University Hospital Basel

Ultrasound during pregnancy

Dear expectant mother

Following the growth and development of your baby by ultrasound is one of the beautiful events in pregnancy and, today, it is impossible to imagine prenatal care without it. The following information is intended to serve as a foundation for the medical consultation and help you better understand the reasons, limitations and possible consequences of ultrasound examinations during pregnancy. In case you have further questions about any of the information below, do not hesitate to ask your doctor or midwife at any time.

Why do we perform ultrasound during pregnancy?
Ultrasound is an imaging technique that can be used to monitor the development of an unborn baby in the mother's womb. The ultrasound technique has been used prenatally for several decades and there is no evidence of harm to the mother or baby when ultrasounds are performed.

The following can be monitored or detected:

- appropriate growth of the baby
- fetal malformations (3 – 4 out of 100 pregnant women will have a baby with a malformation)
- signs of chromosomal abnormalities (e.g. Down's syndrome) and certain pediatric diseases
- certain maternal risks (e.g. shortening of the cervix)

If the ultrasound is normal, is my baby guaranteed to be healthy?
No, but if the ultrasound is normal, the probability is very high that everything is « okay». Not all diseases or malformations can be ruled out even when ultrasound examinations are properly and carefully performed.

What happens if there are abnormalities in the ultrasound examination?
If an abnormality is detected in the ultrasound, it will serve as a basis for you and your physicians to discuss what, if anything, needs to be done. This includes, for example, performing an amniocentesis (amniotic fluid test) or chorionic villus sampling (tissue sampling from the maternal placenta). In rare cases, treatment can be given directly in the womb or via the mother (e.g. in case of cardiac arrhythmias). For certain diseases, pediatric care immediately after birth is necessary. If we already know about this during the pregnancy, we have enough time to explain everything in detail to you and can make the necessary plans before delivery to optimize the care of your child after birth.

If your baby is diagnosed with a serious, incurable problem, it may need to be considered how to continue the pregnancy. In such cases, we have a team of experienced, specialized doctors who provide you with professional advice and support.

What is important to note before the ultrasound examination?
The image quality depends on the examination conditions and the baby's position in the womb. In some cases, we may need to repeat the examination at a later point in time if not everything can be seen.
Please do not use lotions, creams or oils on your belly for one week before the examination.

Please note that several doctors may be present at your ultrasound examination and they will need to be able to concentrate on the health of you and your baby, so only a limited number of visitors and only well-behaved children are allowed during the examination.

When will the ultrasounds be performed and what will be examined?
In Switzerland, pregnant women usually have two ultrasound examinations during pregnancy. They take place between the 11th and 14th week of pregnancy and between the 20th and 22nd week of pregnancy. Additional examinations may be needed for medical reasons.

First trimester (11th – 14th week of pregnancy)
- determination of gestational age and delivery date
- detection of multiple pregnancies
- detection of malformations or abnormalities
- measurement of the nuchal translucency and assessment of signs for possible chromosomal abnormalities (first trimester screening, see next page)

Second trimester (20th – 22nd week of pregnancy)
- detection of malformations (organ development)
- determination of the baby's position, examination of amniotic fluid quantity
- monitoring of fetal growth
- position of the placenta and measurement of blood flow (Doppler sonography)
- gender of the baby (disclosed on request)
- measurement of the length of the cervix

If necessary, especially in high-risk pregnancies, another ultrasound may be performed in the third trimester.

Third trimester (30th – 32nd week of pregnancy)
- determination of the baby's position, examination of amniotic fluid quantity
- monitoring of the baby's growth
- evaluation of further development of the organs
- position of the placenta and measurement of blood flow (Doppler sonography)
- measurement of the length of the cervix

First trimester screening

First trimester screening can be performed between the 11th and 14th week of pregnancy following the ultrasound examination, if desired. It can only be carried out during this time frame and serves primarily to determine the risk of chromosomal abnormalities in the child.

During first trimester screening, the following values are used to calculate the risk for chromosomal abnormalities (specifically, trisomy 21, 18 and 13):

- the mother's age
- the width of the child's nuchal translucency (neck fold measurement, as shown in the picture)
- two pregnancy hormones in the mother's blood (PAPP-A, free beta-HCG)

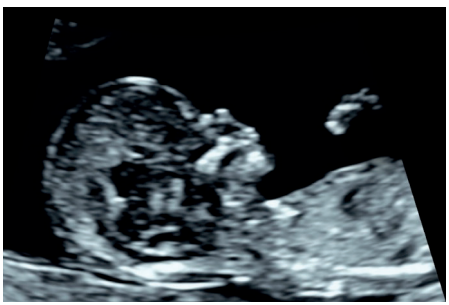


Figure: fetus in 13th week of pregnancy

In about 90% of babies with Down's syndrome (trisomy 21), the test shows an «abnormal» result, but it is also abnormal in about 5% of healthy babies (false positive). If the test shows that your baby is at low risk for a chromosomal abnormality (normal result), no other special examinations are recommended.

What will happen if the risk for a chromosomal abnormality in my baby is higher than normal?

If there is an elevated risk, this does not necessarily mean that your child has a medical problem. It does, however, mean that further testing is needed to determine whether the child is affected or not. This testing may include a fetal DNA test from maternal blood (non-invasive prenatal test), an amnio-centesis or a chorionic villus biopsy. How to proceed would be discussed personally with you in detail, so that you can decide which tests are best for you and your baby.

Non-invasive prenatal testing (NIPT)

Today, it is possible to identify certain chromosomal abnormalities in the child through non-invasive prenatal testing from your own blood. Genetic material from the baby (cell-free DNA) which can be found in the blood of the mother can be examined through special tests. NIPT can be used to rule out the most common chormosomal abnormalities (trisomy 21, 18 and 13) with a very high level of reliability, surpassing that of the ultrasound examination. Ideally, NIPT should be carried out after the first trimester screening. However, it can be performed starting from the 10th week of pregnancy, at the earliest.

In what situations might NIPT be recommended?

- if you are at risk for having a baby with a chromosomal abnormality
- in case of an abnormal first trimester test
- on request

A negative test result means a trisomy 21, 18 or 13 can be ruled out with a high level of reliability.

A positive test result means that the baby has a high risk of having the chromosomal abnormality in question. However, since NIPT can also result in false positive results, amniocentesis or chorionic villus sampling is necessary in case of an abnormal result in order to confirm the diagnosis.

NIPT usually tests for the three most common chromosomal abnormalities (trisomy 21, 18 and 13). It is therefore not comparable to the chromosomal analysis performed following an amniocentesis or chorionic villus sampling, which provide information that is more comprehensive and enable us to confirm or rule out other diseases as well. Therefore, in case of a high risk for fetal abnormalities or malformations, NIPT alone is not an appropriate test.

Invasive testing

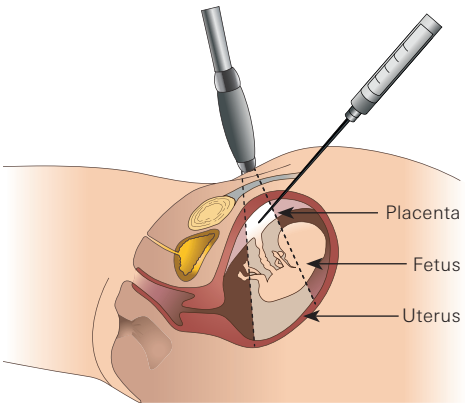
Fetal chromosomal abnormalities can be detected before birth with the amniocentesis or chorionic villus sampling (CVS). Since these interventions may lead to a miscarriage in rare cases (0.5–1%), they will only be performed for specific reasons.

In what situations might an amniocentesis or CVS be performed?

- in case of fetal abnormalities or malformations detected in the ultrasound examination
- to rule out specific hereditary diseases
- in case of a high risk for chromosomal abnormalities in first trimester screening
- on request

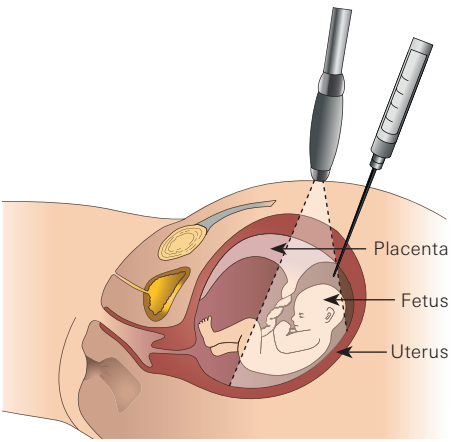
Chorionic villus sampling

(from the 11th week of pregnancy)
In Chorionic villus sampling, the placental tissue is sampled under ultrasound guidance.



Amniocentesis

(from the 16th week of pregnancy)
In amniocentesis, amniotic fluid is sampled under ultrasound guidance.



The tissue of the placenta or the amniotic fluid is then genetically tested. Depending on the issue, different methods are used (e.g. karyotyping, microarray, etc.).

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