nasal bone measurement obtained by ultrasound
- Mean arterial blood pressure (MAP)

TEST DETAILS:

Performed between 11 to 13+6 weeks GA OR for CRL value bet 45-84 mm

- Detection Rate (DR) - 92%
- False Positive Rate - 3%
- Software & Platform - Lifecycle Autodelfia

For Singleton Pregnancy

Reference: Huang, T., Dennis, A., Meschino, W. S., Rashid, S., Mak-Tam, E., & Cuckle, H. (2015). First trimester screening for Down syndrome using nuchal translucency, maternal serum pregnancy-associated plasma protein A, free-β human chorionic gonadotropin, placental growth factor, and α-fetoprotein.

First Trimester Pentamarker

Clinical Utility:

- Pentamarker is a revolutionary technique of screening for Chromosomal Aneuploidies (T13, T18, T21) and Preeclampsia in a comprehensive way.
- By utilizing five serum markers and a sophisticated algorithm, the test offers the **highest detection rate and lowest false positive rate** in the entire range of serum screening tests.

Risk Score Is Calculated Based On:

5 SERUM MARKERS:

- Free B-HCG, PAPP-A, AFP, PIGF, dimeric inhibin-A
- A Maternal medical history assessment, mean arterial blood pressure (MAP)
- Uterine artery Pulsatility Index (UTPI), nuchal translucency (NT) and Nasal Bone measurement obtained by ultrasound.

TEST DETAILS:
Performed between 11 to 13+6 weeks GA OR for CRL value bet 45-84 mm

- Detection Rate (DR) - 98%
- False Positive Rate - 1.2%
- Software & Platform - Lifecycle Autodelfia

For Singleton Pregnancy

Reference: Carmichael, J. B., Liu, H. P., Janik, D., Hallahan, T. W., Nicolaides, K. H., & Krantz, D. A. (2017). Expanded conventional first trimester screening. Prenatal diagnosis, 37(8), 802–807. https://doi.org/10.1002/pd.5090

2nd Trimester SCREENING

(15-21 weeks, 6 days)

For pregnancies that missed the First Trimester Screening, Second Trimester Screening presents with an opportunity to offer screening for common chromosomal aneuploidies and neural tube defects.

Quadruple Marker Test

The Quadruple Marker test has a higher sensitivity and lower False Positive as compared to the Triple Marker Test *[Sablok A et al., 2021 Indian J Med Res.]*

Clinical Utility:

Maternal Serum Screen performed in the second trimester to screen for Chromosomal abnormalities (T13, T18, T21) and Open Neural Tube Defects (ONTD).

Risk Score Is Calculated Based On:

The levels of Alpha Fetoprotein (AFP), Dimeric Inhibin-A, Total BHCG and Unconjugated Estriol (uE3) in the maternal blood along with maternal medical history and maternal age.

TEST DETAILS:
Performed between 15 to 21+6 weeks of pregnancy

- Detection Rate (DR) - 75%
- False Positive Rate - 5%
- Software & Platform - Lifecycle Autodelfia Prisca Ver.5 on CLIA

Applicable for Singleton and Twin Pregnancy

Reference: Phadke SR, Puri RD, Ranganath P. Prenatal screening for genetic disorders: Suggested guidelines for the Indian Scenario. Indian J Med Res. 2017 Dec;146(6):689-699. doi: 10.4103/ijmr.IJMR_1788_15. PMID: 29664026; PMCID: PMC5926339

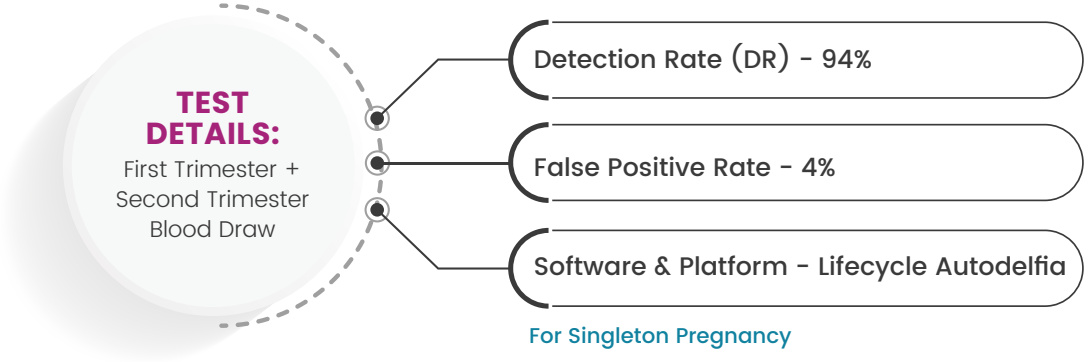
Integrated Screening

Clinical Utility:

Integrated screening combines two blood tests,the first blood test is done between 10 weeks and 13 weeks, 6 days of pregnancy. The second blood test is done between 15 and 16 weeks of pregnancy to screen for Chromosomal abnormalities and Open Neural Tube Defects with higher precision.

Risk Score Is Calculated Based On:

- Levels of PAPP-A and free B-HCG; Nuchal translucency (NT) and nasal bone measurement obtained by ultrasound, maternal age and maternal medical history in the first trimester.
- The levels of Alpha Fetoprotein(AFP), hCG, Estriol, and Inhibin A obtained in the second trimester.
- Integrating the results to offer higher Detection Rate and lower False Positive Rate.



For Singleton Pregnancy

How are the Prenatal Screening tests interpreted?

Prenatal screening is not a diagnostic test and will only indicate the risk of having a baby with a chromosomal abnormality (T13, T18, T21). Further diagnostic tests are recommended to confirm the diagnosis.

Results of screening tests for aneuploidy are reported as the level of risk that the disorder might be present:

Test Result

LOW RISK	INTERMEDIATE RISK	HIGH RISK
A low risk result means that the fetus is at a lower risk* of having the disorder and in most of the cases no further testing is needed.	The risk falls between the low and the high range. Contigency testing by NIPT or by invasive diagnostic test can be opted for.	A positive screening result means that the fetus is at a higher risk of having the disorder. Invasive diagnostic tests can be carried out for confirmation or refutal.

*It does not rule out the possibility that your fetus has the disorder.

Jananyā NIPT

MFine's Non-Invasive Prenatal Test

2022 ACMG Practice Guideline strongly recommends NIPT test over traditional prenatal screening tests. NIPT helps accomplish **the highest standards of prenatal screening with 99%+ sensitivity & specificity for T13, T18, T21.**

Cell-free DNA is the small amount of DNA that is released from the placenta into a pregnant woman's bloodstream. NIPT is a non-invasive, leverages advanced methods like Next Generation Sequencing for the Whole Genome, thereby expanding test options beyond T13, T18, and T21 to include Sex Chromosome Aneuploidies (SCA) and Rare Autosomal Aneuploidies (RAAs).

ACOG & SMFM endorse NIPT regardless of maternal age or baseline risk. It has the **lowest false positive rate & leads to 31-79% reduction in diagnostic procedures.**

Preeclampsia Screening

FIGO Calls for Universal Screening for Preeclampsia

"All pregnant women should be screened for preterm PE during early pregnancy by the first trimester combined test with maternal risk factors and biomarkers as a one step procedure"

MFine/diagnostics Offers
Early-onset & Late-onset
Preeclampsia Screening

How Does **First Trimester Preeclampsia Screening Work?**

Early-onset preeclampsia (before 34 weeks' gestation) is usually associated with placental dysfunction.

The efficacy of screening for **Preeclampsia at 11-13 weeks' gestation using the FMF algorithm of the combination of maternal factors, Mean Arterial Pressure (MAP), Uterine Artery Pulsatility Index (UTPI) and PlGF** is by far superior to all the other methods of screening.

Detection Rate

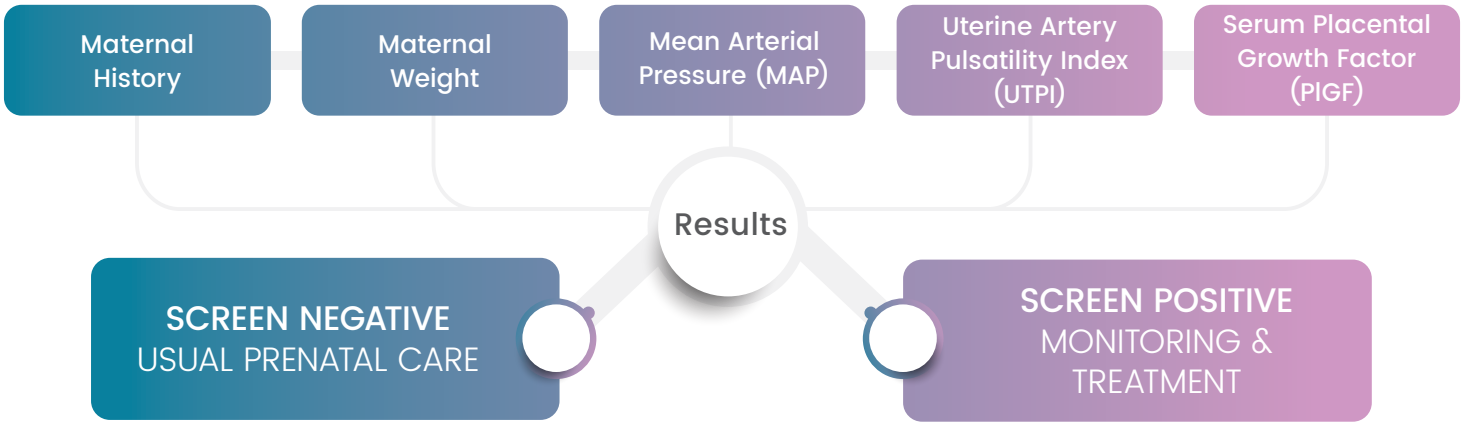
- > 95% for PE < 32 weeks
- > 75% for PE < 37 weeks
- > 43% for PE > 37 weeks

Risk cut-off - 1 in 100 and false positive rate(FPR) - 10%

[Ref: O'Gorman et al, Ultrasound Obstet Gynecol, 2017]

Preeclampsia Risk **Assessment Algorithm**

MFine/diagnostics uses **FMF Accredited Platform to provide accurate results**



Early **Screening Enables:**

- Risk Stratification
- Timely clinical intervention like administration of Aspirin prophylaxis
- Significant Reduction in manifestations of Preeclampsia
- Preemptive reduction in preterm birth, IUGR, severe complications and mortality
- Optimization of calcium intake
- Regular growth scans

Why Is Low Dose Of Aspirin Effective **In Reducing Early-onset Preeclampsia Risk?**

Prophylactic use of aspirin in women at increased risk of preeclampsia dramatically reduces the risk of preeclampsia in pregnant women if the optimal dosage of aspirin is administered during the first trimester of pregnancy. *[Daniel L. Rolnik et. al. , N Engl J Med 2017; Daniel L. Rolnik et. al.,Ultrasound Obstet Gynecol,2017]*

ACOG and SMFM recommend low-dose aspirin prophylaxis for the prevention of Preeclampsia in pregnancies at high risk of preeclampsia.

Can Aspirin be offered **to all Pregnant Women?**

- Although considered as safe, Aspirin is a drug with known side effects
- Better compliance with aspirin prophylaxis achieved when woman is screened and knows the necessity for high compliance
- Combined screening with maternal factors, mean arterial pressure, uterine artery Doppler, and serum PlGF for early prediction of preeclampsia has the capability in identifying a group of high-risk women who are most responsive to aspirin prophylaxis for the prevention of preterm preeclampsia. *[Rolnik DL, Nicolaides KH, Poon LC. Prevention of preeclampsia with aspirin. Am J Obstet Gynecol. 2022]*

How Does Short-term Prediction Of **Preeclampsia Work after 20 weeks of Gestation?**

The clinical presentation of preeclampsia and subsequent clinical course of the disease can vary tremendously, making prediction, diagnosis and assessment of disease progression difficult.

- Angiogenic factors (sFlt-1 and PlGF) are proven to play an important role in the pathogenesis of preeclampsia. *[Hélène Caillon et. al., 2018]*
- Roche Cobas Elecsys sFlt-1 and PlGF immunoassays for sFlt-1/PlGF ratio is a CE marked reliable tool for preeclampsia prediction.
- It helps to identify the patients that are at high risk to develop preeclampsia requiring a closer monitoring and to confidently send home patients that are not likely to develop the disease.

Comprehensive MFine/diagnostics Preeclampsia Screening Packages

Test Package Name	Gestational Age	Biochemical Markers
First Trimester Double Marker with PlGF (Auto-DELFIA®)	11-13 weeks 6 Days	Free Beta-hCG, PAPP-A, PlGF
First Trimester Quad (Auto-DELFIA®)	11-13 weeks 6 Days	Free Beta-hCG, PAPP-A Alpha-fetoprotein, PlGF
First Trimester Penta Marker (Auto-DELFIA®)	11-13 weeks 6 Days	Free Beta-hCG, PaPP-A, Dimeric Inhibin A, Alpha-feto-protein, PlGF
sFlt-1/PlGF ratio (short-term prediction of Preeclampsia with CE-IVD approved Roche Cobas Elecsys® sFlt-1 and PlGF immunoassays)	22-36 weeks 6 days	sFlt-1 /PlGF: with NPV of >99%, rules out onset of PE within next 1 week. Influences clinical decision-making w.r.t. patient triaging & hospitalization.

MFine Diagnostics

Your trusted partner for Prenatal Screening

- **Use of FMF-certified platform**-Autodelfia for measuring analytes ensures higher Detection Rate and lower False Positive Rate
- Risk Calculation algorithm is validated through **large international studies and meta-analysis**
- Robust Multiple of Medians **(MOM) developed by screening 7 lakh+ pregnancies**
- Standardized MOM for **ART/Twin pregnancies**
- **Quarterly Screening Summary** for Universal Accounts
- We follow the **ISPD updates** to maintain the processing quality
- Compliance with the **FMF Good Laboratory Guidelines**
- Satisfactory laboratory **Standard Operating Procedure (SOP)** for prenatal screening
- **Smart self explanatory reports** to guide clinician through further course of actions
- Participation in United Kingdom National External Quality Assessment Service **(UKNEQAS)** for external audits. UK NEQAS Lab Id: 94793
- **Constant adjustments to Medians** to improve the Likelihood Ratio and ensure the Predictability remains stable
- Availability of **NIPT and high-end Diagnostic Testing** under one roof
- **Pan India** Presence with Central Lab, **9 regional labs and 60+ collection centers**
- Availability of **Genetic Counselors and Clinical Geneticists**
- **Triple layer insulated** specialized containers for sample transportation
- Embedded **Preeclampsia Screening Packages** available
- **CAP, NABl and ISO 9001:** 2015 certified laboratory associated with more than 2000 clinics

Our **Offerings**

Name of test	1T Combined Screen	1T Quad	1T Penta	Quadruple Marker	Integrated Screening*	Noninvasive Prenatal Testing
Parameters	Free-Beta HCG, PAPP A & NT, NB	Free-Beta HCG, PAPP A, AFP, PlGF & NT, NB, UTPi & MAP	Beta HCG, PAPP A, AFP, Inhibin A, PlGF + NT, NB, UTPi & MAP	Beta HCG, AFP, unconjugated estriol, Inhibin A	Combined markers form both the trimesters	Cell free DNA extracted from Maternal Blood
GA window	11-13 weeks, 6 days	11-13 weeks, 6 days	11-13 weeks, 6 days	21 weeks, 6 days	11-13 weeks, 6 days and 15-21 weeks, 6 days	10 weeks onwards
Detection of aneuploidy	Yes (90%)	Yes (92%)	Yes (98%)	Yes (75%)	Yes (94%)	Yes (>99%)
FPR (Aneuploidy)	5%	3%	1.2%	5%	4%	(<0.1%)
Screens for ONTDs	No	No	No	Yes	Yes	No
Detection/ Screen for pre-eclampsia	No	Yes	Yes	No	No	No

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