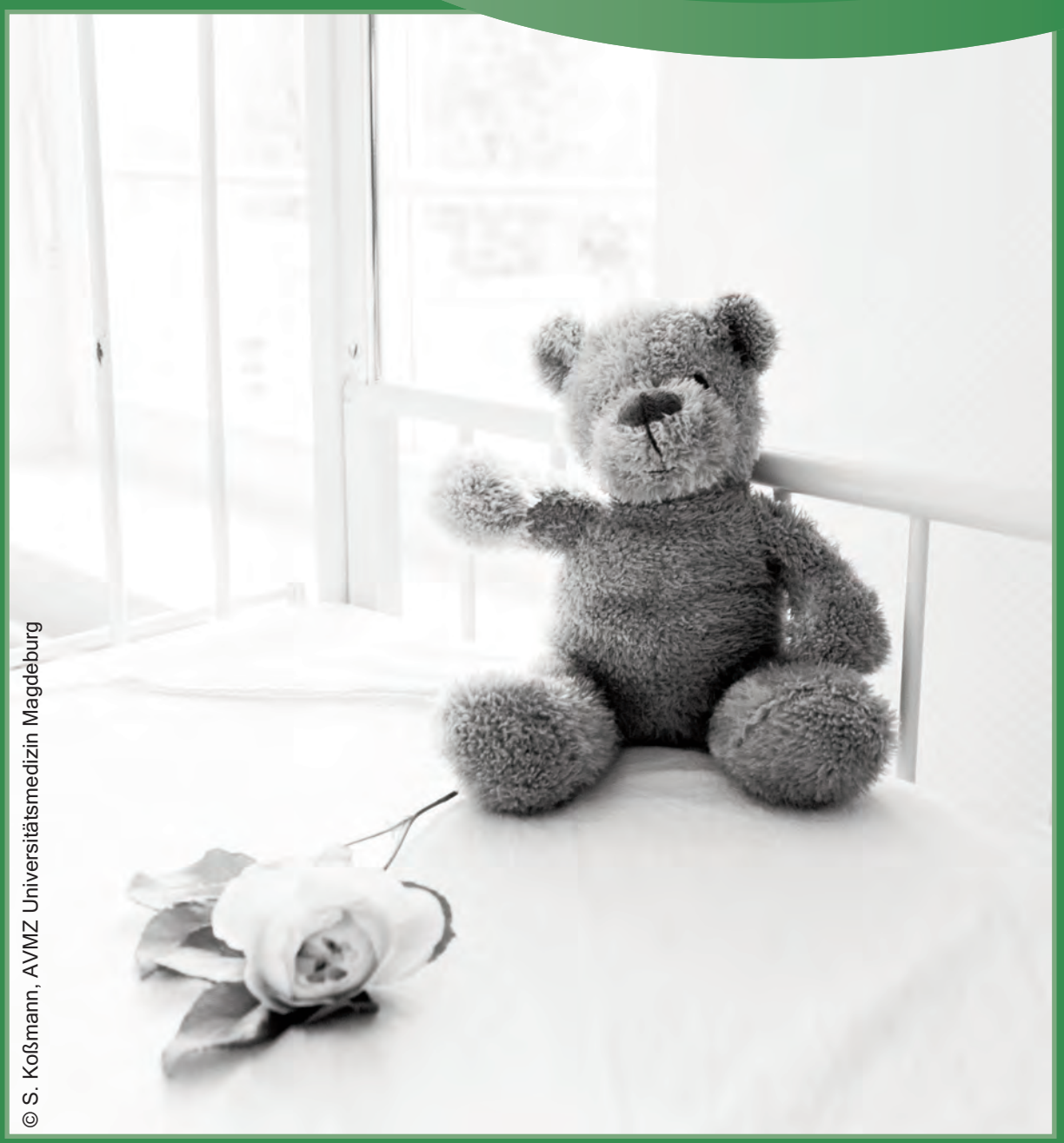
Annual Report 2017



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SACHSEN-ANHALT

Ministerium für Arbeit, Soziales und Integration

Annual Report 2017
of the Federal State of Saxony-Anhalt
about the frequency of congenital malformations
and anomalies as well as chromosomal aberrations

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Introduction

Dear reader,

infant and child mortality are one of the most important main indicators for the overall assessment of the health situation of the population and the assessment of the medical care of pregnant women and newborns. For this reason, the topic of congenital malformations and chromosomal anomalies is focus of this annual report. In this connection, this special analysis does not only contain data about infant and child mortality but also, depending on the pregnancy outcome, the prenatal mortality is included in case a pregnancy was concerned by a prenatal malformation or chromosomal aberration.

During the last years the positive downwards trend was continued in our Federal State and also Germany wide. A success of our work is, that the infant mortality in the new Federal States lies under the infant mortality rate in the old Federal States. At the beginning of the 1990s, this trend was reverse.

Congenital malformations and chromosomal anomalies are in Germany after premature births, the second most common reason for infant mortality. In the USA, they occupy the first rank. For this reason, an exact analysis of the reasons is necessary and at the same time precondition for the development of strategies to avoid further deaths.

The early death of a child or infant is not only tragic for the parents, also the immediate family is shocked. As well as the concerned employees of Health and Social Affair institutions, who are always deeply moved by such incidents and therefore searching continuously for solutions to avoid such tragical incidents. For this reason, the present analysis is indispensable.

Important factors that influence infant mortality are the quality of early detection examinations and medical care of risk conditions during pregnancy, the births assistance and care of newborns and premature births. The performance of early detection measures and care of children during their first year of life are of the same importance. Since 1992 the Monitoring of congenital malformation Saxony- Anhalt is part of the European Network for population-based malformation registration EUROCAT. And since 1993, the registration center Saxony-Anhalt is part of the WHO associated International Clearinghouse for Birth Defects Surveillance and Research (ICBDSR). With the population-based data from Saxony-Anhalt we were able to contribute in regard to the question how different mortality rates can be explained in similar developed countries. The differences originate partly from different traditions or the acceptance of prenatal diagnostics resp. preimplantation diagnostics by parents or the legislature but also from different governmental care offers of mother and births. For Industrial countries like Germany an increased infant mortality can be determined for deprived groups, e.g. with migrant background.

The target value of the WHO for Europe until 2020 is to reach an infant mortality from less than 20 and if possible, less than 10 infants per 10,000 life births. These targets are reached thankfully in Germany for lots of years. In this sense, the infant mortality was less than four infants per 1000 life births in 2016, in Saxony-Anhalt at less than three infants. However, also as the WHO predefined targets are reached in Saxony-Anhalt during the last years, the further reduction of infant mortality is an important issue. And the present report is an important component on the further way.

We battle on for every life and I would like to thank therefore everyone who gets involved in the interdisciplinary cooperation in regards to a continuously malformation reporting and of course everyone in charge for the organisation of this important meeting.

Yours sincerely

Petra Grimm-Benne
Federal Minister of Labour, Social Affairs and Integration
Saxony Anhalt

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Abbreviations

AABR	automated auditory brainstem response (Hirnstammaudiometrie)	ICBDSR	International Clearinghouse for Birth Defects Surveillance and Research
ASD	atrial septal defect	ICSI	intracytoplasmatic sperm injection
ATC	Anatomical-Therapeutical-Chemical classification	LB	live births
		MCA	multiple congenital anomalies
blt.	bilateral	NHS	newborn hearing screening
BMI	Body-Mass-Index	NT	nuchal translucency
BP	basic prevalence	n.(o.)s.	not (otherwise) specified
CI	confidence intervall	OR	Odds Ratio
CNS	central nervous system	P	prevalence
dB	decibel	PDA	persistent ductus arteriosus
DIV	Double Inlet Ventricle	PFO	persistent foramen ovale
DORV	Double Outlet Right Ventricle	SA	spontaneous abortion
DUP	dilated uropathy	SB	stillbirths
EUROCAT	European Surveillance of Congenital Anomalies	TEOAE	transitory evoked otoacoustic emissions
ENT	ears, nose, throat	TOP	termination of pregnancy
FASD	Fetal Alcohol Spectrum Disorder	UCS	urine conducting system
G-BA	Federal Joint Comittee (Gemeinsamer Bundesausschuss)	VSD	ventricular septal defect
		WOG	week of gestation

Figures

1 Saxony-Anhalt - Registration Area

2 Birth Rate 2017

	Live birth*	Stillbirths*	Spontaneous Abortion (> 16 WOG)	Termination of Pregnancy for fetal anomaly following prenatal diagnosis	Total
Altmarkkreis Salzwedel	661	4	-	4	**669**
Anhalt-Bitterfeld	1,251	8	-	8	**1,267**
Börde	1,350	4	7	9	**1,370**
Burgenlandkreis	1,297	6	-	1	**1,304**
Dessau-Roßlau	647	2	-	1	**650**
Halle	2,391	11	1	10	**2,413**
Harz	1,594	5	1	10	**1,610**
Jerichower Land	730	6	-	2	**738**
Magdeburg	2,310	8	5	21	**2,344**
Mansfeld-Südharz	891	4	2	5	**902**
Saalekreis	1,466	8	3	6	**1,483**
Salzlandkreis	1,439	6	1	7	**1,453**
Stendal	901	4	3	2	**910**
Wittenberg	909	5	-	3	**917**
Unknown districts in Sachsen-Anhalt n.o.s.	-	-	-	-	**-**
Major cities: Dessau-Roßlau, Halle, Magdeburg	5,348	21	6	32	**5,407**
Districts, in total	12,489	60	17	57	**12,623**
Saxony-Anhalt	**17,837**	**81**	**23**	**89**	**18,030**

* Source: © Federal Statistical Office Saxony-Anhalt, Halle (Saale), 2018

3 Participating Institutions of the Region 2017

3.1 Maternity units / paediatric units / paediatric surgery / paediatric cardiology (ordered by location)

- AMEOS Klinikum Aschersleben
- Gesundheitszentrum Bitterfeld/Wolfen
- HELIOS Klinik Jerichower Land Burg
- Städtisches Klinikum Dessau
- Altmark-Klinikum Krankenhaus Gardelegen
- AMEOS Klinikum Halberstadt
- Krankenhaus St. Elisabeth und St. Barbara Halle
- Universitätsklinikum Halle (Saale)
- HELIOS Klinik Köthen
- Herzzentrum Leipzig - Universitätsklinik, Klinik für Kinderkardiologie *(outside of Saxony Anhalt)*
- Krankenhaus St. Marienstift Magdeburg
- Klinikum Magdeburg
- Universitätsklinikum Magdeburg A.ö.R.
- Saale-Unstrut Klinikum Naumburg
- Harzklinikum Dorothea Christiane Erxleben Klinikum Quedlinburg
- Altmark-Klinikum Krankenhaus Salzwedel
- HELIOS Klinik Sangerhausen
- AMEOS Klinikum Schönebeck
- Johanniter-Krankenhaus Genthin-Stendal
- Asklepios Klinik Weißenfels
- Harzklinikum Dorothea Christiane Erxleben Klinikum Wernigerode
- HELIOS Klinik Zerbst/Anhalt

3.2 Institution of pre- and postnatal diagnostics (ordered by location)

- Dipl. Heilpädagogin Schlote, Glindenberg/Magdeburg
- Ameos Klinikum Halberstadt, pränatale Ultraschalldiagnostik
- Universitätsklinikum Halle (Saale), Universitätsklinik für Geburtshilfe und Pränatalmedizin
- Zentrum für Pränatale Medizin Halle: S. Rieße, PD Dr. Hahmann
- Krankenhaus St. Elisabeth und St. Barbara Halle, Pränatale Ultraschalldiagnostik: CA Dr. Seeger / OÄ Dr. Radusch
- Dr. Altus, Fachärztin für Humangenetik, Magdeburg
- Dr. Karstedt, Facharzt für Kinder- und Jugendmedizin, Kinderkardiologie, Magdeburg
- Dr. Karsten, Facharzt für Frauenheilkunde und Geburtshilfe, Magdeburg
- Klinikum Magdeburg, Pränatale Ultraschalldiagnostik: OÄ Dr. Schleef
- Universitätsklinkum Magdeburg A.ö.R., Institut für Humangenetik
- Universitätsklinkum Magdeburg A.ö.R., Universitätsfrauenklinik, Pränatale Ultraschalldiagnostik: OÄ Dr. Gerloff
- Universitätsklinkum Magdeburg A.ö.R., Institut für Klinische Chemie, Screeninglabor
- Trackingstelle Neugeborenenhörscreening Sachsen-Anhalt, Magdeburg
- Dr. Welger, Fachärztin für Frauenheilkunde und Geburtshilfe, Magdeburg
- Dipl.-Med. Fiedler und Giesecke, Fachärzte für Orthopädie, Merseburg
- Altmark-Klinikum Krankenhaus Salzwedel, Pränatale Ultraschalldiagnostik: CA Dr. Müller
- Dr. Achtzehn, Facharzt für Kinder- und Jugendmedizin, Dr. Blaschke, Wanzleben
- Harzklinikum Dorothea Christiane Erxleben Klinikum Wernigerode, Pränatale Ultraschalldiagnostik: OÄ Dr. Schulze

3.3 Pathological-anatomical institutes (ordered by location)

- Institut für Pathologie Dr. Taege, Dr. Bilkenroth und Dr. Irmscher, Eisleben
- Universitätsklinikum Halle (Saale), Institut für Pathologie
- Klinikum Magdeburg, Institut für Pathologie
- Universitätsklinikum Magdeburg A.ö.R., Institut für Pathologie
- Praxis für Pathologie PD Dr. Schultz, Dr. Lüders, Dr. Hainz, Stendal

4 Malformation Registration in Saxony-Anhalt

4.1 General Information

The present annual report of the birth cohort 2017 does not only summarize the data analysis about prevalence of congenital malformations in our Federal State for another year, we also take the opportunity to thank all senders for the interdisciplinary cooperation in connection with the malformation registration in Saxony-Anhalt.

Congenital malformations and chromosomal anomalies are in Germany after premature births, the second most common reason for infant mortality. They occupy the first rank in the USA. Our special topic in the current year deals with the mortality in connection with congenital malformations and chromosomal anomalies in our Federal State. In this connection, this special analysis does not only contain data about infant and child mortality but also, depending on the pregnancy outcome, the prenatal mortality (spontaneous abortion, stillbirth) is included in case a pregnancy was concerned by a prenatal malformation or chromosomal aberration.

Infant fatalities lead on population level to a high number of lost years of life and therefore contribute to a decrease of the average life expectancy. A data analysis of the course of mortality in connection with congenital malformations has therefore for our Federal State a high health political importance from public-health-view. Our aim is to identify the factors which enable a decrease of early fatalities. Therefore, further international comparison analysis will be necessary.

The Monitoring of Congenital Malformations Saxony-Anhalt represents Germany with its collected data at the ICBDSR since 1993 (International Clearinghouse for Birth Defects Surveillance and Research), which is a WHO connected International Association of 42 malformation registers from 38 countries of the world. At the annual meeting in October 2018, Dr. Anke Rißmann was voted on the scientific board of ICBDSR. Further information about ICBDSR is available at: www.icbdsr.com. Furthermore, we are working actively since 1992 in cooperation with the population-based malformation registration centre EUROCAT. The central register of EUROCAT is located since 1st January 2015 at the JRC (Joint Research Center), which is the inhouse science service of the European Commission in Ispra, Italy. Further information about EUROCAT is available at: www.eurocat-network.eu.
We wish to point out again that this European and worldwide networking and epidemiological surveillance would not be possible without the dedicated collaboration of every single sender!

The consistent support of the Ministry of Employment, Social Affairs and Integration of the Federal State of Saxony-Anhalt enables the regionwide interdisciplinary project of the malformation data registration. In 2018, a personnel change took place and we wish to thank Prof. Dr. Dr. R. Nehring for the provided development assistance and constant support. We are glad that the collaboration also continues with his successor Mrs. K. Müller. Furthermore, we thank Dr. H.Willer and Mr. M. Schiener for their overall active collaboration. Additionally, we would like to thank our colleagues at the Medical Faculty of the Otto-von-Guericke University for their support within the project of the Monitoring of Congenital Malformations. These persons are Prof. Dr. H.-J. Rothkötter, Dr. J. L. Hülsemann and the commercial director Mrs. Dr. K. Stachel.

4.2 Registration and Analysis

The present report contains data about infants of the Federal State of Saxony-Anhalt with congenital malformations and chromosomal disorders in relation to the mother's place of residence during pregnancy, respectively at birth.

The total number of "births" includes:
- live births,
- stillbirths,
- terminations of pregnancy after prenatal diagnostics (all weeks of gest.)
- spontaneous abortions (>16 weeks of gest.)
and forms basis for the annual prevalence calculation.

The expected date of delivery is used as basis for analysing the termination of pregnancy, e.g. 2017 is considered the year of birth although some terminations of pregnancy after prenatal diagnostics took place at the end of 2016. This method is common on an international scale. In contrast, the time of delivery of spontaneous abortions is not corrected as the abortion is registered in the month when it actually took place.

The data of live births and stillbirths is provided annually in the middle of the year by the Statistical Office of Halle and refers to the previous year.
The outlined percentage indications and prevalences are rounded.

All data transmitted to the Monitoring of Congenital Malformations is medically controlled upon receipt and the diagnoses are encoded according to ICD-10 and according to a further extension (Adaptation of the Royal College of Pediatrics and Child Health). Details about the intake of medication during pregnancy are registered by using the internationally recommended ATC codes.

The total number of infants with major malformations as well as the geographical distribution of appearance in the big cities and districts is outlined in chapter 7 and 8. Infants with only minor malformations or rather norm variations are not evaluated separately since this data is only collected incompletely in the end. Chapter 11 outlines the most frequent single diagnoses of major malformations registered in 2017.
Similar to the previous years we analysed the reported pathological prenatal screening results separately in Chapter 10.

Chapter 12 contains again the analysis of the so-called indicator birth defects. As we have presented data in this way for a number of years, it is possible to evaluate the current prevalences of 2017 in comparison to the last 12 years (2005-2016). Here, a total number of 208,656 births forms basis for the basis prevalence calculation 2005 to 2016.

The graphical presentation of the annual prevalences allows to identify frequent appearances and gives a good overview about rarely appearing indicator births defects. The exact calculation of confidence levels is based on the binominal distribution with a confidence probability of 95%. To discover a certain trend the percentage change of an indicator malformation prevalence is illustrated as well during the publishing time of the Annual Report (Chapter 12.37).

Chapter 13 outlines data regarding genetically caused diseases, chromosomal disorders, sequences, associations, complexes and embryopathies. Chapter 14 contains an analysis of malformation caused terminations of pregnancy.

As usual, the Newborn hearing screening forms part of the Report of the Monitoring of Congenital Malformations Saxony-Anhalt and is outlined in chapter 18.
Chapter 19 presents the Annual Report of the department of newborn screening in Saxony-Anhalt with data regarding congenital metabolic disorders and endocrinopathies.

4.3 Data Quality and Completeness/Reporting Procedure

All data records about births and foetuses from the maternity and paediatric units resp. from institutions of pre- and postnatal diagnostics which are mentioned in chapter 5.2 were analysed, encoded and stored in the database of the Monitoring of Congenital Malformations. This database which contains meanwhile about 60,000 data records forms basis for scientific papers and at for the elaboration of the current annual report. In 2017, the Monitoring of Congenital Malformations Saxony-Anhalt received data about 2020 newborns and foetuses which corresponds to a percentage of 11 % of all births in Saxony-Anhalt in 2017. Since our Annual Report 2016 was published the number of births and corresponding data records for 2016 increased from 2055 to 2080.

We received 2292 reports for the year 2017. In 11.1 % of all cases we received information from two or more institutions. Receiving these double-reportings helps to reconfirm a diagnosis or to classify complex malformations exactly.
It is very positive that the health care canter Bitterfeld/Wolfen and the University hospital Halle increased their reportings. Furthermore, we receive continuously reports from three outpatient facilities, the center for Prenatal Medicine (Halle), Dr. Altus (specialist for human genetics, Magdeburg) and Dr. Karstedt (Specialist for paediatrics and adolescent medicine, paediatric cardiologist, Magdeburg). The Carl-von-Basedow-Clinic Merseburg, the Georgius-Agricola Clinic Zeitz and the evangelical hospital Paul Gerhardt Stift Wittenberg did not send any reports in 2017. In total, we would have expected approximately 40 to 50 reportings of foetuses resp. infants with major malformations from these hospitals.

The data quality remained also in 2017 on a high level thanks to the excellent work and dedication of all our senders. Complete information on the registration sheet and a correct and preferably detailed diagnosis description is therefore essential for the classification of malformations risks. The data quality influences the quality of statistical evaluation and quality of analysis in our annual report.

We received important information nearly in all cases: gender 99,1 %, maternal age 98,9 % and district 99,5 %. The birth weight was not reported in 68 cases (3.4 %), among them 17 live births without indication of birth weight. In almost a quarter of all cases of non-descended live births (442 infants, 24.0 %) the indication of head circumference was missing, which is important in connection with the diagnosis of microcephaly.

We kindly ask again all reporting institutions in Saxony-Anhalt to report carefully and describe every diagnosed malformation as detailed as possible and to mention also additional malformations. It is remarkable that only in case of five foetuses in 2017 the prenatal diagnosed indicator malformation could not be assigned to a postnatal reporting. However, when the results confirmation is missing, the prenatal results are not included into the statistics of the indicator malformations (Chapter 12).

We receive two thirds of malformation registrations and indications of control cases by means of the "green documentation sheets", which we provide free of charge to the reporting institutions. Documentation sheets may be ordered at any time by phone +49 391-6714174 or e-mail to monz@med.ovgu.de.
Additionally, it is also possible to report on so-called "white documentation sheets". This form serves to register a minimum data set. The indication of the above-mentioned information and possible risk factors like intake of medication or family histories and an exact description of the malformation and corresponding symptoms are important here.

Both documentation sheets are also available for download on our homepage www.angeborene-fehlbildungen.com. It is possible to complete them manually or to enter the data directly into the PDF file, print it out and send it back to us. Mostly, we receive the reports by mail on our documentation form sheets. In many institutions fax reports have become the preferred method of transmission. Our fax number is: +49 391-6714176. We will be at your disposal for answering any further questions about the reporting procedure and congenital malformations in general.

6 Sex Ratio

Sex ratio of all lives births and stillbirths in Saxony Anhalt (according to the information of the Statistical Office Halle)

male	9,228	live births and stillbirths
female	8,690	live births and stillbirths
total	17,918	live births and stillbirths

Sex ratio m : f = 1.06

The Statistical Office Saxony-Anhalt registered in 2017 a total number of 17,837 live births and 81 stillbirths. Compared to the previous year, the number of live births decreased about 256, but significantly more stillbirths were registered (2016: 54). The slightly higher birth rate of boys remains in 2017 similar to the birth rate of 2016 (life and stillbirths 2017: 9,228 boys, 8,960 girls). The sex ratio is also similar to the previous year (2016: 1.07) with m : f = 1.06.

679 births with major malformations were registered in 2017. This group includes life births, stillbirths, medical induced abortions and spontaneous abortions from the 16th WOG. Furthermore, an androtropism existed in 2017 with a sex ratio (m : f) of 1.22. This remains similar to the previous year (2016: m : f = 1.21) and appeared more clearly than in 2015 with a slight shifting to the girls (2015: m : f = 1.08). Additionally, 269 births with only minor malformations were registered in 2017 (133 boys, 136 girls). Consequently for the first time, there was an interchanged sex ratio (m : f = 0.98). During the whole time of the reporting period this was never determined before. Generally, more boys were concerned (2016: 1.33; 2015: 1.39; 2014: 1.54).

Sex ratio of all births with major malformations (including abortions)

male	365	births
female	298	births
uncertain	1	births
unknown	15	births
total	679	births

Sex ratio m : f = 1.22

Sex ration of all births with only minor malformations and anomalies

male	133	births
female	136	births
total	269	births

Sex ratio m : f = 0.98

In total, 116 births less than in 2016 were registered in 2017 with major and minor malformations (2017: 984; 2016: 1064). We registered in 2016 an uncommon high number of infants/foetuses with only minor malformations, while the number of births with major malformations remained similar.

11 Organ System Involvement in Infants and Foetuses with Major Malformations

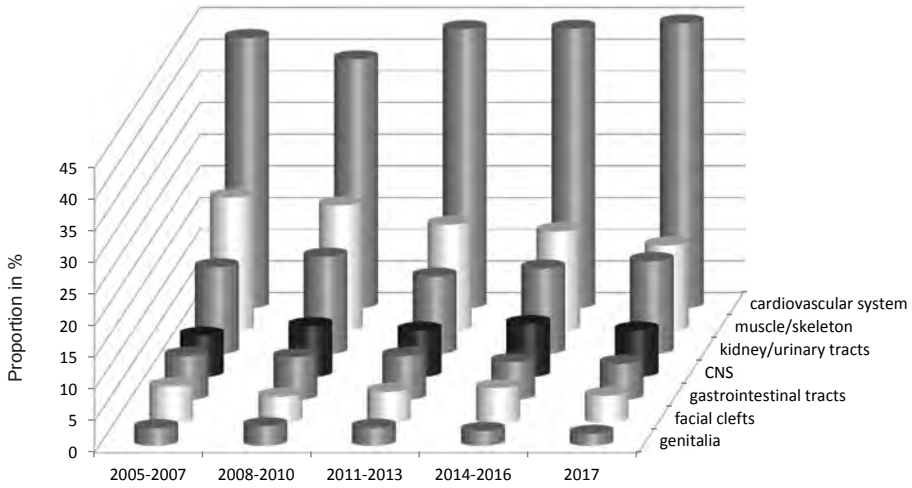


Fig. 5: Organ system involvement in major malformations (grouped)

The monitoring of congenital malformations Saxony-Anhalt registered 679 births with major malformations, thereof 307 births with multiple congenital anomalies (45.21 %) in 2017.

Figure 5 presents the proportionate appearance of malformations in seven important organ systems for births with major malformations. Multiple malformations may appear at the same time at one birth, therefore multiple mentions are possible. The diagram does not present births with chromosomal aberrations and MCA without exact specification of the malformation.

Data of 2017 is presented separately in a three-years-classification, data of the previous years is categorised beginning with 2005. The proportions of concerned organ systems of all births with major malformations remain nearly unchanged in the same order since 2005.

Similar to the previous years, the organ system which was most frequently affected by a malformation in 2017, was the cardiovascular system. Once again, a slight increase of the percentage of the registered cardiovascular malformations can be identified (2017: 48.90 %; 2014-2016: 44.15 %).

In the average of the years 2014-2016, we registered 13.53 % of all births with malformations of the kidney / urinary tract. The total percentage of the kidney and urinary tract malformations (14.73 %) slightly increased in 2017 in contrast to the previous years. Therefore, the kidney / urinary tract malformations were registered more frequently for the first time than the muscle/skeleton malformations.

The muscle / skeleton system was during 2005 and 2016 always the organ system which was the second most frequently concerned one by major malformations. The maximum registered percentage during this time period was a value of 23.46 % (2007). During the recent years these malformations were observed less frequently. In 2017, the percentage of infants / foetuses with malformations of the muscle / skeleton system decreased to a value of 13.55 %.

The percentage of malformations of the CNS lies in 2017 at 7.36 %, which is only marginal less than the values we registered during the years 2014-2016 (8.39 %). During the time of the registration period the percentage fluctuates between 5.43 % (2005) and 9.08 % (2014).

The figure shows clearly, that malformations of the gastrointestinal tract decreased proportionally when regarding the total number of infants / foetuses with major malformations (2011-2013: 6.96 %; 2014-2016: 6.03 %). The value decreased again in 2017 (5.74 %).

The 2017 registered percentage of facial clefts of 4.27 % of all births with major malformations remains in the lower middle of the registered values. During the years 2005 and 2016 we registered in 2015 a maximum value of 6.66 %.

With a value of 1.91%, in relation to the total number of infants with major malformations, malformations of the genitalia appeared 2017 less frequently than in all time periods that are illustrated in the diagram. This minimal trend has to be observed further on.

The most frequent single diagnoses 2017 (only major malformations)

	ICD-10	Diagnosis	Infants/Foetuses 2017		Infants/Foetuses 2005-2016 Prevalence /10,000**
			Number	Prevalence /10,000*	
1.	Q21.1	Atrial septal defects (inclusive persistent foramen ovale/PFO)	224	124.2	87.2
2.	Q21.0	Ventricular septal defect	90	49.9	46.2
3.	Q62.3	Other obstructive defects of renal pelvis und ureter (dilated uropathy grade II-IV)	53	29.4	22.6
4.	Q90.	Down-Syndrom (Trisomy 21)	38	21.1	17.6
5.	H90.	Conductive and sensorineural hearing loss	34	18.9	19.1 (22.0#)
6.	Q66.0	Pes equinovarus congenitus (clubfoot)	25	13.9	15.7
7.	Q63.0	Accessory kidney	21	11.6	7.1
8.	Q69.	Polydactyly (pre- und postaxial)	19	10.5	12.3
	Q22.1	Pulmonary valve stenosis	19	10.5	6.7
9.	Q65.3-5	Hip subluxation (unilateral/bilateral)	18	10.0	11.6
10.	Q37.	Cleft palate with cleft lip	16	8.9	10.7
11.	Q62.2	Congenital megaureter	15	8.3	8.3
	Q62.1	Atresia and stenosis of ureter	15	8.3	8.1
	Q25.1	Coarctation of aorta	15	8.3	5.3
12.	Q03.	Congenital hydrocephaly (without neural tube defects)	14	7.8	5.2
13.	Q04.0	Hypoplasia / Agenesis of the corpus callosum	12	6.7	4.9
14.	Q33.6	Hypoplasia and dysplasia of the lung	11	6.1	3.6
	Q79.2	Omphalocele	11	6.1	3.3
15.	Q61.4	Renal dysplasia	10	5.5	6.2
16.	Q60.0	Renal agenesis, unilateral	9	5.0	5.9
	Q23.3	Congenital mitral insufficiency	9	5.0	5.0
	Q35.1 Q35.5 Q35.9	Cleft palate	9	5.0	4.1
	Q91.0-3	Edwards-Syndrom (Trisomy 18)	9	5.0	3.8
17.	Q25.0	Patent ductus arteriosus	8	4.4	10.2
	Q05.	Spina bifida	8	4.4	5.4
	Q20.3	Discordant ventriculoarterial connection	8	4.4	3.5
	Q25.4	Right-sided aortic arch	8	4.4	2.5

* based on 18,030 newborns ** based on 208,656 newborns

2007-2016 (since 2007 data is synchronised with the newborn hearing screening tracking centre)

The above presented table shows the actual prevalence, the basis prevalence and the most frequently registered single diagnoses in Saxony-Anhalt. 18,030 births form the basis of the prevalences of the year 2017 and 208,656 births of the basis prevalences (2005-2016).

Cardiac malformations always appear most frequently. Therefore, ASD (2017: 124.2 per 10,000 births) and VSD (2017: 49.9 per 10,000 births) can be found constantly in the first two rows of the table. The prevalence of the current year exceeds in both cases the prevalences of the years 2005-2016 (87.2 per 10,000 births, CI 83.2 to 91.3 resp. 46.2 per 10,000 births, CI 43.4 to 49.3). Since a couple of years cardiac malformations are reported more often and more detailed. For this reason, the single counting shows actually higher prevalences than in the recent years. A currently higher prevalence above the basis prevalence is also present for the cardiac malformations pulmonary valve stenosis (2017: 10.5 per 10,000 births, 2005-2016: 6.7 per 10,000 births, CI 5.7 to 7.9), aortic coarctation (2017: 8.3 per 10,000 births, 2005-2016: 5.3 per 10,000 births, CI 4.4 to 6.3), discordant ventricular arterial connection as well as right passing aortic arch (2017 each: 4.4 per 10,000 births, 2005-2016: 3.5 per 10,000 births, CI 2.7 to 4.4 resp. 2.5 per 10,000 births, CI 1.9 to 3.3).

Once again, the dilated uropathy II.-IV.°/ ureterocoele (2017: 29.4 per 10,000 births; 2005-2016: 22.6 per 10,000 births, CI 20.6 to 24.7) appears as third most frequent single malformation. It was never registered as frequently as in the current year since 2000, similar to the accessory kidney on rank seven (2017: 11.6 per 10,000 births; 2005-2016: 7.1 per 10,000 births, CI 6.1 to 8.4).

Rank four occupies actually, after 2016 with unusually few cases, however more often than the average, the Down`s syndrome (2017: 21.1 per 10,000 births, 2005-2016: 17.6 per 10,000 births, CI 15.9 to 19.5).

The hearing loss follows 2017 on rank five (2017: 18.9 per 10,000 births). In 2007, the Newborn hearing screening was invented in Saxony-Anhalt. The influence of the screenings on the detection and reporting rate leaded to a break of the prevalence. The basis prevalence during the entire period 2005-2016 of 19.1 per 10,000 births (CI 17.3 to 21.0) does not illustrate this. Until the year 2006 it was clearly under 10.0 and raised 2007-2016 to 22.04 per 10,000 births (174,256 births, CI 19.9 to 24.3). In comparison with the time period 2007-2016 the prevalence of 2017 does not reach the expected value.

The clubfoot was registered in 2017 on rank six, which is slightly under the basis prevalence (2017: 13.9 per 10,000 births; 2005-2016: 15.7 per 10,000 births, CI 14.1 to 17.5).

The polydactyly occupies 2017 rank eight (2017: 10.5 per 10,000 births; 2005-2016: 12.3 per 10,000 births, CI 10.9 to 13.9). Polydactyly is composed of the rarely appearing indicator malformation preaxial polydactyly (chapter 12.28) and the postaxial polydactyly. The prevalence of both lies slightly under the confidence interval of the respective basis prevalence.

Rank nine and ten, in each case slightly under the average prevalence of the years 2005-2016 (11.6 per 10,000 births, CI 10.2 to 13.1 resp. 10.7 per 10,000 births, CI 9.4 to 12.2) are occupied in this year by the subluxation of hip joint (2017: 10.0 per 10,000 births) and the cleft lip jaw palate (2017: 8.9 per 10,000 births). The cleft lip jaw palate is part of the indicator malformation cleft lip and cleft lip jaw palate (chapter 12.14), which appeared 2017 also with a frequency that was slightly under the expected value.

Two malformations of the urogenital system, the megaureter and the atresia/stenosis of ureter (2017: 8.3 per 10,000 births) appear again on the usual rank eleven. They appear 2017 in the range of the basis prevalence (2005-2016: 8.3 per 10,000 births, CI 7.2 to 9.6 resp. 8.1 per 10,000 births, CI 6.9 to 9.3). For the renal dysplasia (rank 15) a prevalence (5.5 per 10,000 births) within the basic area was calculated in 2017, too (2005-2016: 6.2 per 10,000 births, CI 5.2 to 7.3).

The indicator malformations hydrocephaly (chapter 12.6) occupies rank 12 of the current frequency table. It appeared significantly more often than usual (2017: 7.8 per 10,000 births; 2005-2016: 5.2 per 10,000 births, CI 4.3 to 6.2). Rank 13 is occupied, also more frequently than expected by the hypoplasia/agenesis of corpus callosum (2017: 6.7 per 10,000 births; 2005-2016: 4.9 per 10,000 births, CI 4.0 to 5.9).

Hypoplasia/dysplasia of lung and omphalocele are (chapter 12.31) two malformations which are normally to find on rank 20 of the list of most frequent malformations. Both appeared 2017 with 6.1 per 10,000 births significantly more often than usual (2005-2016: 3.6 per 10,000 births, CI 2.8 to 4.5 resp. 3.3 per 10,000 births, CI 2.6 to 4.2).

Rank 16 is occupied 2017 with 5.0 per 10,000 births by four major malformations at the same time. One of them, the Edwards-syndrome (chapter 12.36), was diagnosed slightly more often than expected (2005-2016: 3.8 per 10,000 births, CI 3.0 to 4.7).

Three further single malformations, the unilateral renal agenesis (chapter 12.25), the mitral valve insufficiency and the cleft palate appeared with a frequency in the common area of the basis prevalence. The cleft of soft palate (Q35.3) belongs to the in chapter 12.15 presented indicator malformation cleft palate (2017: 5.5 per 10,000 births).

The hemodynamical effective PDA and spina bifida (chapter 12.3) are in 2017 to find just at the end of the table of the most frequent single malformations. With 4.4 per 10,000 births they appeared less frequently than expected (2005-2016: 10.2 per 10,000 births, CI 4.0 to 11.7 resp. 5.4 per 10,000 births, CI 4.5 to 6.5). The values of PDA vary very much. The maximum value was registered at 2017 with 17.7 per 10,000 births.

12 Indicator Defects of the International Clearinghouse for Birth Defects Surveillance and Research (ICBDSR)

12.0 Definition

1. Neural tube defects: common congenital malformations that occur when the neural tube fails to achieve proper closure during early embryogenesis, resulting in defective development of the associated vertebral arches.
Phenotypes: Spina bifida, anencephaly, NTD.

2. Anencephaly: a congenital malformation characterized by the total or partial absence of the cranial vault, the covering skin, and the brain missing or reduced to small mass. Inclusive craniorachischisis, infants with iniencephaly and other neural tube defects as encephalocele or open spina bifida, when associated with anencephaly. Exclusive acephaly, that is, absence of head observed in amorphous acardiac twins.

3. Spina bifida: a family of congenital malformation defects in closure of the spinal column characterized by herniation or exposure of the spinal cord and/or meninges through an incompletelyclosed spine. Inclusive meningocele, meningomyelocele, myelocele, myelomeningocele, rachischisis. Spina bifida is not counted when present with anencephaly. Exclusive spina bifida occulta, sacrococcygeal teratoma without dysraphism.

4. Encephalocele: a congenital malformation characterized by herniation of the brain and/or meninges through a defect in the skull. Encephalocele is not counted when present with spina bifida.

5. Microcephaly: a congenitally small cranium, defined by an occipito-frontal circumference (OFC) 3 standard deviation below the age and sex appropriate distribution curves (see growth charts Voigt et al. 2014, charts 25).
Exclusive microcephaly associated with anencephaly or encephalocele.

6. Congenital Hydrocephaly: a congenital malformation characterized by dilatation of the cerebral ventricles, not associated with a primary brain atrophy, with or without enlargement of the head, and diagnosed at birth. Not counted when present with encephalocele or spina bifida. Exclusive macrocephaly without dilatation of ventricular system, skull of macerated fetus, hydranencephaly, holoprosencephaly, and postnatally acquired hydrocephalus.

7. Arhinencephaly/Holoprosencephaly: a congenital malformation of the brain, charaterized by various degrees of incomplete lobation of the brain hemispheres. Olfactory nerve tract may be absent. Holoprosencephaly includes cyclopia, ethmocephaly, and premaxillary agenesis.

8. Anophthalmos/Microphthalmos: apparently absent or small eyes. Some normal adrenexal elements and eyelids are usually present. In microphthalmia, the corneal diametes is usually less than 10 mm, and the antero-posterior diameter of the globe is less than 20 mm.

9. Anotia/Microtia: a congenital malformation characterized by absent parts of the pinna (with or without atresia of the ear canal) commonly expressed in grades (I - IV) of which the extreme form (grade V) is anotia, absence of pinna. Exclussive small, nomally shaped ears , imperforate auditory meatus with a normal pinna, dysplastic and low set ears.

10. Tetralogy of Fallot: a condition characterized by ventricular septal defects, overriding aorta, infundibular pulmonary stenosis, and often right ventricular hypertrophy.

11. Transposition of great vessels (TGV): a cardiac defect where the aorta exits from the right ventricle and the pulmonary artery from the left ventricle, with or without other cardiac defects. Inclusive double outlet ventricle so calles corrected transposition.

12. Hypoplastic left heart syndrome: a cardiac defect with a hypoplastic left ventricle, associated with aortic and/or mitral valve atresia, with or without other cardiac defects.

13. Coarctation of the aorta: an obstruction in the descending aorta, almost invariably at the insertion of the ductus arteriosus.

14. Cleft lip with or without cleft palate: a congenital malformation characterized by partial or complete clefting of the upper lip, witho or without clefting of the alveolar ridge or the hard palate. Exclusive midline cleft of upper or lower lip and oblique facial pressure (going towards the eye).

15. Cleft palate without cleft lip: a congenital malformation characterized by a closure defect of the hard and/or soft palate behind the foramen incisivumwithout cleft lip. Inclusive submucous cleft palate. Exclusive cleft palate with cleft lip, cleft uvula, functional short palate and high narrow palate.

16. Choanal atresia, bilateral: congenital obstruction (membraneous or osseous) of the posterior choana or choanae. Exclusive choanal stenosis and congestion of nasal mucosa.

17. Oesophageal atresia/stenosis: a congenital malformation characterized by absence of continuity or narrowing of the esophagus, with or without tracheal fistula. Inclusive trachealoesiphageal fistula with or without mention of atresia or stenosis of oesophagus.

18. Small intestine atresia/stenosis: complete or partial occlusion of the lumen of a segment of the small intestine. It can involve a single area or multiple area of the jejunum or ileum. Exclusive duodenal aresia.

19. Anorectal atresia/stenosis: a congenital malformation characterized by absence of continuity of the anorectal canal or of communication between rectum and anus, or narrowing of anal canal, with or without fistula to neighbouring organs. Exclusive mild stenosis which does not need correction, and ectopic anus.

20. Undescended testis: bilateral undescended testes in at term newborn or at least unilateral undescended testis in males more than 1 year of age. Exclusive retractile testis.

21. Hypospadias: a congenital malformation characterized by the opening of the urethra on the ventral side of the penis, distally to the sulcus. Inclusive penile, scrotal and perineal hypospadias. Exclusive glandular or first degree hypospadias ad ambiguous genitalia (intersex or pseudohermaphroditism).

22. Epispadias: a congenital malformation characterized by the opening of the urethra on the dorsal surface of the penis. Not counted when part of exstrophy of the bladder.

23. Indeterminate sex: genital ambiguity at birth that does not readily allow to phenotypic sex determination. Inclusive male or female true or psudohermaphroditism.

24. Potter sequence: a congenital malformation characerized by complete absence of kidneys bilaterally or severely dysplastic kidneys.

25. Renal agenesis, unilateral: a congenital malformation characterized by complete absence of one kidney unilaterally. Exclusive unilateral dysplastic kidney.

26. Cystic kidney: a congenital malformation characterized by multiple cysts in the kidney. Inclusive infantile polycystic kidney, multicystic kidney. other forms of cystic kidney and unspecified cystic kidney. Exclusive single kidney cyst.

27. Bladder exstrophy: complex malformation characterized by a defect in the closure of the lower abdominal wall and bladder. Bladder opens in the ventral wall of the abdomen between the umbilicus and the symphysis pubis. It is often associated with epispadias and structural anomalies of the pubic bones.

28. Polydactyly, preaxial: extra digit(s) on the radial side of the upper limb or the tibial side of the lower limb. It can affect the hand, the foot, or both.

29. Limb reduction defects: a congenital malformation characterized by total or partial absence or severe hypoplasia of skeletal structures of the limbs. Inclusive femoral hypoplasia. Exclusive mild hypoplasia with normal shape of skeletal parts, brachydactyly, finger or toe reduction directly associated with syndactyly, general skeletal dysplasia and sirenomelia.

30. Diaphragmatic hernia: a congenital malformation characterized by herniation of abdominal contents through a defect of the diaphragm into the thorax. Inclusive total absence of the diaphragm. Exclusive hiatus hernia, eventration and phrenic palsy.

31. Omphalocele: a congenital malformation characterized by herniation of abdomal contents through the umbilical insertion and covered by a membrane which may or may not be intact. Exclusive gastroschisis (para umbilical hernia), a or hypoplasia of abdominal muscles, skin covered umbilical hernia.

32. Gastroschisis: a congenital malformation characterized by visceral herniation through a right side abdominal wall defect to an intakt umbilical cord and not covered by a membrane. Exclusive hypoplasia of abdominal mucles, skin covered umbilical hernia, omphalocele.

33. Prune belly sequence: a complex congenital malformation charaterized by deificient abdominal muscle and urinary obstruction/distension. It can be caused by urethral obstruction secondary to posterior urethral valves or urethral atresia. In the affected fetus the deficiency of the abdominal muscle may not be evident. It can be associated with undescended testes, clubfoot, and limb deficiency.

34. Down's Syndrome (Trisomy 21): a congenital chromosomal malformation syndrom characterized by a well known pattern of minor and major anomalies and associated with excess chromosomal 21 material. Inclusive trisomy mosaicsm and translocations of chromosome 21.

35. Patau syndrome (Trisomy 13): a congenital chromosomal malformation syndrome associated with extra chromosome 13 material. Inclusive translocation and mosaic trisomy 13.

36. Edwards syndrome (Trisomy 18): a congenital chromosomal malformation syndrome associated with extra chromosome 18 material. Inclusive translocation and mosaic trisomy 18.

Note:

The prevalences we calculated in the following chapters are population-based. The value indicates the number of births with malformations born in a certain population with reference to the total number of births in this population. Since 2000, the prevalence calculations are only referring to children whose mothers have their residence in Saxony-Anhalt. Between 1996-1999 the registration area of the Monitoring of Congenital Malformations did not cover the entire area of Saxony-Anhalt (1996/1997: 14, 1998: 15, 1999: 16 of 21 districts). The calculation of the basis prevalences (2005-2016) is based on a total number of 208.656 births.

The analysis of the indicator malformations is made with regard to the diagnosis. It is possible that one child has more than one indicator malformation. Therefore, the number of all indicator malformations might be higher than the total number of births with an indicator malformation.

The in chapter 12 indicated comparison prevalences which correspond to the basis prevalences of Saxony-Anhalt are based on data of the years 2005-2016 of the Full-Member-Register of European Surveillance of Congenital Anomalies (EUROCAT) from 18 different European countries. Only registers are taken into account into the prevalence calculation of EUROCAT which presented data at EUROCAT for the last five years (2012-2016) or more and for at least five years during the time period of 2005-2016.

12.1 Neural tube defects (Q00./Q01./Q05.)

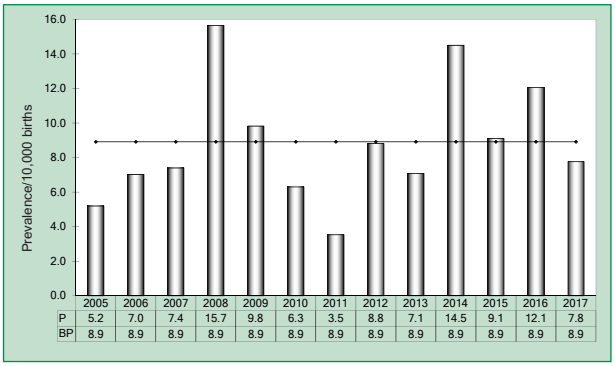
	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 1 x Dessau-Roßlau 1 x Halle 1 x Magdeburg	3	5.5	↓
Districts: 1 x Anhalt-Bitterfeld 2 x Börde 3 x Harz 1 x Jerichower Land 1 x Mansfeld-Südharz 1 x Stendal 2 x Wittenberg	11	8.7	↔
Saxony-Anhalt	**14**	**7.8**	↔

Neural tube defects (2005 to 2016)		
	Basic prevalence /10,000 births	**Confidence intervall (CI of 95%) /10,000 births**
Cities	9.40	7.06 - 12.26
Districts	8.73	7.39 - 10.29
Region	8.91	7.75 - 10.25
EUROCAT	10.15	9.94 - 10.37
		3.44 S Portugal* 20.75 Isle de la Reunion (France)**

*/** centres with the lowest resp. highest prevalence/10,000 births

14 cases of neural tube defects were registered in 2017. These can be divided into four cases of anencephalus (28.6 %), eight cases (57.1 %) of spina bifida and two cases (14.3 %) of encephalocele.

This results in a prevalence of 7.8 per 10,000 births for neural tube defects. It lies within the confidence interval of the calculated basis prevalence (time period 2005 to 2016: 8.9 per 10,000 births). The basis prevalence that was calculated for European comparison for the time period of 2005 to 2016 lies with 10.15 per 10,000 births rather over the value.



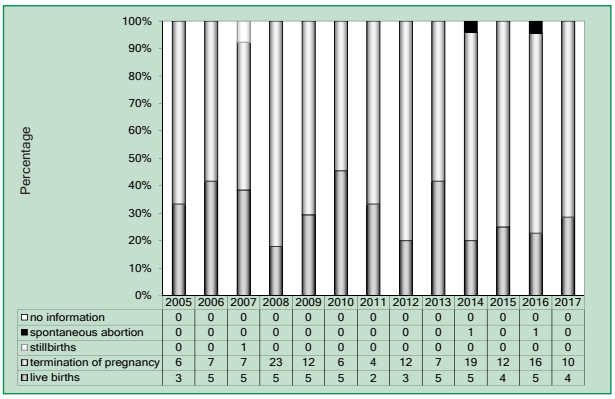
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
P	5.2	7.0	7.4	15.7	9.8	6.3	3.5	8.8	7.1	14.5	9.1	12.1	7.8
BP	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9	8.9

Fig. 6: Development of prevalence/10,000 births with neural tube defects in Saxony-Anhalt since 2005

28.6 % of concerned infants were live births. One infant with anencephalus died postnatally. For further details, please see point 12.2 to 12.4.

additional information:

Pregnancy outcome	3 x live births 1 x live births deceased within 7 days 10 x termination of pregnancy
Sex	11 x male 2 x female 1 x no indication
Number of isolated malformations/MCA	6 x MCA 8 x isolated



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
no information	0	0	0	0	0	0	0	0	0	0	0	0	0
spontaneous abortion	0	0	0	0	0	0	0	0	0	1	0	1	0
stillbirths	0	0	1	0	0	0	0	0	0	0	0	0	0
termination of pregnancy	6	7	7	23	12	6	4	12	7	19	12	16	10
live births	3	5	5	5	5	5	2	3	5	5	4	5	4

Fig. 7: Pregnancy outcomes of neural tube defects in the registration area since 2005

In 2017, one neural tube defect per 1,288 births was registered in Saxony-Anhalt.

Neural tube defects are probably the most investigated congenital malformation within scientific studies. Already in 1995, several German specialist societies published their recommendation regarding primary prevention of folic acid sensitive neural tube defects. A periconceptional intake of 0.4 mg folic acid was recommended to women at child-bearing age. On the other hand, insufficient realisation of this recommendation is urged by recent studies as in case of unplanned pregnancy (first consultation of gynaecologist not before 5 to 7 WOGs) and by risk groups with low socio-economic status or migrants. In a lot of countries outside from Europe it is therefore usual to decrease the neural tube defects rate by enriching basic food like flour with folic acid. New is a controversial discussed statement of September 2017 about the topic safety of folic acid enrichment on population level by the Federal Institute for Risk Assessment (BfR) [1]. This statement concludes that the majority of the German population is well nurtured with folic acid and a nationwide flour fortification is inadvisable at the moment due to possible health risks for older people. In contrast, but at the same point of time (July 2017), the English Scientific Advisory Committee on Nutrition comes to a completely different estimation of the topic. They recommend a mandatory folic acid enrichment [2]. However, which further scientific arguments support this folic acid enrichment and why also the working committee folic acid (Monitoring of Congenital malformations is also member) regards a re-evaluation also as necessary, is outlined in an article of the German magazine “Deutsches Ärzteblatt” [3]. Literature on page 29.

12.2 Anencephaly (Q00.)

	Number	Prevalence /10,000 births	Trend in comp. to basic-prevalence
Major cities	0	0.0	↓
Districts: 1 x Anhalt-Bitterfeld 2 x Harz 1 x Wittenberg	4	3.2	↔
Saxony-Anhalt	**4**	**2.2**	↔

Anencephaly (2005 to 2016)		
	Basic prevalence /10,000 births	**Confidence intervall (CI of 95%) /10,000 births**
Cities	1.91	0.96 - 3.43
Districts	2.31	1.61 - 3.22
Region	2.20	1.61 - 2.94
EUROCAT	3.90	3.76 - 4.03
		0.67 Wielkopolska (Poland)*
		7.57 Isle de la Reunion (France)**

*/** centres with the lowest resp. highest/10,000 births

We registered four births with anencephaly in 2017. The prevalence lies at 2.2 per 10,000 births.
The annual prevalence is identical to the basis prevalence of 2.2 per 10,000 births which was calculated for the time period of 2005-2016.

In the European comparison these values lie under the confidence interval that was calculated for the EUROCAT register for the time period of 2005-2016.

NOTE

After a pregnancy was affected by a neural tube defect, women with desire to have further children should be informed about an increased folic acid prophylaxis according to recommendation of the medical expert association (in Germany available preparation with 5 mg folic acid equivalent per day). Women with anti-epileptic medication and chronical malabsorption are recommended to take this higher dose, too.

Literature
1 Bundesinstitut für Risikobewertung (BfR). Nutzen-Risiko-Abwägung einer flächendeckenden Anreicherung von Mehl mit Folsäure. Stellungnahme Nr. 027/2017 des BfR vom 13. Sept. 2017., 2017. https://www.bfr.bund.de/de/bewertung_von_vitaminen_und_mineralstoffen_in_lebensmitteln-54416.html
2 Scientific Advisory Committee on Nutrition (SACN). Update on folic acid, 2017. https: //assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/637111/SACN_Update_on_folic_acid.pdf, 05.11.2018
3 Obeid R, Pietrzik K. Das Veto gegen Folsäure im Mehl sollte überdacht werden. Deutsches Ärzteblatt international 2018; 115(27-28): A1329-A1330 and A4

additional information:

Pregnancy outcome	1 x live births deceased within 7 days 3 x termination of pregnancy
Sex	2 x male 2 x female
Number of isolated malformations/MCA	1 x MCA 3 x isolated

Malformations combination (MCA) or superordinated syndromes detected:

- blt. each with one accessory pulmonary lobe

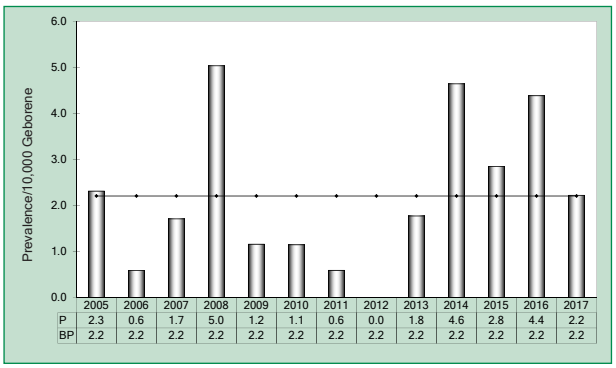


Fig. 8: Development of prevalence/10,000 births with anencephaly in Saxony-Anhalt since 2005

In 2017, one anencephaly per 4,508 births was registered in Saxony-Anhalt.

12.3 Spina bifida (Q05.)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 1 x Dessau-Roßlau 1 x Halle	2	3.7	↘
Districts: 1 x Börde 1 x Harz 1 x Jerichower Land 1 x Mansfeld-Südharz 1 x Stendal 1 x Wittenberg	6	4.8	↔
Saxony-Anhalt	**8**	**4.4**	↘

Spina bifida (2005 bis 2016)		
	Basic prevalence /10,000 births	**Confidence intervall (CI of 95%) /10,000 births**
Cities	5.57	3.81 - 7.86
Districts	5.36	4.25 - 6.66
Region	5.42	4.53 - 6.47
EUROCAT	5.03	4.88 - 5.18
		1.77 S Portugal* 10.72 Isle de la Reunion (France)**

*/** centres with the lowest resp. highest prevalence/10,000 births

The prevalence of 2017 lies with 4.4 per 10,000 births minimally under the calculated confidence interval.
The annual prevalence lies slightly under the basis prevalence of 5.4 per 10,000 births, which was calculated for the time period of 2005 to 2016.

additional information:

Pregnancy outcome	3 x live births 5 x termination of pregnancy
Sex	8 x male
Number of isolated malformations/MCA	5 x MCA 3 x isolated

Three live births and five terminations of pregnancy were affected by spina bifida. In five cases a lumbar resp. lumbosacral defect was present and in one case the defect appeared in the sacral area (in one case without indication of lesion height).

In three cases (37.5%) an Arnold-Chiari-II malformation was additionally diagnosed and in five cases (62.5%) a hydrocephalus was present already at point of diagnosis.

Malformation combinations (MCA) or superordinated syndromes detected:

- Edwards-syndrome with: Dextro-transposition of aorta, VSD, cleft upper jaw and palate right, oesopha geal atresia with fistula over to the trachea, horseshoe kidney, flexion contractures and brachydactyly of fin ger at both hands, low set ears
- 3 x Arnold-Chiari-Syndrome (1 x with corpus-callosum -hypoplasia, 1 x with micropenis, macrocephaly, neurogenic bladder)
- DUP II. grade and renal hypoplasia right

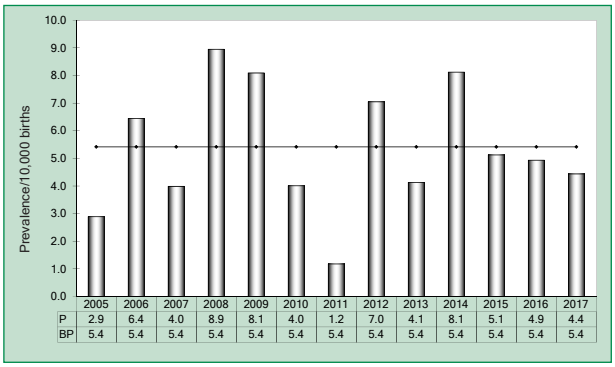


Fig. 9: Development of prevalence/10,000 births with spina bifida in Saxony-Anhalt since 2005

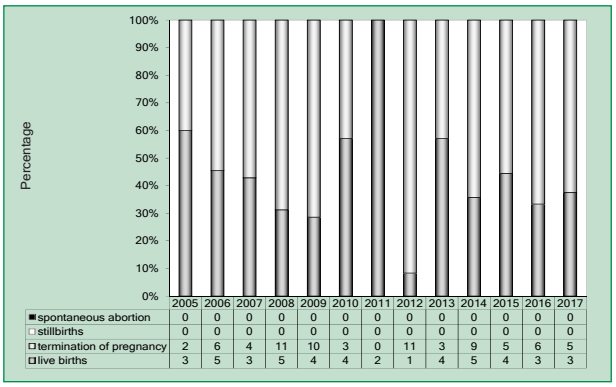


Fig. 10: Pregnancy outcomes of spina bifida in Saxony-Anhalt since 2005

In 2017, one spina bifida per 2,254 births was registered in Saxony-Anhalt.

12.4 Encephalocele (Q01.)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 1 x Magdeburg	1	1.8	↔
Districts: 1 x Börde	1	0.8	↔
Saxony-Anhalt	**2**	**1.1**	↔

Encephalocele (2005 to 2016)		
	Basic prevalence /10,000 births	**Confidence intervall (CI of 95%) /10,000 births**
Cities	1.91	0.96 - 3.43
Districts	1.06	0.60 - 1.72
Region	1.29	0.85 - 1.88
EUROCAT	1.23	1.16 - 1.31
		0.25 S Portugal* 2.49 Mainz (Germany)**

*/** centres with the lowest resp. highest prevalence/10,000 births

In 2017, two cases of occipital encephalocele were registered.
The calculated prevalence for the reporting year lies at 1.1 per 10,000 births. This lies within the confidence interval of the calculated basis prevalence (time period 2005 to 2016: 1.3 per 10,000 births).

additional information:

Pregnancy outcome	2 x termination of pregnancy
Sex	1 x male 1 x no indication
Number of isolated malformations/MCA	2 x isolated

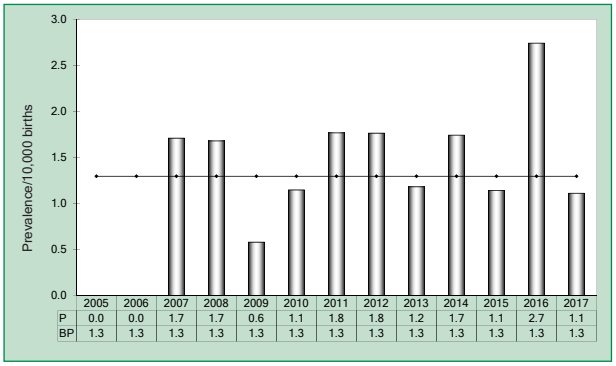


Abb. 11: Development of prevalence/10,000 births withi encephalocele in Saxony-Anhalt since 2005

In 2017, one encephalocele per 9,015 births was registered in Saxony-Anhalt.

12.5 Microcephaly (Q02.)

	Number	Prevalence /10,000 births	Trend in comp. to basic-prevalence
Major cities: 1 x Halle 3 x Magdeburg	4	7.4	↗
Districts: 1 x Burgenlandkreis 1 x Jerichower Land 1 x Stendal	3	2.4	↘
Saxony-Anhalt	**7**	**3.9**	↔

Microcephaly (2005 to 2016)		
	Basic prevalence /10,000 births	**Confidence intervall (CI of 95%) /10,000 births**
Cities	4.18	2.68 - 6.22
Districs	3.31	2.45 - 4.36
Region	3.55	2.78 - 4.45
EUROCAT	2.70	2.59 - 2.82
		0.49 S Portugal* 12.14 Auvergne (France)**

*/** centres with the lowest resp. highest prevalence/10,000 births

Seven births with microcephaly were registered in 2017. The prevalence was calculated for the reporting year with 3.9 per 10,000 births. It lies within the confidence interval of the calculated basis prevalence of 3.5 per 10,000 births for the time period of 2005 to 2016.

Our calculated annual prevalence lies in the European comparison also above the confidence interval of the EUROCAT-basis prevalence of 2.7 per 10,000 births for the time period of 2005 to 2016.

additional information:

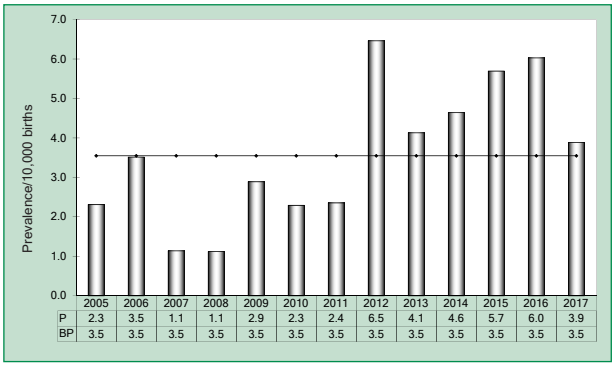
Pregnancy outcome	6 x live births 1 x termination of pregnancy
Sex	2 x male 5 x female
Number of isolated malformations/MCA	5 x MCA 2 x isolated

Microcephaly and other cerebral anomalies came to the fore since the zika virus outbreak in 2015. Our data is adapted accordingly since 2015 to the at Lancet published international percentile curves (see definition under point 12.0 definition microcephaly). In our region, a connatal infection by the zika virus does not play any role. However, the most frequently appearing infection in Germany which may cause microcephaly is a connatal cytomegalovirus infection. It was verified in one case (see also point 13.4).

The trend analysis (see point 12.37) shows a significant increasing trend during the time period of 2005 to 2017. This trend development cannot be separated for sure from the enlarged attention to microcephaly in connection with the connatal infections. Therefore, further scientific analyses also in comparison with data from other EUROCAT registers are planned, to evaluate possible causal chains.

Malformation combinatios (MCA) or superordinated syndromes detected:

- alobar holoprosencephaly, pituitary and adrenal glands hypoplasia, duplex ureter right, macroglossia, low set ears, hypertelorism, missing nasal septum, undifferentiated philtrum, high palate, craniofacial dysmorphia
- cytomegaly, hydrocephalus internus, corpus-callosum -hypoplasia
- Cri-du-Chat syndrome with: ASD at full-term infant, retarded hip right
- CFC-syndrome with: pulmonary valve stenosis
- dermoids at eye, palate fissure, blt. preauricular and multiple facial tags, craniofacial dysmorphia, wide nasal root, low set ears, blt. lateral descending eyelid, hypertelorism



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
P	2.3	3.5	1.1	1.1	2.9	2.3	2.4	6.5	4.1	4.6	5.7	6.0	3.9
BP	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5

Fig. 12: Development of prevalence/10,000 births with microcephaly in Saxony-Anhalt since 2005

In 2017, one microcephaly per 2,576 births was registered in Saxony-Anhalt.

12.6 Congenital Hydrocephaly (Q03.)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 1 x Magdeburg	1	1.8	↓
Districts: 1 x Altmarkkreis Salzwedel 3 x Börde 3 x Harz 1 x Jerichower Land 1 x Mansfeld-Südharz 1 x Salzlandkreis 2 x Stendal 1 x Wittenberg	13	10.3	↑
Saxony-Anhalt	**14**	**7.8**	↑

Congenital Hydrocephaly (2005 to 2016)		
	Basic prevalence /10,000 births	**Confidence intervall (CI of 95%) /10,000 births**
Cities	5.92	4.10 - 8.27
Districts	4.89	3.84 - 6.14
Region	5.18	4.31 - 6.20
EUROCAT	5.68	5.52 - 5.84
		1.57 Dublin (Ireland)* 12.30 Paris (France)**

*/** centres with the lowest resp. highest prevalence/10,000 births

14 cases of hydrocephalus were registered in 2017 (see definition under point 12.0), the secondary hydrocephaly is not mentioned here. This resulted in a calculated prevalence for the reporting year of 7.8 per 10,000 births. It lies above the confidence interval of the calculated basis prevalence for the time period of 2005 to 2016 of 5.2 per 10,000 births.

additional information:

Pregnancy outcome	5 x live births 1 x live days deceased after 7 days 1 x spontaneous abortion 7 x termination of pregnancy
Sex	6 x male 8 x female
Number of isolated malformations/MCA	12 x MCA 2 x isolated

Multiple organ systems were affected by malformations in 12 cases (multiple congenital malformations), a chromosomal aberration was guiding for the diagnosis in five cases. Only in one case a connatal infection was present (cCMV).

Malformation combinations (MCA) or superordinated syndromes detected:

- Edwards-syndrome with: cystic fibrosis, omphalocele, Meckel-diverticulum, double-sided hernia inguinalis, corpus-callosum-agenesis, macrocephaly, tricuspid insufficiency, mitral valve insufficiency, not haemodynamically effective PDA at full term infant
- Patau-syndrome (translocation) with: brachycephaly, cleft lip with cleft upper jaw left, polydactyly of both feet, low set ears
- Down-syndrome with: VSD, pulmonary valve stenosis, PFO at preterm infant, hydrocele left
- Acrocephalosyndactyly-syndrome (Apert) with: craniosynostosis, blt osseous syndactyly of finger (digit II-IV), spoon hand, deformed big toe, flat foot, low set ears, hypertelorism
- cytomegaly, microcephaly, corpus-callosum-hypoplasia
- 3 x corpus-callosum-agenesis (1 x with small intestine, 1 x with cerebellum agenesis, polydactyly at left foot)
- cleft palate, mandibular micrognathia, micropenis, blt syndactyly type 1 (II./III. toe)
- Oculo-mandibulo-facial syndrome with: syndactyly type 1 (right III./IV. finger), epiglottitis
- 2 x cerebellum hypoplasia (1 x blt missing motion activity of legs, knee joint fixed)

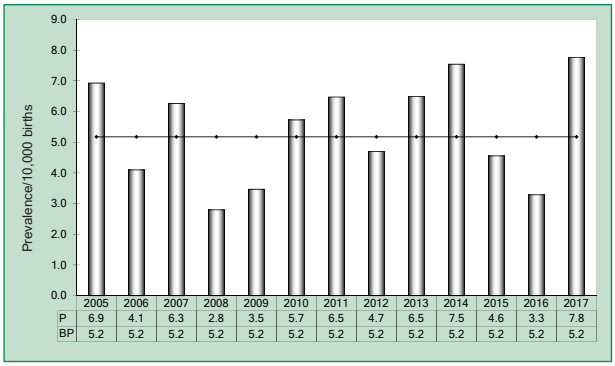


Fig. 13: Development of prevalence/10,000 births with congenital hydrocephaliy in Saxony-Anhalt since 2005

In 2017, one congenital hydrocephaly per 1,288 births was registered in Saxony-Anhalt.

12.7 Arhinencephaly/Holoprosencephaly (Q04.1/Q04.2)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 2 x Magdeburg	2	3.7	↔
Districts: 1 x Mansfeld-Südharz	1	0.8	↔
Saxony-Anhalt	**3**	**1.7**	↔

Arhinencephaly/Holoprosencephaly (2005 to 2016)		
	Basic prevalence /10,000 births	**Confidence intervall (CI of 95%) /10,000 births**
Cities	2.96	1.72 - 4.74
Districts	1.12	0.65 - 1.80
Region	1.63	1.13 - 2.28
EUROCAT	1.47	1.39 - 1.56
		0.38 Wielkopolska (Poland)*
		3.10 Isle de la Reunion (France)**

*/** centres with the lowest resp. highest prevalence/10,000 births

Three cases of holoprosencephaly were registered during the reporting year 2017. The calculated prevalence of 1.7 per 10,00 births lies for this rarely appearing malformation within the confidence interval of the basis prevalence (time period of 2005 to 2016: 1.6 per 10,000 births).

A comparison with data from other registers of the EUROCAT network shows that this prevalence lies slightly above the calculated confidence interval for the time period of 2005 to 2016.

additional information:

Pregnancy outcome	3 x termination of pregnancy
Sex	2 x male 1 x female
Number of isolated malformations/MCA	2 x MCA 1 x isolated

Malformation combinations (MCA) or superordinated syndromes detected:

- Edwards-syndrome with: blt cleft lip with cleft upper jaw and palate and renal dysplasia, polydactyly (six fingers right, six toes left), low set ears, craniofacial dysmorphia
- microcephaly, hypophysis- and adrenal gland hypoplasia at malformations of hypothalamus, duplex ureter right, macroglossia, low set ears, hypertelorism, missing nasal septum, undifferentiated philtrum, high palate, craniofacial dysmorphia

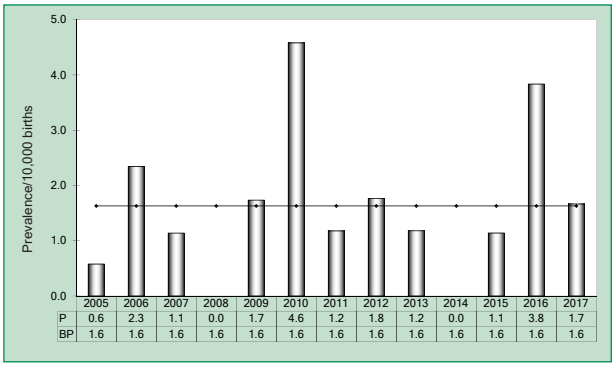


Fig. 14: Development of prevalence/10,000 births with arhinencephaly/holoprosencephaly in Saxony-Anhalt since 2005

In 2017, one child/foetus with arhinencephaly/holoprosencephaly per 6,010 births was registered in Saxony-Anhalt.

12.8 Anophthalmos/Microphthalmos (Q11.0/Q11.1/Q11.2)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities	0	0.0	↓
Districts: 1 x Jerichower Land 1 x Salzlandkreis	2	1.6	↑
Saxony-Anhalt	**2**	**1.1**	↔

Anophthalmos/Microphthalmos (2005 to 2016)		
	Basic prevalence /10,000 births	**Confidence intervall (CI of 95%) /10,000 births**
Cities	1.74	0.83 - 3.20
Districts	0.66	0.32 - 1.22
Region	0.96	0.59 - 1.48
EUROCAT	0.95	0.88 - 1.02
		0.27 Hainaut (Belgium)* 2.04 French West Indies (France)**

*/** centres with the lowest resp. highest prevalence/10,000 births

In 2017, this very rarely appearing malformation was registered in two cases. The annual prevalence 2017 lies with a value of 1.1 per 10,000 births within the range of the calculated basis prevalence (time period of 2005 to 2016: 1.0 per 10,000 births).

In the European comparison, our current prevalence lies slightly above the confidence limit.

additional information:

Pregnancy outcome	1 x live births deceased within 7 days 1 x live births deceased after 7 days
Sex	1 x male 1 x female
Number of isolated malformations/MCA	2 x MCA

Malformation combinations (MCA) or superordinated syndromes detected:

- Patau-syndrome (translocation) with: blt cleft lip with cleft upper jaw and palate, clubfoot, and polysyndactyly left, scalp defect, VSD, ASD II, bicuspid aortic valve, slim thorax, low set ears
- Fraser syndrome with: larynx malformation with blind ending larynx, cleft lip with cleft upper jaw and palate, renal agenesis right, blt hypoplastic thumb and osseous syndactyly of fingers, missing vagina, melted labia

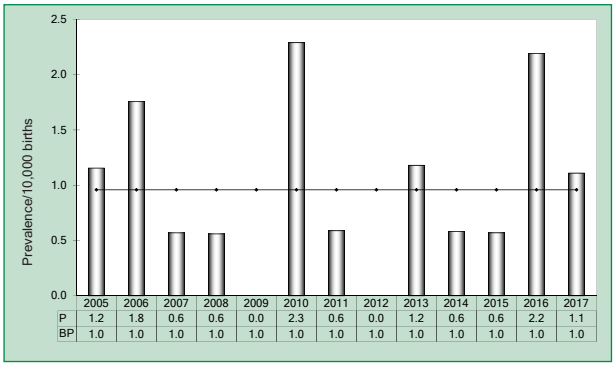


Fig. 15: Development of prevalence/10,000 births with anophthalmos/microphthalmos in Saxony-Anhalt since 2005

In 2017, one child/foetus with anopthalmos/micropthalmos per 9,015 birth was registered in Saxony-Anhalt.

12.9 Microtia/Anotia (Q16.0/Q17.2)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 4 x Magdeburg	4	7.4	↑
Districts: 2 x Anhalt-Bitterfeld 2 x Burgenlandkreis 1 x Harz 1 x Stendal	6	4.8	↑
Saxony-Anhalt	**10**	**5.5**	↑

Microtia/Anotia (2005 to 2016)		
	Basic prevalence /10,000 births	**Confidence intervall (CI of 95%) /10,000 births**
Cities	3.13	1.86 - 4.95
Districs	1.98	1.34 - 2.83
Region	2.30	1.70 - 3.05
EUROCAT	no information	no information

Ten cases of microtia were registered in 2017. Four live births of these cases suffered also in connection with an atresia of the osseous ear canal from a unilateral sound conduction disorder. The microtia appeared unilateral in seven cases.
The prevalence that was calculated for 2017 is with 5.5 per 10,000 births higher than all comparison data we collected during the last twelve years.

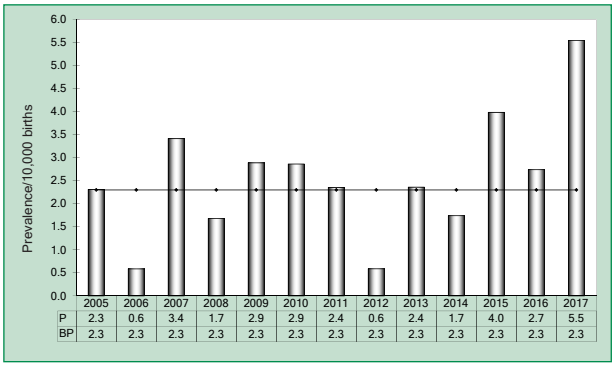
No data from other European register is present for comparison for this indicator malformation. They only register the much rarer malformation anotia, which was registered with two cases for the last time in 2016 in Saxony-Anhalt.

additional information:

Pregnancy outcome	8 x live births 1 x live birth deceased within 7 days 1 x spontaneous abortion
Sex	8 x male 2 x female
Number of isolated malformations/MCA	9 x MCA 1 x isolated

Malformation combinations (MCA) or superordinated syndromes detected:

- Edwards-syndrome with: arachnoid cyst, corpus-callosum-and septum-pellucidum-agenesis, trigonocephaly, bell-shaped thorax, low set ears, microtomy, flexion contractures of all fingers, hypertelorism, flat foot
- Turner-Syndrome with: preductal aortic coarctation, streak ovary, saddle nose, low set ears, prominent clitoris
- deletion of one chromosomal part (karyotype 46,XY,del(1)(p36)) with: microgyria, VSD and hemo dynamical not effective PDA at full term infant, low set ears, heel-skew foot, wide nasal root, craniofacial dysmorphia, sacral dimple
- DORV, pulmonary valve atresia, VSD, ASD II, tricuspid insufficiency 1st grade, hemodynamical not effective PDA at full term infant, blt not descended testis, high palate
- stricture of the osseous ear canal and sound conduction disorder left (50-60 dB), VSD, blt preauricular tag
- atresia of the osseous ear canal and sound conduction disorder left
- atresia of the osseous ear canal and sound conduction disorder right
- stricture of the osseous ear canal and light sound conduction disorder (20 dB) right
- cerebral cyst, auricular tag right



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
P	2.3	0.6	3.4	1.7	2.9	2.9	2.4	0.6	2.4	1.7	4.0	2.7	5.5
BP	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3

Fig. 16: Development of prevalence/10,000 births with microtia/anotia in Saxony-Anhalt since 2005

In 2017, one child with microtia/anotia per 1,803 births was registered in Saxony-Anhalt.

12.10 Tetralogy of Fallot (Q21.3)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities	0	0.0	↓
Districts: 1 x Anhalt-Bitterfeld 1 x Burgenlandkreis 1 x Mansfeld-Südharz 1 x Stendal	4	3.2	↔
Saxony-Anhalt	**4**	**2.2**	↓

Fallot-Tetralogy (2005 to 2016)		
	Basic prevalence /10,000 births	**Confidence intervall (CI of 95%) /10,000 births**
Cities	4.35	2.82 - 6.42
Districts	3.64	2.74 - 4.73
Region	3.83	3.04 - 4.77
EUROCAT	3.38	3.25 - 3.50
		1.83 Wielkopolska (Poland)*
		5.60 Mainz (Germany)**

*/** centres with the lowest resp. highest prevalence/10,000 births

In 2017, four births with a Fallot-Tetralogy as complex cardiac malformation with pulmonary stenosis, VSD, dextroposition of aorta and right heart hypertrophy were registered. The calculated prevalence for 2017 lies at 2.2 per 10,000 births. It lies under the confidence interval of the calculated basis prevalence (time period 2005 to 2016: 3.8 per 10,000 births).

The comparison with data from other European registers shows a value below the confidence interval, too.

additional information:

Pregnancy outcome	3 x live births 1 x live birth deceased after 7 days
Sex	4 x male
Number of isolated malformations/MCA	2 x MCA 2 x isolated

Malformation combinations (MCA) or superordinated syndromes detected:

- smaller, but confluent arteria pulmonalis, partial misjunction of pulmonary vein left, hemivertebra left (thoracic vertebral body 5 and 10), PFO at preterm infant
- persistent left vena cava superior, partial misjunction of pulmonary veins, PFO at full term infant

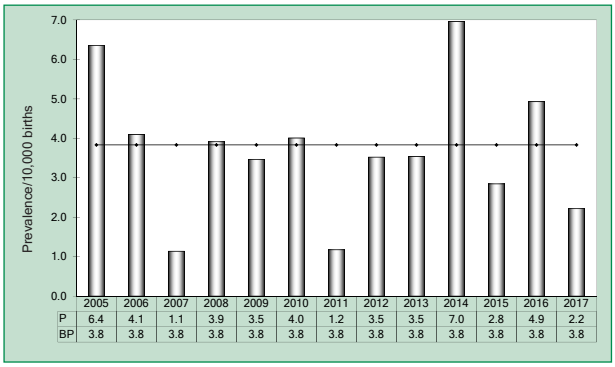


Fig. 17: Development of prevalence/10,000 births with Fallot-Tetralogy in Saxony-Anhalt since 2005

In 2017, one Tetralogy of Fallot per 4,508 births was registered in Saxony-Anhalt.

12.11 Transposition of Great Vessels - TGV (Q20.1/Q20.3)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 3 x Halle	3	5.5	↔
Districts 2 x Börde 2 x Salzlandkreis 2 x Stendal 1 x Wittenberg	7	5.5	↗
Saxony-Anhalt	**10**	**5.5**	↗

Transposition of great vessels (2005 to 2016)		
	Basic prevalence /10,000 births	**Confidence intervall (CI of 95%) /10,000 births**
Cities	5.40	3.67 - 7.66
Districts	3.90	2.97 - 5.03
Region	4.31	3.47 - 5.30
EUROCAT (Q20.3)	3.44	3.32 - 3.57
		1.48 S Portugal* 4.74 Basque Country (Spain)**

*/** centres with the lowest resp. highest prevalence/10,000 births

The transposition of great vessels (TGA) was registered in ten cases in 2017. The prevalence for 2017 lies at 5.5 per 10,000 births. It additionally lies slightly above the confidence interval of the basis prevalence for the time period 2005 to 2016 with a value of 4.3 per 10,000 births.

A European comparison is only possible in a limited way, as the prevalence calculation of the EUROCAT-data does not include the double outlet right ventricle (DORV, see also point 12.0).

additional information:

Pregnancy outcome	8 x live births 2 x termination of pregnancy
Sex	5 x male 5 x female
Number of isolated malformations/MCA	8 x MCA 2 x isolated

Malformation combinations (MCA) or superordinated-syndromes detected:

- Edwards-syndrome with: dextro-transposition of the aorta, VSD, cleft lip with cleft upper jaw and palate right, oesophageal atresia with fistula reaching to the trachea, sacral spina bifida, horseshoe kidney, flexion contracture and brachydactyly of fingers at both hands, low set ears
- Chromosomal duplication with complex rearrangements with: CHARGE-association, atresia of aorta, ASD, bicuspid aortic valve, ASD II, oesophageal atresia with fistula (Vogt IIIb), submucosal cleft palate, big septum-pellucidum-cyst
- Microtia left, pulmonary valve atresia, VSD, ASD II, tricuspid insufficiency 1st grade, haemodynamically not effective PDA at full term infant, blt not descended testis, high palate
- DORV, VSD, ASD II, preductal aortic coarctation
- VSD, complete misjunction of pulmonary vein, Azygos continuation of vena cava inferior

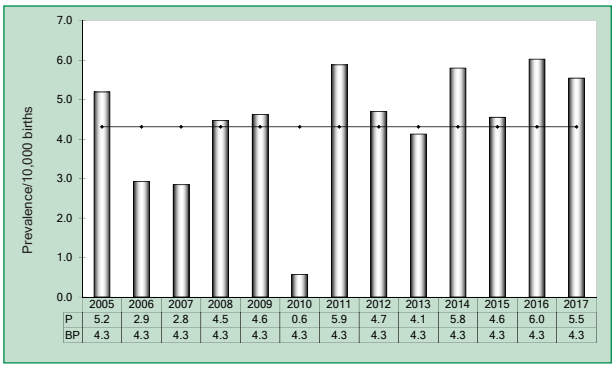


Fig. 18: Development of prevalence/10,000 births with transposition of great vessels in Saxony-Anhalt since 2005

In 2017, one transposition of great vessels per 1,803 births was registered in Saxony-Anhalt.

12.12 Hypoplastic Left Heart Syndrome (Q23.4)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 1 x Halle	1	1.8	↔
Districts: 1 x Anhalt-Bitterfeld 1 x Börde 1 x Salzlandkreis	3	2.4	↔
Saxony-Anhalt	**4**	**2.2**	↔

Hypoplastic left heart syndrome (2005 to 2016)		
	Basic prevalence /10,000 briths	Confidnece intervall (CI of 95%) /10,000 births
Cities	2.96	1.72 - 4.74
Districts	2.65	1.89 - 3.60
Region	2.73	2.07 - 3.54
EUROCAT	2.75	2.64 - 2.87
		0.64 S Portuga 4.06 Styria (Austria)**

*/** centres with the lowest resp. highest prevalence/10,000 births

Four cases of hypoplastic left heart syndrome were registered in 2017. The prevalence of 2017 was calculated with 2.2 per 10,000 births. At the same time, it lies within the confidence interval of the calculated basis prevalence (time period 2005 to 2016: 2.7 per 10,000 births).

A comparison with the European-wide calculated prevalences shows that the calculated prevalences of Saxony-Anhalt in 2017 lie in the middle third of other EUROCAT registers resp. also in the confidence interval of the calculated basis prevalence of the EUROCAT registers.

additional information:

Pregnancy outcome	1 x live birth 1 x live birth deceased within 7 days 2 x termination of pregnancy
Sex	2 x male 1 x female 1 x no information
Number of isolated malformations/MCA	3 x MCA 1 x isolated

Malformation combinations (MCA) or superordinated syndromes detected:

- Shone-complex, bladder neck obstruction, megaureter and DUP IV. grade blt
- VSD, low set ears
- Tricuspid insufficiency

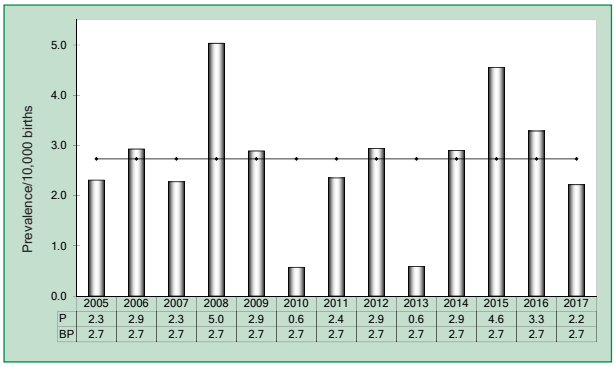


Fig. 19: Development of prevalence/10,000 births with hypoplastic left heart syndrome in the registration area since 2005

In 2017, one child with hypoplastic left heart syndrome per 4,508 births was registered in Saxony-Anhalt.

12.13 Coarctation of Aorta (Q25.1)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 2 x Halle 1 x Magdeburg	3	5.5	↔
Districts: 3 x Anhalt-Bitterfeld 2 x Burgenlandkreis 3 x Börde 2 x Harz 1 x Salzlandkreis 1 x Stendal	12	9.5	↑
Saxony-Anhalt	**15**	**8.3**	↑

Coarctation of aorta (2005 to 2016)		
	Basic prevalence /10,000 births	Confidence intervall (CI of 95%) /10,000 births
Cities	4.70	3.10 - 6.84
Districts	5.49	4.37 - 6.80
Region	5.27	4.40 - 6.31
EUROCAT	3.87	3.74 - 4.01
		1.06 Zagreb (Croatia)* 6.48 Styria (Austria)**

*/** centres with the lowest resp. highest prevalence/10,000 births

15 cases of haemodynamical relevant coarctation of aorta were registered in 2017. The prevalence lies at 8.3 per 10,000 births. At the same time, it exceeds the 12-years-confidence interval of the basis prevalence of 5.3 per 10,000 births. A similar prevalence was calculated in the years 2008 and 2014 in Saxony-Anhalt when comparing both values.

The comparison with the European data shows a maximum value. In eleven cases (73.3%) the diagnosis was only postnatally made. Only in one case the coarctation of aorta occurred isolated. During the trend analysis (see point 12.37) no significant increase during the course of the last 12 years was calculated.

A coarctation of aorta is difficult to detect during prenatal ultrasound screening.
In the end of 2016, the newborn pulse oximetry screening for critical congenital cardiac malformations was invented. If the effect of this additional screening can be already seen in the data of 2017 has to be analysed further on. Unfortunately, no collected data about the rate of positive screening results is present.

additional information:

Pregnancy outcome	13 x live births 1 x live birth deceased within 7 days 1 x spontaneous abortion
Sex	12 x male 3 x female
Number of isolated malformations/MCA	14 x MCA 1 x isolated

Malformation combinations (MCA) or superordinated syndromes detected:

- Turner-Syndrome with: blt microtia, streak-ovaries, saddle nose, low set ears, prominent clitoris
- hypoplastic left heart syndrome, bladder neck obstruction, megaureter and DUP IV. grade blt
- DORV, VSD, ASD II
- VSD, ASD II, pulmonary valve stenosis, bicuspid aortic valve
- VSD, PFO at preterm infant, blt renal hypoplasia, DUP II. grade right
- VSD
- pulmonary valve stenosis, supravalvular pulmonary artery stenosis and PFO at full term infant, tricuspid insufficiency (1st grade)
- vascular ring through the anomalous right sub clavicular artery
- 2 x bicuspid aortic valve (1 x at hypoplastic aorta)
- 2 x PFO at full term infant (1 x at canalis atrioventricularis communis)
- coronary fistulisation of the left coronary artery to the right ventricle, blt. DUP I. grade
- syndrome of infant of a mother with gestational diabetes mellitus, blt DUP I. grade

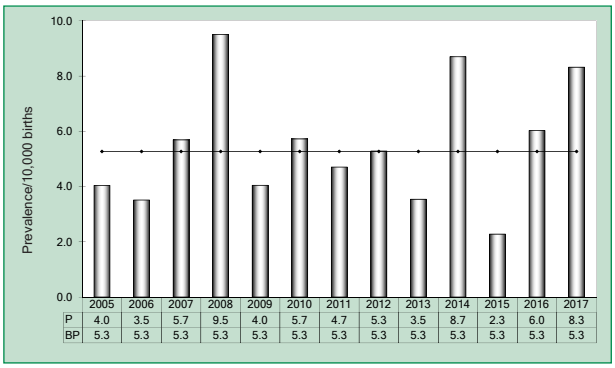


Fig. 20: Development of prevalence/10,000 births with coarctation of aorta in Saxony-Anhalt since 2005

In 2017, one coarctation of aorta per 1,202 births was registered in Saxony-Anhalt.

12.14 Cleft Lip with or without Cleft Palate (Q36./Q37.)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 3 x Halle 1 x Magdeburg	4	7.4	↓
Districts: 2 x Altmarkkreis Salzwedel 2 x Anhalt-Bitterfeld 2 x Börde 1 x Harz 2 x Jerichower Land 2 x Mansfeld-Südharz 2 x Saalekreis 1 x Salzlandkreis 1 x Wittenberg	15	11.9	↔
Saxony-Anhalt	**19**	**10.5**	↓

Cleft lip with or without cleft palate (2005 to 2016)		
	Basic prevalence /10,000 births	Confidence intervall (CI of 95%) /10,000 births
Cities	13.58	10.74 - 16.94
Districts	13.03	11.37 - 16.92
Region	13.18	11.74 - 14.79
EUROCAT	8.85	8.65 - 9.05
		3.74 S Portugal* 13.38 N Netherlands**

*/** centres with the lowest resp. highest prevalence/10,000 births

19 infants with cleft lip and cleft lip with cleft palate were registered in 2017. The calculated prevalence for 2017 lies at 10.5 per 10,000 births. The confidence interval is lower than the basis prevalence for the time period of 2005 to 2016 with 13.2 per 10,000 births.

In comparison with EUROCAT-data, the upper confidence interval of the basis prevalence of the years 2005 to 2016 is exceeded.

additional information:

Pregnancy outcome	14 x live births 1 x live birth deceased within 7 days 1 x live birth deceased after 7 days 3 x termination of pregnancy
Sex	11 x male 8 x female
Number of isolated malformations/MCA	13 x MCA 6 x isolated

A cleft lip with cleft palate appeared in 15 cases, an upper cleft lip appeared in three cases and a cleft lip and jaw appeared in one case.
The malformation appeared unilateral (7 x left, 5 x right, 2 x without specification) in 14 cases and in three cases a bilateral cleft formation was present (2 x without specification).

Malformation combinations (MCA) or superordinated syndromes detected:

- Edwards-syndrome with: holoprosencephaly-syndrome, blt renal dysplasia, polydactyly (six fingers right, six toes left), low set ears, craniofacial dysmorphia
- Edwards-syndrome with: dextro-transposition of aorta, VSD, oesophageal atresia with fistula to trachea, sacral spina bifida, horse shoe kidney, flexion contractures and brachydactyly of fingers at both hands, low set ears
- Patau-syndrome (translocation) with: hydrocephalus internus, brachycephaly, polydactyly at both feet, low set ears
- Patau-syndrome (translocation) with: microphthalmy, club foot and polysyndactyly left, scalp defect, VSD, ASD II, bicuspid aortic valve, slim thorax, low set ears
- Fraser syndrome with: anophthalmos, laryngeal malformation with blind ending larynx, renal agenesis right, blt hypoplastic thumb and osseous syndactyly of fingers, missing vagina, melted labia
- ASD II, not haemodynamical effective PDA at full term infant, stenosis of arteria pulmonalis, plagiocephaly with undescended testis right, subluxation of hip left, retarded hip right, plexus cyst
- unilateral subluxation of hip
- hypoplasia of osseous ear canal and combined sound conduction and perception disorder (blt 70 dB), arachnoid cyst, craniofacial dysmorphia, conspicuous lid axis, sunset eye sign
- combined sound conduction and sound perception disorder (blt 50 dB)
- sound conduction disorder (blt 45 dB), blt retarded hip, pigeon toes
- Sound conduction disorder blt., retarded hip right
- sound conduction disorder right

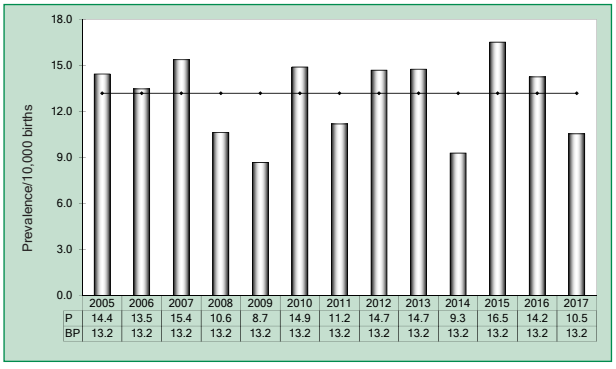


Fig. 21: Development of prevalence/10,000 births with cleft lip with or wthout cleft palate in Saxony-Anhalt since 2005

In 2017, one child with cleft lip with or without cleft palate per 949 births was registered in Saxony-Anhalt.

12.15 Cleft Palate (Q35.1/Q35.3/Q35.5/Q35.9)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 1 x Dessau-Roßlau 3 x Halle	4	7.4	↔
Districts: 1 x Altmarkkreis Salzwedel 1 x Anhalt-Bitterfeld 1 x Harz 1 x Mansfeld-Südharz 1 x Saalekreis 2 x Salzlandkreis 1 x Stendal 1 x Wittenberg	9	7.1	↔
Saxony-Anhalt	**13**	**7.2**	↔

Cleft palate (2005 to 2016)		
	Basic prevalence /10,000 births	**Confidence intervall (CI of 95%) /10,000 births**
Cities	7.14	5.12 - 9.68
Districts	7.67	6.43 - 9.14
Region	7.52	6.46 - 8.75
EUROCAT	6.07	5.90 - 6.24
		3.20 French West Indies (France)*
		12.93 Malta**

*/** centres with the lowest resp. highest prevalence/10,000 births

13 cases of cleft palate were registered in 2017. This corresponds to a prevalence for 2017 of 7.2 per 10,000 births. The prevalence lies within the range of the confidence interval of the 12-years-prevalence of 7.5 per 10,000 births.

Similar to the previous years, the prevalence of Saxony-Anhalt lies slightly above the European basis prevalence for 2005 to 2016.

additional information:

Pregnancy outcome	12 x live births 1 x termination of pregnancy
Sex	6 x male 7 x female
Number of isolated malformations/MCA	4 x MCA 9 x isolated

Malformation combinations (MCA) or superordinated syndromes detected:

- duplication of chromosomes with complex rearrangements with: CHARGE-association, DORV, atresia of aorta, ASD, bicuspid aortic valve, ASD II, oesophageal atresia with fistula (Vogt IIIb), big septum-pellucidum-cyst
- anal atresia, lid coloboma right, hypoplasia of lung, malrotation of colon, craniofacial dysmorphia, low set ears, mandibular retrognathia, hygroma colli cysticum
- Dandy-Walker-syndrome with: mandibular micrognathia, micropenis, blt syndactyly type 1 (II./III. toe)
- sound conduction disorder (right 70 dB)

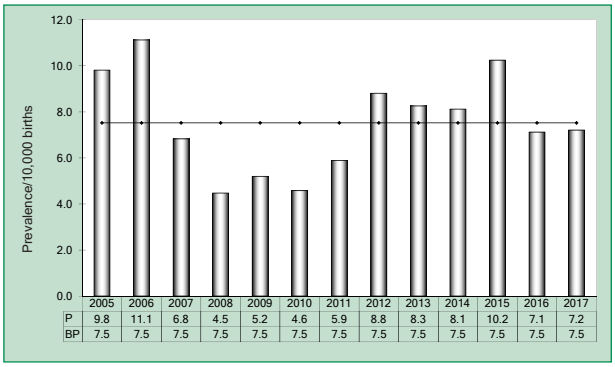


Fig. 22: Development of prevalence/10,000 births with cleft palate in Saxony-Anhalt since 2005

In 2017, one child with cleft palate per 1,288 births was registered in Saxony-Anhalt.

12.16 Choanal Atresia (Q30.0)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 1 x Dessau-Roßlau	1	1.8	↔
Districts: 1 x Wittenberg	1	0.8	↔
Saxony-Anhalt	**2**	**1.1**	↔

Choanal atresia (2005 to 2016)		
	Basic prevalence /10,000 births	**Confidence intervall (CI of 95%) /10,000 births**
Cities	0.87	0.28 - 2.03
Districts	0.99	0.56 - 1.64
Region	0.96	0.59 - 1.48
EUROCAT	no information	no information

*/** centres with the lowest resp. highest prevalence/10,000 births

Choanal atresia belongs to the rarely appearing malformations and two cases of choanal atresia were registered in 2017. The stenoses in need of a therapy are not mentioned here (see definition point 12.0). The prevalence for 2017 was calculated with 1.1 per 10,000 births. It lies within the confidence interval of the basis prevalence (time period of 2005 to 2016: 1.0 per 10,000 births).

additional information:

Pregnancy outcome	2 x live births
Sex	1 x male 1 x female
Number of isolated malformations/MCA	2 x MCA

In both cases, the complex malformation combination CHARGE association was present.

Malformation combinations (MCA) or superordinated syndromes detected:

- chromosomal duplication with complex rearrangements with: DORV, atresia of aorta, ASD, bicuspid aortic valve, ASD II, oesophageal atresia with fistula (Vogt IIIb), submucosal cleft palate, big septum-pellucidum-cyst
- sound perception disorder (right 50-70 dB, left 60-70 dB), iris coloboma right, retina coloboma, duplex right kidney, craniofacial dysmorphia, high palate

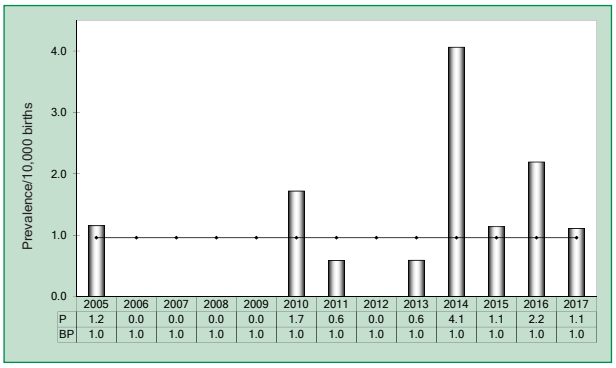


Fig. 23: Development of prevalence/10,000 births with choanal atresia in Saxony-Anhalt since 2005

In 2017, one child with choanal atresia per 9,015 births was registered in Saxony-Anhalt.

12.17 Oesophageal Atresia/ Stenosis/ Fistula (Q39.0-Q39.4)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 1 x Dessau-Roßlau 3 x Halle	4	7.4	↑
Districts: 1 x Börde 1 x Mansfeld-Südharz 1 x Wittenberg	3	2.4	↔
Saxony-Anhalt	**7**	**3.9**	↑

Oesophageal atresia/ stenosis/ fistula (2005 to 2016)		
	Basic prevalence /10,000 births	**Confidence intervall (CI of 95%) /10,000 births**
Cities	2.79	1.59 - 4.52
Districts	2.38	1.67 - 3.30
Region	2.49	1.86 - 3.27
EUROCAT (Q39.0-Q39.1)	2.52	2.41 - 2.63
		0.67 SE Ireland* 3.64 French West Indies (France)**

*/** centres with the lowest resp. highest prevalence/10,000 births

Seven cases of oesophageal atresia were registered in 2017. The prevalence of 2017 lies at 3.9 per 10,000 births. At the same time, it lies above the confidence interval of the 12- years-basis prevalence (time period of 2005 to 2016: 2.5 per 10,000 births).

A comparison with EUROCAT data shows that the prevalence of 2017 of Saxony-Anhalt lies in the upper third of other registers data and at the same time above the calculated confidence interval of the basis prevalence 2005 to 2016.

additional information:

Pregnancy outcome	6 x live births 1 x termination of pregnancy
Sex	4 x male 3 x female
Number of isolated malformations/MCA	6 x MCA 1 x isolated

In three cases a oesophageal atresia with fistula between trachea and lower oesophageal pocket (type Vogt IIIb). No fistula was detected in one case and we received no indication about presence of a fistula in two cases.

Malformation combinations (MCA) or superordinated syndromes detected:

- Edwards-syndrome with: dextro-transposition of aorta, VSD, cleft lip with or without cleft palate right, sacral spina bifida, horseshoe kidney, flexions contractures and brachydactyly of fingers at both hands, low set ears
- Downs-syndrome with: duodenal stenosis, pancreas anulare, VSD, ASD II, not hemodynamical effective PDA at preterm infant
- chromosomal duplication with complex rearrangements with: CHARGE association, DORV, atresia of aorta, ASD, bicuspid aortic valve, ASD II, submucosal cleft palate, big septum-pellucidum-cyst
- duodenal stenosis, pancreas anulare, tracheomalacia, ASD II, persistent left vena cava superior
- VSD, ASD II, clubfoot
- VSD, dextrocardia

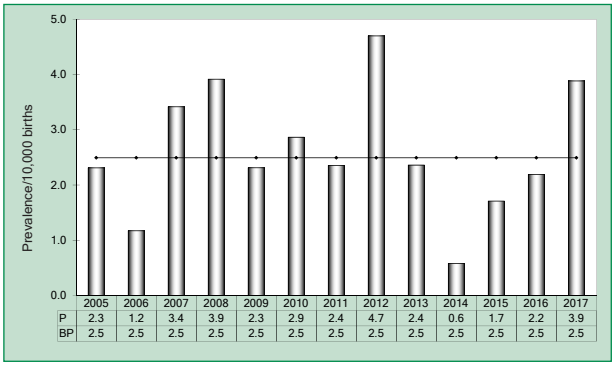


Fig. 24: Development of prevalence/10,000 births with oesophageal atresia/ stenosis/ fistula in Saxony-Anhalt since 2005

In 2017, one child/foetus with oesophageal atresia/stenosis/fistula per 2,576 births was registered in Saxony-Anhalt.

12.18 Small Intestinal Atresia/Stenosis(Q41.1/Q41.2/Q41.8/Q41.9)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 1 x Halle	1	1.8	↗
Districts: 2 x Harz 1 x Jerichower Land 2 x Saalekreis 1 x Wittenberg	6	4.8	↑
Saxony-Anhalt	**7**	**3.9**	↑

Small intestinal atresia/stenosis (2005 to 2016)		
	Basic prevalence /10,000 births	Confidence intervall (CI of 95%) /10,000 births
Cities	0.70	0.19 - 1.78
Districts	1.92	1.28 - 2.75
Region	1.58	1.09 - 2.22
EUROCAT (Q41.1-Q41.8)	0.95	0.89 - 1.02
		0.29 Wielkopolska (Poland)*
		1.72 Isle de la Reunion (France)**

*/** centres with the lowest resp. highest prevalence/10,000 births

Small Intestinal Atresia/Stenosis was registered in seven cases in 2017. The calculated prevalence lies at 3.9 per 10,000 births for 2017. It therefore lies above the calculated confidence interval of the basis prevalence (2005 to 2016: 1.6 per 10,000 births). A similar high prevalence was reached during the 12-years-overview for the last time in 2012.

The prevalence lies in comparison with the EUROCAT data also above the maximum value of Isle de la Reunion (France).

additional information:

Pregnancy outcome	6 x live births 1 x live birth deceased after 7 days
Sex	2 x male 5 x female
Number of isolated malformations/MCA	3 x MCA 4 x isolated

Malformation combinations (MCA) or superordinated syndromes detected:

- fetopathy diabetica with: rectal atresia with vestibular fistula, volvulus, pelvic kidney right, hepatomegaly
- corpus-callosum-agenesis, hydrocephalus internus
- omphalocele

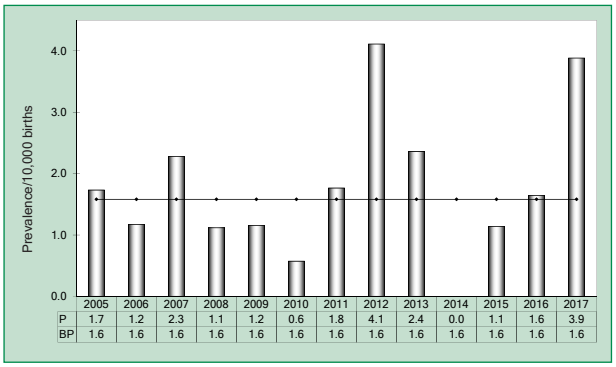


Fig. 25: Development of prevalence/10,000 births with small intestinal atresia/stenosis in Saxony-Anhalt since 2005

In 2017, one child with small intestinal atresia/stenosis per 2,576 births was registered in Saxony-Anhalt.

12.19 Anorectal Atresia/Stenosis (Q42.0-Q42.3)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 1 x Halle	1	1.8	↓
Districts: 2 x Saalekreis 1 x Salzlandkreis 1 x Wittenberg	4	3.2	↓
Saxony-Anhalt	**5**	**2.8**	↓

Anorectal atresia/stenosis (2005 to 2016)		
	Basic prevalence /10,000 births	**Confidence intervall (CI of 95%) /10,000 births**
Cities	5.05	3.38 - 7.25
Districts	5.29	4.20 - 6.58
Region	5.22	4.35 - 6.26
EUROCAT	3.22	3.10 - 3.35
		1.38 S Portugal*
		6.58 Styria (Austria)**

*/** centres with the lwoest resp. highest prevalence/10,000 births

In 2017, five cases of Anorectal Atresia/ Stenosis were registered. The prevalence for 2017 lies at 2.8 per 10,000 births. It lies clearly under the confidence interval of the basis prevalence (time period of 2005 to 2016: 5.2 per 10,000 births).

A comparison with EUROCAT data shows that the prevalence 2017 in Saxony-Anhalt remains under the confidence interval that was calculated for the basis prevalence for the last 12 years.

additional information:

Pregnancy outcome	4 x live births 1 x termination of pregnancy
Sex	2 x male 3 x female
Number of isolated malformations/MCA	4 x MCA 1 x isolated

An anal atresia appeared in three cases (2 x without fistula, 1 x with fistula) and two cases of anorectal atresia (with fistula). The gastrointestinal malformation appeared only in one case isolated.

Malformation combinations (MCA) or superordinated syndromes detected:

- Fetopathia diabetica with: jejunum- and ileum atresia, volvulus, pelvic kidney right, hepatomegaly
- VATER-association with: rectal atresia with fistula, renal agenesis left, ASD II, naevus flammeus at left arm and hand
- median cleft palate, lid coloboma right, hypoplasia of lung, malrotation of colon, craniofacial dysmorphia, low set ears, mandibular retrognathia, hygroma colli cysticum
- multicystic dysplastic kidney right (pelvic kidney)

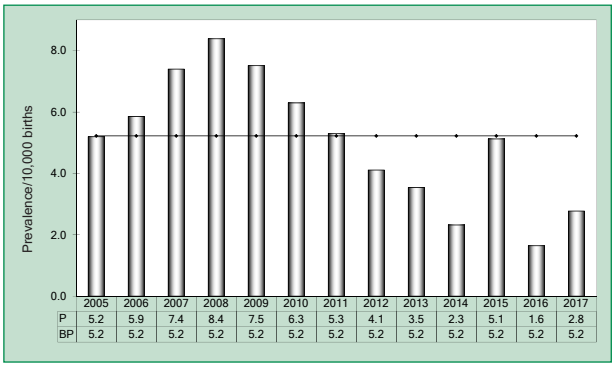


Fig. 26: Development of prevalence/10,000 births with Anorectal Atresia/Stenosis in Saxony-Anhalt since 2005

In 2017, one anorectal atresia/stenosis per 3,606 births was registered in Saxony-Anhalt.

12.20 Undescended Testis (Q53.1-Q53.9)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 2 x Halle 1 x Magdeburg	3	5.5	↓
Districts: 5 x Anhalt-Bitterfeld 1 x Mansfeld-Südharz 4 x Saalekreis 1 x Stendal	11	8.7	↗
Saxony-Anhalt	**14**	**7.8**	↔

Undescended testis (2005 to 2016)		
	Basic prevalence /10,000 births	Confidence intervall (CI of 95%) /10,000 births
Cities	12.53	9.81 - 15.78
Districts	6.68	5.53 - 8.05
Region	8.29	7.17 - 9.58
EUROCAT	no information	no information

Only 14 cases of undescended testis at full term infants were registered in 2017. The calculated prevalence lies with 7.8 per 10,000 births within the confidence interval of the basis prevalence (time period 2005 to 2016: 8.3 per 10,000 births).

A European comparison is not possible. EUROCAT does not register the malformation undescended testis.

additional information:

Pregnancy outcome	14 x live births
Sex	14 x male
Number of isolated malformations/MCA	7 x MCA 7 x isolated

Scientific analyses show that an estimated number of this malformation exists additionally and the registration is carried out only incompletely. This anomaly is in nearly all cases already not present in the maternity clinic.

Malformation combinations (MCA) or superordinated syndromes detected:

- microtia left, DORV, pulmonary valve atresia, VSD, ASD II, tricuspid insufficiency 1st grade, hemodynamically not effective PDA at full term infant, high palate
- cleft lip with cleft upper jaw and palate left, ASD II, not hemodynamically effective PDA at full term infant, stenosis of arteria pulmonalis, plagiocephaly, subluxation of hip left, retarded hip right, plexus cyst
- duodenal stenosis, pancreas anulare, glandular hypospadias
- tuberous sclerosis
- renal agenesis right, megaureter and DUP IV. grade left
- left DUP II. grade, megaureter and ureter orifice stenosis
- osseous syndactyly at both hands

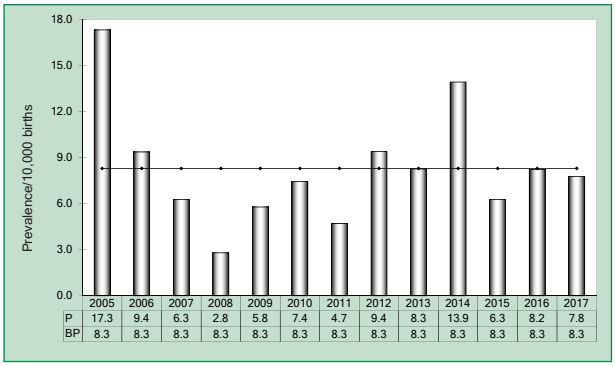


Fig. 27: Development of prevalence/10,000 births with undescended testis in Saxony-Anhalt since 2005

In 2017, one child with undescended testis per 1,288 births (663 boys) was registered in Saxony-Anhalt.

12.21 Hypospadias (Q54.0-Q54.3/Q54.8/Q54.9)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 1 x Dessau-Roßlau 5 x Halle 5 x Magdeburg	11	20.3	↔
Districts: 4 x Altmarkkreis Salzwedel 3 x Anhalt-Bitterfeld 5 x Harz 1 x Mansfeld-Südharz 2 x Saalekreis 3 x Stendal	18	14.3	↓
Saxony-Anhalt	**29**	**16.1**	↓

Hypospadias (2005 to 2016)		
	Basic prevalence /10,000 births	**Confidence intervall (CI of 95%) /10,000 births**
Cities	23.85	20.26 - 28.03
Districts	20.30	18.20 - 22.64
Region	21.28	19.42 - 23.31
EUROCAT	17.74	17.45 - 18.03
		6.79 S Portugal* 34.53 Mainz (Germany)**

*/** centres with the lowest resp. highest prevalence/10,000 births

For the 29 infants registered with hypospadias in 2017, a prevalence of 16.1 per 10,000 births was calculated. The confidence interval of the calculated basis prevalence is therefore in the current year lower as it was in the time period of 2005 to 2016.

In comparison with data from other EUROCAT registers, the prevalence of 2017 lies in the lower third and is at the same time lower than the confidence interval of the European basis prevalence.

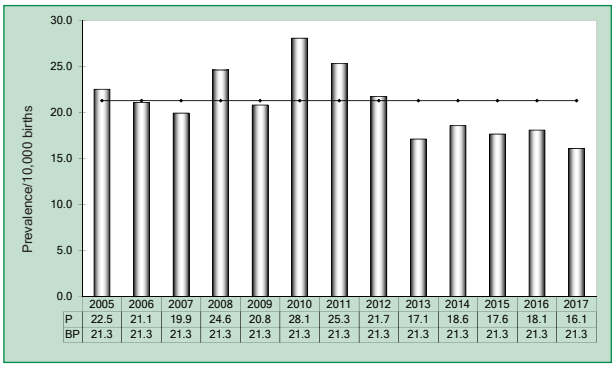
additional information:

Pregnancy outcome	28 x live births 1 x live birth deceased after 7 days
Sex	29 x male
Number of isolated malformations/MCA	6 x MCA 23 x isolated

In 22 cases (75.9%) a glandular hypospadias was present, in one case (3.4%) a hypospadias coronaria was present, in four cases (13.9%) a penile hypospadias was present and in one further case (3.4%) a perinal hypospadias was present. In another case (3.4 %) no further specification regarding the type of hypospadias was given.

Malformation combinations (MCA) or superordinated syndromes detected:

- partial trisomy 16q and partial monosomy 2 with: ASD II, clubfoot, blt sound conduction disorder, not hemodynamically effective PDA at preterm infant
- duodenal stenosis, pancreas anulare, blt not descended testis
- unilateral renal agenesis, porencephaly, DUP I. grade
- renal agenesis left
- osseous syndactyly and hypoplasia of fingers (digit I - IV right and II / III left), right thumb without upper phalanx, blt brachydactyly of fingers, blt hydrocele
- ASD at full term infant



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
P	22.5	21.1	19.9	24.6	20.8	28.1	25.3	21.7	17.1	18.6	17.6	18.1	16.1
BP	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3

Fig. 28: Development of prevalence/10,000 births with hypospadias in Saxony-Anhalt since 2005

In 2017, one hypospadias per 622 births (320 boys) was registered in Saxony-Anhalt.

12.22 Epispadias (Q64.0)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities	0	0.0	↓
Districts: 1 x Mansfeld-Südharz	1	0.8	↗
Saxony-Anhalt	**1**	**0.6**	↔

Epispadias (2005 to 2016)		
	Basic prevalence /10,000 births	**Confidence intervall (CI of 95%) /10,000 births**
Cities	0.52	0.11 - 1.53
Districts	0.20	0.04 - 0.58
Region	0.29	0.11 - 0.63
EUROCAT	no information	no information

As only one case of epispadias was registered, the prevalence for 2017 lies at 0.6 per 10,000 births. It lies within the confidence interval of the calculated basis prevalence for 2005 to 2016 with 0.3 per 10,000 births.

Epispadias is a very rare appearing malformation and no EUROCAT data is present for comparison.

additional information:

Pregnancy outcome	1 x live birth
Sex	1 x male
Number of isolated malformations/MCA	1 x MCA

Malformation combinations (MCA) or superordinated syndromes detected:

- DUP IV. grade, ASD

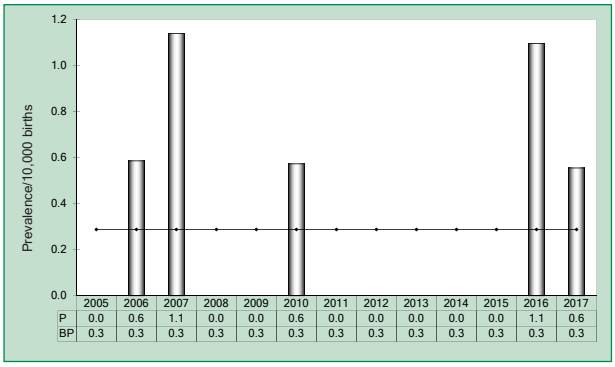


Fig. 29: Development of prevalence/10,000 births with epispadias in Saxony-Anhalt since 2005

In 2017, one child with epispadias per 18,030 births (9,283 boys) was registered in Saxony-Anhalt.

12.23 Indeterminate Sex (Q56.)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 1 x Halle	1	1.8	↗
Districts: 1 x Saalekreis	1	0.8	↔
Saxony-Anhalt	**2**	**1.1**	↔

indeterminate sex (2005 to 2016)		
	Basic prevalence /10,000 births	Confidence intervall (CI of 95%) /10,000 births
Cities	0.35	0.04 - 1.26
Districts	0.79	0.41 - 1.39
Region	0.67	0.37 - 1.13
EUROCAT	0.66	0.61 - 0.72
		0.09 Brittany (France)* 1.92 Wessex (UK)**

*/** centres with the lowest resp. highest prevalence/10,000 births

Two births with indeterminate sex were registered in 2017. The calculated annual prevalence lies with 1.1 per 10,000 births within the confidence interval of the basis prevalence (time period of 2005 to2016: 0.7 per 10,000 births).

Compared with data of EUROCAT our value lies within the upper third of the analysed EUROCAT registers for the time period of 2005 to 2016.
A good statistical comparison or even a trend calculation is not possible.

additional information:

Pregnancy outcome	1 x live birth 1 x spontaneous abortion
Sex	1 x female 1 x indeterminate
Number of isolated malformations/MCA	2 x MCA

Malformation combinations (MCA) oe superordinated syndromes detected:

- streak ovaries, aplasia of ureter, craniofacial dysmor phia, low set ears, hypertelorism, wide nose, mandi bular retrognathia, prominent tailbone, thymus hypo plasia
- streak ovary right, prominent clitoris

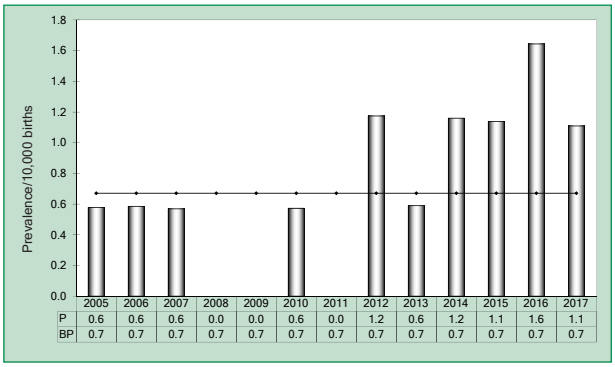


Fig. 30: Development of prevalence/10,000 births with indeterminate sex in Saxony-Anhalt since 2005

In 2017, one birth with indeterminate sex per 9,015 births was registered in Saxony-Anhalt.

12.24 Potter Sequence (Q60.6)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 1 x Magdeburg	1	1.8	↔
Districts: 1 x Altmarkkreis Salzwedel 1 x Jerichower Land 2 x Salzlandkreis	4	3.2	↔
Saxony-Anhalt	**5**	**2.8**	↔

Potter sequence (2005 to 2016)		
	Basic prevalence /10,000 births	Confidence intervall (CI of 95%) /10,000 births
Cities	1.57	0.72 - 2.97
Districts	2.78	2.00 - 3.75
Region	2.44	1.82 - 3.21
EUROCAT	1.25	1.17 - 1.33
		0.20 Malta* 4.98 Mainz (Germany)**

*/** centres with the lowest resp. highest prevalence/10,000 births

The bilateral functionless kidneys in sense of a Potter-sequence were registered in five cases in 2017. This corresponds to a prevalence for 2017 of 2.8 per 10,000 births. It lies within the confidence interval of the basis prevalence of the last 12 years.

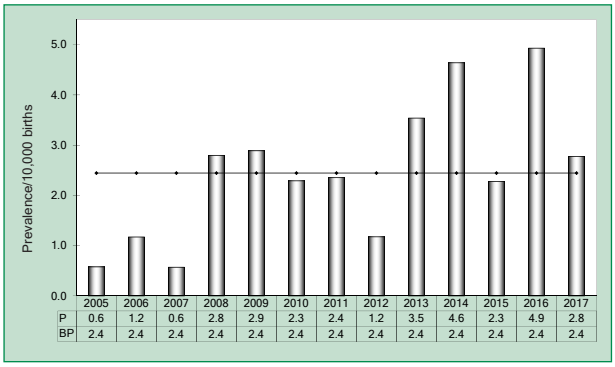
additional information:

Pregnancy outcome	4 x termination of pregnancy 1 x stillbirth
Sex	2 x male 3 x female
Number of isolated malformations/MCA	3 x MCA 2 x isolated

In one case a bilateral renal agenesis was diagnosed, in two cases a functionless multicystic-dysplastic kidney and in two further cases at unilateral renal agenesis a hypoplastic functionless kidney was diagnosed at the opposite side. Potter-sequence is well-known as the domain of prenatal ultrasound screening and therefore all case were already detected during prenatal ultrasound screening.

Malformation combinations (MCA) or superordinated syndromes detected:

- Meckel-Gruber-syndrome with: situs inversus, hexadactyly
- craniofacial dysmorphia, overlapping fingers right, man dibular retrognathia and micrognathia



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
P	0.6	1.2	0.6	2.8	2.9	2.3	2.4	1.2	3.5	4.6	2.3	4.9	2.8
BP	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4

Fig. 31: Development of prevalence/10,000 births with Potter sequence in Sachsen-Anhalt since 2005

In 2017, one Potter sequence per 3,606 births was registered in Saxony-Anhalt.

NOTE

What are ACE inhibitors and what is Sartan fetopathie?

The group of pharmaceuticals "sartans" were developed from ACE inhibitors. Mainly used in the antihypertensive therapy, they have a teratogenic effect in case of maternal intake during second and third trimenon of pregnancy. The suspected pathomechanism of both substances results in a reduced perfusion of the foetal organs, in particular of the kidneys. That means both substances interrupt the renin-angiotensin system at different points. The result of such a foetal damage is an intrauterine oliguria. Since amniotic fluid production depends from the second trimenon on mainly from foetal urine production, an oligohydramnios can occur which might be diagnosed by prenatal ultrasound screening. This leads into **occurrence of a potter sequence** with lung and thorax hypoplasia, distorsion of limbs, characteristic face and further consequential problems. Affected infants often suffer postnatal from a renal failure which is in most cases not reversible. Additionally, a hypoplasia/dysplasia of the cranial bone can occur at insufficient cranial ossification (it is also possible that only gaping cranial sutures are present).
German speaking people can get further information about this topic by visiting the website of the pharmacovigilance and advisery centre for embryonic toxicology (www.embyotox.de).

12.25 Renal Agenesis, unilateral (Q60.0/Q60.2)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 1 x Halle 2 x Magdeburg	3	5.5	↔
Districts: 1 x Altmarkkreis Salzwedel 1 x Harz 1 x Mansfeld-Südharz 1 x Saalekreis 2 x Salzlandkreis	6	4.8	↘
Saxony-Anhalt	**9**	**5.0**	↘

Renal agenesis, unilateral (2004 to 2015)		
	Basic prevalence /10,000 births	Confidence intervall (CI of 95%) /10,000 births
Cities	5.92	4.10 - 8.27
Districts	5.95	4.79 - 7.31
Region	5.94	5.01 - 7.04
EUROCAT	no information	no information

The unilateral renal agenesis was registered in nine cases in 2017. The prevalence for the reporting year lies at 5.0 per 10,000 births. Additionally, it lies at the lower confidence interval limit for the calculated basis prevalence of 5.9 per 10,000 births (time period of 2005 to 2016).

No EUROCAT data is present here for comparison.

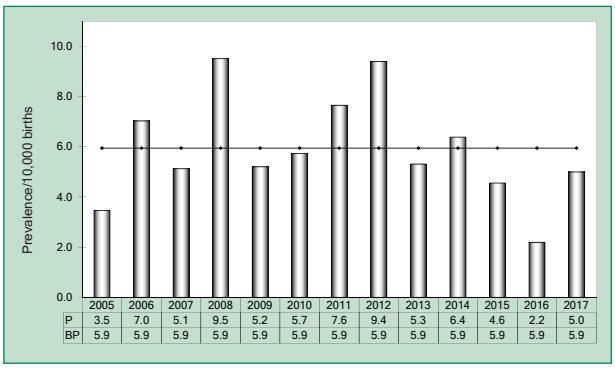
additional information:

Pregnancy outcome	8 x live births 1 x live births deceased within 7 days
Sex	4 x male 5 x female
Number of isolated malformations/MCA	8 x MCA 1 x isolated

This malformation has overall a good prognosis. The left kidney was affected five times and the right kidney was affected three times. No detailed information is present in one case.

Malformation combinations (MCA) or superordinated syndromes detected:

- Fraser syndrome with: anopthalmos, larynx malformation with blind ending larynx, cleft lip with cleft upper jaw and palate, blt hypoplastic thumb and osseous syndactyly of fingers, missing vagina, melted labia
- VATER-association with: rectal atresia with fistula, ASD II, naevus flammeus at left arm and hand
- porencephaly, glandular hypospadias, DUP I. grade
- penile hypospadias
- megaureter and DUP IV. grade left, undescended testis right
- right megaureter, DUP III. grade and ureter orifice stenosis
- 2 x hyperplastic kidney (1 x right, 1 x left)



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
P	3.5	7.0	5.1	9.5	5.2	5.7	7.6	9.4	5.3	6.4	4.6	2.2	5.0
BP	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9

Fig. 32: Development of prevalence/10,000 births with unilateral renal agenesis in Saxony-Anhalt since 2005

In 2017, one renal genesis, unilateral per 2,003 births was registered in Saxony-Anhalt.

12.26 Cystic kidney (Q61.1-Q61.9)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 2 x Halle 2 x Magdeburg	4	7.4	↔
Districts: 2 x Burgenlandkreis 2 x Börde 1 x Mansfeld-Südharz 1 x Salzlandkreis 1 x Stendal	7	5.5	↘
Saxony-Anhalt	**11**	**6.1**	↔

Cystic kidney (2004 to 2015)		
	Basic prevalence /10,000 births	Confidence intervall (CI of 95%) /10,000 births
Cities	9.23	6.91 - 12.07
Districts	6.88	5.70 - 8.27
Region	7.52	5.01 - 7.04
EUROCAT	no information	no information

Four cases of bilateral and seven cases of unilateral cystic kidneys were registered in the reporting year. This leads to a calculated prevalence of 6.1 per 10,000 births in 2017. It lies within the confidence interval of the basis prevalence (time period 2005 to 2016: 7.5 per 10,000 births).

No EUROCAT data is available for comparison.

additional information:

Pregnancy outcome	9 x live births 2 x termination of pregnancy
Sex	6 x male 4 x female 1 x no information
Number of isolated malformations/MCA	7 x MCA 4 x isolated

The malformation group of cystic kidneys is a very inhomogeneous group which includes various clinical pictures (see point 12.0).

Malformation combinations (MCA) or superordinated syndromes detected:

- Edwards-syndrome with: holoprosencephaly, blt cleft lip with cleft upper jaw and palate, polydactyly (six fingers right, six toes left), low set ears, craniofacial dysmorphia
- caudal regression syndrome with: os sacrum, agene sis, blt bending of long leg bones,VSD, persistent right aortic arch, DUP
- anal atresia, pelvic kidney right
- ASD II, VSD, DUP I. grade, hernia inguinalis left
- aortic valve and mitral valve insufficiency
- VSD
- hydronephrosis left

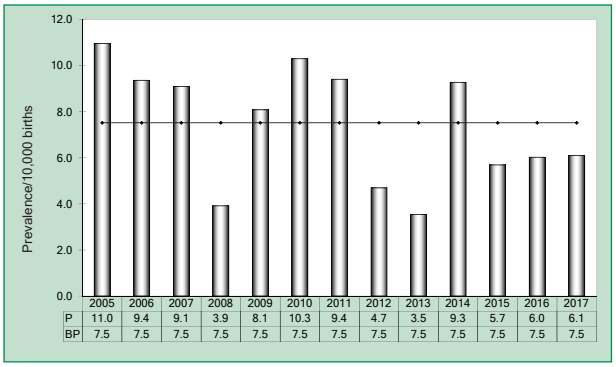


Fig. 33: Development of prevalence/10,000 births with cystic kidney in Saxony-Anhalt since 2005

In 2017, one cystic kdney per 1,639 births was registered in Saxony-Anhalt.

12.27 Bladder Exstrophy (Q64.1)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities	0	0.0	↔
Districts	0	0.0	↓
Saxony-Anhalt	**0**	**0.0**	↓

Bladder exstrophy (2004 to 2015)		
	Basic prevalence /10,000 births	Confidence intervall (CI of 95%) /10,000 births
Cities	0.00	0.00 - 0.52
Districts	0.53	0.23 - 1.04
Region	0.38	0.17 - 0.76
EUROCAT	no information	no information

No case of bladder exstrophy was registered in 2017. The bladder exstrophy is a very rarely appearing malformation. Its basis prevalence lies at 0.4 per 10,000 births for 2005 to 2016.

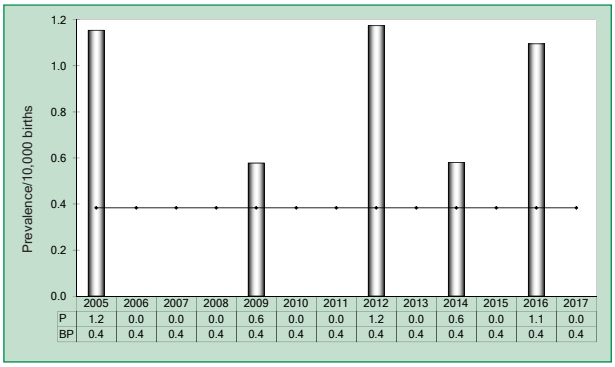


Fig. 34: Development of prevalence/10,000 births with bladder exstrophy in Saxony-Anhalt since 2005

In 2017, no child/feotus with bladder exstrophy was registered in Saxony-Anhalt..

12.28 Preaxial Polydactyly (Q69.1/Q69.2)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 1 x Halle	1	1.8	↘
Districts: 1 x Harz 1 x Saalekreis	2	1.6	↓
Saxony-Anhalt	**3**	**1.7**	↓

Preaxial polydactyly (2004 to 2015)		
	Basic prevalence /10,000 births	Confidence intervall (CI of 95%) /10,000 births
Cities	3.83	2.40 - 5.80
Districts	3.90	2.97 - 5.03
Region	3.88	3.08 - 4.82
EUROCAT	no information	no information

Three cases of preaxial polydactyly were registered in 2017. The calculated prevalence for 2017 of 1.7 per 10,000 births lies under the basis prevalence (time period of 2005 bis 2016: 3.9 per 10,000 births).

Comparative EUROCAT data for preaxial polydactyly is not available.

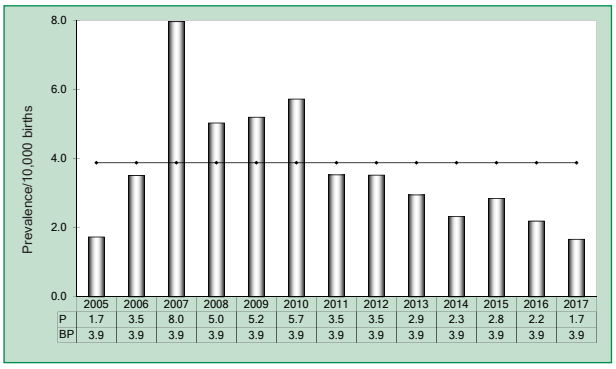
additional information:

Pregnancy outcome	2 x live births 1 x termination of pregnancy
Sex	2 x male 1 x female
Number of isolated malformations/MCA	1 x MCA 2 x isolated

Polydactyly is a malformation with an overall good prognosis if it does not appear in combination with complex malformation syndromes or associations.

Malformation combinations (MCA) or superordinated syndromes detected:

- polysyndactyly with: osseous syndactyly of fingers (digit II / III and IV / V left and II / III right), accessory finger left, hypoplastic tibia, fibula and humerus left, cardiomegaly, blepharophimosis blt, clubfoot left



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
P	1.7	3.5	8.0	5.0	5.2	5.7	3.5	3.5	2.9	2.3	2.8	2.2	1.7
BP	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9

Fig. 35: Development of prevalence/10,000 births with preaxial polydactyly in Saxony-Anhalt since 2005

In 2017, one preaxial polydactyly per 6,010 births was registered in Saxony-Anhalt.

12.29 Limb Reduction Defects of both Upper and Lower Limbs (Q71./Q72./Q73.)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 2 x Halle 5 x Magdeburg	7	12.9	↗
Districts: 1 x Altmarkkreis Salzwedel 2 x Börde 1 x Harz 1 x Jerichower Land 1 x Mansfeld-Südharz 1 x Saalekreis 2 x Salzlandkreis	9	7.1	↔
Saxony-Anhalt	**16**	**8.9**	↗

Limb reduction defects of both upper and lower limbs (2004 to 2015)		
	Basic prevalence /10,000 births	Confidence intervall (CI of 95%) /10,000 births
Cities	8.70	6.46 - 11.47
Districts	8.07	6.79 - 9.57
Region	8.24	6.46 - 8.75
EUROCAT	5.52	5.36 - 5.68
		2.36 S Portugal* 9.57 Auvergne (France)**

*/** centres with the lowest resp. highest prevalence/10,000 births

16 cases of a limb reduction malformation were registered in 2017. The calculated prevalence lies at 8.9 per 10,000 births. At the same time, it lies at the upper limit of the confidence interval of the basis prevalence that was calculated for the last 12 years (time period of 2005 to 2016: 8.2 per 10,000 births).
In total, the is no indication in Saxony-Anhalt for a suspicious temporal or local accumulation.

A comparison with the European data of EUROCAT shows that the prevalence lies within the upper third of all registers.

additional information:

Pregnancy outcome	7 x live births 1 x live birth deceased within 7 days 1 x spontaneous abortion 7 x termination of pregnancy
Sex	10 x male 5 x female 1 x no information
Number of isolated malformations/MCA	12 x MCA 4 x isolated

Malformation combinations (MCA) or superordinated syndromes detected:

- Edwards-syndrome
- Down-syndrome
- Fraser-syndrome
- Wiedemann-Beckwith-syndrome
- partial trisomy 4 and partial monosomy 15
- Turner-syndrome
- Potter-sequence
- polysyndactyly with: osseous syndactyly of fingers (digit II / III and IV / V left and II / III right), accessory finger, thumb and big toes left, cardiomegaly, blepha rophimosis blt, clubfoot left
- glandular hypospadias, blt osseous syndactyly and brachydactyly of fingers blt, blt hydrocele
- blt hypoplasia of lung, blt overlapping finger, flat back of the head, hygroma colli cysticum, wide nasal root, low set ears
- clubfoot left, hemangioma

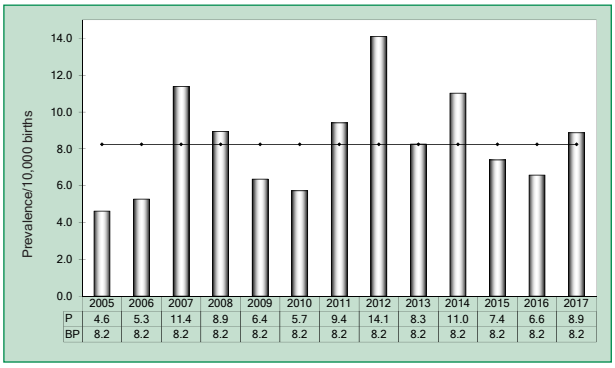


Fig. 36: Development of prevalence/10,000 births with limb reduction defects in Saxony-Anhalt since 2005

In 2017, one child with limb reduction defects per 1,127 births was registered in Saxony-Anhalt.

NOTE

The French media reported in October 2018 about suspicious limb malformations which should have appeared in different parts of France. The registers for congenital anomalies in the network EUROCAT are working currently about providing exact and actual information about the appearance of these anomalies in all over Europe. This scientific investigation enables an evidence-based interpretation of possible temporal or local accumulations of the appeared cases.

12.30 Diaphragmatic Hernia (Q79.0/Q79.1)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 2 x Halle	2	3.7	↔
Districts: 1 x Burgenlandkreis 1 x Börde 2 x Saalekreis	4	3.2	↑
Saxony-Anhalt	**6**	**3.3**	↗

Diaphragmatic hernia (2004 to 2015)		
	Basic prevalence /10,000 births	**Konfidenzintervall (KI von 95%) /10,000 Geborene**
Cities	4.00	2.54 - 6.01
Districts	1.72	1.12 - 2.52
Region	2.35	1.74 - 3.10
EUROCAT (Q79.0)	2.84	2.73 - 2.96
		1.32 Zagreb (Croatia)* 5.57 Malta**

*/** centres with the lowest resp. highest prevalence/10,000 births

Diaphragmatic hernia was reported in six cases in the reporting year. The prevalence for 2017 lies at 3.3 per 10,000 births. It lies slightly above the upper confidence interval limit of the basis prevalence (time period of 2005 to 2016: 2.3 per 10,000 births).

The basis prevalence of European comparison registers lies within the middle range of the basis prevalence that was calculated for Saxony-Anhalt. However, it overlaps a small tolerance area.

additional information:

Pregnancy outcome	4 x live births 2 x live births deceased within 7 days
Sex	3 x male 1 x female 2 x no information
Number of isolated malformations/MCA	1 x MCA 5 x isolated

Malformation combinations (MCA) or superordinated syndromes detected:

- big liver tumour with intra-thoracic herniation right

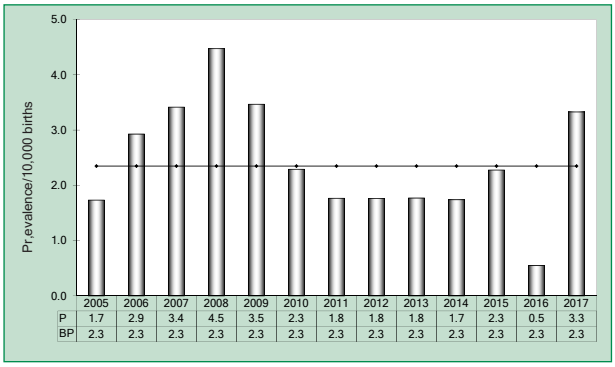


Fig. 37: Development of prevalence/10,000 births with diaphragmatic hernia in Saxony-Anhalt since 2005

In 2017, one diaphragmatic hernia per 3,005 births was registered in Saxony-Anhalt.

12.31 Omphalocele (Q79.2)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 2 x Halle 2 x Magdeburg	4	7.4	↑
Districts: 1 x Altmarkkreis Salzwedel 2 x Anhalt-Bitterfeld 1 x Harz 1 x Saalekreis 1 x Stendal 1 x Wittenberg	7	5.5	↑
Saxony-Anhalt	**11**	**6.1**	↑

Omphalocele (2005 to 2016)		
	Basic prevalence /10,000 births	**Confidence intervall (CI of 95%) /10,000 births**
Cities	3.66	2.26 - 5.59
Districts	3.17	2.34 - 4.21
Region	3.31	2.57 - 4.18
EUROCAT	3.27	3.15 - 3.40
		0.69 S Portugal* 6.70 French West Indies (France)**

*/** centres with the lowest resp. highest prevalence/10,000 births

Eleven cases of omphalocele were reported in 2017. The prevalence of 2017 lies at 6.1 per 10,000 births. It lies above the basis prevalence of the last 12 years (time period of 2005 to 2016: 3.3 per 10,000 births). Currently, our prevalence is the highest prevalence in a 12-years-comparison.
All cases are evaluated further on and the prevalence development will be observed.

A comparison with data of EUROCAT shows a prevalence just below all other prevalences of the centres with a maximal prevalence (French West Indies, France).

additional information:

Pregnancy outcome	4 x live births 2 x live births deceased after 7 days 5 x termination of pregnancy
Sex	4 x male 5 x female 2 x no information
Number of isolated malformations/MCA	9 x MCA 2 x isolated

Malformation combinations (MCA) or superordinated syndromes detected:

- Edwards-syndrome with: cystic fibrosis, Dandy-Walker-syndrome, Meckel-diverticula, duplex hernia inguinalis, corpus-callosum-agenesis, macrocephaly, tricuspid insufficiency, mitral valve insufficiency, not hemodynamical effective PDA at full term infant
- Edwards-syndrome with: common ventricle
- triploidy with: hydrothorax, VSD
- Wiedemann-Beckwith-syndrome with: clubhand, mis sing radius and hypoplastic thumb rights, duodenal atresia, hepatomegaly
- ileum atresia
- tricuspid insufficiency, pulmonary valve atresia
- persistent ductus omphaloentericus, small intestine adhesion, PFO at full term infant

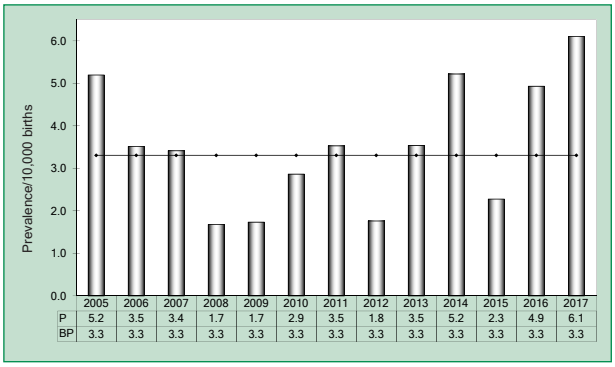


Fig. 38: Development of prevalence/10,000 births with omphalocele in Saxony-Anhalt since 2005

In 2017, one child/foetus with omphalocele per 1,639 births was registered in Saxony-Anhalt.

12.32 Gastroschisis (Q79.3)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 1 x Halle 1 x Magdeburg	2	3.7	↔
Districts: 1 x Anhalt-Bitterfeld 1 x Wittenberg	2	1.6	↓
Saxony-Anhalt	**4**	**2.2**	↓

Gastroschisis (2005 to 2016)		
	Basic prevalence /10,000 births	**Confidence intervall (CI of 95%) /10,000 births**
Cities	4.00	2.54 - 6.01
Districts	3.97	3.03 - 5.11
Region	3.98	3.17 - 4.93
EUROCAT	2.89	2.78 - 3.01
		0.98 Emilia Romagna (Italy)* 5.29 Mainz (Germany)**

*/** centres with the lowest resp. highest prevalence/10,000 births

Four cases of gastroschisis were reported in 2017. The calculated prevalence for 2017 lies at 2.2 per 10,000 births. It lies below the confidence interval of the 12-years-basis prevalence (time period of 2005 to 2016: 4.0 per 10,000 births).

The annual prevalence of Saxony-Anhalt lies similar to the previous year under the confidence interval of the European basis prevalence for the time period of 2005 to 2016.
Futhermore, the EUROCAT data show a falling trend of the prevalence after the before remarkable high prevalence of the previous years.
EUROCAT currently points its scientific focus on the influence of the decrease of teenage pregnancies on the falling prevalence as the young maternal age is a well-known risk factor.

additional information:

Pregnancy outcome	2 x live births 1 x live birth deceased after 7 days 1 x termination of pregnancy
Sex	3 x male 1 x no information
Number of isolated malformations/MCA	1 x MCA 3 x isolated

Malformation combinations (MCA) or superordinated syndromes detected:

- caudal regression syndrome with: scoliosis caused by malformations of bones, deformation of the long leg bones

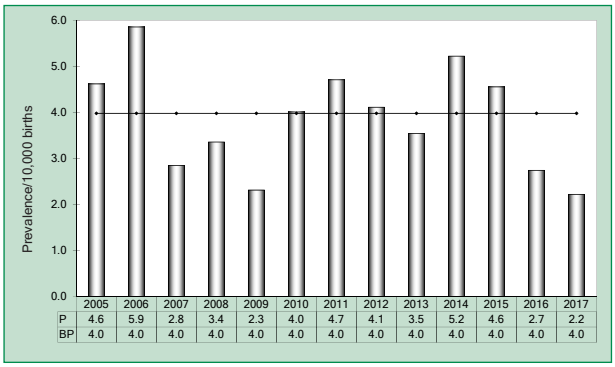


Fig. 39: Development of prevalence/10,000 births with gastroschisis in Saxony-Anhalt since 2005

In 2017, one gastroschisis per 4,508 births was registered in Saxony-Anhalt.

12.33 Prune Belly Sequence (Q79.4)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 1 x Magdeburg	1	1.8	↔
Districts: 1 x Wittenberg	1	0.8	↔
Saxony-Anhalt	**2**	**1.1**	↔

Prune belly sequence (2005 to 2016)		
	Basic prevalence /10,000 births	Confidence intervall (CI of 95%) /10,000 births
Cities	1.39	0.60 - 2.74
Districts	0.60	0.27 - 1.13
Region	0.81	0.47 - 1.30
EUROCAT	no information	no information

A Prune-belly-sequence was registered in two cases in 2017. The prevalence for 2017 was calculated with a value of 1.1 per 10,000 births. It lies within the confidence interval of the basis prevalence for 2005 to 2016 of 0.8 per 10,000 births.

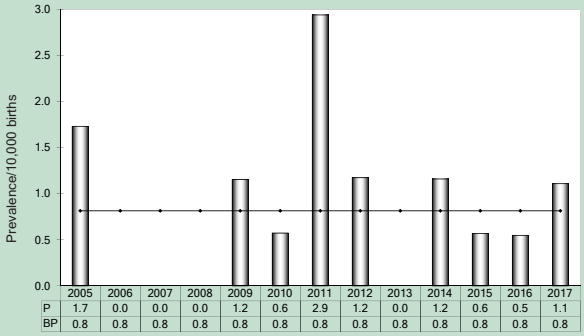
EUROCAT-data for comparison is not present for this rarely appearing malformation.

additional information:

Pregnancy outcome	2 x termination of pregnancy
Sex	1 x male 1 x no information
Number of isolated malformations/MCA	2 x MCA

Malformation combinations (MCA):

- omphalocele, low set ears, megacystis
- blt megaureter and DUP, urethral stenosis, blt lung hypoplasia, megacystis



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
P	1.7	0.0	0.0	0.0	1.2	0.6	2.9	1.2	0.0	1.2	0.6	0.5	1.1
BP	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8

Fig. 40: Development of prevalence/10,000 births with Prune belly sequence in Saxony-Anhalt since 2005

In 2017, one Prune belly sequence per 9,015 births was registered in Saxony-Anhalt.

12.34 Down's syndrome - Trisomy 21 (Q90.)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 1 x Dessau-Roßlau 7 x Halle 4 x Magdeburg	12	22.2	↔
Districts: 1 x Altmarkkreis Salzwedel 2 x Anhalt-Bitterfeld 1 x Burgenlandkreis 2 x Börde 6 x Harz 2 x Mansfeld-Südharz 4 x Saalekreis 4 x Salzlandkreis 3 x Stendal 1 x Wittenberg	26	20.6	↑
Saxony-Anhalt	**38**	**21.1**	↑

Down syndrome (2005 to 2016)		
	Basic prevalence /10,000 births	Confidence intervall (CI of 95%) /10,000 births
Cities	20.89	17.55 - 24.81
Districts	16.33	14.46 - 18.44
Region	17.59	15.91 - 19.44
EUROCAT	23.17	22.85 - 23.50
		9.50 S Portugal* 41.79 Paris (France)**

*/** centres with the lowest resp. highest prevalence/10,000 births

38 cases of trisomy 21 were registered in 2017. The prevalence was calculated with a value of 21.1 per 10,000 births for 2017. It lies above the confidence interval of the basis prevalence for the time period of 2005 to 2016 with 17.6 per 10,000 births.
After we registered the highest prevalence in 2003, the annual prevalence 2017 lies again within the range of the years 2006, 2008 and 2010. The minimum value during the 12-years- course was registered in 2005.

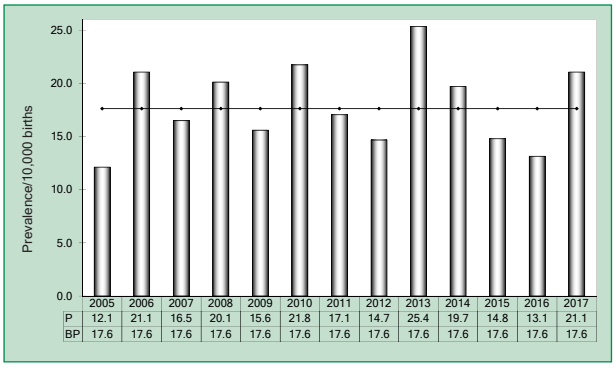
In comparison to data of EUROCAT, the prevalence of 2017 lies even under the range of the confidence interval of the basis prevalence of the EUROCAT register data.

additional information:

Pregnancy outcome	13 x live births 1 x live birth deceased within 7days 24 x termination of pregnancy
Sex	22 x male 14 x female 2 x no information
Number of isolated malformations/MCA	13 x MCA 25 x isolated

Malformation combinations (MCA):

- brachycephaly, reduction of arms and legs, brachydactyly of fingers and overlapping toes blt
- Dandy-Walker-syndrome with: AVSD, VSD, pulmona ry valve stenosis, PFO at preterm infant, hydrocele links
- oesophageal atresia, duodenal stenosis, pancreas anulare, VSD, ASD II, not hemodynamical effective PDA at preterm infant
- Prader-Willi-syndrome with: VSD, ASD II, not hemo dynamical effective PDA at preterm infant, ventricular asymmetry
- VSD, ASD at full term infant
- canalis atrioventricularis communis, PFO at full term infant, pulmonary valve stenosis, persistent left vena cava superior, lacrimal duct stenosis right, blt brachy dactyly
- canalis atrioventricularis communis, hypoplasia of aorta, clubfoot left, blt various deformities of feet
- canalis atrioventricularis communis
- PFO at full term infant
- duodenal stenosis
- not hemodynamical effective PDA at preterm infant, ASD II, sound conduction disorder right
- sound perception disorder (right 50 dB)
- sound conduction disorder (blt 30-35 dB), epilepsy



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
P	12.1	21.1	16.5	20.1	15.6	21.8	17.1	14.7	25.4	19.7	14.8	13.1	21.1
BP	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6

Fig. 41: Development of prevalence/10,000 births with Down syndrome in Saxony-Anhalt since 2005

In 2017, one child with Down syndrome (trisomy 21) per 474 births was registered in Saxony-Anhalt.

12.35 Patau syndrome - Trisomy 13 (Q91.4-Q91.7)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities	0	0.0	↓
Districts: 1 x Altmarkkreis Salzwedel 1 x Jerichower Land 1 x Saalekreis	3	2.4	↑
Saxony-Anhalt	**3**	**1.7**	↗

Patau syndrome (2005 to 2016)		
	Basic prevalence /10,000 births	**Confidence intervall (CI of 95%) /10,000 births**
Cities	1.39	0.60 - 2.74
Districts	0.99	0.56 - 1.64
Region	1.10	0.70 - 1.65
EUROCAT	2.15	2.05 - 2.25
		0.64 S Portugal* 4.50 Paris (France)**

*/** centres with the lowest resp. highest prevalence/10,000 births

In 2017, three cases of trisomy 13 were registered. The prevalence for 2017 was calculated with a value of 1.7 per 10,000 births. It lies minimal above the confidence interval of the basis prevalence for the time period of 2005 to 2017 with 1.1 per 10,000 births.

A comparison with EUROCAT-data shows that our prevalence lies under the confidence interval of the basis prevalence of the European comparison registers.

additional information:

Pregnancy outcome	1 x live birth deceased after 7 days 2 x termination of pregnancy
Sex	1 x male 2 x female
Number of isolated malformations/MCA	2 x MCA 1 x isolated

Malformation combinations (MCA):

- microphthalmos blt, cleft lip with clef upper jaw and palate, clubfoot and polysyndactyly left, scalp defect, VSD, ASD II, bicuspid aortic valve, slim thorax, low set ears
- hydrocephalus internus, brachycephaly, cleft lip with cleft upper jaw and palate left, polydactyly at both feet

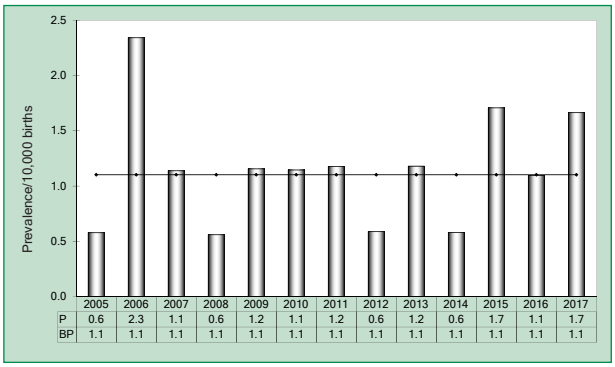


Abb. 42: Development of pregnancy/10,000 births with Patau syndrome in Saxony-Anhalt since 2005

In 2017, one child/foetus with Patau syndrome (trisomy 13) per 6,010 births was registered in Saxony-Anhalt.

12.36 Edwards Syndrome - Trisomy 18 (Q91.0-Q91.3)

	Number	Prevalence /10,000 births	Trend in comp. to basic prevalence
Major cities: 1 x Halle 5 x Magdeburg	6	11.1	↑
Districts: 1 x Börde 1 x Mansfeld-Südharz 1 x Stendal	3	2.4	↘
Saxony-Anhalt	**9**	**5.0**	↗

Edwards syndrome (2005 to 2016)		
	Basic prevalence /10,000 births	Confidence intervall (CI of 95%) /10,000 births
Cities	4.35	2.82 - 6.42
Districts	3.57	2.68 - 4.66
Region	3.79	3.00 - 4.72
EUROCAT	5.61	5.45 - 5.77
		1.17 Wielkopolska (Poland)* 13.67 Paris (France)**

*/** centres with the lowest resp. highest prevalence/10,000 births

Nine cases of trisomy 18 were registered in 2017. The prevalence for 2017 lies at 5.0 per 10,000 births. It lies above the confidence interval of the 12-years-basis prevalence with a value of 3.8 per 10,000 births.

The annual prevalence of Saxony-Anhalt lies within the European comparison slightly under the confidence interval of the basis prevalence of the EUROCAT-comparison data.
The minimum and maximum values of the EUROCAT registers are wide apart from each other.

additional information:

Pregnancy outcome	1 x live birth deceased within 7 days 1 x live birth deceased after 7 days 6 x termination of pregnancy 1 x stillbirth
Sex	4 x male 5 x female
Number of isolated malformations/MCA	7 x MCA 2 x isolated

Malformation combinations (MCA):

- cystic fibrosis, Dandy-Walker-syndrome, omphaloce le, Meckel-diverticula, corpus-callosum-agenesis, macrocephaly, tricuspid insufficiency, mitral valve insufficiency, not hemodynamical effective PDA at full term infant
- holoprosencephaly, blt cleft lip with cleft upper jaw and palate and renal dysplasia, polydactyly (six fingers right, six toes left)
- dextro-transposition of aorta, VSD, cleft lip with cleft upper jaw and palate right, oesophageal atresia with fistula over to the trachea, sacral spina bifida, horses hoe kidney, flexion contractures and brachydactyly of fingers at both hands
- blt microtia, arachnoid cyst, corpus-callosum and sep tum-pellucidum-agenesis, trigonocephaly, bell-sha ped thorax, low set ears, microstomia, flexion contrac tures of all fingers, hypertelorism, flat foot
- omphalocele, common ventricle
- missing radius left (clubhand)
- cardiac malformation

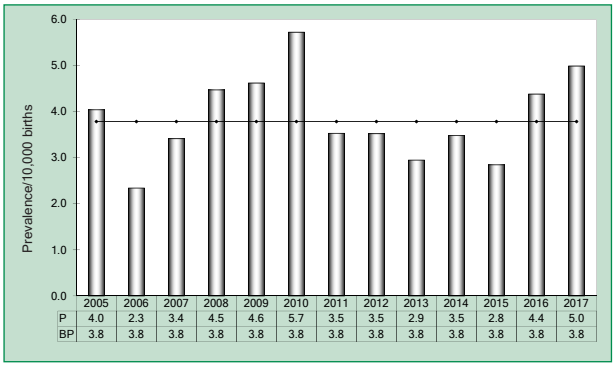


Fig. 43: Development of prevalence/10,000 births with Edwards syndrome in Saxony-Anhalt since 2005

In 2017, one child with Edwards syndrome (trisomy 18) per 2,003 births was registered in Saxony-Anhalt.

12.37 Indicator Malformations, In Total

Chapters 12.1 to 12.36 describe the occurrence of 36 from ICBDSR (International Clearinghouse for Birth) Defects Surveillance and Research) worldwide unequivocal defined indicator malformations (Chapter 12.0). The malformation monitoring in Saxony-Anhalt thus offers the precondition for an assessment of the frequency of malformations with temporal and spatial reference and enables the identification of trends and clusters.

250 births were concerned by an indicator malformation in 2017. 176 (70.4 %) of these were live births. The percentage of live births was always higher during the years of 2005-2016 (Ø 76.6 %, maximum 81.2 %). Indicator malformations were registered in 2017 at two stillbirths and four spontaneous abortions after 16 WOG`s. In total, this percentage (2.4 %) corresponds to the average value during the registration period (2.4 %). The percentage of terminations of pregnancy (27.2 %, 68) reached a maximum value in 2017. During the years (2005-2016: 20.9 %) we registered an increasing trend. After 2005 to 2007, the percentage of terminations of pregnancy with indicator malformations was clearly under 20 %.

313 indicator malformations were registered at 250 births which were concerned by an indicator malformation. 122 births suffered from an isolated indicator malformation. 128 births were affected by multiple malformations, 42 of these had between two and five indicator malformations.

1.39% of all births suffered from indicator malformations

	Number	Prevalence in %	Trend in comp. to basic prevalence
Major cities	78	1.44	↘
Districts	172	1.36	↔
Saxony-Anhalt	250	1.39	↔

Indicator malformations, in total (2005 to 2016)		
	Basic prevalence in %	Confidence intervall (CI of 95 %)
Cities	1.58	1.48 - 1.69
Districts	1.35	1.30 - 1.41
Region	1.42	1.37 - 1.47

in 2017.The value lies within the confidence interval of the calculated basis prevalence for the years 2005-2016 (1.42 %, CI 1.37 to 1.47). The lowest value of the last 20 years as registered with 1.32 % of the births during the previous year.

A comparison of the observed prevalences of districts and independent towns shows regularly, also in 2017, lower values in the districts than in the independent towns (2017: 1.36 % vs. 1.44 %). While 2017 the current prevalence of the districts lies again within the confidence interval (2005-2016: 1.35 %, CI 1.30 to 1.41), we calculated a prevalence for the independent towns which lies slightly under the basis prevalence (2005-2016: 1.58 %, CI 1.48 to 1.69).

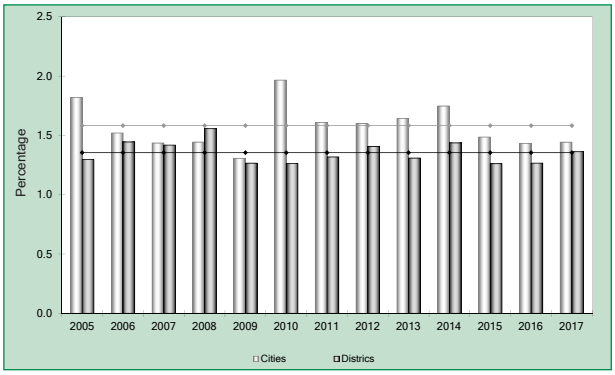


Fig. 44: Indicator malformations in total (2005 to 2017), comparison of frequency (in %) in the major cities and districts

Aim of our trend analysis is to detect long term tendencies in the appearance of indicator malformations. Therefore, we are analysing during the whole registration period (2005-2016) the intensity and orientation of prevalence changes.

Condition for the trend analysis is that we expect each malformation to appear at least five times or that we registered at least two cases of the corresponding malformation. Figure 45 on page 65 shows the average percentage changes of the annual prevalences of all indicator malformations that correspond to these initial conditions. They are rated by binary logistic regression analysis on the basis of the maximum-likelihood-estimation.

The regression coefficient represents the strength and direction of the percentage annual change. A significant increasing trend is indicated by a regression coefficient B, which is together with a confidence interval of 95% illustrated righthand of the axis of ordinates. A descending trend can be identified by a regression coefficient that is presented left hand of the axis (in the negative area). If the confidence interval overlaps the zero value the percentage change is not significant.

We tested the temporary change of the trend-coordinate and the non-linear coordinate for heterogeneity by use of the chi-squared test. We rate the trend as non-linear at a probability of $p > 0.05$ for the linear ratio and $p < 0.05$ for the non-linear ratio. In these cases, we identify a non-linear trend. This applies for neural tube defects, spina bifida and undescended testis.

A probability value of $p < 0.05$ for the linear percentage and $p > 0.01$ for the non-linear percentage means that the linear percentage dominates and the non-linear percentage can be neglected. The observed trend is significant, corresponding to the regression coefficient B.

A significant ascending trend was observed during the registration period for microcephaly (+9,08 %, KI 3,12 % to 16,27 %). A significant decreasing trend, according to a negative regression coefficient B and a not effective non-linear percentage can be observed for rectum- and anal atresia/-stenosis, hypospadias, cystic kidneys and preaxial polydactyly.

All below illustrated indicator malformations do not show a significant positive or negative trend: The chi-squared test gives for the linear and non-linear component a probability of $p > 0.05$. For this reason, no decision regarding a more frequently increase or decrease can be made also when the non-linear percentage is not decisive for the trend evaluation.

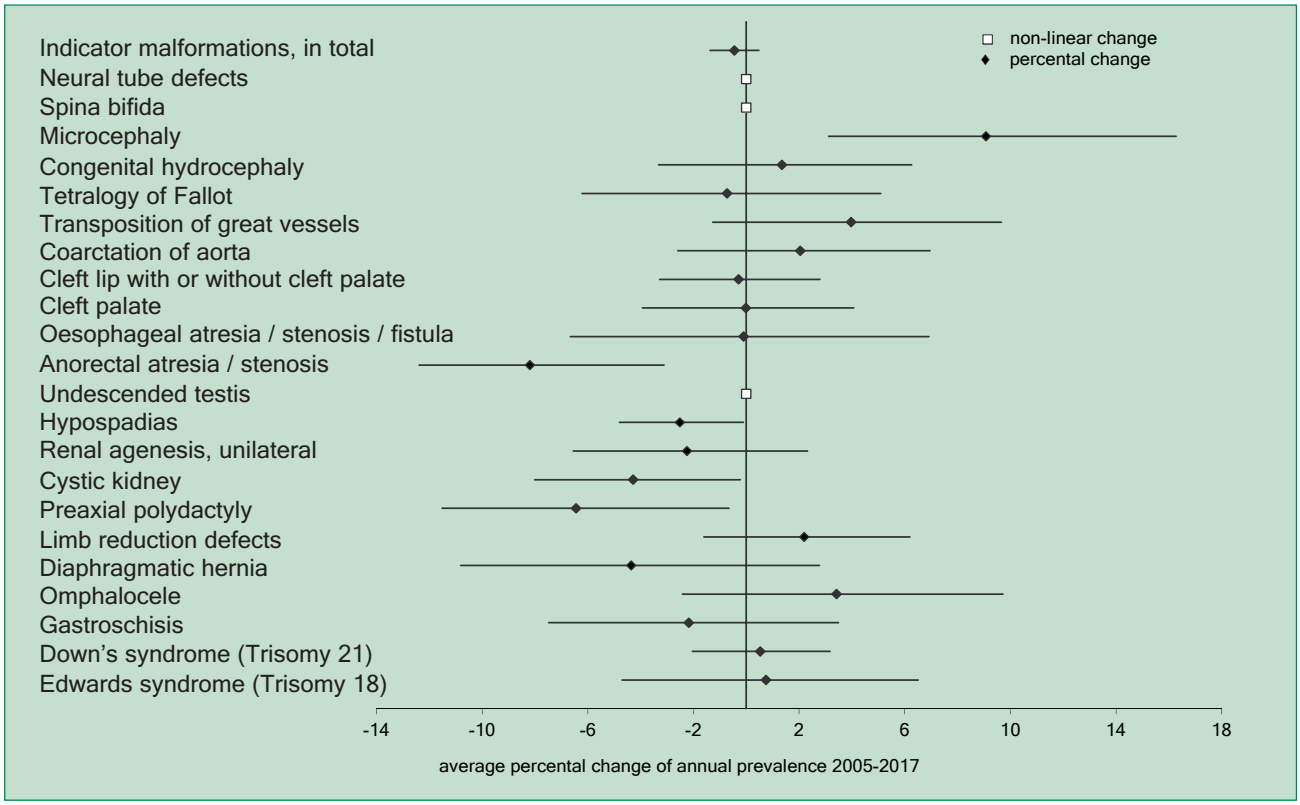


Fig. 45: Trend analysis 2005-2017 with average percental change of prevalence per year (95% confidence intervall)

	Regression coefficient B in %	Confidence intervall (CI of 95 %)
Indicator malformations, in total	-0.45	-1.37 bis 0.48
Microcephaly	9.08	3.12 bis 16.27
Congenital hydrocephaly	1.35	-3.32 bis 6.26
Tetralogy of Fallot	-0.73	-6.21 bis 5.09
Transposition of great vessels	3.97	-1.27 bis 9.66
Coarctation of aorta	2.05	-2.59 bis 6.95
Cleft lip with or without cleft palate	-0.29	-3.28 bis 2.79
Cleft palate	-0.01	-3.93 bis 4.07
Oesophageal atresia / stenosis / fistula	-0.10	-6.65 bis 6.92
Anorectal atresia / stenosis	-8.19	-12.38 bis -3.12
Hypospadias	-2.52	-4.80 bis -0.11
Renal agenesis, unilateral	-2.24	-6.55 bis 2.31
Cystic kidney	-4.29	-8.00 bis -0.23
Preaxial polydactyly	-6.44	-11.51 bis -0.65
Limb reduction defects	2.19	-1.61 bis 6.19
Diaphragmatic hernia	-4.36	-10.81 bis 2.76
Omphalocele	3.42	-2.41 bis 9.72
Gastroschisis	-2.17	-7.48 bis 3.49
Down's syndrome (Trisomy 21)	0.53	-2.04 bis 3.17
Edwards syndrome (Trisomy 18)	0.74	-4.70 bis 6.51

15 Summary

The present annual report about frequency of congenital malformations and anomalies as well as genetically caused diseases is based on the data of 2005 to 2017 that was reported to the Monitoring of Congenital Malformations Saxony-Anhalt for the Federal State of Saxony-Anhalt. The nationwide malformation data is evaluated, sorted and under application of the number of births population-based, statistically analysed by the statistical office Saxony-Anhalt. When available, European values for comparison for the calculated prevalences of the indicator malformations are indicated by the from EUROCAT provided full members.

After a number of less than 17,000 live birth per year between 2011 and 2013, the number of live births in Saxony -Anhalt increased to the level of 15 years ago. In 2016, we registered 18,093 and 2017 17,837 live births.

The statistical office registered 81 stillbirths in 2017. Based on the number of live- and stillbirths during the registration period only 66 stillbirths would have been expected.

According to the Federal Statistical Office of Germany, 784,901 live births were registered in 2017 in Germany. In 2016, 792,141 live births were registered. The development of the number of births in Saxony-Anhalt corresponds to the German-wide trend of the last 6 years. Approximately 2.3% of all births came from Saxony-Anhalt.

In addition to data from live and stillbirths, the prevalences that are presented in the annual report 2017 are based on data of 89 terminations of pregnancy and 23 spontaneous abortions after 16 WOG`s. The statistical calculations of the report are therefore based on a total number of 18,030 births in 2017 (chapter 2).

679 births (3.77 % of all births) showed 2017 a major malformation. Therefore in 2017, again the highest malformation rate during the registration period was reached (3.53 %, CI 3.45 to 3.61 %) (chapter 8).
86.2 % (585) of infants/foetuses with major malformations were live births in 2017. 22 of these infants (3.8 %) died during their first year of life. 82.9 % of all births with major malformations survived infancy. The percentage of terminations of pregnancy lies with 12.52% above the value of the last years (chapter 7,8).

As every year, the most frequent single diagnoses are VSD and ASD. Both were registered in 2017 at 1.24 % resp. 0.50 % of all births and therefore similar to other cardiac malformations (pulmonary valve stenosis, aortic coarctation, TGA, right passing aortic arch), they were registered more frequently than usual. The third most frequent malformation uropathy II.-IV. grade (0.29 %) was also registered more often than usual. The Down`s-syndrome was registered in 2017 with a value of 0.21 % of all infants/foetuses significantly more often than expected (chapter 11).

1.39 % of all births 2017 were affected by an exact defined indicator malformation (chapter 12). Compared to the respective basis prevalences, higer prevalences were calculated for hydrocephaly, microtia/anotia, aortic coarctation, oesophageal atresia/-stenosis/-fistula, small intestinal atresia/-stenosis, omphalocele and Down`s-syndrome. In contrast, lower prevalences were calculated for cleft lip with cleft upper jaw and palate, rectal- and anal atresia/-stenosis, hypospadias, bladder exstrophy, preaxial polydactyly and gastroschisis.

In 2017, the monitoring of congenital malformations received information about 85 malformation caused terminations of pregnancy. The analysis (chapter 14) shows different points of termination of pregnancy depending on the malformation. Malformations of the CNS (21.2 %) are detected later and the pregnancies terminated with approximately 19.7 WOG`s. In contrast to that, foetuses with chromosomal aberrations (45.9 %) and multiple anomalies and other malformations (32.9 %) are aborted with 18.2 resp. 18.5 WOG`s.

50 births were affected in 2017 with a genetically caused disease. A sequence, association or complex was detected at 16 births. Eight infants showed a fetopathy, six births suffered from the results of a congenital infection. As usual, at more than half of 66 births with a chromosomal aberration a Down`s-syndrome (38) was diagnosed (chapter 13).

Chapter 16 of the current annual report gives an overview about the mortality of infants/foetuses with congenital malformations. Here, the focus lies in particular on the in chapter 12 outlined indicator malformations. The monitoring of congenital malformations collects data since 1980, beginning for the ancient district Magdeburg und since 2000 for entire Saxony-Anhalt. The diagrams show the survival of all births from point of pregnancy until the end of the fifth year of life.

The monitoring of congenital malformations received in 2017 2,292 reportings about 2,020 births. At 679 infants/foetuses at least one major malformation and at further 269 births smaller malformations or anomalies were described. Additionally to data of infants and foetuses with congenital malformations and anomalies as well as genetically caused diseases control data from infants without malformations is necessary, as risk evaluation can only be made in scientific founded analyses when both groups are compared.

A solid data base was created by the help for several years from our engaged colleagues from different medical institutions which are reporting voluntary and selfless congenital malformations to the monitoring of congenital malformations. By receiving these reports, we created a solid data basis during the last years which serves to create our report annually, also in 2017. We would like to thank all "senders" and hope that this excellent cooperation will continue!

16 Mortality in Correlation to Congenital Malformations

Infant mortality has historically been one of the most important indicators for general assessment of the health performance of the population situation and the assessment of the medical care for pregnant women and newborns. The mortality rate of children, especially those with congenital malformations could be significantly reduced during the last 30 years. Important factors influencing infant mortality are the quality of prenatal screening examinations, the medical care of risk conditions during pregnancy and the specialized care of newborns and premature babies as well as the implementation of early detection measures, and care of children in the first year of life. The WHO Millennium Development Goals, which include Integrated Childhood Disease Management (IMCI), have succeeded in reducing infant mortality by 50% worldwide. Despite this, around six million cases are reported worldwide every year [1].

Most studies only include a few selected congenital malformations in a long-term observation [2]. From public health point of view, the consideration of the data as a total and in relation to the population has a high significance for health policy. It supports doctors in their task of educating parents to be able to take an informed decision [3].

Overall and despite, for example, the recommendation for periconceptual folic acid prophylaxis can be mentioned, where only few positive changes with regard to the prevention of congenital malformations in the last 10 years took place. [4, 5].

Groen et. al. describes a prevalence of congenital malformations of 2.7 per 10,000 births for the years 1998-2011 with observations of more than three million births in Europe (14 EUROCAT registers) [3]. Of these, 13.1% of pregnancies were terminated. The proportion of deceased children with malformations in the overall mortality rates up to the age of five were registered with a value of 17% to 42% for the period 2005-2009 according to WHO data [5]. For the eleven countries of this EUROCAT study, perinatal mortality was recorded in 73,337 affected pregnancies during this period. This is associated with congenital or prenatally diagnosed malformations of 1.27 per 1,000 live births (spontaneous abortions from 20 WOG`s, stillbirths, terminations of pregnancy after prenatal diagnosis and deceased until first birthday were included).

The differences in the criteria for recording the births, such as the exclusion of stillbirths and medically induced terminations of pregnancy, are often the subject of discussion. In countries where a termination of pregnancy for medical reasons is not legal, the total rate of deaths with congenital malformations increased (Malta 3,0 : 1.000, Ireland 2,1 : 1.000). Terminations of pregnancy after prenatal diagnosis occurred in the EU countries three times more often than stillbirths and deceased live births together [5].

Major malformations were detected prenatally in 20.2 % of all cases, in 34.8 % of all cases after birth of the infant. The isolated large malformations and thereby the heart malformations led most frequently to medical abortions, followed by syndromes and genetically caused diseases. Stillbirths and very early infant deaths occurred most frequently in CNS malformations and large defects of vital organs (lungs, gastrointestinal tract, lung, and intestinal tract). Children with "lethal" malformations were stillborn in 35% of the cases, 16% deceased and 52% could be treated by surgical intervention. Survival inevitably depends on the socio-economic and perinatological possibilities of the country [5].

The data from these two studies showed that survival with congenital major malformations could be increased by improving medical intervention options [3, 5].

The prospective data collection of the malformation registers in the European network EUROCAT also enables trend analyses of mortality. These can be supported in parent counselling for the doctors. EUROCAT data oversees about 1.7 million births per year in Europe, including one third of the European birth rate.

In Saxony-Anhalt, it is possible to look forward to a much longer period of time. Data has been available since 1980, at the beginning for the former district Magdeburg and since 2000-2016 for the whole area of Saxony-Anhalt. The following diagrams show in the individual malformation categories the European trend for survival of all births from beginning of pregnancy until the end of the fifth year of life.

Literatures

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Survival Rate of the Newborns with Indicator Malformations - Graphical Representation from Year 1980-2016

Neural tube defects (Q00./Q01./Q05.)

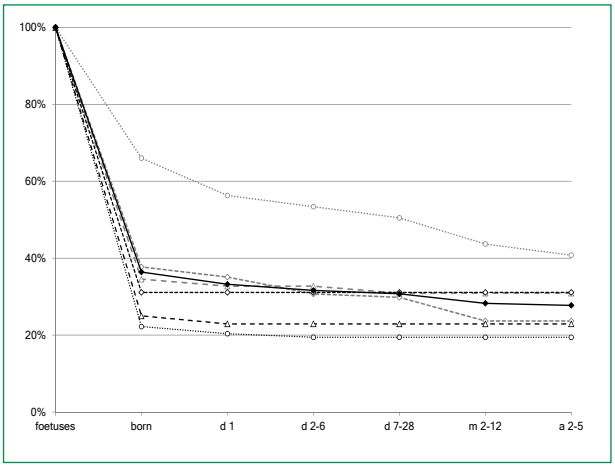


Fig. 48: Survival rate of the newborns 1980-2016

Anencephaly (Q00.)

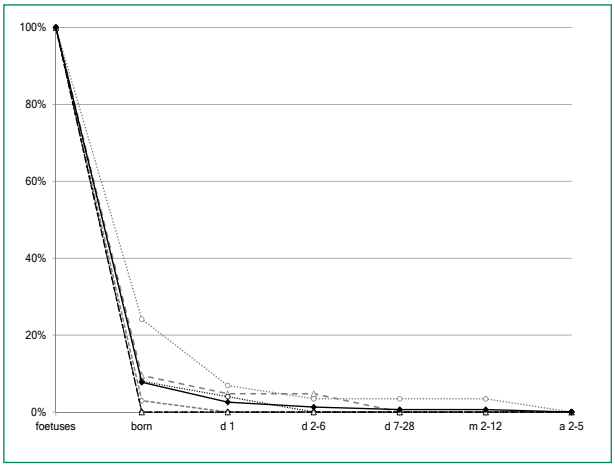


Fig. 49: Survival rate of the newborns 1980-2016

Spina bifida (Q05.)

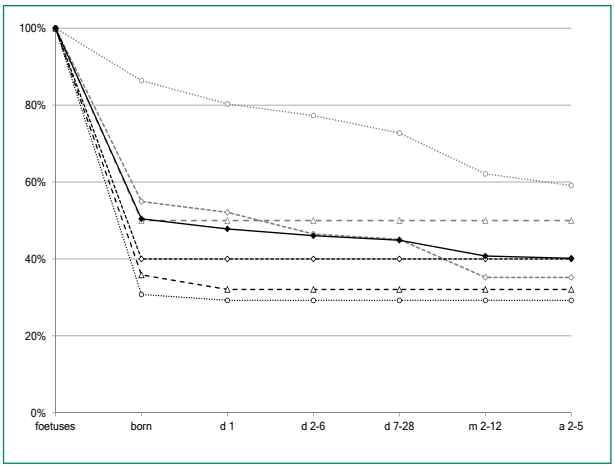


Fig. 50: Survival rate of the newborns 1980-2016

Encephalocele (Q01.)

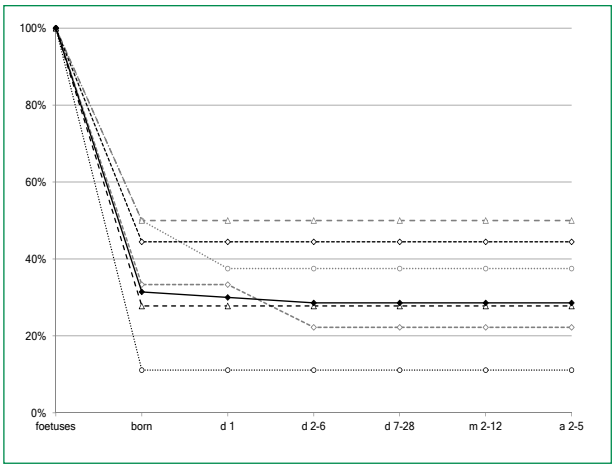


Fig. 51: Survival rate of the newborns 1980-2016

Microcephaly (Q02.)

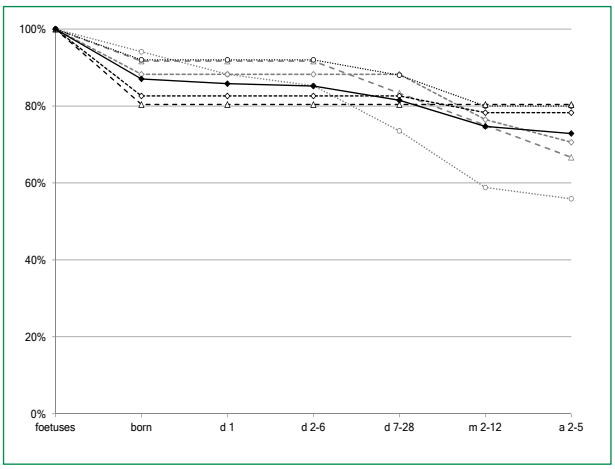


Fig. 52: Survival rate of the newborns 1980-2016

Congenital hydrocephaly (Q03.)

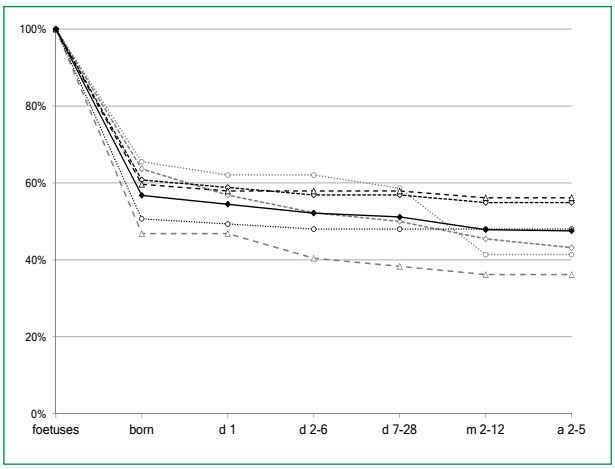


Fig. 53: Survival rate of the newborns 1980-2016

1980-1986 1987-1992 1993-1998 1999-2004 2005-2010 2011-2016 1980-2016 d = day m = month a = year

Arhinencephaly/Holoprosencephaly (Q04.1/Q04.2)

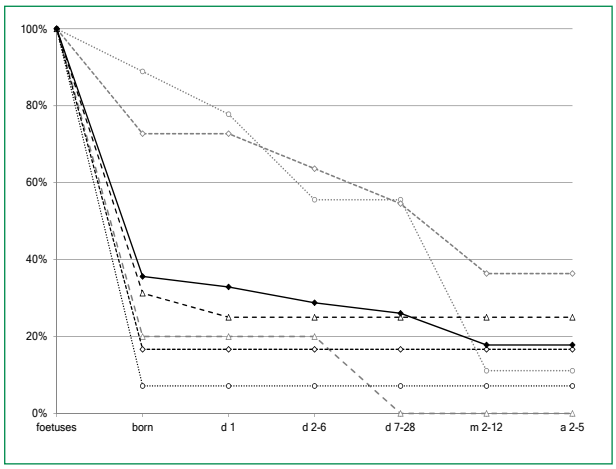


Fig. 54: Survival rate of the newborns 1980-2016

Anophthalmus/Microphthalmus (Q11.0/Q11.1/Q11.2)

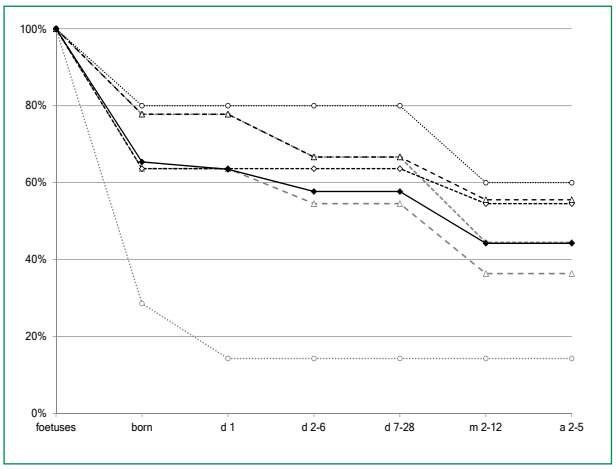


Fig. 55: Survival rate of the newborns 1980-2016

Microtia/Anotia (Q16.0/Q17.2)

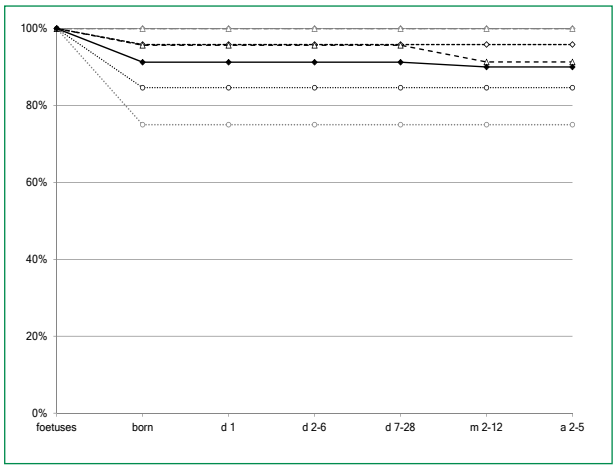


Fig. 56: Survival rate of the newborns 1980-2016

Fallot-Tetralogy (Q21.3)

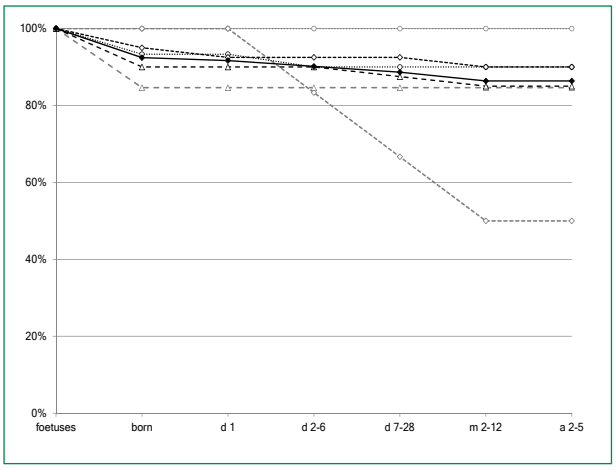


Fig. 57: Survival rate of the newborns 1980-2016

Transposition of great vessels - TGV (Q20.1/Q20.3)

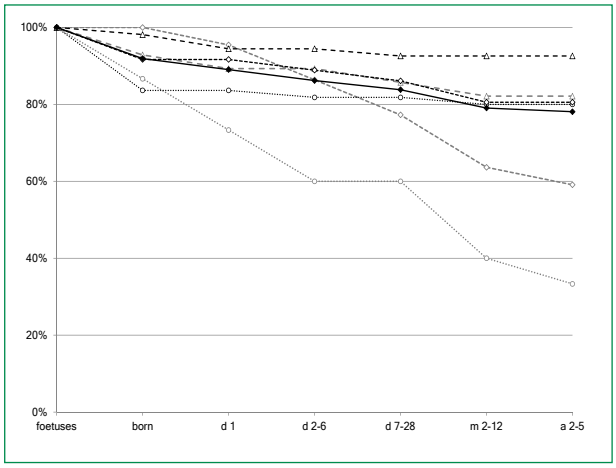


Fig. 58: Survival rate of the newborns 1980-2016

Hypoplastic left heart syndrome (Q23.4)

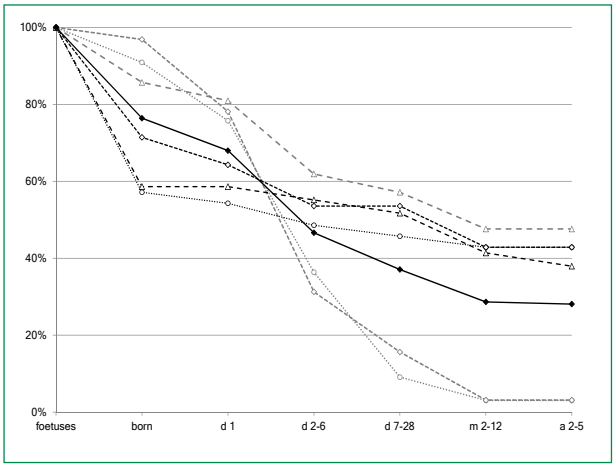


Fig. 59: Survival rate of the newborns 1980-2016

1980-1986 1987-1992 1993-1998 1999-2004 2005-2010 2011-2016 1980-2016 d = day m = month a = year

Coarctation of aorta (Q25.1)

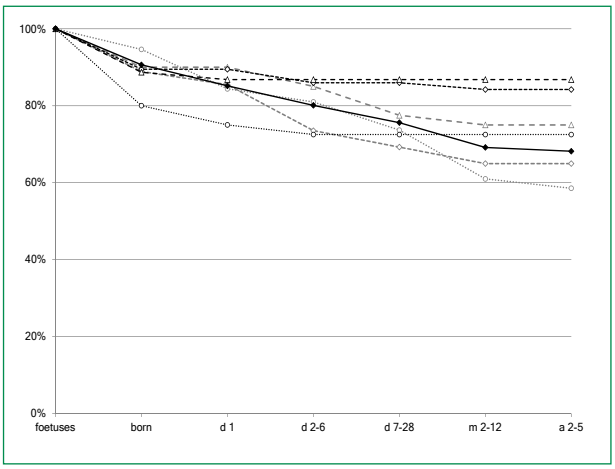


Fig. 60: Survival rate of the newborns 1980-2016

Cleft lip with or without cleft palate (Q36./Q37.)

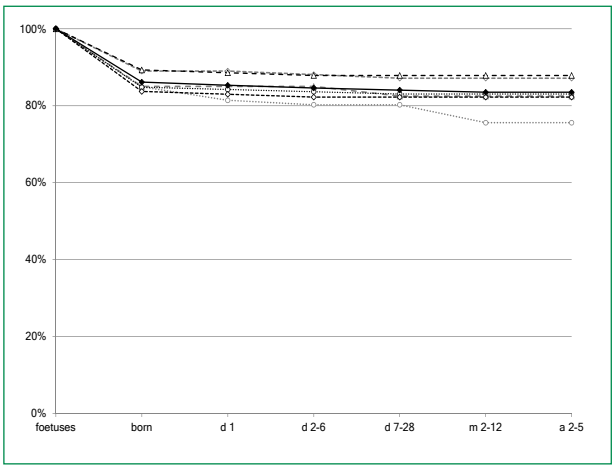


Fig. 61: Survival rate of the newborns 1980-2016

Cleft palate (Q35.1/Q35.3/Q35.5/Q35.9)

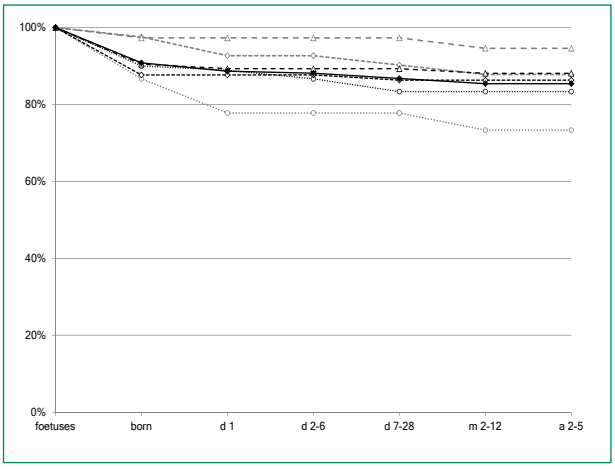


Fig. 62: Survival rate of the newborns 1980-2016

Choanal atresia (Q30.0)

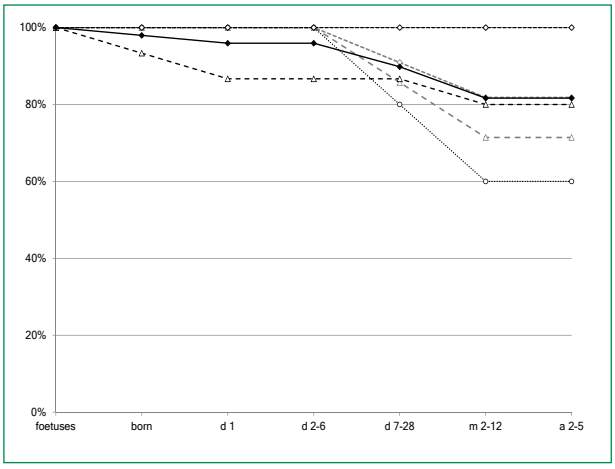


Fig. 63: Survival rate of the newborns 1980-2016

Oesophageal atresia/ stenosis/ fistula (Q39.0-Q39.4)

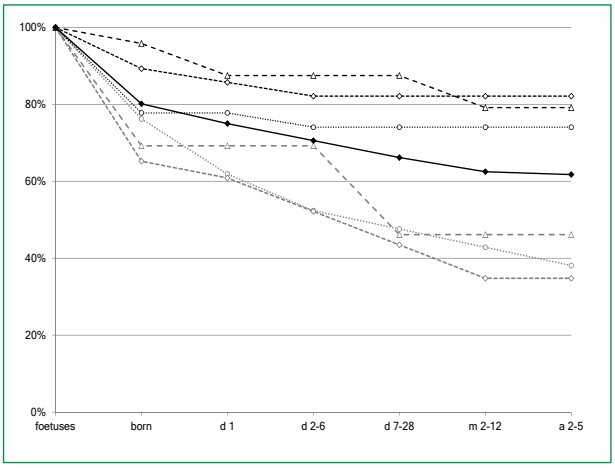


Fig. 64: Survival rate of the newborns 1980-2016

Small intestinal atresia/ stenosis (Q41.1/Q41.2/Q41.8/Q41.9)

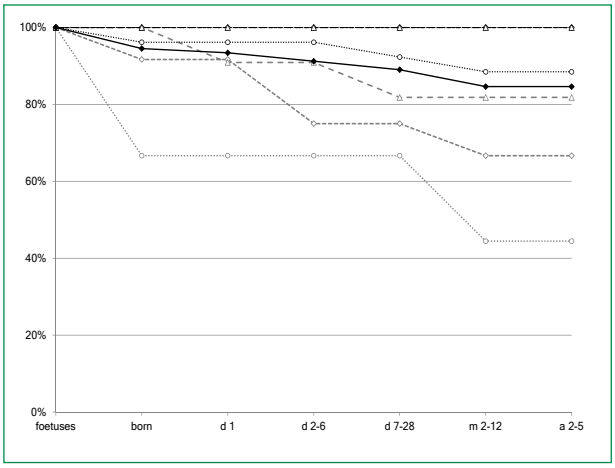


Fig. 65: Survival rate of the newborns 1980-2016

1980-1986 1987-1992 1993-1998 1999-2004 2005-2010 2011-2016 1980-2016 d = day m = month a = year

Anorectal atresia / stenosis (Q42.0-Q42.3)

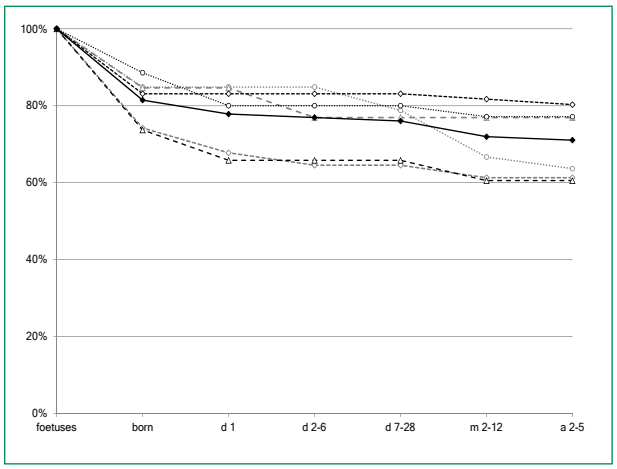


Fig. 66: Survival rate of the newborns 1980-2016

Undescended testis (Q53.1-Q53.9)

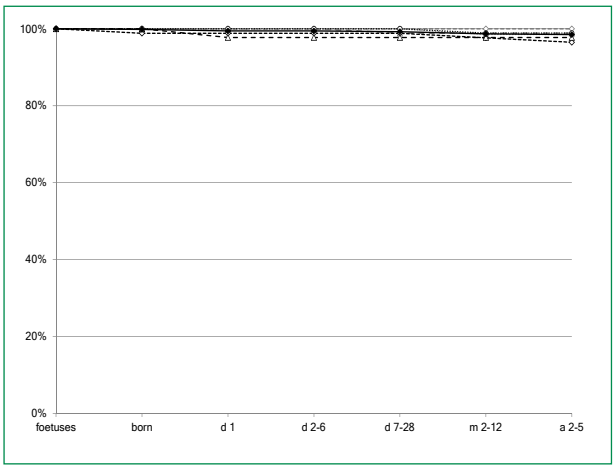


Fig. 67: Survival rate of the newborns 1980-2016

Hypospadias (Q54.0-Q54.3/Q54.8/Q54.9)

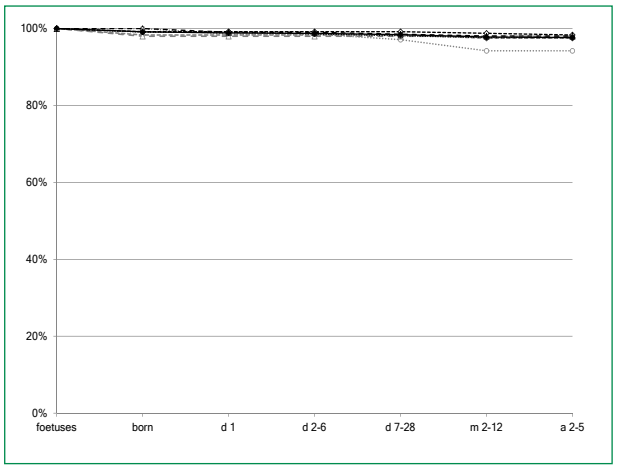


Fig. 68: Survival rate of the newborns 1980-2016

Epispadias (Q64.0)

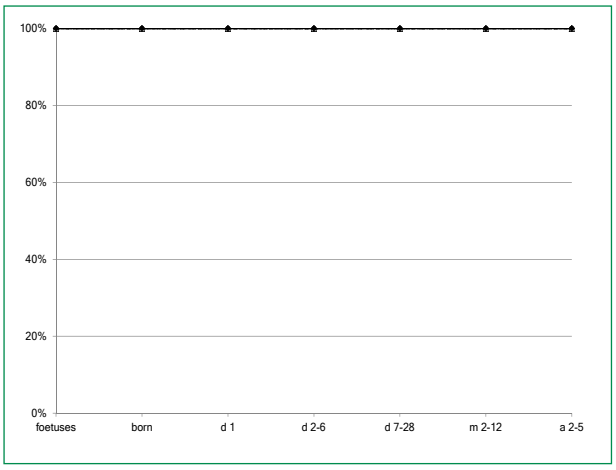


Fig. 69: Survival rate of the newborns 1980-2016

Indeterminate sex (Q56.)

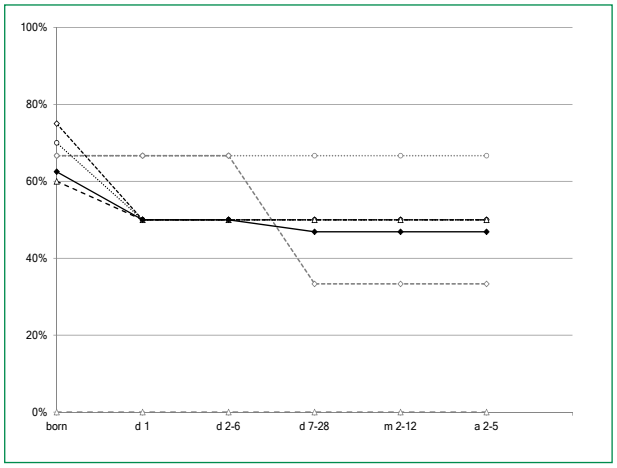


Fig. 70: Survival rate of the newborns 1980-2016

Potter sequence (Q60.6)

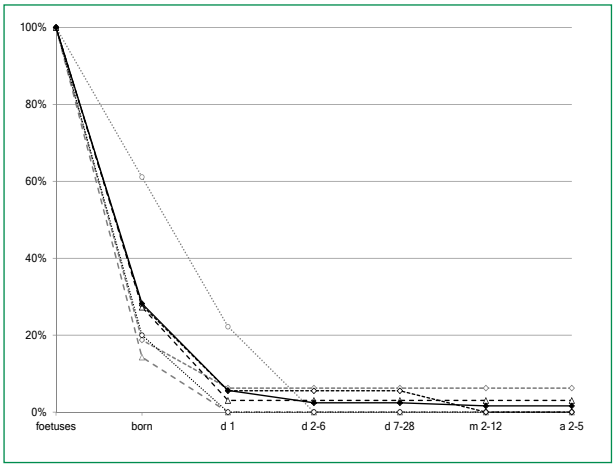


Fig. 71: Survival rate of the newborns 1980-2016

1980-1986 1987-1992 1993-1998 1999-2004 2005-2010 2011-2016 1980-2016 d = day m = month a = year

Renal agenesis, unilateral (Q60.0/Q60.2)

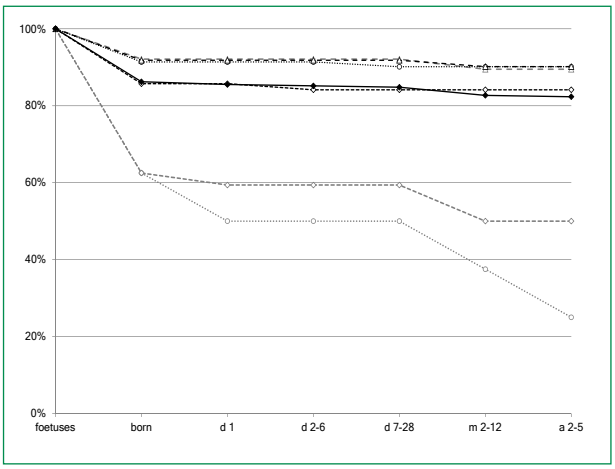


Fig. 72: Survival rate of the newborns 1980-2016

Cystic kidney (Q61.1-Q61.9)

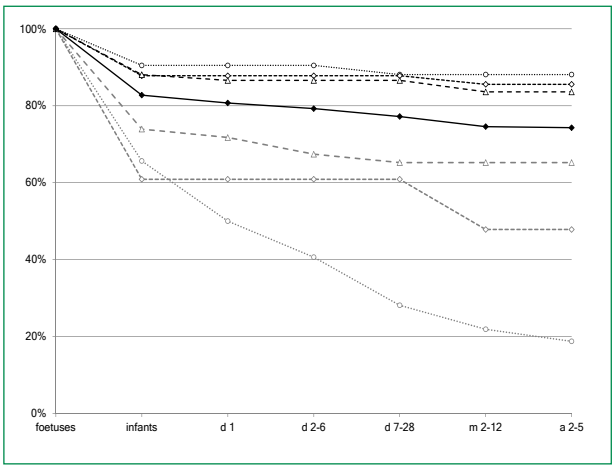


Fig. 73: Survival rate of the newborns 1980-2016

Bladder exstrophy (Q64.1)

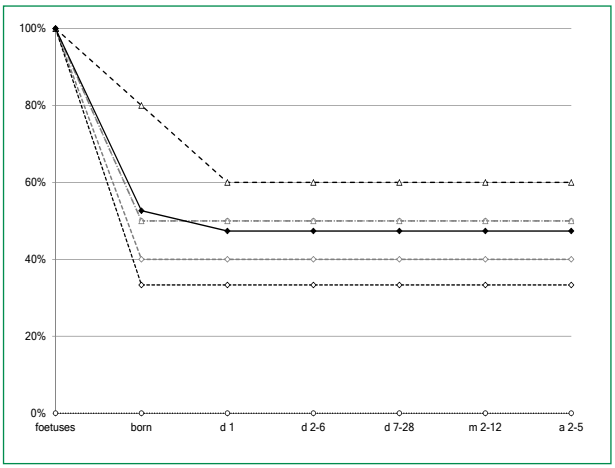


Fig. 74: Survival rate of the newborns 1980-2016

Preaxial polydactyly (Q69.1/Q69.2)

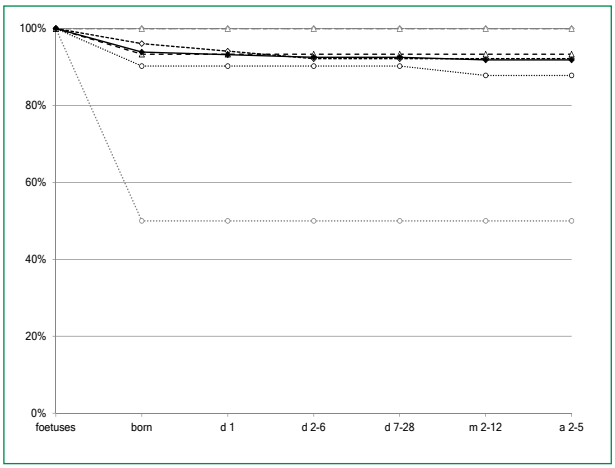


Fig. 75: Survival rate of the newborns 1980-2016

Limb reduction defects of upper and lower limbs (Q71./Q72./Q73.)

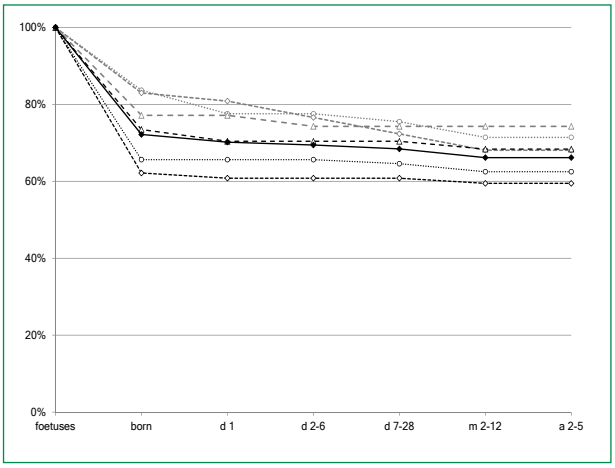


Fig. 76: Survival rate of the newborns 1980-2016

Diaphragmatic hernia (Q79.0/Q79.1)

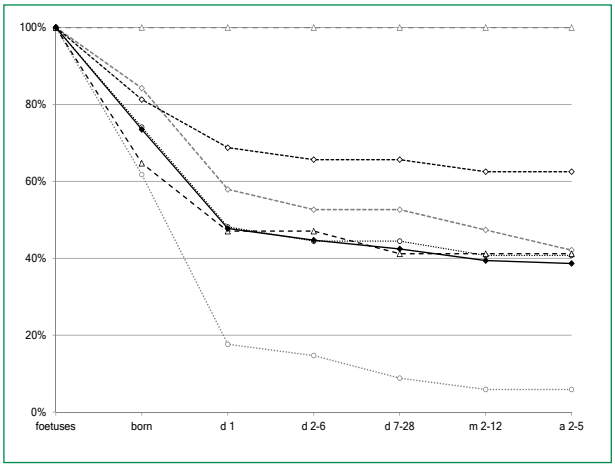


Fig. 77: Survival rate of the newborns 1980-2016

1980-1986 1987-1992 1993-1998 1999-2004 2005-2010 2011-2016 1980-2016 d = day m = month a = year

Omphalocele (Q79.2)

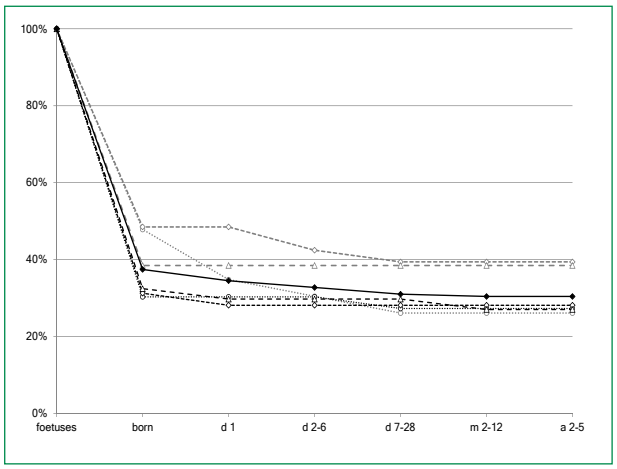


Fig. 78: Survival rate of the newborns 1980-2016

Gastroschisis (Q79.3)

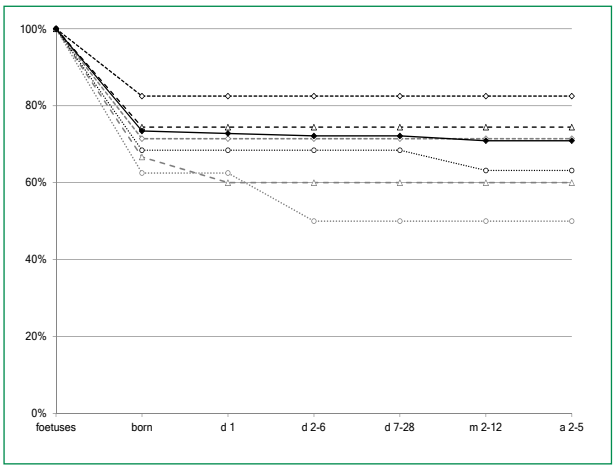


Fig. 79: Survival rate of the newborns 1980-2016

Prune belly sequence (Q79.4)

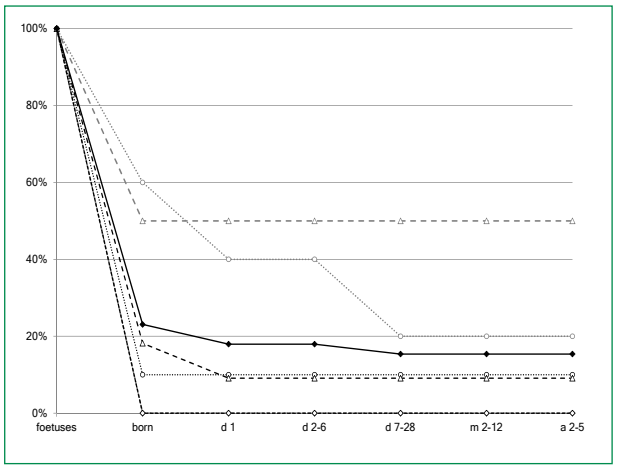


Fig. 80: Survival rate of the newborns 1980-2016

Down syndrome - Trisomy 21 (Q90.)

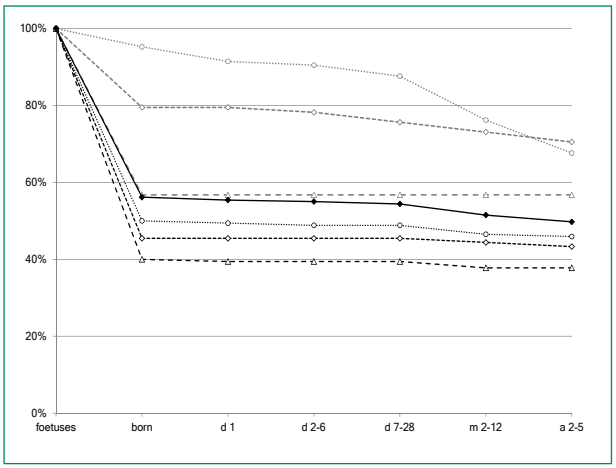


Fig. 81: Survival rate of the newborns 1980-2016

Patau syndrome - Trisomy 13 (Q91.4-Q91.7)

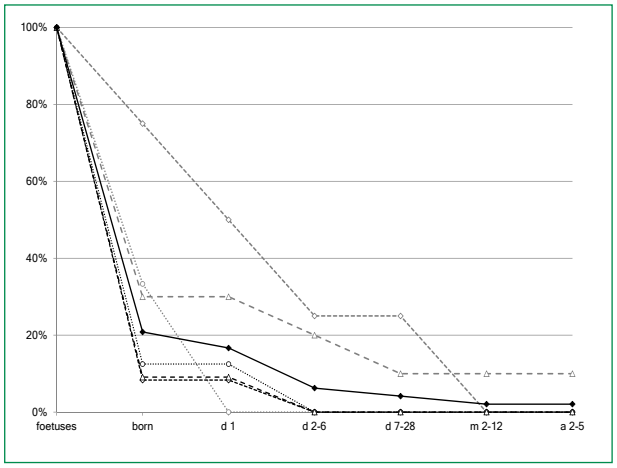


Fig. 82: Survival rate of the newborns 1980-2016

Edwards syndrome - Trisomy 18 (Q91.0-Q91.3)

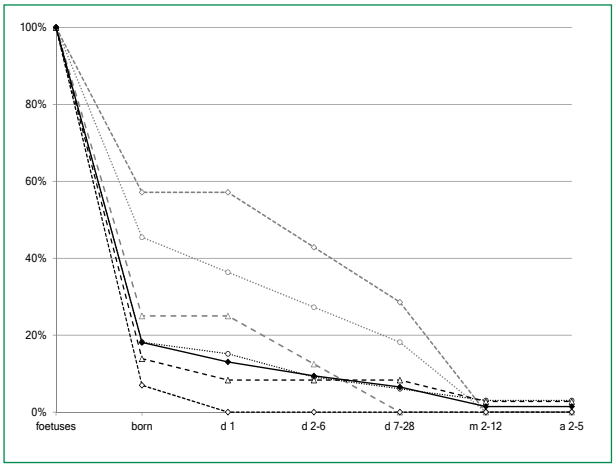
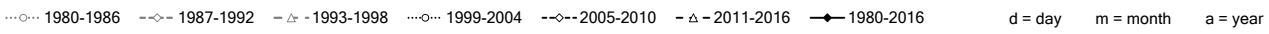


Fig. 83: Survival rate of the newborns 1980-2016



18 Newborn Hearing Screening 2017

Introduction

Every newborn is entitled to receive a general newborn hearing screening which belongs as from 01-01-2009 to the recommended early detection examinations after birth of a child. Aim of the newborn hearing screening (NHS) is to detect congenital hearing disorders at an early stage (up to the 3rd month of life) and to initiate the corresponding therapies (up to the 6th month of life).

Basis for this early detection examination is "Enclosure 6 - early detection examination of hearing disorders at newborns (newborn hearing screening)" of the Children Directive issued by the Federal Joint Committee (G-BA) on 19-06-2008.

The Children Directive determines the process of the newborn hearing screening in the following way:

- measurement of each ear by TEOAE or AABR up to the 3rd day of life (outside of hospital by no later than early detection examination 2 (U2))
- AABR examination is mandatory for children with increased risk for a hearing disorder
- examinations of premature infants by no later than calculated date of delivery and examinations of not healthy births by no later than 3rd month of life
- at suspicious first screening, repetition of examination on both ears by AABR preferably on the same day, but by no later than early detection examination 2 (U2)
- at suspicious finding of the follow-up AABR examina tion a comprehensive confirmation diagnostics is necessary up to the 12th week of life

According to the Children Directive performance and results of the newborn hearing screening as well as a possible confirmation diagnostics have to be recorded in the "yellow book of examination" of every child. The responsible paediatrist resp. ENT physician can evaluate by reading this information if the required diagnostics resp. therapy in case of a hearing disorder was initiated.

The Monitoring of Congenital Malformations Saxony-Anhalt cooperates with the Centre for Newborn Hearing Screening Saxony-Anhalt since 2006 as tracking centre for the newborn hearing screening (Federal State dependent screening centre).

The Newborn Hearing Screening Directive stipulates that the hearing screening should be performed via AABR at children with an increased risk for congenital hearing disorders. The following overview outlines in extracts possible indications for the performance of an AABR examination due to an increased risk of hearing disorders (modified according to JCIH 2007):

- positive family history regarding hearing disorders
- clinical suspicion of hearing disorder/ deafness
- premature birth, birth weight under 1500 g
- neonatal intensive care
- hyperbilirubinemia (exchange transfusion)
- pre-, peri- or postnatal hypoxia (pH < 7.20)
- peri- and postnatal cerebral haemorrhage, oedema
- intrauterine infections
- culture positive postnatal infections associated with increased risk of hearing loss
- craniofacial anomalies
- distinctive diseases with hearing loss
- neurodegenerative diseases or sensomotoric neuro pathies
- outer characteristics, which point to a distinctive disease that appears in combination with a hearing disorder (e.g. white strand of hair)
- APGAR-values of 0-4 in the first minute and/or 0-6 after 5 minutes

Literatur:
Joint Committee on Infant Hearing: Year 2007 position statement: Principles and guidelines for early hearing detection and intervention programs. PEDIATRICS 2007; 120: 898-921

Participating institutions

24 maternity clinics existed in Saxony-Anhalt in 2017. All these clinics offer a newborn hearing screening already for several years by TEOAE or AABR. All 24 maternity clinics participated 2017 in the newborn hearing screening.

A screening-ID is assigned to each child - if there is no denial of this examination and /or data transmission by the parents/guardians - and the hearing screening results are forwarded to the tracking centre of newborn hearing screening Saxony-Anhalt.

The screening ID, which has to be assigned to each infant as condition to participate in the hearing screening trakking is also used by several midwifes. In this way also infants who are exclusively under care of a midwife (e.g. home births) can participate in the newborn hearing screening.

The following table on page 81 gives an overview about the single maternity clinics and number of births with a screening ID.

Maternity clinics in Saxony-Anhalt and participation in the newborn hearing screening tracking (ordered by location)

Maternity Clinics	Tracking period 2017	Live births with screening ID in this period*
Ameos Klinikum Aschersleben	01.01. - 31.12.2017	534
Gesundheitszentrum Bitterfeld/Wolfen	01.01. - 31.12.2017	487
Helios Klinik Jerichower Land	01.01. - 31.12.2017	397
Städtisches Klinikum Dessau	01.01. - 31.12.2017	868
Altmark-Klinikum Krankenhaus Gardelegen	01.01. - 31.12.2017	341
Ameos Klinikum Halberstadt	01.01. - 31.12.2017	580
Krankenhaus St. Elisabeth und St. Barbara Halle	01.01. - 31.12.2017	2,092
Universitätsklinikum Halle (Saale)	01.01. - 31.12.2017	1,305
Helios Klinik Köthen	01.01. - 31.12.2017	493
Krankenhaus St. Marienstift Magdeburg	01.01. - 31.12.2017	1,013
Klinikum Magdeburg	01.01. - 31.12.2017	1,434
Universitätsklinikum Magdeburg A.ö.R.	01.01. - 31.12.2017	1,378
Carl-von-Basedow-Klinikum Saalekreis Merseburg	01.01. - 31.12.2017	739
Saale-Unstrut Klinikum Naumburg	01.01. - 31.12.2017	369
Harzklinikum Dorothea Christiane Erxleben, Klinikum Quedlinburg	01.01. - 31.12.2017	582
Altmark-Klinikum Krankenhaus Salzwedel	01.01. - 31.12.2017	432
Helios Klinik Sangerhausen	01.01. - 31.12.2017	718
Ameos Klinikum Schönebeck	01.01. - 31.12.2017	549
Johanniter-Krankenhaus Genthin-Stendal	01.01. - 31.12.2017	852
Asklepios Klinik Weißenfels	01.01. - 31.12.2017	456
Harzklinikum Dorothea Christiane Erxleben, Klinikum Wernigerode	01.01. - 31.12.2017	708
Evangelisches Krankenhaus Paul Gerhardt Stift Wittenberg	01.01. - 31.12.2017	726
Georgius-Agricola Klinikum Zeitz	01.01. - 31.12.2017	353
Helios Klinik Zerbst/Anhalt	01.01. - 31.12.2017	238
Total number of live births* with screening ID in clinics in Saxony-Anhalt		**17,644**

additional live births with screening ID: e.g. home births / births in a birth centre and live births outside of Saxony-Anhalt, respectively	01.01. - 31.12.2017	**150**

Tracked newborns in total	**17,794**

In total, 17,644 births received a screening ID in their maternity clinic in Saxony-Anhalt in 2017.
Therefore, these infants could participate in the hearing screening tracking.

Furthermore, 150 data records of infants which were delivered at home or born in a birthing centre are included in our analyses. These infants received also a screening ID after birth, e.g. by their corresponding midwife.

Tracking effort

Tracking of the newborn hearing screening requires an ample organising and personnel effort. It starts with recording the results of the hearing test in the maternity clinic and forwarding them by mail or fax to the Monitoring of Congenital Malformations. The results are entered here in a special tracking database. In total, we received results of 101 senders in 2017.

The following table shows how many newborns received a screening ID per month and how many results wereforwarded to the Monitoring of Congenital Malformations per month. It becomes apparent that currently per month an average of approx. 1,940 reports can be expected, however in some cases we received multiple reportings for one child (e.g. from the maternity clinic, paediatric clinic, ENT clinic, ENT physician, paediatrist and from the parents).

Births with screening ID and number of incoming results

2017	Infants with screening-ID	Number of reports
January	1,489	1,984
February	1,381	1,770
March	1,441	1,896
April	1,359	1,828
May	1,534	2,025
June	1,471	1,986
July	1,738	2,183
August	1,641	2,156
September	1,512	2,019
October	1,472	1,873
November	1,411	1,805
December	1,345	1,749
total	**17,794**	**23,274**

To carry out the tracking thoroughly, 2700 letters resp. faxes were forwarded in 2014 (one up to eight letters per infant). With reference to all infants with screening ID this corresponds to an average of 0.15 letters per infant.

Additionally, the parents and attending physicians of the infants born in 2017 were contacted by telephone. In total 251 calls were made in connection with the hearing screening tracking (one up to four calls per infant).

Results (as of October 2018)

All results, that were reported to the hearing screening tracking centre about infants that were born in 2017 are included in our analyses 2017 of the newborn hearing screening:

14,956 infants out of 17,794 infants with screening ID had an unsuspicious newborn hearing screening. In 2,238 cases the first hearing test had to be followed-up, resp. no newborn hearing screening took place in the maternity clinic (these cases are regarded also as follow-up cases). There are numerous reasons why a hearing test did not take place, e.g. ambulant delivery, early discharge from maternity clinic, transfer of the child to another clinic or a defective hearing screening device.

The follow-up examination of the 2,238 infants showed in 2,074 cases an unsuspicious result. The remaining 764 infants had again a suspicious result.
323 of these 764 infants received a complete paediatric audiological confirmation diagnostic. According to our knowledge, 198 infants did not receive a confirmation diagnostic and therefore are considered as lost to follow-up.

189 infants did not participate in the screening (no reaction of parents to reminder letters or refusal of examination) and in 18 cases the status is still pending, i.e. the examinations were not finished in October 2018 or the tracking process still requires more time. In 36 cases the tracking was closed from our side without any result, because we could not get into connection with the parents.

In total, the follow up-examinations of 344 infants who were born in 2017 could be completed (confirmations diagnostics). Among 323 infants with a suspicious result, 21 infants had an unsuspicious first screening. Maybe these infants received a follow-up-examination due to present risk factors. Within the follow-up examination, a hearing disorder could be excluded in 305 cases. In 39 cases a hearing disorder was diagnosed (26 x bilateral and 13 x unilateral hearing disorder) and the corresponding therapy was initiated. For instance, 24 infants received a hearing aid (16 times hearing aid bilateral, 8 times hearing aid unilateral).

19 Annual Report 2017 of the Newborn Screening Centre in Saxony-Anhalt

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Prof. Dr. med. Klaus Mohnike (University Pediatric Clinic)

Head of Laboratory:

Specialist for laboratory medicine Dr. med. Katrin Borucki
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Kompetenznetz Neugeborenen-Screening

Berlin • Greifswald • Magdeburg • Weiden

Introduction

The newborn screening is a medical prevention measure which has the aim of a complete and early detection of endocrine and metabolic diseases and a high-quality therapy for all infants with a treatable type of these diseases. The Directive of the Joint Federal Committee
about the early detection of childhood diseases (Children's Directive) stipulates the details of the newborn screening (NGS) and screening for cystic fibrosis (CF) in paragraphs 13 to 42.
The German Society of newborn screening (DGNS) compiles annually a national screening report in cooperation with the German screening laboratories (http://screening-dgns.de/reports.php). The screening data is analysed on the basis of several realisation and quality criteria of the newborn screening in Germany which are defined by the Directive.

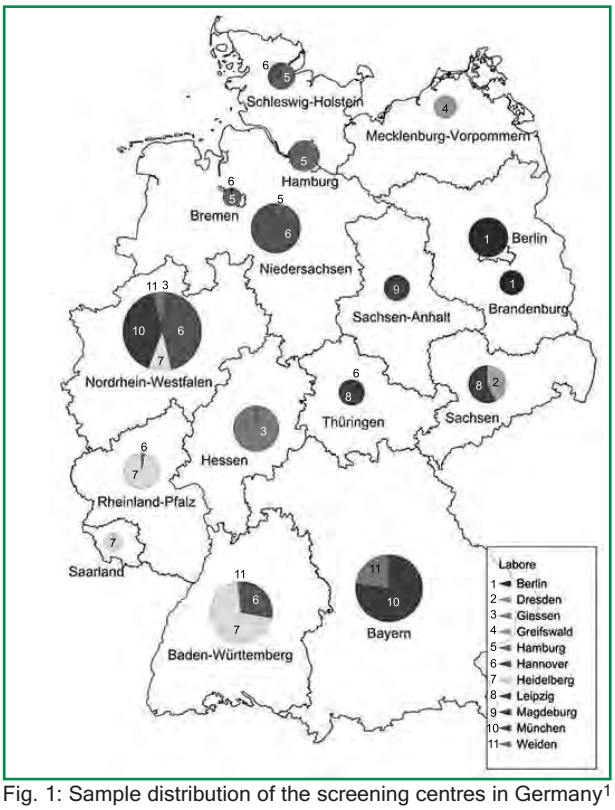

Fig. 1: Sample distribution of the screening centres in Germany[1]

The report only refers to congenital metabolic and endocrinologic diseases which are defined as "target" diseases by the Directive. Furthermore, it gives a complete statistical compilation of related screening figures, recall rates and confirmed diagnoses for the current year. Additionally, data about process quality for whole Germany is presented.

Screening samples from the single Federal States are divided to the laboratories as it is presented in figure 1 1. The screening laboratory in Magdeburg is handling the dry blood samples of all infants born in Saxony-Anhalt.

Table 1 shows the frequencies in the year 2016 of the screening target diseases in Germany1 for a total number of 783,873 screened births.

Tab. 1: Frequency of diseases in Germany 2016, detected during screening[1] (inclusive mild variantions)

Diseases	Confirmed cases	Prevalence
Hypothyroidism	242	1 : 3,273
Congenital adrenal hypoplasia (CAH)	54	1 : 14,669
Biotinidase deficiency (incl. partial defects)	27	1 : 29,338
Galactosemia (classic)	14	1 : 56,581
Phenylketonuria (PKU) n=70 / Hyperphenylalaninemia (HPA) n=77 / Cofactor deficiency n=1	148	1 : 5,352
Maple syrup urine disease (MSUD)	7	1 : 113,162
Medium-Chain-Acyl-CoA-Dehydrogenase (MCAD) deficiency	76	1 : 10,423
Long-Chain-3-OH-Acyl-CoA-Dehydrogenase (LCHAD) deficiency	8	1 : 99,016
(Very-)Long-Chain-Acyl-CoA-Dehydrogenase (VLCAD) deficiency	8	1 : 99,016
Carnitin-Palmitoyl-CoA-Transferase I (CPTI) deficiency	1	1 : 792,131
Carnitin-Palmitoyl-CoA-Transferase II (CPTII) deficiency	2	1 : 396,066
Carnitin-Acylcarnitin-Translocase (CACT) deficiency	1	1 : 792,131
Glutaric aciduria type I (GA I)	5	1 : 158,426
Isovaleric acidaemia (IVA)	12	1 : 66,011
total	**605**	1 : 1,309

Screening data 2017 of Saxony-Anhalt is outlined in the following:

Process quality

The process quality describes the process itself and its evaluation on a basis of given indicators by expert committees.
Indicators for the newborn screening are:

- complete coverage of target population
  - coverage method and rate
  - blank card systems
- completeness of control (recall)- and follow up examinations
- registration of examination parameter and cut-offs
- according to disease, laboratory and age/gestational age stratified recall rates, positive predictive values, prevalences
- specificity and sensitivity of test methods
- process times (here only in the preanalytic and labo ratory field: age at time of blood taking, time between blood taking, arriving at laboratory and result trans mission)
- individual screening results of newborns, which have to be examined further on
- confirmation diagnostics
  - diagnostics type
  - diagnostics period of time
- final diagnosis
- start of therapy

Registration rates

Since according to §15 and §31 of the Children's Directive each newborn has a right of participation in the extended newborn screening and cystic fibrosis screening, a tracking for completeness is necessary. This can be realised for children which are delivered in obstetric clinics by control of the respective consecutive number in the birth register and by means of a so-called blank card system in the screening laboratory. According to the Children`s Directive the obstetric clinics have to document on a blank test card the total refusal of screening, the refusal of an early blood taking within the screening, the transfer to specialised institutions or death of the newborn. This test card is sent to the responsible laboratory; however, it differs between the single Federal States how successful this method is.

We collected the following registration rates in Saxony-Anhalt in 2017:
According to the Federal Statistical Office 17,837 children were live births in Saxony-Anhalt
(according to the maternal residence).

Tab. 2: First examination according to maternal residence

	Number
FIrst screening in Magdeburg	17,722
Non-resident in Saxony-Anhalt	754
Screening of children living in Saxony-Anhalt	**16,968**

The discrepancy between the number of live births and screened infants amounts to **869**.

Basis for the data of the State Statistical Office are the births that are sent by the birth centres to the registry offices, which are determined according to the place of maternal residence. However, the number of mothers with residence in Saxony-Anhalt but who delivered their infant in another Federal State can not be recorded in our screening statistics if the screening of the infant also took place in another Federal State.

Tab. 3: Registration by blank cards

Blank cards in total	**377**
Blank card: child deseased / stillbirth	89
Blank card: refusal of early blood sampling	243
Blank card: transfer to another clinic	32
Blank card: screening refused by parents	13
Screening took places	268

The follow-up (telephone calls, letters to parents) meant that only 1.5 % of the blank cards sent in were without result. All other live births participated later successfully in the newborn screening and the CF screening in our or in a neighbouring screening laboratory.
Furthermore, the tracking of missing screening examinations is performed successfully according to the reasons mentioned in table 4.

Tab. 4: Completeness of controll (recall) and follow-up examinations

Reason of second screening:	'Fail' in the first screening	First screening < 36 hrs.	First screening < 32 WOG
Requested	70	320	185
Received at own laboratory	70	295	171
Deceased before control examination	-	1	11
Received at other laboratory	-	8	3

WOG = Week of Gestation

Examination Numbers, Recall Rates and Assured Cases

Table 5 shows recall rates of the single parameter and assured cases. In total, 109 control examinations had to be done in 2017.

Tab. 5: Recall rates 2017 and diagnosed patients with a metabolic disease based on 17,722 screening tests (including early blood sampling < 36 hrs. and premature infants < 32 WOG), prevalence 1992-2017'

Target disease including all variations of the disease	Number of recalls* 2017	Assured cases 2017	Prevalence in Saxony-Anhalt 1992-2017
Hypothyroidism (CH)	52	4	1 : 3,986
Phenylketonuria (PKU/HPA)	4	3	1 : 5,399
Galactosemia (classic)	2	-	1 : 142,172
Biotinidase deficiency	5	-	1 : 152,135
Congenital adrenal hypoplasia (CAH)	60	1	1 : 17,281#
Medium-Chain-Acyl-CoA-Dehydrogenase (MCAD) deficiency	6	6	1 : 10,492##
Long-Chain-3-OH-Acyl-CoA-Dehydrogenase (LCHAD) deficiency	2	1	1 : 76,068
(Very-)Long-Chain-Acyl-CoA-Dehydrogenase (VLCAD) deficiency	4	-	1 : 304,270
Maple syrup urine disease (MSUD)	-	-	
Carnitin-Palmitoyl-CoA-Transferase I und II (CPTI/CPTII) deficiency	-	-	
Carnitin-Acylcarnitin-Translocase (CACT) deficiency	-	-	
Glutaric aciduria type I (GA I)	2	-	1 : 304,270
Isovaleric acidaemia (IVA)	5	-	
Cystic fibrosis (CF)	16	3	1 : 5,907###
Others	12	-	

* Recall: Request of a second blood sample for abnormal findings in the first screening test. The presented numbers include early blood sampling (< 36 hrs.) and premature infants (< 32 WOG)
\# Screening for congenital adrenal hypoplasia (CAH) since 1997 in Saxony-Anhalt
\## Extended screening (TMS) since May 2001 in Saxony-Anhalt
\### Screening for cystic fibrose since September 2016

Process Times

Blood Sampling Times

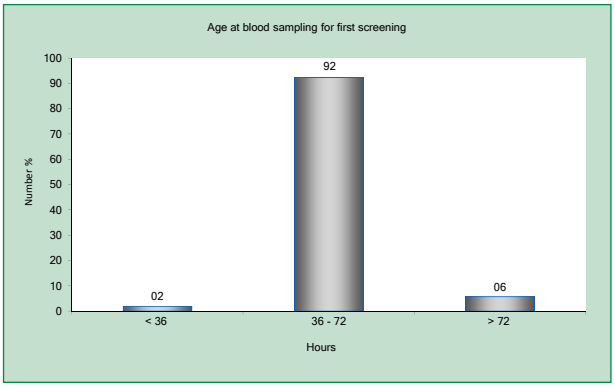

Fig. 2: Age at times of blood sampling for the first screening

The optimal point of taking blood samples for the newborn screening (36 -72 hours of life, §20 Children`s Directive) took place within the required period of time at 92.3% of all cases (2016: 92.2%). At a total number of 7.6% the taking of blood samples took not place within the required period of time (2016: 5.5%). This trend remaines unchanged in comparison to the previous year.

Note: Data of a newborn infants was only registered when all required information was given (date of birth and time as well as date of blood taking and time).

Transport times

According to §21 of the Children's Directive, the date of dispatch of the blood sample shall be equal to the date of blood collection. The aim is to ensure that the postal route does not exceed 72 hours. Figure 3 shows that 18.5% (2016: 15.4%) of all transmittals reached the laboratory more than three days after the blood taking. On average, samples from the 24 clinics reach the laboratory in the required time window, although in some cases there are major differences in the shipping time (table 6).

Similar to previous years, there were also 2017 delays of the postal shipment. There were dry blood cards that reached the laboratory after more than 10 days. Three of 24 clinics have too high shipping times. Since any delayed blood collection or any extended postal route means a potential (life) risk for the affected children, the laboratory tries to improve the duration of shipment by means of trainings (annual training event). The main reason for this is surely the dispatch via private mail deliverers. We recom-

recommend urgently to ship the samples therefore with the Deutsche Post directly to the screening mailbox. The following information must also be observed:

- send blood samples on the day of collection
- not send to the hearing screening tracking center

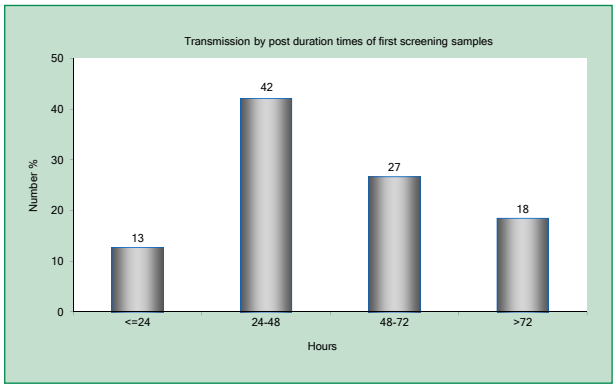

Fig. 3: Post-sending time frames of the blood sample cards (first screening), time from the sampling until the receipt at the laborytory

Tab. 6: Post-sending time of the blood sample cards per sending clinic (mean from all wards of a clinic)

Maternity hospital / pediatric ward	Average transport times (h)
Magdeburg St. Marienstift*	19.3
Magdeburg Klinikum*	26.6
Magdeburg Universitätsklinikum*	**30.2**
Gardelegen	39.2
Naumburg	40.8
Halle St. Elisabeth und St. Barbara	42.4
Zeitz	43.3
Schönebeck	44.0
Quedlinburg	44.7
Salzwedel	47.0
Bitterfeld-Wolfen	49.1
Köthen	49.4
Aschersleben	49.7
Merseburg	51.0
Wernigerode	51.5
Zerbst	52.2
Halle Universitätsklinikum	52.6
Sangerhausen	56.8
Lutherstadt Wittenberg	57.9
Stendal	60.5
Weißenfels	62.2
Burg	75.4 ↑
Dessau-Roßlau	79.7 ↑
Halberstadt	94.2 ↑

* clinic with a sample courier

Transmission of Results

Figure 4 shows how much time a complete diagnostic of first examinations takes in the laboratory. Results which are finished after more than 36 hours are caused by internal repetitions. The 11.1 % (2016: 5.2 %) of all findings, which leave the laboratory after more than 48 hours essentially reflect the extended finding duration due to cystic fibrosis screening (3-step screening) and possible disturbances in the laboratory process (equipment maintenance, repairs, etc.).

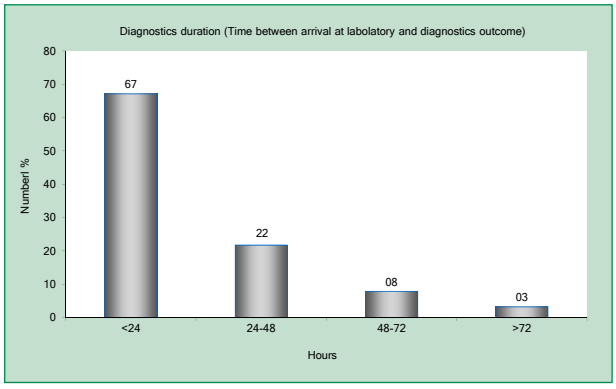

Fig. 4: Duration of diagnostics (date of result - arrival dates)

Figure 5 shows the time from the oral transmission of the pathological findings up to the receipt of the control sample (recall). Pathological findings are basically transmitted orally after they have been laboratory-internally confirmed and faxed as a partial result. These activities are documented.

The data of figure 5 does not include cystic fibrosis screening, because there is no control card requested in these cases. On the contrary, these children with a suspicious screening result participate in a sweat test in a certified CF outpatient clinic.

Cases with a reaction time of more than 5 days are related to immature premature births, where the withdrawal of the control blood was not performed until a corrected gestational age of 32 weeks was reached (timely second withdrawal). These infants are during the whole time in the intensive medical care of a premature infant ward.

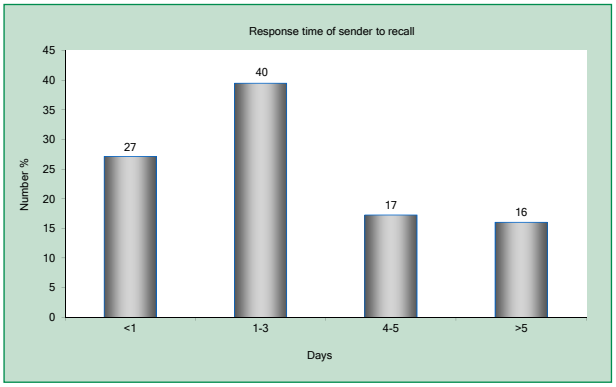

Fig. 5: Response time of sender to recall

Confirmation Diagnostics and Therapy of Patients with Positive Screening

20 suspected screening cases could be confirmed by confirmation diagnostics, 16 of these patients needed a therapy:

Tab. 7: Diagnosis, confirmation diagnostics and therapy start

Diagnosis	Confirmation diagnostics	Age at start of therapy
2 x Galactosemia, Duarte variant	Analysis of total galactose, mutation analytics	no need for therapy
4 x Hypothyroidism	Serum-TSH, fT3, fT4, sonography, 1 infant with complex malformation	5-12 days
3 x Phenylketonuria	Serum-Phe, BH4-Test	7-11 days
6 x MCAD-deficiency (3 x classic, 2 mild cariants, 1 x no report of diagnosis)	Analysis of organic acid in urine, partly mulation analytics, partly analysis of enzyme activity	6-8 days
1 x LCAD deficiency	Analysis of organic acid in urine, partly mulation analytics	5 days
1 x congenital adrenal hypoplasie with iodine deficiency syndrome	Multisteroid analysis	6 days
3 x cystic fibrose (2 x classic homozygous CF)	Sweat test Mutation analytics	25-62 days

Summary

On September 01, 2016 a new version of the Children`s Directive became effective. The screening for cystic fibrosis was identified as a new screening disorder in the paragraphs 29 to 42.
As a result, new declarations of consent have been developed and the layout on the dry blood cards has been adapted. Parents have the option of screening for cystic fibrosis independent of an extended neonatal screening to be carried out or to be denied (checkbox on the dry blood card). That is possible until the 4th week of life of the newborn. Both screening programs can be performed from one blood collection if there was enough blood taken.
The Gene Diagnostics Act also applies to cystic fibrosis screening and is the overarching law with penalty paragraphs. Midwives are only allowed to take blood for cystic fibrosis screening after commissioning by a paediatrician. Forms can be found in our homepage (www.stwz.ovug.de).

The Newborn Screening and Metabolism Laboratory belongs to the Institute of Clinical Chemistry and Pathobiochemistry since October 2015 (central laboratory of the university hospital Magdeburg A.ö.R.). Nevertheless, an intensive cooperation with specialists in paediatrics continues to exist and is strongly encouraged.

In 2017, a new LC tandem mass spectrometer was purchased for the for newborn screening. This device is also capable of meeting new requirements and can be applied for new target diseases.

The process quality of the newborn screening of Saxony-Anhalt remains very good, similar to the previous years and lies in the middle of the national average of all German screening laboratories (national screening report of the German society of newborn screening).

As usual, all patients with a positive first screening result were followed up and their diagnosis was assured resp. excluded. We thank all medical centres and ambulances for the good and smooth collaboration.

We calculated an incidence of 1: 1,760 for all objective diseases of the newborn screening in Saxony-Anhalt in 2017.

For further information about the metabolic screening centre Magdeburg we kindly invite you to visit our website:

www.stwz.ovgu.de

We would like to inform sender, parents and interested people here about the Newborn Screening and about special metabolic diagnostics and provide downloads/forms.

The national screening report of the DGNS1 is available on their own website (http://screening-dgns.de) two years after the respective period of time

[1]Source: Deutsche Gesellschaft für Neugeborenenscreening e.V. (DGNS): Nationaler Screeningreport Deutschland 2016 http://www.screening-dgns.de/Pdf/Screeningreports/DGNS-Screeningreport-d_2016.pdf