Information is for qualified healthcare professionals only.

Information is not meant to substitute qualified medical advice and is for reference only.

The NIFTY® and NIFTY® pro test screens for the specific genetic conditions listed on the testing panel (as selected for testing by the patient). The purpose of the NIFTY® and NIFTY® test is to identify pregnancies as more likely to be affected by one of the listed genetic conditions. If the test result returns as high risk, further confirmatory diagnostic testing should be performed for final diagnosis of any condition by a qualified healthcare professional.

Any patient treatment plans should only be recommended and provided by a qualified healthcare professional.

BGI recommends that non-directive genetic counseling and guidance always be provided to patients prior to undertaking any genetic testing and when reviewing results with the patient.

Accuracy of genetic testing may be affected by certain clinical factors. Therefore, test results should always be interpreted in the context of other clinical and family information of the patient.

Informed consent should always be obtained from the patient prior to testing.

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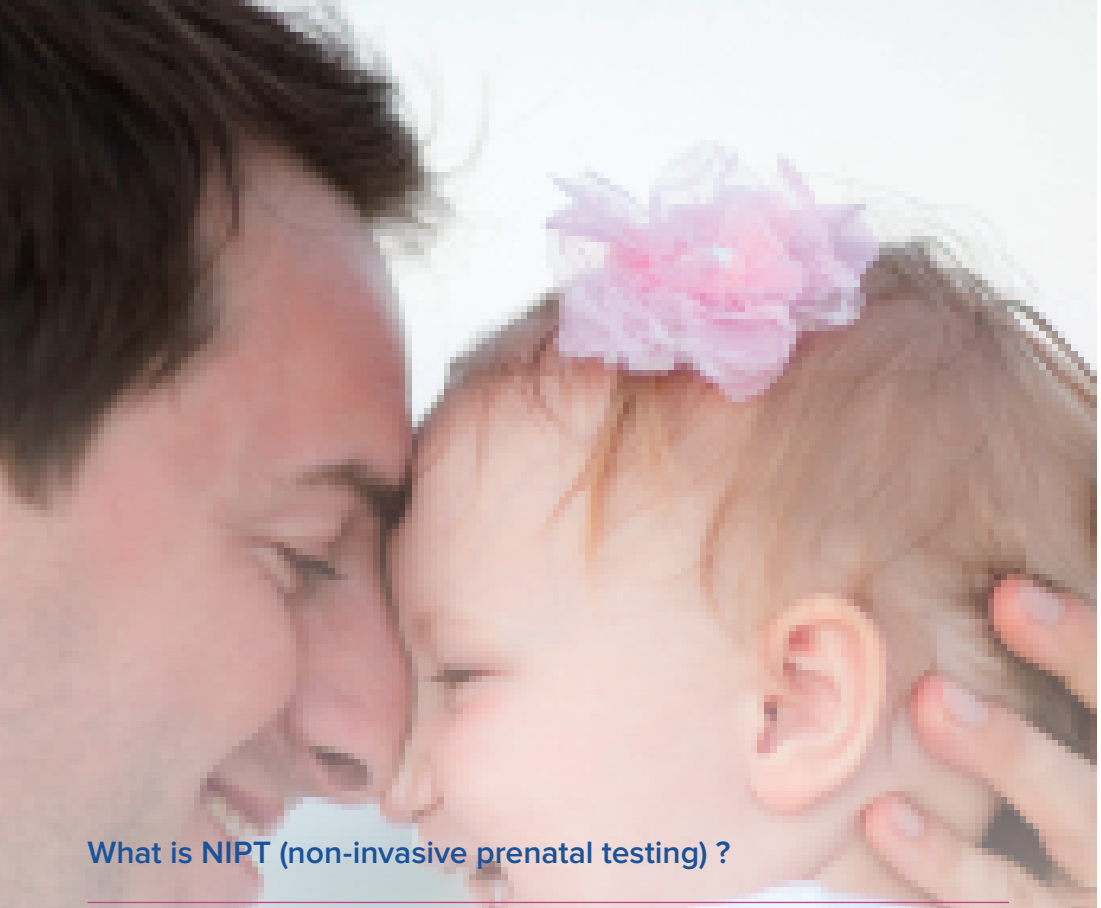
NIFTY® PRO

A MIRROR OF YOUR BABY

Over 2,800,000 tests performed worldwide. Validated by a study of nearly 146,958 pregnancies.



What is NIPT (non-invasive prenatal testing) ?

During the last decade, developments in the science of genetics and enormous advances in genetic technologies have altered our capability to understand diseases, make diagnoses and provide effective treatments. Transforming the world of prenatal testing, the advent of new DNA-based non-invasive prenatal testing (NIPT) has introduced a highly accurate screening strategy for fetal aneuploidy. NIPT uses a tube of blood sample from the pregnant mother to analyze the cell-free fetal DNA for fetal chromosomal conditions, such as Down Syndrome, Edward Syndrome, that could cause defect to a baby's health.

What is Cell-Free DNA and Cell-Free Fetal DNA

Cell-free DNA fragments (cfDNA) are short fragments of DNA which can be found circulating in the blood. During pregnancy, cfDNA fragments originated from both the mother and fetus are present in maternal blood circulation. Cell-free fetal DNA (cffDNA) is present only as a minority component of the total cfDNA in maternal plasma, which poses a significant technical challenge for some NIPT detection methods.

Why NIPT

Currently, many prenatal screening options have already existed. However, compared to non-invasive prenatal testing (NIPT), traditional screening methods suffer from lower accuracy and higher false positive rates. Invasive diagnostic tests such as amniocentesis or chorionic villus sampling (CVS) are accurate but carry a 1-2% risk of miscarriage.

How does NIPT (NIFTY®) compare to traditional screening methods?

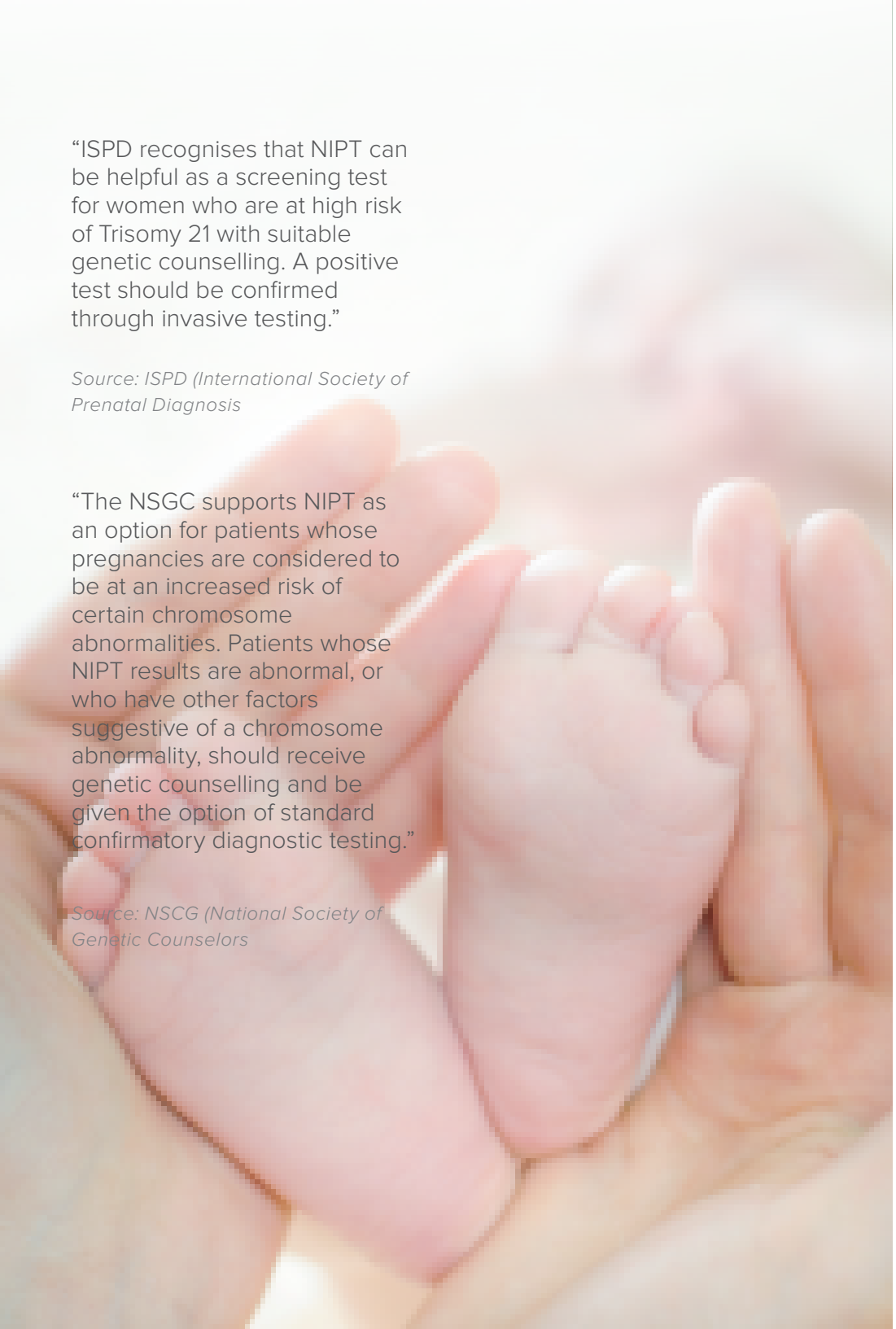
A Comparison of Detection Rates

NIFTY®	available from week 10 >99%*
Integrated Screening	<96%
Serum Integrated Screening	<88%
Quad Screening	<81%
First Trimester Screening	<80%

A Comparison of False Positive Rates (FPR)

NIFTY®	<0.05%*
Integrated Screening	<4%
Serum Integrated Screening	<7%
Quad Screening	<10%
First Trimester Screening	<9%

**Non-Invasive Prenatal Testing For Trisomy 21, 18 and 13 – Clinical Experience from 146,958 Pregnancies, Wei Wang et al, Journal of Ultrasound in Obstetrics and Gynecology*



"ISPD recognises that NIPT can be helpful as a screening test for women who are at high risk of Trisomy 21 with suitable genetic counselling. A positive test should be confirmed through invasive testing."

Source: ISPD (International Society of Prenatal Diagnosis

"The NSGC supports NIPT as an option for patients whose pregnancies are considered to be at an increased risk of certain chromosome abnormalities. Patients whose NIPT results are abnormal, or who have other factors suggestive of a chromosome abnormality, should receive genetic counselling and be given the option of standard confirmatory diagnostic testing."

Source: NSCG (National Society of Genetic Counselors

Introduction to NIFTY® and NIFTY® pro

The NIFTY® test (Non-Invasive Fetal TrisomY test) was the first NIPT to enter clinical testing in 2010, providing screening for the most common trisomies present at birth, as well as testing options for gender, sex chromosome aneuploidies and chromosomal deletions. For providing a more comprehensive test to mothers, NIFTY® finished her upgrade by the end of March in 2018, becoming NIFTY® pro that can test for all the chromosomal numeric aneuploidies and 84 kinds of microdeletion/duplication syndromes with four times of data size increased.
To date, over 2,800,000 NIFTY® tests have been performed worldwide. The NIFTY® pro test is now brought to you by BGI.

NIFTY® Methodology

The NIFTY® test works by isolating the cfDNA (including both maternal and fetal DNA) from a maternal blood sample and performing low coverage whole genome sequencing using Next Generation Sequencing technology. The unique reads of each chromosome are calculated and compared to an optimal reference control sample. Data is analyzed using BGI's proprietary bioinformatics algorithms and a risk score and/or assessment is produced for the conditions tested for. For gender identification, cfDNA is followed with molecular genetic testing to analyze if Y chromosome is detected or not detected.

Introduction to Genetic Conditions Tested by NIFTY® and NIFTY® pro

Trisomies

A trisomy is a type of aneuploidy in which there are three chromosomes instead of the usual pair. Trisomy 21 (Down syndrome), Trisomy 18 (Edwards syndrome) and Trisomy 13 (Patau syndrome) are the three most commonly occurring autosomal chromosome aneuploidies in live births. These chromosomal conditions are caused by the presence of an extra copy or partial copy of chromosome 21, 18 or 13 respectively. This additional genetic material can cause dysmorphic features, congenital malformation and different degrees of intellectual disability.

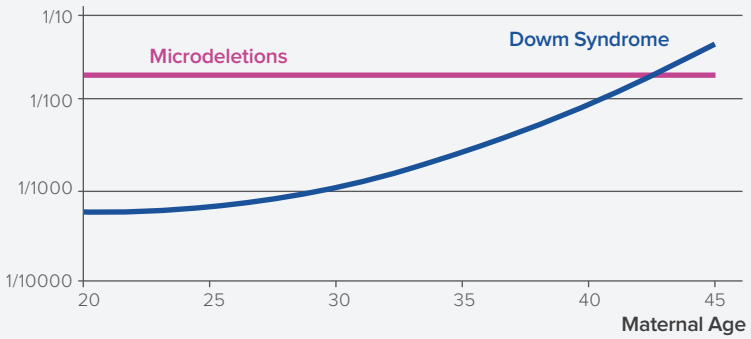
Sex Chromosome Aneuploidies

Sex chromosome aneuploidy is defined as a numeric abnormality of an X or Y chromosome, with addition or loss of an entire X or Y chromosome. Although most cases of sex chromosome aneuploidies are generally mild without intellectual disability, some have a well-established phenotype that can include physical abnormalities, learning delays and infertility.

Microdeletion / duplication syndromes

Besides common chromosomal aneuploidies of T21, T18, T13, chromosomal microdeletion/duplication syndromes (also called chromosomal copy number variation, CNV) can also cause serious birth defects and health problems. Prevalence of these conditions are ranged from 1/4000 to 1/200,000, with fragment size from 100K to over 10M. Some of them have even a higher prevalence than Trisomy 13, such as DiGeorge syndrome, which is resulted from a small part of deletions on chromosome 22. For pregnant women under 40 years old, the probability for being affected by microdeletions is even higher than that of Down Syndrome.

Microdeletions are more common than down syndrome for women under 40



Snijders,et al.ultrasound obstet gynecol 1999

Test overview

CONDITIONS SCREENED	NIFTY	NIFTY pro
Trisomy 21	√	√
Trisomy 18	√	√
Trisomy 13	√	√
Trisomy 9	√	√
Trisomy 16	√	√
Trisomy 22	√	√
Monosomy X (Turner Syndrome)	√	√
XXY (Klinefelter Syndrome)	√	√
XXX (Triple-X)	√	√
XYY	√	√
Gender Identification(optional)	√	√
22q11.2 deletion/Di George	×	√
Data size of 6M	√	/
Data size of 25M	×	√

The accuracy of CNV test is closely related to the data size of tested sample, with a data size of 25M, the detection rate for microdeletion/duplication syndrome, the abnormal size of which is over 5M can be as high as 95%. (According to BGI internal data)

Indications

NIFTY® and NIFTY® pro can be performed as early as 10 weeks of pregnancy. They are suitable for pregnant women of all ages that would like to know about the genetic conditions of their babies.

Workflow

1. Conduct pre-test genetic counseling and ensure patient provides informed consent for test
2. Discuss and fill in the NIFTY® Consent Form/Test Request Form with the patient
3. Conduct blood draw
4. Send scanned copies of Consent Form/Test Request Form and information sheet to BGI
5. Arrange collection of blood sample with courier
6. Send Consent Form/Test Request Form with blood sample to BGI laboratory
7. Receive results back in 10 working days
8. Conduct post test genetic counseling and provide drug guidance advice as required

What Does NIFTY® and NIFTY® pro Report Involve?

You will usually get your NIFTY® or NIFTY® pro report in five to ten calendars days after your sample's arrival at BGI.

The report will tell you your baby's probability of being affected by Trisomy 21, Trisomy 18, Trisomy 13, and if being at high risk or low risk. It will also tell you if your baby is at high risk or low risk in condition of Trisomy 9, Trisomy 16, Trisomy 22, and sex chromosome aneuploidies. Other findings include microdeletion/duplication syndromes and other chromosomal aneuploidies will be indicated on the report if detected. Like other screening tests, NIFTY® and NIFTY® pro result are not for use in diagnostic procedure.

Validation

The NIFTY® test has been validated by the world's largest study with 146,958 pregnancies on the clinical performance of NIPT to date.

Trisomy	Sensitivity	Specificity	PPV	NPV
T21	99.17%	99.95%	97.58%	99.99%
T18	98.24%	99.95%	97.67%	100%
T13	100%	99.96%	83.33%	100%

Samples were collected between Jan 2011 and Aug 2013. Study was published in the Journal of Ultrasound in Obstetrics and Gynecology. Data above are the combination of clinical study and laboratory calculation.

SAFE

Non-invasive with no risk of miscarriage

TRUSTED

Over 2,800,000 NIFTY® tests carried out to date

SIMPLE

Test from a small 10ml maternal blood sample as early as week 10 of pregnancy

COMPREHENSIVE

NIFTY® pro can test more than 80 kinds of microdeletion or microduplication syndromes including:

Detected region	Relevant disease	Prevanlance
4p16.3	Wolf-Hirschhorn syndrome	1/50,000
7q11.23	Williams beuren syndrome	1/7,500-1/20,000
15q11.2	Prader-Willi/Angelman syndrome	1/10,000-1/25,000
17p13.3	Miller-Dieker syndrome	1/100,000
17p11.2	Smith-Magenis syndrome	1/15,000-1/25,000
22q11.21	DiGeorge syndrome	1/4,000
1p36	Chromosome 1p36 deletion syndrome	1/5,000-1/10,000

NIFTY has published 40 scientific papers on SCI, includes:

Methodology

1. Chiu RW, et al. Non-invasive prenatal assessment of trisomy 21 by multiplexed maternal plasma DNA sequencing: large scale validity study. BMJ. 2011; 342:c7401, doi:10.1136/bmj.c7401.

2. Chen EZ, et al. Non-invasive prenatal diagnosis of fetal trisomy 18 and trisomy 13 by maternal plasma DNA sequencing. PLoS One. 2011;6(7):e21791. doi:10.1371/journal.pone.0021791.

3. Dan S, et al. Prenatal detection of aneuploidy and imbalanced chromosomal arrangements by massively parallel sequencing. PLoS One. 2012;7(2):e27835.

4. Fuman Jiang, et al. Non-invasive Fetal Trisomy (NIFTY) test: an advanced non-invasive prenatal diagnosis methodology for fetal autosomal and sex chromosomal aneuploidies. BMC Med Genomics. 2012 Dec 1;5:57.

5. Yuan Y, et al. Feasibility study of semiconductor sequencing for noninvasive prenatal detection of fetal aneuploidy. Clin Chem. 2013 May; 59(5):846-9.

6. Chen S, et al. A method for noninvasive detection of fetal large deletions/duplications by low coverage massively parallel sequencing. Prenat Diagn. 2013 Jun;33(6):584-90.

Clinical Validation

7. Lau TK, et al. Non-invasive prenatal diagnosis of common fetal chromosomal aneuploidies by maternal plasma DNA sequencing. J Matern Fetal Neonatal Med. 2012 Aug; 25(8):1370-4.

8. Dan S, et al. Clinical application of massively parallel sequencing-based prenatal noninvasive fetal trisomy test for trisomies 21 and 18 in 11,105 pregnancies with mixed risk factors. Prenat Diagn. 2012 Dec;32(13):1225-32.

9. Lau TK, et al. Clinical utility of non-invasive fetal trisomy (NIFTY) test--early experience. J Matern Fetal Neonatal Med. 2012 Oct;25(10):1856-9.

10. Lau TK, et al. Non-invasive prenatal screening of fetal sex chromosomal abnormalities: perspective of pregnant women. J Maternal Fetal Neonatal Med. 2012 Dec;25(12):2616-9.

11. Lau TK, Cheung SW, Lo PS, et al. Non-invasive prenatal testing for fetal chromsomal abnormalities by low-coverage whole-genome sequencing of maternal plasma DNA: review of 1982 consecutive cases in a single center. Ultrasound Obstet Gynecol. 2014 Mar;43(3):254-64

12. Yao H, Jiang F, Hu H, et al., Detection of Fetal Sex Chromosome Aneuploidy by Massively Parallel Sequencing of Maternal Plasma DNA: Initial Experience in a Chinese Hospital. Ultrasound Obstet Gynecol. 2014 Mar 10. doi: 10.1002/uog.13361. [Epub ahead of print]

13. Zhou Q, Pan L, Chen S, et al. Clinical application of noninvasive prenatal testing for the detection of trisomies 21, 18, and 13: a hospital experience. Prenat Diagn. 2014 Jun 4. doi: 10.1002/pd.4428. [Epub ahead of print]

Twin Study

14. Huang X, et al. Non-invasive prenatal screening of fetal Down syndrome by maternal plasma DNA sequencing in twin pregnancies. J Matern Fetal Neonatal Med. 2013 Mar;26(4):434-7.

15. Jing Zheng. et al. Effective Non-invasive Zygosity Determination by Maternal Plasma Target Region Sequencing. PLOS ONE. 2013: 8 (6) :e65050

BGI

BGI was founded in 1999 as a nonprofit research organization to support the Human Genome Project. Over the years, BGI has grown into a multinational genomics company with significant global operations, including sequencing laboratories based in the US, Europe, Hong Kong and mainland China.

BGI offers a wide portfolio of transformative genetic testing products across major diseases, enabling medical providers and patients worldwide to realize the promise of genomics-based healthcare. BGI's services and solutions are available in more than 50 countries around the world.