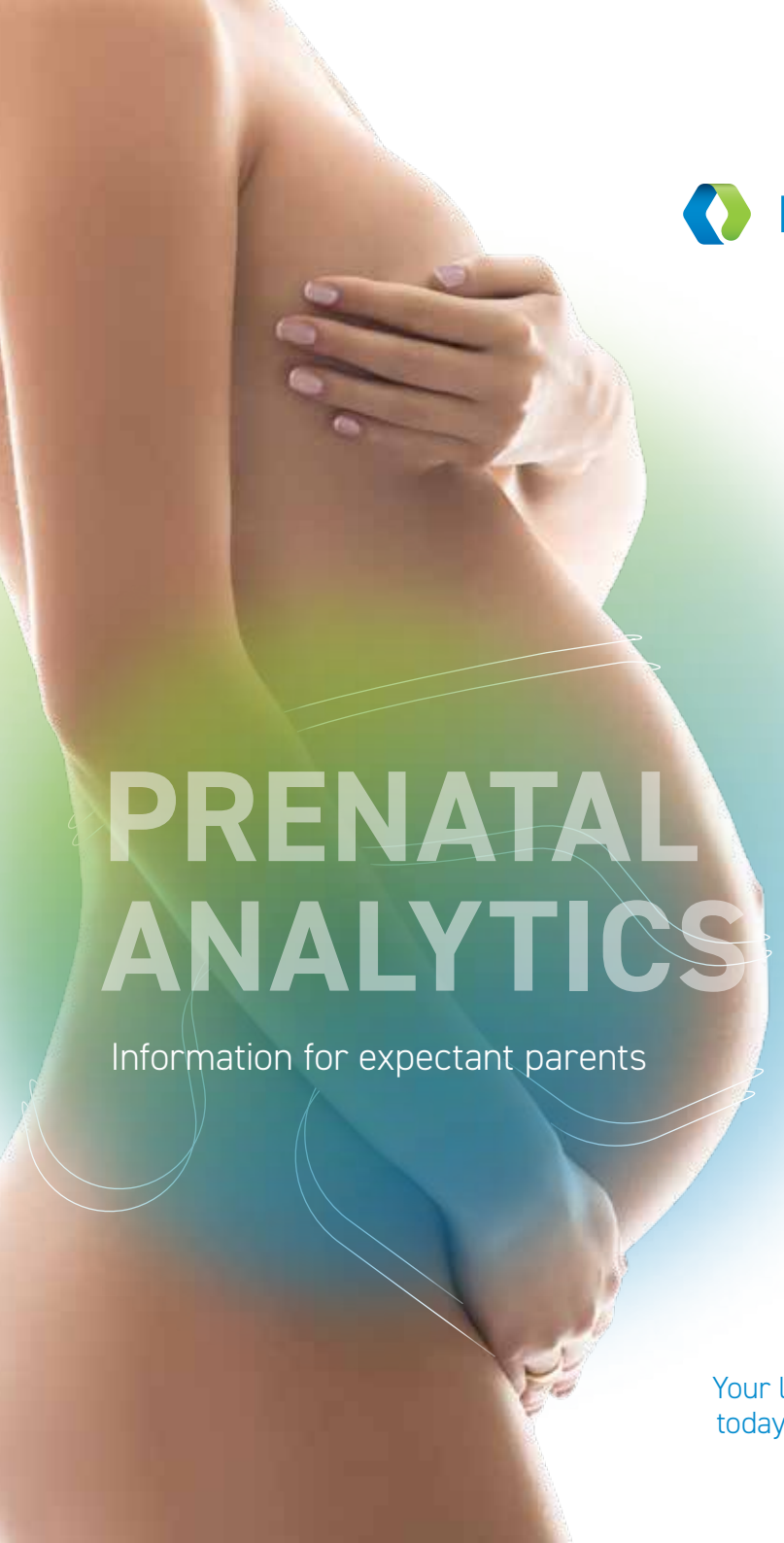


Dr Risch

PRENATAL ANALYTICS

Information for expectant parents

Your laboratory –
today and tomorrow

Dear expectant parents

You decide.

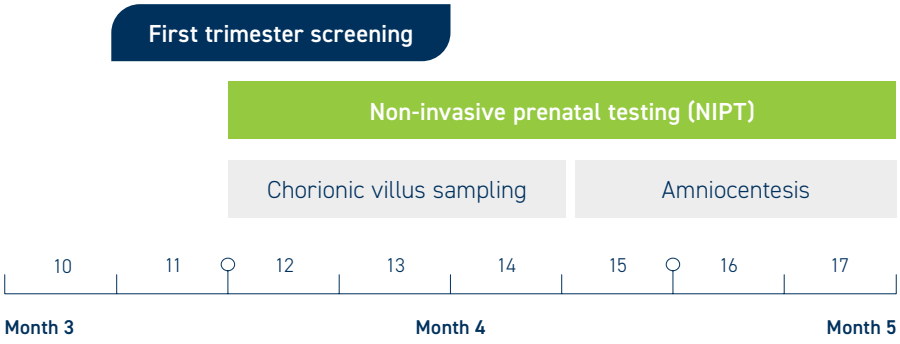
This brochure provides you with important information on prenatal diagnostics of foetal trisomies. The decision to have a test performed or not is yours alone. Please discuss any questions you have with your doctor.

WHAT ARE TRISOMIES?

Trisomies are anomalies of the chromosomes, where an extra chromosome is present in a pair of chromosomes. Normally, every human has 46 chromosomes, divided into 23 pairs. Every pair consists of one maternal and one paternal chromosome. Since chromosomes are the carriers of our genetic material, deviations from the normal number, such as in trisomies, can have serious consequences.

The most common is trisomy 21 (Down's syndrome), which is accompanied by variable mental disability and can be associated with malformations of organs. The risk of trisomy 21 increases with advancing maternal age. For example, a 20-year-old has a risk of 1:1500 (0.07 %), but for a 40-year-old it is already 1:100 (1 %). Trisomy 18 and trisomy 13 occur more rarely. Both anomalies are associated with severe mental and physical disabilities, which make the survival of the children concerned impossible in most cases.

The sex chromosomes can also be distributed in an unusual way. These anomalies are usually easily compatible with life, however, and an examination of them is therefore only recommended in special cases.



First trimester screening (FTS)

WHAT IS FIRST TRIMESTER SCREENING?

First trimester screening consists of the combination of an ultrasound scan and a blood test, which are carried out in the first third of the pregnancy. In the ultrasound (11th - 14th week of pregnancy), gestational age is determined, in addition to other aspects. This is carried out by measuring the crown-rump length (CRL) of the foetus and is more accurate than determining the week of pregnancy by the last menstrual period. In this ultrasound scan, the nuchal translucency of the foetus is also assessed. Nuchal translucency is a collection of fluid under the skin at the back of the baby's neck. The higher the nuchal translucency, the higher the risk of a trisomy. Increased nuchal translucency is also an important indication of a multitude of congenital organ malformations.

In the maternal blood, two substances that are produced by the placenta are examined: PAPP-A (pregnancy associated plasma protein A) and free βhCG (free beta human chorionic gonadotropin). From a combination of the mother's age, medical history (smoking, ethnicity, diabetes, trisomy in a previous pregnancy, weight), nuchal translucency and the abovementioned blood values, the individual risk of a trisomy for the current pregnancy is calculated.

WHAT DOES FIRST TRIMESTER SCREENING INDICATE?

In most cases, FTS shows that your baby does not have an increased risk of a trisomy and that no severe deformity is present. It can, however, show you and your doctor that an increased risk of one of these anomalies is present for your baby. An abnormal FTS result does not, however, mean that your baby is ill, as FTS is a screening method and not a definitive diagnostic test. In the event of an increased risk, a medical consultation is recommended to discuss possible further examinations (non-invasive prenatal testing, chorionic villus sampling or amniocentesis).

HOW ACCURATE IS FIRST TRIMESTER SCREENING?

Over 90% of babies with trisomy 21 have an abnormal FTS result. A normal FTS result does not, however, mean that your baby shows none of these anomalies, as 10% of pregnancies with trisomy 21 have a normal first trimester screening result. In most cases, however, no increased risk is found, and you can assume that it is very likely that your baby does not have a trisomy. Other disabilities and/or malformations cannot be excluded by a normal FTS result. A detailed ultrasound scan provides more information for this purpose.

FROM WHEN CAN FIRST TRIMESTER SCREENING BE CARRIED OUT?
The blood test for FTS takes place between the end of the 9th and 14th week of pregnancy. The ultrasound scan for first trimester screening is carried out between the 11th and 14th week of pregnancy. The blood test and the ultrasound scan can take place on the same day or on two different days.

IS FIRST TRIMESTER SCREENING POSSIBLE FOR A MULTIPLE PREGNANCY?
Yes, the assessment of multiple pregnancies is possible, although the test accuracy decreases with the number of foetuses.

IS FIRST TRIMESTER SCREENING POSSIBLE FOR AN IVF PREGNANCY?
IVF pregnancies can be assessed using first trimester screening if the age of the egg cell used is known. In addition, for the risk calculation it must be known whether it is identical twins or fraternal twins.

REIMBURSEMENT
First trimester screening is covered by the health insurance funds.

Non-invasive prenatal testing (NIPT)

WHAT IS NIPT?
Tiny pieces of the baby's genetic material that come from the placenta circulate in the mother's blood. Through a simple blood test for the pregnant woman, trisomy 13, 18 and 21 as well as maldistribution of the sex chromosomes in the baby can be analysed with a high degree of certainty. Your doctor will show you whether this test is suitable for you.

WHAT DOES NIPT INDICATE?
NIPT provides information on the presence of trisomy 13, 18 and 21 and anomalies of the sex chromosomes. If your baby is affected by a different disease, NIPT cannot provide any information on this. If the result indicates a trisomy, your doctor will discuss with you how to proceed. Since NIPT does not represent a definitive diagnostic method, confirmation of the result by means of chorionic villus sampling or amniocentesis generally follows, depending on the time window.

HOW ACCURATE IS NIPT?

99% of the foetal trisomies analysed are identified correctly with NIPT. There are, however, rare cases that are assessed as false positive or false negative due to an unusual feature in the development of the placenta. For a definitive diagnosis, the invasive method is therefore necessary (chorionic villus sampling/amniocentesis).

FROM WHEN CAN NIPT BE CARRIED OUT?

The testing can be used from the end of the 10th week of pregnancy.

IS NIPT POSSIBLE FOR A MULTIPLE PREGNANCY?

It is possible to perform NIPT for twin pregnancies. Anomalies of the sex chromosomes cannot be assessed. NIPT is not possible for multiple pregnancies with more than two foetuses.

IS NIPT POSSIBLE FOR AN IVF PREGNANCY?

It is possible to perform NIPT for an IVF pregnancy. The same limitations apply as for a normal pregnancy.

CAN THE SEX BE DETERMINED WITH NIPT?

It is possible to determine the baby's sex with NIPT. For ethical reasons, the sex may not be disclosed until after the end of the 12th week of pregnancy. For twin pregnancies, only limited sex determination is possible. Performing NIPT solely to determine the sex is prohibited in Switzerland.

WHICH PROBLEMS CAN OCCUR?

In some cases, it is not possible to obtain sufficient foetal DNA from the blood sample and you will be asked to take another blood test. This has no effect on the test result and should not give you cause for concern.

REIMBURSEMENT

The costs of NIPT for trisomies 13, 18 and 21 are covered by the health insurance funds if first trimester screening for a normal pregnancy shows a risk higher than 1:1000 for a trisomy (e.g. 1:520). For an IVF pregnancy or a twin pregnancy, it is not the first trimester screening risk that is decisive, but rather the combined risk of the pregnant woman's age and the foetal nuchal translucency. The costs are also covered by the health insurance funds here in the event of a risk higher than 1:1000.

Chorionic villus sampling and amniocentesis (invasive testing)

WHAT IS INVASIVE TESTING SUCH AS CHORIONIC VILLUS SAMPLING AND AMNIOCENTESIS?

In chorionic villus sampling, a small piece of tissue is removed from the placenta with a needle through the mother's abdominal wall. In amniocentesis, amniotic fluid is extracted from the amniotic cavity with a needle through the mother's abdominal wall.

Both methods allow the number and structure of the chromosomes to be examined. Both chorionic villus sampling and amniocentesis carry a risk of miscarriage of about 0.5 - 1 %. Chorionic villus sampling can be carried out from the end of the 11th week of pregnancy, and amniocentesis after the end of the 15th week of pregnancy. Both procedures deliver a preliminary outcome after 24 hours and the final result after about two weeks. On account of the risk of miscarriage, these invasive procedures should only be performed if an increased risk of a trisomy exists based on the first trimester screening and/or NIPT. An invasive procedure may also be appropriate in the event of anomalies in the detailed ultrasound.

Responsible for the content
DR. RISCH GROUP

Sources

- Fact sheet on prenatal screening for trisomy 21, 18 and 13 by the Federal Office of Public Health (FOPH), 19/06/2017
- Expert letter no. 52 by the Swiss Society of Gynaecology and Obstetrics, update 01/01/2018