· Röteln (Rubella)

Rubella infections are caused by rubiviruses from the Togaviridae family. They are transmitted by droplets. During a pregnancy, the viruses can be transmitted to the unborn child through the placenta, causing severe damage. The possible massive damage to the fetus is designated by the terms rubella embryopathy, Gregg's syndrome, or congenital rubella syndrome (CRS). The earlier an infection occurs during the phase where organs are formed in the fetus, the more pronounced the deformities will be. A rubella infection in the first 4 months of pregnancy may cause spontaneous abortion, premature birth or the following forms of damage:

- Inner ear deafness
- Heart defects (open ductus arteriosus)
- Myocarditis (inflammation of the heart muscle)
- Cataract (a clouding of the lenses in the eye)
- Deformities in the central nervous system
- Encephalitis (inflammation of the brain)
- Hepatosplenomegaly (liver and spleen enlargement)
- Thrombocytopenia (reduction of blood platelet count)

There is no specific antiviral therapy, which is why it is important prior to a planned pregnancy to check for the presence of antibodies from a previous rubella infection. If no antibodies (IgG antibody titer to rubella) are detected, a woman should be vaccinated before a pregnancy begins. If an initial infection with rubella occurs during pregnancy, i.e. the mother has no antibodies, it is still possible to administer rubella hyperimmunoglobulin within 48 hours of the infections, though this drug is no longer effective 5 days after infection with rubella.

· Herpes

Herpes infections are caused by Herpes simplex viruses of types 1 and 2. Type 1 viruses cause the typical lip sores, type 2 viruses are responsible for genital herpes infections. Herpes infections in the early stages of a pregnancy are rare. They can cause either a spontaneous abortion or damage to the child as follows:

- Formation of a small cranium
- Hydrocephalus (water on the brain)
- Herpes infection of the eyes with risk of blindness
- Intelligence deficits

Most herpes infections of children occur during birth when a genital herpes infection can be transmitted to the newborn. This infection can cause very severe symptoms in a newborn child. The fatality rate is high despite medical treatment and permanent damage is massive:

- Encephalitis with destruction of brain tissue, resulting in severe mental handicaps.
- Epilepsy (seizures)
- Herpes infection of the eyes with risk of going blind
- Herpes infection of inner organs such as the stomach, lungs and liver

The virostatic agent acyclovir is used in drug treatment of herpes infections.

· Toxoplasmosis (parasitic)

This infectious disease is caused by a unicellular parasite, the protozoan Toxoplasma gondii. Cats are the primary hosts of this parasite. Infected animals excrete the eggs of the pathogen. These eggs in the cat feces are highly viable and are transmitted either via smear infection (cat litter) or food intake (raw or insufficiently heated meat), and can then cause a toxoplasmosis infection. A toxoplasmosis infection of the fetus during early pregnancy resulting from an initial infection of the mother may lead to a spontaneous abortion or severe developmental damage of the brain with calcifications, seizures, hydrocephalus (water on the brain), or inflammation of the eyes. Children born with a toxoplasmosis infection who are asymptomatic at birth may suffer

hearing and eye damage as well as retarded mental development with attention deficits over the course of their development. In cases of an initial toxoplasmosis infection of the mother during pregnancy, antibiotic treatment is carried out beginning in the 16th week of pregnancy to prevent the infection from spreading to the child.

· Listeriosis (bacterial)
Listeriosis is caused by the gram-positive Listeria monocytogenes bacterium and is normally transmitted by the ingestion of infected raw animal products. During pregnancy, the pathogen can be transmitted to the unborn child via the placenta as early as the 5th week of pregnancy. Most infections occur starting with the 5th month of pregnancy. A listeriosis infection can lead to a spontaneous abortion, premature birth, or severe pathologies in the newborn. The early-onset form of listeriosis in newborns manifests in the child's organ systems immediately after birth with sepsis (blood poisoning), pneumonia, and extensive abscesses (accumulations of pus). The late-onset form of the disease is characterized by pathological developments such as purulent meningitis, seizures, and clouding which manifest in the 2nd to 3rd weeks of life. Neurological long-term consequences such as hydrocephalus and mental retardation may also occur. Listeriosis is treated with antibiotics.

· Syphilis (lues, hard chancre) (bacterial)
Syphilis is a venereal disease caused by the Treponema pallidum bacterium. A mother infected by syphilis can transmit the bacteria to an unborn child through the placenta beginning in the 4th month of pregnancy. Left untreated, the disease can damage the child severely.

Other causes of possible development of brain damage to a fetus during pregnancy are:
- · Consumption by the mother of drugs, alcohol or nicotine
- · Diabetes mellitus
- · EPH-gestosis (also known as eclampsia, pregnancy-induced hypertension, SIH or HELLP syndrome). The cause of gestosis is not known.
  It can cause hypertension, edemas, proteinuria, seizures and coma, liver failure with decompensation of the coagulation system accompanied by hemorrhaging (hemolysis), and multiple organic failure (HELLP syndrome) in a pregnant woman. Early and late-onset gestoses are differentiated. Both forms represent a severe pregnancy complication for both mother and unborn child, depending on the progression of the disease. The symptoms mentioned above in the mother may lead to placental insufficiency. The resulting deficiencies in the unborn child may cause brain damage.
  Premature placental detachment may cause a spontaneous abortion, premature birth, or stillbirth.
- · Exposure to x-rays during the 1st trimester of pregnancy.
  A high dose of radiation can damage the embryo up to about the 15th week of pregnancy.
- · Early oxygen deficiency in the unborn child
  - · due to placental or umbilical anomalies
  - · due to hemorrhaging, shock, or collapse of the mother

· The following factors may cause brain damage in the child during birth (peripartal):
- · Oxygen deficiency (anoxia) of the brain due to umbilical strangulation or blockage of the respiratory tract
- · Placenta praevia (blockage of the os uteri by the placenta)
- · Birth trauma with cerebral hemorrhaging

· Following birth (postpartum), brain damage to the child may be caused by the following conditions:
- · Cerebral hemorrhaging
- · Encephalitis

What forms can infantile cerebral palsy take?

The forms can be differentiated as to the different locomotor disorders they case:
· Spastic form (spasmos, Greek: seizure, cramp), in which damage to the motor tract between the brain and spinal cord raises the muscle tonus, resulting in retardation, restriction and stiffening of movements.
· Dyskinetic-athetotic form, in which the nuclei under the cerebral cortex are damaged. Involuntary muscle contractions result in slow, cramped movements, where the joints are overextended for flexed, particularly the joints of the hand.
· Atactic form, caused by damage to the cerebellum and cerebellar tract, causing disorders affecting balance and coordination, in turn resulting in spasmodic, choppy movements.

The forms of the disease can also be differentiated according to the paralytic picture:
· Hemiparesis (hemiplegia, one-sided paralysis)
· Diparesis (diplegia, paralysis - in particular of both legs)
· Tetraparesis (paralysis of head, trunk, arms and legs, tetraplegia)

What orthopedic problems can occur in infantile cerebral palsy?

Depending on the severity of the paralyses and the locomotor character of the palsy:
· Muscular foreshortening in hip and knee joints
· Muscular foreshortening in hands and feet
· Spasticity of the trunk, arm and leg musculature contractures (muscular foreshortening)
· Deformities of the feet and hands
· Deformities of the spinal column (scoliosis, kyphosis)
· Restriction of movement up to and including loss of ability to walk, stand and sit

How are the orthopedic problems resulting from infantile cerebral palsy treated?

Due to the wide variety of possible symptoms, intensive cooperation between parents, child and therapist(s) is always required. All therapeutic efforts depend on the severity of the disability, the age of the child and the individual severity of the limitations requiring treatment. The objective must be to relieve manifest functional deficits, to train functional and coordinated movements and posture and to prevent potential deformities of the spinal column and joints by means of preventive measures (physiotherapy, orthopedic aids, occupational therapy). Depending on the overall findings in each case, surgical correction may be required for manifest deformities in order to prevent the loss of the ability to walk, stand or sit, and to prevent pain and further loss of member functionality.
The progression of a scoliosis in infantile cerebral palsy frequently leads to grotesque pathological curvature of the spinal column, above all to formation of a pelvic obliquity (pelvic malposition). This is frequently a cause of considerable problems related to everyday care and a pronounced pelvic obliquity may also make it impossible for the patient to sit. In such serious cases of scoliosis, surgery is also indicated in infantile cerebral palsy.
The objective of this operation must be a straightening of the spinal column and, above all, straightening of the pelvic position so that the patient is once again able to assume a seated position. This means that in most cases instrumentation must be continued up to S1 or even into the pelvis. The pronounced rigidity observed in infantile cerebral palsy may frequently also require ventral mobilizing measures to achieve a sufficient degree of correction. The important factor in these children is a segmental instrumentation with pedicle screws, since brace therapy is generally not possible. Therefore, the elements connecting the bone and implant must be as rigid as possible to minimize postoperative complications.

What other neuromuscular diseases are there?
The best-known neuromuscular diseases are:

- **Meninomyelocele**
- **Spinal muscular atrophy**
- **Duchenne muscular dystrophy**

These terms describe a progressive muscle disease beginning in the first two years of life with a weakness of the pelvic muscles that then spreads to the shoulder girdle muscles and develops into a generalized muscular weakness. The relevant trait is carried on the X chromosome, meaning that only boys are affected. Life expectancy is about 20 years. Patients suffering from this condition die of cardiac or respiratory insufficiency due to affected heart or respiratory muscles with repeated bouts of severe pneumonia.

· Syringomyelia, syringobulbia

Syringomyelia is a disease of the spinal cord affecting mainly the cervical and thoracic spine, while syringobulbia affects the extended spinal cord (medulla oblongata). Cavities (syringes) containing no nerve cells form in the spinal cord, resulting in dysfunctions of varying severity (disturbance of depth perception, sense of position, uncertain gait, muscular atrophy with altered body statics and the development of scoliosis).
The causes leading to formation of these cavities may be both congenital (Arnold Chiari malformation, spina bifida and other primary diseases) and acquired (tumors or infections of the spinal cord).

· Poliomyelitis

Polio is caused by RNA viruses from the group of the picorna viruses.
After it attacks the central nervous system, poliomyelitis damages the second motor neurons in the spinal cord, causing paralyses and meningitis.
No antiviral therapy has been developed as yet. The best protection is preventive vaccination.

· Spinocerebellar ataxia (Friedreich's ataxia)

Friedreich's ataxia is an inherited spinal locomotor system disorder, characterized by poor locomotor coordination with uncertain stance and gait (stance and gait ataxia). The disease is progressive. A possible cause is iron oversaturation of the mitochondria, resulting in the formation of free radicals, which then damage the nerve cells.
In addition to other complications, such as cardiac muscle enlargement (cardiomyopathy), this ataxia may also cause the development of scoliosis.

· Arthrogryposis multiplex congenita (AMC)

This is a congenital disorder of the connective tissues and nervous system resulting in the disruption of the development of muscles (muscle weakness, missing muscle groups) and therefore in poorly developed joints with rigidification. The disease may be associated with malpositions of the spinal column and severe anomalies in the central nervous system.