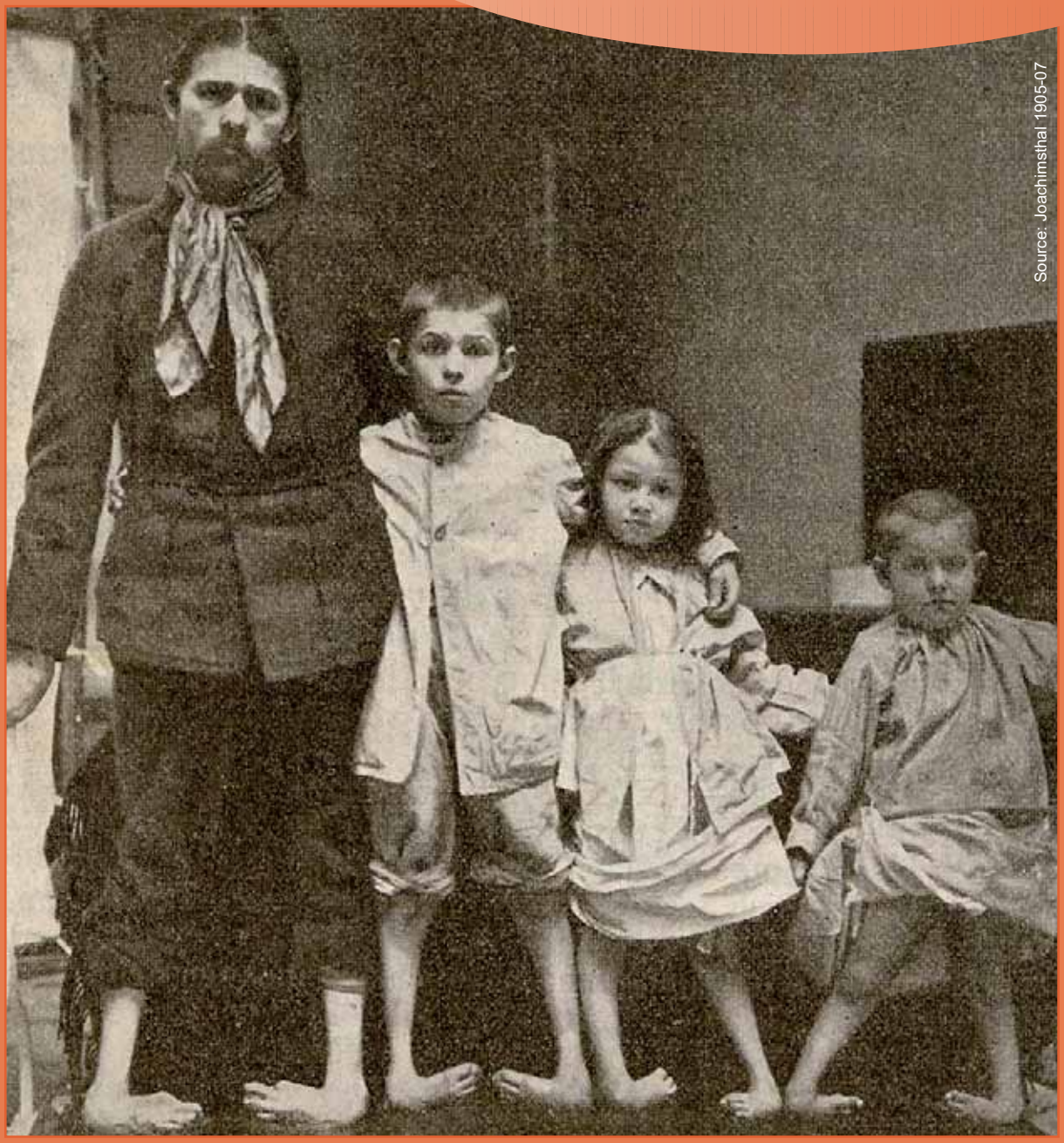
Annual Report 2007



Monitoring of Congenital Malformations Saxony-Anhalt

Medical Faculty of the

Otto-von-Guericke-University Magdeburg

SACHSEN-ANHALT

Ministerium für
Gesundheit und Soziales

Annual Report 2007
of the Federal State of Saxony-Anhalt
about the frequency of congenital malformations
and anomalies as well as genetically caused diseases

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Coverpicture: A man and his three children with profoundly distinct club-foods on both sides.
Source: Joachimsthal, G. (Hg): Handbuch der orthopaedischen Chirurgie. vol. 2, half 2, special part (2). Jena: Fischer 1905-07, p. 596

Editorial Deadline: September 2008
ISSN: 1861-3535

* With support of Department of Health and Social Affairs of the Federal State of Saxony-Anhalt

Introduction

Dear reader,

Another year has passed, and I am glad once again to present you the 2007 Annual Report of the Monitoring of Congenital Malformations Saxony-Anhalt. This report contains data regarding the frequency of congenital malformations and anomalies as well as genetically caused diseases. Congenital malformations are found in 3 to 5% of all infants. Considering the number of infants who died in the first year of age with reference to 1,000 live births, congenital malformations after premature birth are the second most frequent cause of infant mortality.

Fortunately 2007 was the year with the lowest rate of infant mortality here, the rate being 3.0 per 1,000 live births. Compared to 1998 this is a decrease of 43%, Saxony-Anhalt clearly remaining below the national average. This fact is indicative of the very good perinatal care of newborn and premature infants in our Federal State as reported by us at the 4th Federal Health Conference on September 15.

In 2007 17,387 children were born in Saxony-Anhalt, i.e. a positive slight increase of the birth rate of about 2.7% compared to 2006. Throughout Germany the birth rate rose by about 1.8%.

Our Monitoring of Congenital Malformations detected at least one major malformation in 593 infants, corresponding to a rate of 3.4%. This percentage did not change compared to the previous year.

For the first time the present report also includes an analysis of congenital hearing loss, because the Monitoring of Congenital Malformations has generously adopted the tracking function for newborn hearing screening. As a result clearly more children with congenital hearing loss were identified in 2007. Congenital hearing loss finally became the fourth most frequent diagnosis in 2007.

This report is interesting to read not only for experts, but also provides the interested public with a great many information and recommendations to avoid malformations before and during the pregnancy by correct behaviour and prevention.

Finally, I want to thank all those in maternity clinics of the Federal State for their high commitment by providing the Register and the Monitoring of Congenital Malformations almost complete and detailed, however anonymised data, as well as Dr. med. Simone Pötzsch and her team for their great work and diligent compilation of the 2007 Annual Report.

Dr. Gerlinde Kuppe
Minister of Health and Social Affairs
of the Federal State of Saxony-Anhalt

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Abbreviations

ASD	atrial septal defect
BERA	Brainstem Electric Response Audiometry
bil.	bilateral
BP	basis prevalence
CNS	central nervous system
DD	differential diagnosis
EUROCAT	European Surveillance of Congenital Anomalies
G-BA	Federal joint committee (Gemeinsamer Bundesausschuss)
ICBDSR	International Clearinghouse for Birth Defects Surveillance and Research
LB	live birth
MCA	multiple congenital anomalies
n.o.s.	not otherwise specified
n.s.	not specified
NT	nuchal translucency
OAE	otoacoustic emissions
P	prevalence
PDA	persistent Ductus arteriosus
PFO	persistent Foramen ovale
PLB	prevalence live births
SA	spontaneous abortion
SB	stillbirths
s.o.	suspicion of
TOP	termination of pregnancy
WOG	weeks of gestation
VSD	ventricular septal defect

1 Saxony-Anhalt - Registration Area

2 Birth Rate 2007

	Live births*	Stillbirths*	Spontaneous abortions (> 16 weeks of gest.)	Termination of pregnancy after prenatal diagnostics	Total
Altmarkkreis Salzwedel	695	5	1	1	702
Anhalt-Bitterfeld	1250	7	5	5	1267
Boerde	1413	9	5	3	1430
Burgenlandkreis	1340	5	-	2	1347
Dessau-Roßlau	602	5	-	3	610
Halle	2087	8	3	4	2102
Harz	1682	4	4	5	1695
Jerichower Land	674	5	2	3	684
Magdeburg	1854	7	16	9	1886
Mansfeld-Suedharz	977	2	5	1	985
Saalekreis	1483	8	1	5	1497
Salzlandkreis	1491	12	4	3	1510
Stendal	921	4	1	1	927
Wittenberg	918	2	1	2	923
unknown district	-	-	4	-	4
Major cities (Dessau-Roßlau, Halle, Magdeburg)	4543	20	19	16	4598
Districts in total	12,844	63	33	31	12,971
Saxony-Anhalt	**17,387**	**83**	**52**	**47**	**17,569**

* Statistical Office of Saxony-Anhalt, 2008

3 Participating Institutions of the Region 2007

3.1 Materny clinics/paediatric clinics (ordered by location)

- Kreisklinik Aschersleben-Staßfurt gGmbH
- Charité - Universitätsmedizin Berlin
- Klinikum Bernburg gGmbH
- Gesundheitszentrum Bitterfeld/Wolfen gGmbH
- MEDIGREIF Kreiskrankenhaus Burg GmbH
- Städtisches Klinikum Dessau
- Klinikum Mansfelder Land gGmbH, Haus Eisleben
- Altmark-Klinikum gGmbH Krankenhaus Gardelegen
- AMEOS Klinikum St. Salvator Halberstadt
- Sana Ohre-Klinikum GmbH Haldensleben
- Krankenhaus Martha-Maria Halle-Dölau gGmbH
- Krankenhaus St. Elisabeth und St. Barbara Halle
- Universitätsklinikum Halle
- Krankenhaus Köthen GmbH
- Klinik St. Marienstift Magdeburg
- Klinikum Magdeburg gGmbH
- Universitätsklinikum Magdeburg A.ö.R.
- Carl-von-Basedow-Klinikum Merseburg
- Saale-Unstrut Klinikum Naumburg
- MEDIGREIF Bördekrankenhaus GmbH, Kreiskrankenhaus 4, Neindorf
- Klinikum Dorothea Christiane Erxleben Quedlinburg gGmbH
- Altmark-Klinikum gGmbH Krankenhaus Salzwedel
- Krankenhaus am Rosarium GmbH Sangerhausen
- Klinikum Schönebeck gGmbH
- Diakoniekrankenhaus Seehausen gGmbH
- Johanniter-Krankenhaus Genthin-Stendal gGmbH
- Asklepios Kliniken Weißenfels-Hohenmölsen GmbH
- Harz-Klinikum Wernigerode-Blankenburg GmbH
- Evangelisches Krankenhaus "Paul-Gerhardt-Stift" Lutherstadt Wittenberg
- Georgius-Agricola Klinikum Zeitz

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

- AMEOS Klinikum St. Salvator Halberstadt, Pränatale Ultraschalldiagnostik: OA Dr. Köhler
- Dres. Perlitz, Fachärzte für Frauenheilkunde, Haldensleben
- PD Dr. Hahmann, Facharzt für Frauenheilkunde, Halle
- Krankenhaus St. Elisabeth und St. Barbara Halle, Pränatale Ultraschalldiagnostik: CA Dr. Seeger
- Dr. Altus, Fachärztin für Humangenetik, Magdeburg
- Dr. Karstedt, Facharzt für Kinder- und Jugendmedizin, Kinderkardiologie, Magdeburg
- Dr. Karsten, Facharzt für Frauenheilkunde, Magdeburg
- Universitätsklinkum Magdeburg A.ö.R., Institut für Humangenetik
- Universitätsklinikum Magdeburg A.ö.R., Universitätsfrauenklinik, Pränatale Ultraschalldiagnostik: OÄ Dr. Gerloff
- Universitätsklinkum Magdeburg A.ö.R., Universitätskinderklinik, Screeninglabor
- Dipl.-Med. Fiedler und Giesecke, Fachärzte für Orthopädie, Merseburg
- Altmark-Klinikum gGmbH Krankenhaus Salzwedel, Pränatale Ultraschalldiagnostik: CA Dr. Müller
- Johanniter-Krankenhaus Genthin-Stendal gGmbH, Pränatale Ultraschalldiagnostik: CA Dr. Henschen
- Frauenärzte Sachsen-Anhalt, Pränatale Ultraschalldiagnostik:
  - Dipl.-Med. Heweker, Fachärztin für Frauenheilkunde, Bernburg
  - Dr. Schneider, Facharzt für Frauenheilkunde, Naumburg

3.3 Pathological-anatomical institutes (ordered by location)

- Städtisches Klinikum Dessau, Institut für Pathologie
- Universitätsklinikum Halle, Institut für Pathologie
- Klinikum Magdeburg gGmbH, Institut für Pathologie
- Universitätsklinikum Magdeburg A.ö.R., Institut für Pathologie
- Klinikum Dorothea Christiane Erxleben Quedlinburg gGmbH, Institut für Pathologie
- PD Dr. Schultz und Dr. Lüders, Fachärzte für Pathologie, Stendal

4 Gereral Information

Congenital malformations are observed in 3 to 5% of all births. It is assumed that in one fifth of the cases these malformations are marked such that the infants will suffer from lifetime impairment or disability or even die from the consequences of their congenital malformation. The number of infants who died in the first year shows that congenital malformations are the second most frequent cause of infant mortality after premature birth with reference to 1000 live births.

Fortunately the rate of infant mortality in Saxony-Anhalt was at its lowest in 2007 with 3.0 per 1000 live births. Compared to 1998 the number decreased by about 43%. This result is indicative of a very good perinatal care of the newborn and premature infants.

Comparing the data regarding the frequency of congenital malformations registered by perinatal statistics in Germany, a clear undercoverage can be found not reflecting the the real significance of congenital malformations. Most recent figures from EUROCAT prove that only an average of 30 to 50% of serious malformations occurring in newborns are documented through the perinatal data collection. In addition, only malformations of live births are recorded in the perinatal statistics.

In this connection we want to underline the importance of the the Monitoring of Congenital Malformations consistently collecting malformation data, also including stillbirths and abortions as well as collateral and anamnestic data and risk factors in their evaluations.

This facilitates long-term evaluation of the prevalence of congenital malformations. It is possible to evaluate primary and secondary preventive effects. The results of the scientific analyses are made available also to stakeholders in health care.

In 2007 we have compiled our Annual Report once again to present the results of the annual data collection of congenital malformations to the public. Our work is only only possible since the Monitoring of Congenital Malformations is consistently funded by the Department of Health and Social Affairs of the Federal State of Saxony-Anhalt. At this point we extend our thanks, especially to our contact partner of the Ministry, Dr. Dr. Nehring and Dr. Gunkel. Moreover, we want to thank the Medical Faculty of the Otto-von-Guericke-University for providing us with organisational support.

The present Annual Report 2007 contains the evaluation results of reported malformations received from the different health facilities of the Federal State. Therefore, we extend a special thanks to all "senders"!

4.1 Registration and Analysis

The present report contains data about infants of the Federal State of Saxony-Anhalt with congenital malformations and chromosomal disorders. From July 01, 2007 a new district area structure was established in Saxony-Anhalt. Out of the three big cities and 21 districts, three big cities and eleven districts were formed (see Chapter 1).

This change is also reflected in the analysis of the data. The collected and analysed data of the births in 2007 refers to the districts after the Administrative District Reform, where the mother lived during her pregnancy or stayed at the time of delivery.

The total number of births includes:
- live births
- stillbirths
- terminations of pregnancy (all weeks of gest.)
- spontaneous abortions (>16 weeks of gest.)

and forms the basis for the annual prevalence calculation.

The expected date of delivery is used as the basis for analysing the termination of pregnancy, e.g. 2007 is considered the year of birth although induced termination of pregnancy took place at the end of 2006. This method is common on an international scale. Normally the time of delivery of the spontaneous abortions is not corrected. The data of live births and stillbirths is provided by the Statistical Office of Halle. All data transmitted to the Monitoring of Congenital Malformations is medically controlled upon receipt and the diagnoses are encoded according to ICD-10. Details about the intake of medication during the pregnancy are registered by using the internationally recommended ATC-codes.

In chapter 7 and 8 the present report outlines the total number of infants with major malformations as well as the geographical distribution of appearance in the big cities and districts. Infants with only minor malformations or rather norm variations are not evaluated separately because we are of the opinion that we are not able to collect and register data which is sufficient and complete enough to this end. The most frequent single diagnoses of major malformatios registered in 2007 are outlined in Chapter 11.

The pathologic prenatal screening results transmitted by the gynaecologists are analysed separately in Chapter 10.

As is common for our reports, Chapter 12 contains the analysis of the so-called indicator birth defects registered by the ICBDSR. As we have presented data in this way for a number of years, it is possible to evaluate the current data in comparison to the new basic prevalences calculated this year for the years 1997-2006. On the basis of the

EUROCAT data it is possible to show the position of Saxony-Anhalt in the European context.

Additionally, Chapter 13 of the present report depicts data of genetically caused diseases, chromosomal disorders, sequences, associations, complexes and embryopathies, and Chapter 14 contains the malformation caused by termination of pregnancy.

Chapter 18 of the 2007 Annual Report deals with a new topic and contains the results of the newborn hearing screening of Saxony-Anhalt.

The Annual Report of the department of newborn screening with data of congenital metabolic disorders and endocrinopathies is also part of our report (Chapter 19).

4.2 Data Quality and Completeness/Reporting Procedure

In 2007 we received data about births from 30 materny and paediatric clinics as well as 21 institutions of prenatal and postnatal diagnostics (including pathological institutes). Therefore, we have possibly received nore than one report for one and the same infant from different institutions.

A total of 2,393 data sets of births with malformations and control cases (irrespective of their registration region) were documented (2006: 2,289).

For 103 prenatal ultrasound screening results it was not possible to obtain information about the postnatal results.

Regarding data quality the month of birth of the remaining 2,290 births is known. This corresponds to 99.9% of all cases (2006: 100.0%).

It was also possible to realise an almost complete registration of the gestational age. In only 1.1% of all cases (26 births) the gestational age was not reported and in 98.3% of the births the weight at birth also was reported (2006: 97.0%).

It was not possible to determine the sex in 0.6% of all cases, frequently being control cases.

The maternal age of the 2,290 birth was known in 98.9% of all cases. The age of the father was reported in only 70.6% of all cases.

Summarising the above, the number of registered data sets slightly increased in 2007. Also the total number of all reports increased.

The report quality is similar to the quality of last year and is again an indication of the high commitment of the senders from all institutions.

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

Many malformation reports as well as information about control cases are reported by means of the "green documentation sheets", which we make available to the reporting institutions free of charge.

It is also possible to report on so-called "white documentation sheets". This form serves to register a minimum data set. Here it is not necessary that parents consent to the the transmission of the malformation report by signing this form.

Documentation sheets may be ordered at any time by phone +49 391-6714174 or e-mail at monz@med.ovgu.de.

We will be at your disposal for answering any further questions about the reporting procedure and congenital malformations in general.

5 Source of Information

5.1 Reporting Institutions

	Reporting institution (ordered by location)	Number of major malformations	Number of major/minor malformations	Total number of malformations
Hospitals	Kreisklinik Aschersleben-Staßfurt gGmbH	5	13	20
	Klinikum Bernburg gGmbH	7	8	8
	Gesundheitszentrum Bitterfeld/Wolfen gGmbH	8	9	10
	MEDIGREIF Kreiskrankenhaus Burg GmbH	9	9	9
	Städtisches Klinikum Dessau	17	22	22
	Städtisches Klinikum Dessau, Institut für Pathologie	10	13	14
	Klinikum Mansfelder Land gGmbH, Haus Eisleben	1	1	2
	Altmark-Klinikum gGmbH Krankenhaus Gardelegen	5	9	9
	AMEOS Klinikum St. Salvator Halberstadt	27	36	37
	AMEOS Klinikum St. Salvator Halberstadt, Pränatale Ultraschalldiagnostik	8	8	36
	Sana Ohre-Klinikum GmbH Haldensleben	13	105	254
	Krankenhaus Martha-Maria Halle-Dölau gGmbH	1	1	1
	Krankenhaus St. Elisabeth und St. Barbara Halle	67	70	72
	Krankenhaus St. Elisabeth und St. Barbara Halle, Pränatale Ultraschalldiagnostik	1	1	2
	Universitätsklinikum Halle, Institut für Pathologie	22	22	24
	Universitätsklinikum Halle, Universitätsklinik u. Poliklinik für Geburtshilfe und Reproduktionsmedizin	78	95	96
	Universitätsklinikum Halle, Universitätsklinik u. Poliklinik für Kinder- und Jugendmedizin	27	27	27
	Krankenhaus Köthen GmbH	8	21	354
	Klinik St. Marienstift Magdeburg	27	91	294
	Klinikum Magdeburg gGmbH	29	77	100
	Klinikum Magdeburg gGmbH, Institut für Pathologie	6	6	17
	Universitätsklinikum Magdeburg A.ö.R., Institut für Humangenetik	17	17	17
	Universitätsklinikum Magdeburg A.ö.R., Institut für Pathologie	24	27	60
	Universitätsklinikum Magdeburg A.ö.R., Universitätsfrauenklinik	28	31	33
	Universitätsklinikum Magdeburg A.ö.R., Universitätsfrauenklinik, Pränatale Ultraschall-diagnostik	35	37	38
	Universitätsklinikum Magdeburg A.ö.R., Universitätskinderklinik	51	62	66
	Universitätsklinikum Magdeburg A.ö.R., Universitätskinderklinik, Screeninglabor	11	11	11
	Carl-von-Basedow-Klinikum Merseburg	5	6	6
	Saale-Unstrut Klinikum Naumburg	4	6	10
	MEDIGREIF Bördekrankenhaus GmbH, Kreiskrankenhaus 4, Neindorf	3	35	86
	Klinikum Dorothea Christiane Erxleben Quedlinburg gGmbH	9	11	11
	Klinikum Dorothea Christiane Erxleben Quedlinburg gGmbH, Institut für Pathologie	1	1	1
	Altmark-Klinikum gGmbH Krankenhaus Salzwedel	6	9	9
	Altmark-Klinikum gGmbH Krankenhaus Salzwedel, Pränatale Ultraschalldiagnostik	8	8	33
	Krankenhaus am Rosarium GmbH Sangerhausen	11	13	23
	Klinikum Schönebeck gGmbH	19	43	430
	Johanniter-Krankenhaus Genthin-Stendal gGmbH	17	23	49
	Johanniter-Krankenhaus Genthin-Stendal gGmbH, Pränatale Ultraschalldiagnostik	8	11	76
	Asklepios Kliniken Weißenfels-Hohenmölsen GmbH	2	8	8
	Harz-Klinikum Wernigerode-Blankenburg GmbH	8	8	8
	Georgius-Agricola Klinikum Zeitz	4	4	4
outpatient clinics	Dres. Perlitz, Fachärzte für Frauenheilkunde, Haldensleben	1	1	3
	PD Dr. Hahmann, Facharzt für Frauenheilkunde, Halle	21	21	43
	Dr. Altus, Fachärztin für Humangenetik, Magdeburg	21	21	21
	Dr. Karstedt, Facharzt für Kinder- und Jugendmedizin, Kinderkardiologe, Magdeburg	68	80	80
	Dr. Karsten, Facharzt für Frauenheilkunde, Magdeburg	22	26	46
	Dipl.-Med. Fiedler & Giesecke, Fachärzte für Orthopädie, Merseburg	2	12	12
	PD Dr. Schultz & Dr. Lüders, Fachärzte für Pathologie, Stendal	2	2	2
	Frauenärzte Sachsen-Anhalt, Pränatale Ultraschalldiagnostik	1	2	2

It is possible that we received information about one child from different institutions. And because there are multiple reports about one child, the number of infants and foetuses with malformations not corresponds to the total number.

5.2 Origin (district) and Materny Clinics of Infants and Foetuses with Malformations

Districts / Materny clinics and paediatric clinics (ordered by location)	Altmarkkreis Salzwedel	Anhalt-Bitterfeld	Boerde	Burgenlandkreis	Dessau-Roßlau	Halle	Harz	Jerichower Land	Magdeburg	Mansfeld-Suedharz	Saalekreis	Salzlandkreis	Stendal	Wittenberg	other residence	total per hospital
Kreisklinik Aschersleben-Staßfurt gGmbH	-	-	-	-	-	-	2	-	-	6	-	9	-	-	-	17
Charité - Universitätsmedizin Berlin	1	-	-	-	-	-	1	1	1	-	-	1	-	-	-	5
Klinikum Bernburg gGmbH	-	1	-	-	-	-	-	-	-	-	-	8	-	-	-	9
Gesundheitszentrum Bitterfeld/Wolfen gGmbH	-	8	-	-	-	-	-	-	-	-	-	-	-	1	-	9
MEDIGREIF Kreiskrankenhaus Burg GmbH	-	-	1	-	-	-	-	21	-	-	-	-	1	-	-	23
Städtisches Klinikum Dessau	-	3	-	-	14	-	-	-	-	-	-	-	-	11	1	29
Klinikum Mansfelder Land gGmbH, Haus Eisleben	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	2
Altmark-Klinikum gGmbH Krankenhaus Gardelegen	17	-	1	-	-	-	-	-	-	-	-	-	1	-	-	19
AMEOS Klinikum St. Salvator Halberstadt	-	-	2	-	-	-	33	-	-	-	2	-	-	-	-	37
Sana Ohre-Klinikum GmbH Haldensleben	1	-	102	-	-	1	-	-	-	-	-	-	1	-	1	106
Krankenhaus Martha-Maria Halle-Dölau gGmbH	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
Krankenhaus St. Elisabeth und St. Barbara Halle	-	5	-	1	-	48	-	-	-	3	11	1	-	-	1	70
Universitätsklinikum Halle	-	21	-	8	5	44	4	-	-	6	22	4	-	6	1	121
Krankenhaus Köthen GmbH	-	26	-	-	-	-	-	-	-	-	-	-	-	-	-	26
Klinik St. Marienstift Magdeburg	-	-	27	-	-	-	-	2	48	-	-	18	1	-	1	97
Klinikum Magdeburg gGmbH	-	1	23	-	-	-	-	5	58	-	-	5	-	-	4	96
Universitätsklinikum Magdeburg A.ö.R.	1	1	23	-	-	-	5	13	47	-	-	16	3	-	1	110
Carl-von-Basedow-Klinikum Merseburg	-	-	-	1	-	-	-	-	-	-	13	-	-	-	-	14
Saale-Unstrut Klinikum Naumburg	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	6
MEDIGREIF Bördekrankenhaus GmbH, Kreiskrankenhaus 4, Neindorf	-	-	36	-	-	-	1	-	-	-	-	1	-	-	-	38
Klinikum Dorothea Christiane Erxleben Quedlinburg gGmbH	-	-	-	-	-	-	12	-	-	1	-	1	-	-	-	14
Altmark-Klinikum gGmbH Krankenhaus Salzwedel	9	-	-	-	-	-	-	-	-	-	-	-	-	-	4	13
Krankenhaus am Rosarium GmbH Sangerhausen	-	-	-	1	-	-	-	-	-	8	3	-	-	-	3	15
Klinikum Schönebeck gGmbH	-	-	1	-	-	-	-	1	-	-	-	41	-	-	-	43
Diakoniekrankenhaus Seehausen gGmbH	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1
Johanniter-Krankenhaus Genthin-Stendal gGmbH	-	-	-	-	-	-	-	1	-	-	-	-	23	-	1	25
Asklepios Kliniken Weißenfels-Hohenmölsen GmbH	-	-	-	9	-	-	-	-	-	-	2	-	-	-	-	11
Harz-Klinikum Wernigerode-Blankenburg GmbH	-	-	-	-	-	-	6	-	-	-	-	-	-	-	2	8
Evangelisches Krankenhaus "Paul-Gerhardt-Stift" Lutherstadt Wittenberg	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Georgius-Agricola Klinikum Zeitz	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	4
unknown	-	1	3	1	1	-	1	1	7	-	2	1	2	-	1	21

This table shows the origin (district) of the infants/foetuses with major and minor malformations (live births, still births, terminations of pregnancy and spontaneous abortions, including the ones > 16 weeks of gest.). They were reported to the Monitoring of Congenital Malformations Saxony-Anhalt with indication of the corresponding materny clinic. The Monitoring of Congenital Malformations was not always informed about the clinic and not all malformations were reported by the materny clinics.

6 Sex Ratio

Sex ratio of all live births and stillbirths of Saxony-Anhalt according to the information of the Statistical Office of Halle

male	8,988	live births and stillbirths
female	8,482	live births and stillbirths
total	17,470	live births and stillbirths

Sex ratio m : f = 1.06

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

male	331	births
female	259	births
unknown	3	births
total	593	births

Sex ratio m : f = 1.28

Sex ratio of all births with only minor malformations and anomalies

male	187	births
female	178	births
unknown	1	birth
total	366	births

Sex ratio m : f = 1.05

The Statistical Office of Halle registered in the year 2007 a total number of 17,387 live births and 83 stillbirths. Compared to the previous year the total number of still- and live births in Saxony-Anhalt increased slightly (+2.86%). The sex ratio of all live births and stillbirths shows with 1.06 a light androtropism (2006: 1.09, 2005: 1.02).
The almost similar number of births with major malformations in 2007 shows a clearer androtropism than in the previous years with a value of 1.28 (2006: 1.12; 2005: 1.16).

7 Pregnancy Outcome of Births with Major Malformations (N=593)

Pregnancy Outcome	Number	Percentage (%)
Live births	527	88.9
of these: live births deceased before 1st week of life	(5)	(0.8)
of these: live births deceased after 1st week of life	(2)	(0.3)
spontaneous abortions > 16 weeks of gestation	9	1.5
terminations of pregnancy	44	7.4
stillbirths	13	2.2
total	**593**	**100**

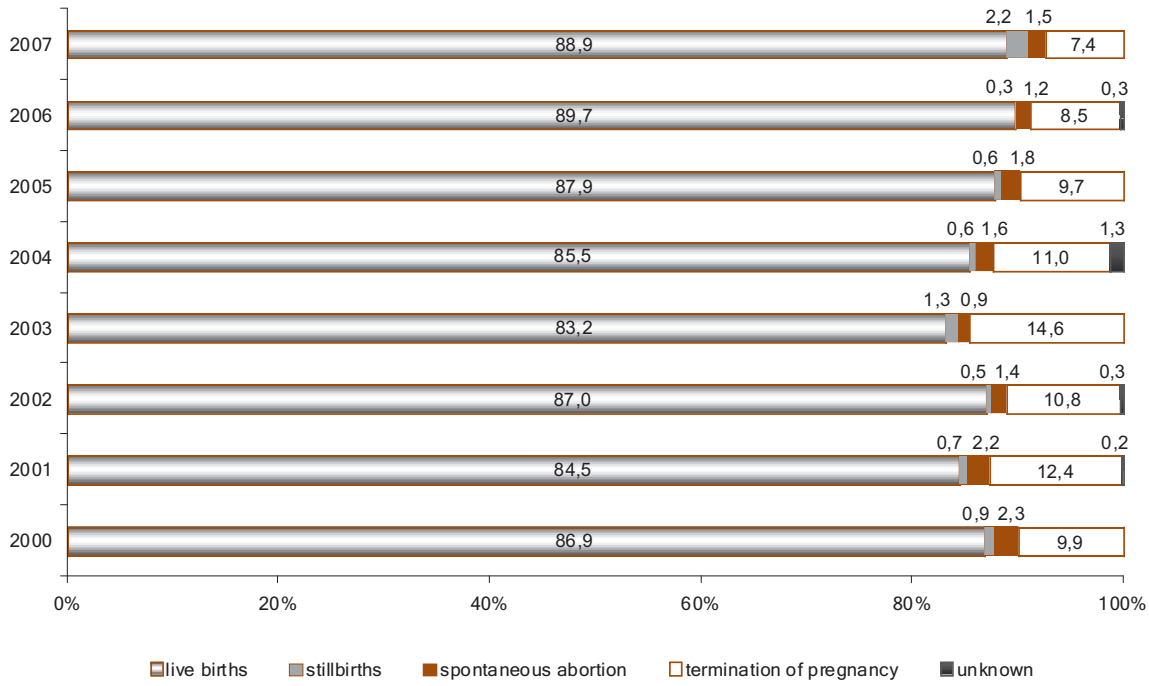


Fig. 1: Pregnancy outcome of births with major malformations (comparison between 2000 and 2007)

The total number of births with major malformations was similar to the numbers of the previous years (2006: 603; 2005: 618). Compared to the previous years, the share of live births slightly decreased, amounting to 88.9%. The same holds true for the number of live births who died before or after the 7th day of life in comparison with the previous years.
This is indicative of a constant quality of postnatal care of live births with major malformations.
The percentage of spontaneous abortions (> 16 weeks of gestation) of all births with major malformations amounts to 1.5%.

Considering the figures of stillbirths in Saxony-Anhalt in 2007 (see Chapter 2) there is a clear increase by almost the half. This is also reflected by the percentage of stillbirths with major malformations. Thirteen stillbirths were registered, corresponding to 2.2%. In 2006 only two stillbirths (0.3%) and in the year 2005 only four stillbirths (0.6%) were registered. A possible reason for this development is insufficient or lacking prenatal diagnostics. Frequently, nicotine abuse can be found in the anamnesis of the pregnant women.

8 Births/Foetuses with Major Malformations (N=593)

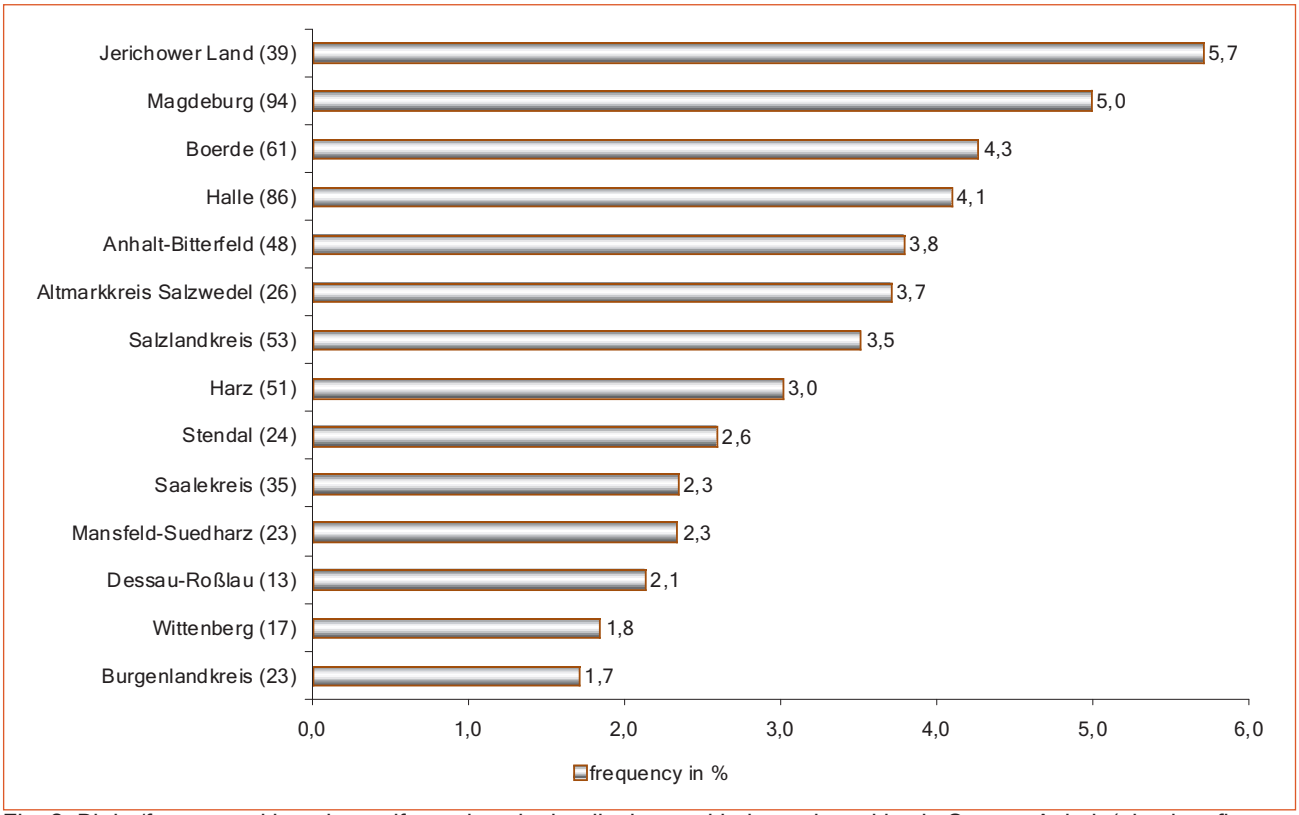


Fig. 2: Births/foetuses with major malformations in the districts and independent cities in Saxony-Anhalt (absolute figures and percentages of reported malformations)

	Number	Malformation rate (%)
Major cities Dessau-Roßlau, Halle and Magdeburg	193	4.2
Districts in total (inclusive unknown)	400	3.1
Saxony-Anhalt	**593**	**3.4**

Major malformations (1997 to 2006)		
	Malformation rate (%)	Confidence interval (CI 95%)
Major cities	4.5	4.3 - 4.7
Districts	3.1	3.0 - 3.2
Region	3.4	3.3 - 3.5

In 2007 data of 593 births with major malformations was registered. With reference to all births in Saxony-Anhalt the calculated rate of major malformations amounts to 3.4%, which is identical to the previous-year rate. This figure lies in the confidence range of the years 1997 to 2006.

In the major cities of Magdeburg, Halle and Dessau-Roßlau the malformation rate amounts to 4.2%. As expected, this figure is higher than the malformation rate in the districts amounting to 3.1% only

As a result of the Administrative District Reform in Saxony-Anhalt of July 01, 2007 there are now only three independent cities and eleven districts. The regional malformation rates of the individual districts show the highest rate of 5.7% for Jerichower Land. The Bördekreis district ranks second with a rate of 4.3%. In the Burgenlandkreis district and Wittenberg malformation rates clearly remain under the total malformation rate.

A comparison of the major city regions reveals that Magdeburg with a rate of 5.0% remained slightly under the previous-year rate (2006: 6.1%). In contrast, the rate of the city of Halle with 4.1% was higher than in the previous year (2006: 2.6%). With 2.1% the malformation rates of the Dessau-Roßlau region were similar in 2007 and 2006 (2006: 1.7%).

9 Births with Multiple Congenital Anomalies (MCA) (N=208)

	Number	Malformation rate (%)
Major cities Dessau-Roßlau, Halle and Magdeburg	67	1.5
Districts in total	141	1.1
Saxony-Anhalt	**208**	**1.2**

Multiple congenital anomalies (1997 to 2006)		
	Defect rate (%)	confidence interval (CI 95%)
Major cities	1.7	1.6 - 1.8
Districts	1.4	1.3 - 1.4
Region	1.4	1.4 - 1.5
EUROCAT	no data	no data

From the total number of 593 births in 2007 with major malformations a share of 208 births with multiple congenital anomalies (MCA) was registered, i.e. cases with not less than two major malformations. This corresponds to a percentage of 31.5% of all births with major malformations. In the previous year this percentage was higher (2006: 39.8%; 2005: 38.3%).

With reference to all births in Saxony-Anhalt in 2007 the percentage of infants/foetuses with MCA is about 1.2% and lies below the level of the previous years. The confidence interval was lower compared to the years 1997 to 2006.

In the big cities an MCA rate of 1.5% was determined, whereas this rate is about 1.1% in the districts. The comparison shows a higher MCA rate in the big cities. However, we are observing an approximation of the MCA rates in the big cities and districts as in the previous year.

Comparing the individual districts, a similar distribution of infants with major malformations can be observed (Chapter 8). Most frequently births with MCA occur in Magdeburg and Jerichower Land, whereas the are less frequent in the districts of Wittenberg and Stendal.

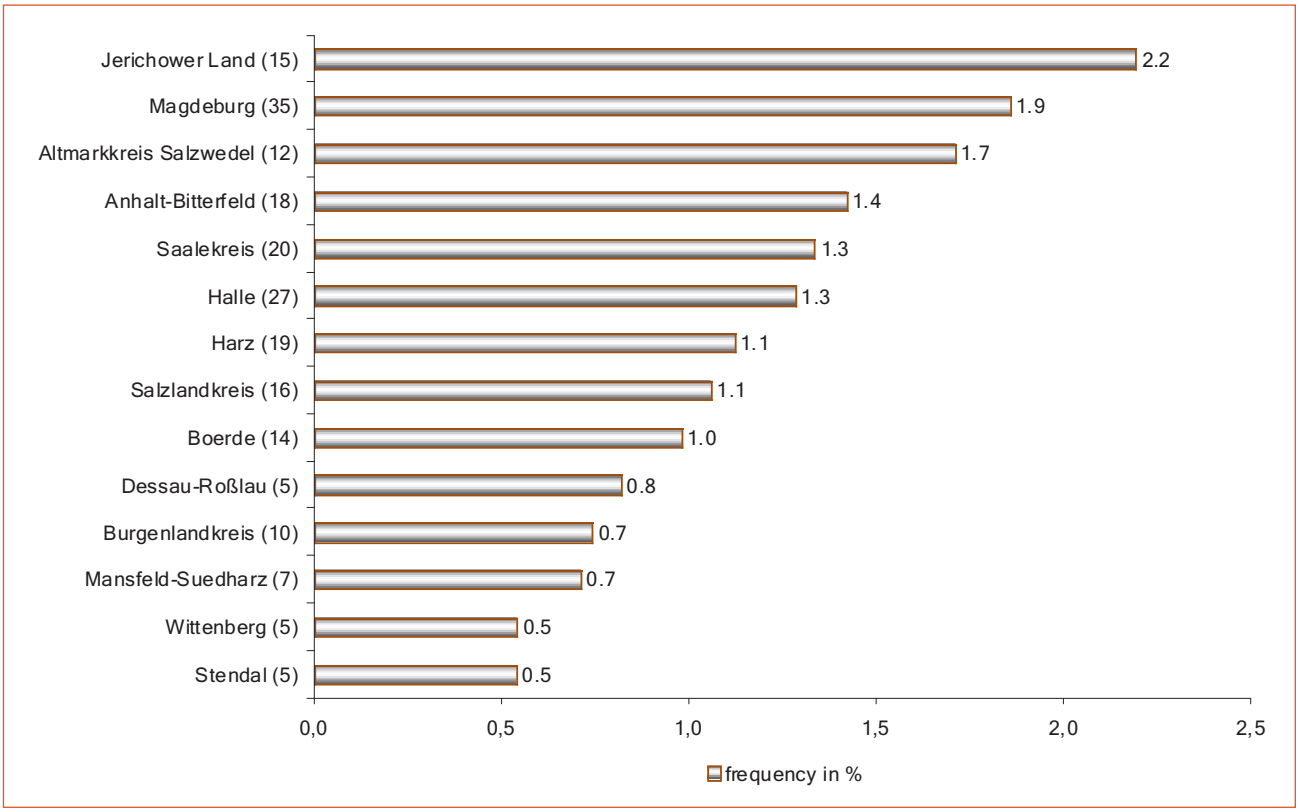


Fig. 3: Births/foetuses with multiple congenital anomalies (MCA) in the districts and big cities of Saxony-Anhalt (absolute figures and percentages of reported malformations)

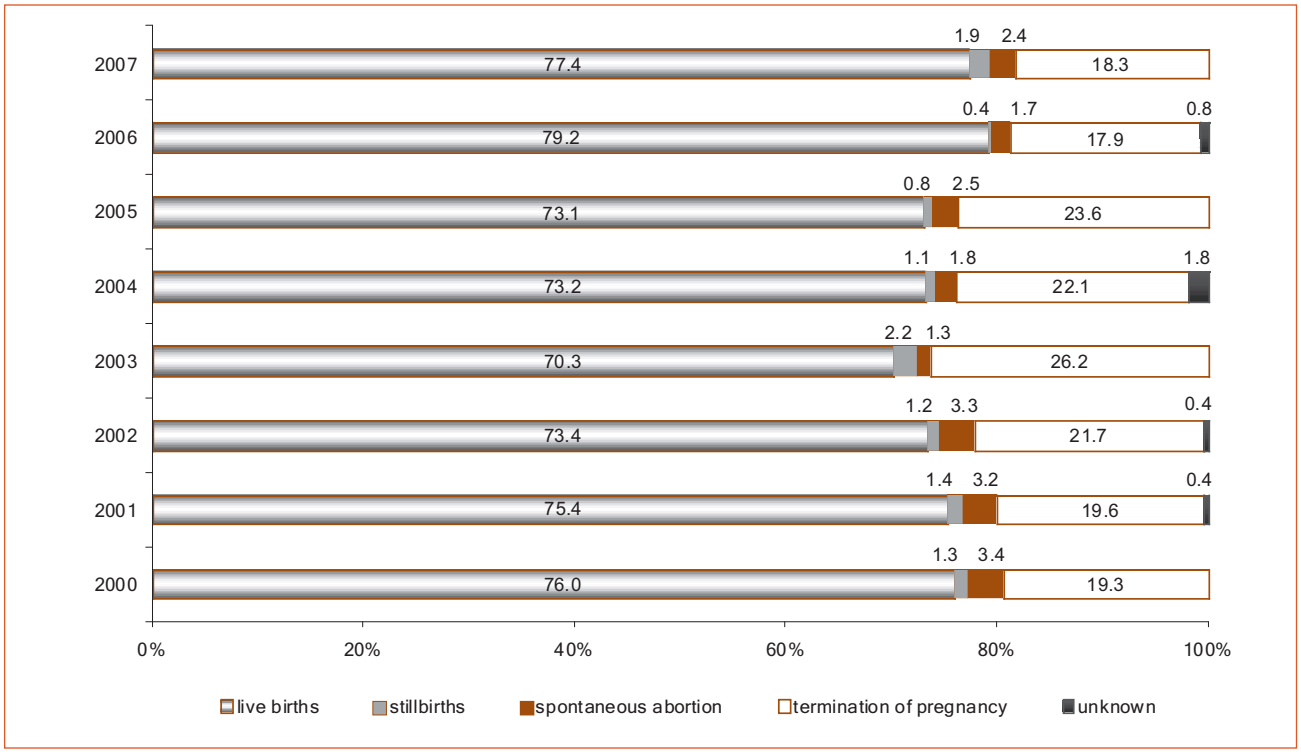


Fig. 4: Pregnancy outcomes of births with multiple congenital anomalies (MCA) (comparison between 2000 and 2007)

The percentage of live births with MCA amounting to 77.4% in 2007 slightly decreased compared to 2006, however increased compared to the years before. Termination of pregnancy after the prenatal diagnosis of MCA of the foetus was induced in 18.3%, i.e. in one fifth of all cases. This shows clearly that a termination of pregnancy was induced more often in foetuses with MCA than in foetuses with only one major malformation (7.4%).
This rate is similar to the 2006 rate.

It is interesting that in births with MCA and births with major malformations the percentage of stillbirths and spontaneous abortions > 16 weeks of gestation, i.e. 1.9% and 2.4% respectively, has increased over the past three years. This tendency may be attributed to the clearly higher rate of stillbirths in Saxony-Anhalt in 2007 compared to the years before and the majority of the infants was pathologically examined.

10 Prenatal Ultrasound Screening Results

In 2007 we received information about the prenatal ultrasound screening of 1,783 births. This figure includes all births with malformations as well as all healthy control infants.

Of this number 312 infants exhibited a pathologic screening result. In 72 cases there was no information about the pregnancy outcome.

In many cases we were informed about the presence of so-called "soft markers". 147 of 172 births showed one "soft marker" occurring isolated. 22 births had two "soft marker" and three births had three "soft marker".

Most frequently we received the results from gynaecologists after precision diagnostics in the second trimester of pregnancy. Therefore, it is not possible to make any differentiated statement about the first trimester screening.

The following soft markers were reported: (multiple mentions are possible)

Prenatal ultrasound screening results	Number of infants
White spots	42
Singular umbilical artery	33
Pyelectasis	32
Oligo-/Anhydramnios	18
Choroid plexus cysts	16
Hydrops fetalis	10
Abnormal head shape	8
Nuchal oedema	8
Polyhydramnios	8
Ventriculomegaly	7
Nuchal translucency (NT)	7
Echoic intestine	4
Hypoplastic nasal bone	2
Congenital shortened long bones	1
Sandals´gap	1
Double-bubble phenomenon	1

Soft marker results of births with selected chromosomal disorder:

In 14 cases out of the total number of 26 births with Down´s syndrome in 2007 we did not receive any information about the prenatal ultrasound screening. For three births it was not possible to collate pathological findings. For the remaining nine births we received the following results:

- 3 x enlarged nuchal translucency
- 1 x hypoplastic nasal bone
- 1 x polyhydramnios
- 1 x shortened long bones
- 3 x no soft marker (other pathological results)

Six foetuses with the Edwards syndrome were registered in 2007. In one case we do not have a prenatal ultrasound screening findings. The remaining five foetuses had the following soft marker:
- 1 x hydrops fetalis
- 1 x singular umbilical artery
- 1 x choroid plexus cysts
- 2 x choroid plexus cysts + singular umbilical artery

One of the two registered births with the Patau syndrome, in 2007 exhibited a prenatal soft marker:
- 1 x abnormal head shape

Regarding the remaining births with chromosomal disorders, one case of the Ullrich-Turner syndrome in combination with a hydrops fetalis and a nuchal translucency- was diagnosed.

We received no information about the prenatal ultrasound screening of one child registered with the Klinefelter´s syndrome in 2007.

In one child with ensured partial Trisomy 1q a singular umbilical artery was found as a prenatal soft marker apart from other multiple anomalies.

Indicator malformations (during prenatal ultrasound screening)	Number of reported conspicuous foetuses	Number of postnatal confirmed results of these foetuses
Congenital hydrocephalus	15	7
Cystic kidney	14	11
Cleft lip and Cleft lip with cleft upper jaw and palate	12	11
Spina bifida	8	7
Gastroschisis	5	5
Microcephalus	4	2
Renal agenesis, unilateral	4	2
Encephalocele	3	1
Hypoplastic left heart syndrome	3	2
Oesophageal atresia	3	3
Limb reduction defects	3	3
Anencephalus	2	2
Transposition of the great vessels	2	1
Coarctation of the aorta	2	1
Small intestine atresia and stenosis	2	2
Diaphragmatic hernia	2	1
Omphalocele	2	2
Holoprosencephaly	1	(1)
Microphthalmus	1	1

The above table shows the postnatally confirmed results for the indicator malformations detected during the prenatal ultrasound screening. In most cases it was possible to ascertain the pregnancy outcome. Seven prenatal results with supposed indicator malformations could not be assigned to a birth.

In nearly three fourth of the cases the prenatal result was confirmed. A very good accordance of diagnoses turned out for gastroschisis and omphalocele, oesophageal atresia, intestine atresia and stenosis as well as the very rare malformations, e.g. microphthalmus.

Also specific CNS malformations are detected by precise diagnosis in most cases, such as anencephalus and the spina bifida. However, in many cases of congenital hydrocephalus postnatal examinations do not reveal anyhydrocephalus or they reveal ventriculomegaly not deemed to be of clinical relevance. In one case (suspicion of holoprosencephaly) it was not possible to confirm the result during the autopsy because of a marked autolysis.

One of the most frequent indicator malformation diagnoses of the prenatal ultrasound screening is cystic kidneys. Here it is possible to postnatally confirm the finding in the most cases.

As in the past year we want to point out that the analysis of prenatal diagnoses is not representative for all births, because we do not receive prenatal results for all children with congenital malformations.

Prenatal diagnostics is an important measure for secondary prevention of congenital malformations. To draw a clearer picture of this effect, transmissions of the relating findings and their analysis are very helpful.

11 Organ System Involvement in Infants and Foetuses with Major Malformations

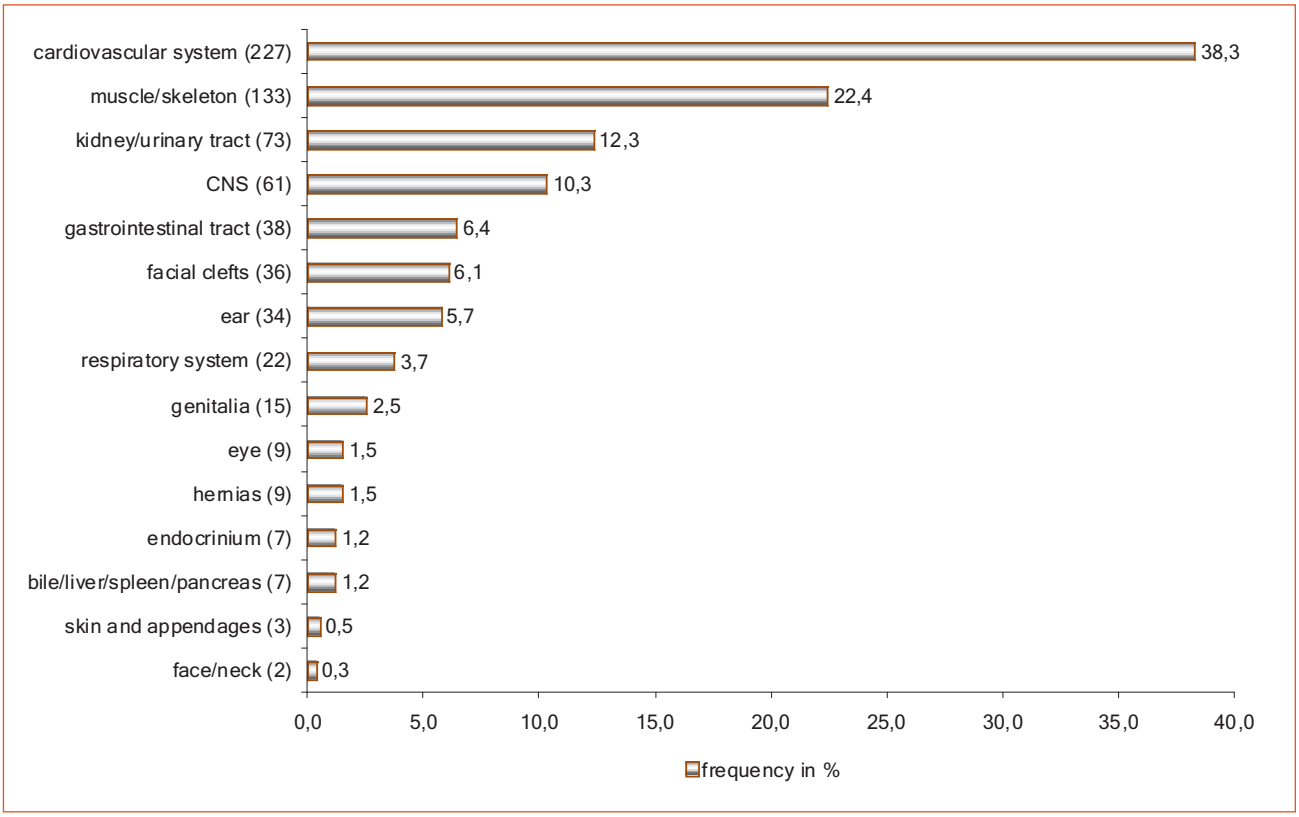


Fig. 5: Organ system involvement in major malformations (absolute figures and percentages of reported malformations)

Considering all registered major malformations of the cardiovascular system formed the biggest part with a percentage of 33.8%. A total of 227 births with a diagnosis of this category was reported.

The percentage of 22.4% of malformations of the musculosceletal system in 2007 was rather high compared to the previous years. 133 births were registered with a diagnosis of this category. In particular, the number of infants/foetuses with an indicator malformation of this organ category (preaxial polydactyly and reduction malformations) has nearly doubled as is shown in Chapter 12.

The number of malformations falling under the organ category is almost similar to the previous years. These are malformations of the kidney and the urinary system, the CNS, the gastrointestinal tract and also the facial clefts.

Since the end of 2006 the Monitoring of Congenital Malformations has registered children with a congenital hearing loss, acting as a tracking office for the newborn hearing screening.

In 2006 only three diagnoses belonging to this organ system were registered, whereas in 2007 34 diagnoses were registered. This corresponds to a percentage of 5.7% (2006: 0.5%). The congenital hearing losses form the biggest part. Based on this observation, under-reporting of this diagnosis can be assumed. The reason might be that congenital hearing loss was not diagnosed directly after the birth, but a few months later and then this diagnosis was not reported to the Monitoring of Congenital Malformations.

The most frequent single diagnoses in 2007 (only major malformations)

	ICD 10	Diagnosis	Infants/foetuses 2007	
			Num-ber	Prevalence /10.000
1.	Q21.1	Atrial septal defect (inclusive persistent foramen ovale/PFO)	147	83.7
2.	Q21.0	Ventricular septal defect	69	39.3
3.	Q65.3 Q65.4 Q65.5	Congenital subluxation of hip (unilateral/bilateral/laterality unspecified)	31	17.6
4.	H90.5	Congenital hearing loss or deafness	29	16.5
5.	Q02.	Microcephaly	28	15.9
	Q69.0 Q69.1 Q69.2 Q69.9	Polydactyly (pre- and postaxial)	28	15.9
6.	Q66.0	Talipes equinovarus (clubfoot)	27	15.4
7.	Q90.0 Q90.1 Q90.2 Q90.9	Down´s syndrome (Trisomy 21)	26	14.8
8.	Q62.3	Other obstructive defects of renal pelvis and ureter (dilated uropathy grade II-IV/ureterocele)	24	13.7
9.	Q37.0 Q37.1 Q37.4 Q37.5	Cleft hard and soft palate with unilateral/bilateral cleft lip	21	12.0
10.	Q61.4	Renal dysplasia (unilateral/bilateral)	16	9.1
	Q62.2	Congenital megaloureter	16	9.1
11.	Q63.0	Accessory kidney	15	8.5
12.	Q22.8	Congenital tricuspid regurgitation	12	6.8
13.	Q22.1	Congenital pulmonary valve stenosis	11	6.3
14.	Q54.1 Q54.2 Q54.3 Q54.8 Q54.9	Hypospadias (without coronal/glandular)	10	5.7
	Q65.0 Q65.1	Congenital dislocation of hip (unilateral/bilateral)	10	5.7
	Q23.3	Congenital mitral insufficiency	10	5.7
	Q25.1	Coarctation of aorta	10	5.7
	Q42.2 Q42.3	Congenital absence, atresia and stenosis of anus with or without fistula	10	5.7

Atrial and ventricular septal defects belong to the most frequent congenital malformations and top the list of the most common single diagnoses also in 2007. Prevalences do not show fundamental changes compared to the previous years.

With 31 children suffering from a subluxation of the hip, the number has nearly doubled compared to the previous year. This diagnosis is the third most common in 2007, but its prevalence lies within the period of 2004 and 2005.

A new diagnosis in the list of 2007 is the congenital hearing loss or deafness with 29 affected children. The reasons for this "increase in prevalence" have already been outlined on page 22.

In 2007 fewer children with microcephaly were registered than in 2006 and 2005. But with 28 affected children this diagnosis still occupies a front place in the list. Frequently these are children of smoking mothers; in additon also two children were affected by phenylalanine embryopathy with maternal phenylketonuria.

With 28 the number of infants/foetuses with polydactyly nearly doubled compared to the previous years. In half of the cases a preaxial polydactyly was observed.

Regarding the number of children with a congenital clubfoot, the prevalence compared to the previous years was rather similar. In 2007 this diagnosis was ranking sixth amount the most frequent single diagnoses.

In 2007 26 Down´s syndrome births were registered, of them 14 live births (also refer to Section 12.34). Thus, the Down´s syndrome ranks seventh among the most frequent single diagnoses. Amounting to 14.8 per 10,000 births, the prevalence of the year slightly remained below the average of the previous year.

Congenital malformations of the urinary tract can be detected early due to the postnatal sonographic screening which takes place regularly in most materny clinics. Only in a few cases dilated uropathy was suspected. With 24 affected infants this diagnosis was less frequent than in the previous year.

With a share of with 12.0 per 1,000 births the prevalence of the cleft lip with cleft upper jaw and palate diagnosis was almost similar compared to the previous year. This malformation ranks nineth among the most common single diagnoses in 2007.

Compared to the previous year the highest number of infants with renal dysplasia, i. e. 16 live births, was registered in 2007. In many cases this was a prenatally suspected diagnosis. The annual prevalence is at 9.1 per 1,000 births in 2007.

Reports of congenital megaureter were as frequent as renal dysplasia reports, followed by the diagnosis of accessory kidney.

The number of infants suffering from congenital tricuspid insufficiency or pulmonary valve stenosis, i.e. twelve and eleven, respectively, was almost identical to that of the previous year. Mainly paediatric cardiologists reported these diagnoses to the Monitoring of Congenital Malformations. This also applies to the diagnosis of congenital mitral insufficiency with 10 affected infants.

The number of infants suffering from congenital subluxation of hip and also hypospadias was a bit lower than in the previous year. The two diagnoses rank 14th on the single diagnoses list. The annual prevalence of this two diagnoses: 5.7 per 1000 birth.

The number of infants with anal atresia was identical with that in the previous year. However, with a prevalence of 5.7 per 1000 births the confidence area of the previous years was exceeded again (refer to Section 12.19).

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

12.0 Definitions

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.
Synonyms: 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. Inclusive 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 the closure of the spinal column characterized by herniation or exposure of the spinal cord and/or meninges through an incompletely closed spine. Inclusive meningocele, meningomyelocele, myelocele, myelomeningocele, rhachischisis. 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. [If using a different definition or cut off point (e.g., 2 standard deviations), report but specify criteria]. 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, characterized by various degrees of incomplete lobation of the brain hemispheres. Olfactory nerve tract may be absent. Holoprosencephaly includes cyclopia, ethmocephaly, cebocephaly, and premaxillary agenesis.

8. Anophthalmos/microphthalmos: apparently absent or small eyes. Some normal adnexal elements and eyelids are usually present. In microphthalmia, the corneal diameter 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. Exclusive small, normally shaped ears, imperforate auditory meatus with a normal pinna, dysplastic and low set ears.

10. Tetralogy of Fallot: a condition characterized by ventricular septal defect, 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 called 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 defect.

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, with or without clefting of the alveolar ridge or the hard palate. Exclusive midline cleft of upper or lower lip and oblique facial fissure (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 incisivum without 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 Tracheoesophageal 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 multiples areas of the jejunum or ileum. Exclusive duodenal atresia.

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 neighboring 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 retractrile testis.

21. Hypospadias: a congenital malformation characterized by the opening of the urethra on the ventral side of the penis, distally to the sulcus. Incl. penile, scrotal, and perineal hypospadias. Exclusive glandular or first degree hypospadias and 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 for phenotypic sex determination. Incl. male or female true or pseudohermaphroditism.

24. Potter sequence: a congenital malformation characterized 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 into the thorax of abdominal contents through a defect of the diaphragm. Inclusive total absence of the diaphragm. Exclusive hiatus hernia, eventration and phrenic palsy.

31. Omphalocele: a congenital malformation characterized by herniation of abdominal 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 covere umbilical hernia.

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

33. Prune belly sequence: a complex congenital malformation characterized by deficient 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 deficiencies.

34. Down syndrome (Trisomy 21): a congenital chromosomal malformation syndrome characterized by a well known pattern of minor and major anomalies and associated with excess chromosomal 21 material. Inclusive trisomy mosaicism 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 prevalence calculations are only referring to children whose mothers have their residence in Saxony-Anhalt. The analysis of the indicator malformations is made with regard to the diagnoses. It is possible that one child has more than one indicator malformation what affects the absolute figures.

12.1 Neural Tube Defects (Q00./Q01./Q05.)

	Number	Prevalence /10,000 births	Trend in comp. to basis prevalence
Major cities: 2 x Dessau-Roßlau 2 x Halle 3 x Magdeburg	7	15.2	↑
Districts: 1 x Saalekreis 2 x Salzlandkreis 1 x Jerichower Land 1 x Stendal 1 x Boerde	6	4.6	↓
Saxony-Anhalt	**13**	**7.4**	↓

Neural Tube Defects (1997 to 2006)		
	Basic prevalence /10,000 births	**Confidence interval (CI 95%) /10,000 births**
Major cities	9.6	6.4 - 12.8
Districts	9.8	8.0 - 11.5
Region	9.7	8.2 - 11.3
EUROCAT 1996-2005	8.54	2.19 ECEMC (Spain)* 25.15 Mainz (Germany)**

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

A total number of 13 births with neural tube defects was registered in 2007. They all had only one neural tube defect.

The annual prevalence of 7.4 per 10,000 births was slightly lower than the basic prevalence of the years 1997-2006. For the first time the prevalence in the big cities was higher than that in the districts last years.

Compared to all EUROCAT centres our annual prevalence is within the middle range, but there are also marked prevalence differences between the several centres.

Additional Information:

Pregnancy outcome	5 x live birth 1 x stillbirth 7 x termination of pregnancy
Sex	8 x male 5 x female
Number of isolated malformations/MCA	5 x isolated 8 x MCA

Births with neural tube defects exhibit slight androtropism. This mainly concerns spina bifida and encephalocele.

Being the most frequent entity of the neural tube defects, spina bifida occurred in seven births. Anencephalus and encephalocele were less frequent.

With 38.5%, the percentage of live births of all infants/foetuses with neural tube defects was rather high in 2007 compared to the previous years. Obviously this was due to the fact that encephalocele had not been diagnosed prenatally in two births.
Considering the pregnancy outcome of births with spina bifida, the percentage of live births was 42.9% in 2007.

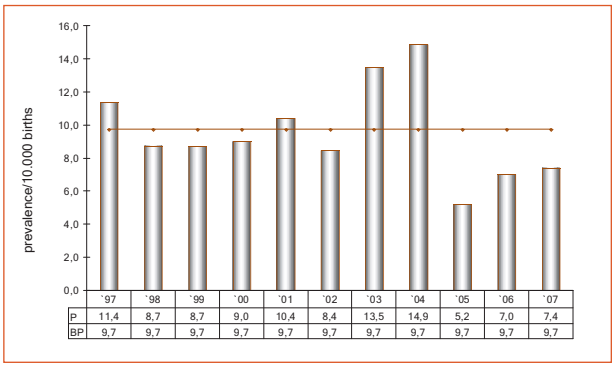


Fig. 6: Development of prevalence/10,000 births with neural tube defects in the registration area since 1997

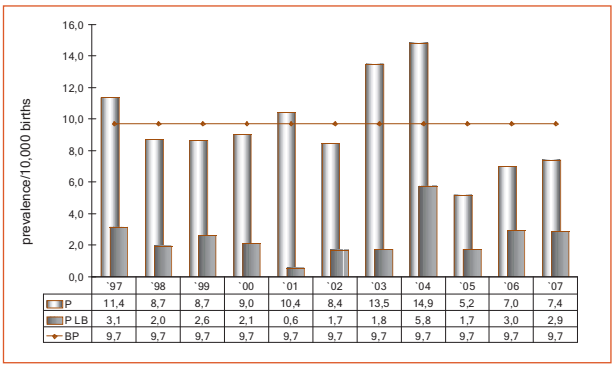


Fig. 7: Development of the total prevalence of neural tube defects and of the prevalence in live births in the registration area since 1997

In 2007 one neural tube defect per 1,351 births was registered in Saxony-Anhalt.

12.2 Anencephaly (Q00.)

	Number	Prevalence /10,000 births	Trend in comp. to basis prevalence
Major cities	0	0	↓
Districts: 1 x Saalekreis 2 x Salzlandkreis	3	2.3	↔
Saxony-Anhalt	**3**	**1.7**	↔

Anencephaly (1997 to2006)		
	Basic prevalence /10,000 births	**Confidence interval (CI 95%) /10,000 births**
Major cities	2.0	0.5 - 3.4
Districts	2.7	1.7 - 3.6
Region	2.5	1.7 - 3.3
EUROCAT 1996-2005	2.94	0.31 ECEMC (Spain)* 6.90 CARIS Wales (UK)**

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

In 2007 three births with anencephalus were registered. The malformation only occurred in births from the districts.

With an annual prevalence of 1.7 per 10,000 births the value was within the lower range of the 1997-2006 prevalences.

The prevalence was below the European average.

Additional Information:

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

The anencephalus births were two terminations of pregnancy (13 and 21 weeks of gest.) as well as one stillbirth (35 weeks of gest.). In the latter case we assume that no prenatal diagnostics took place.
In two of the births the pathological examination revealed additional malformations; one foetus exhibited an isolated anencephalus

Malformation combinations (MCA) or superordinated syndromes detected:

- Cleft palate, exophthalmos, malformation of retina, diastematomyely, auricle and face dysmorphy, hypoplasia of the suprarenal glands, skew foot
- Exophthalmos, auricle and face dysmorphia, hypoplasia of the suprarenal glands

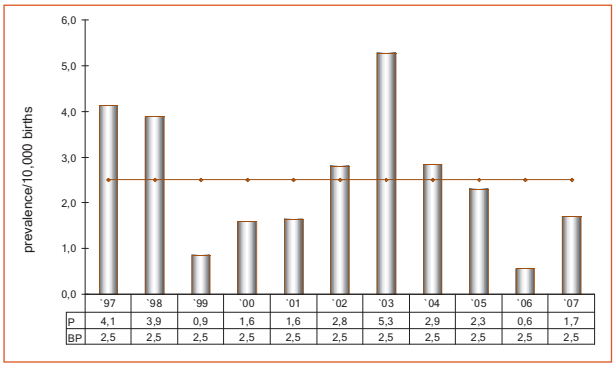


Fig. 8: Development of prevalence/10,000 births with anencephaly in the registration area since 1997

In the 2007 one anencephaly per 5,856 births was registered in Saxony-Anhalt.

12.3 Spina Bifida (Q05.)

	Number	Prevalence /10,000 births	Trend in comp. to basis prevalence
Major cities: 2 x Dessau-Roßlau 2 x Halle 1 x Magdeburg	5	10.9	↑
Districts: 1 x Jerichower Land 1 x Stendal	2	1.5	↓
Saxony-Anhalt	**7**	**4.0**	↓

Spina Bifida (1997 to 2006)		
	Basic prevalence /10,000 births	Confidence interval (CI 95%) /10,000 births
Major cities	5.4	2.9 - 7.8
Districts	5.8	4.5 - 7.2
Region	5.7	4.5 - 6.9
EUROCAT 1996-2005	4.53	1.69 ECEMC (Spain)* 17.57 Mainz (Germany)**

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

In 2007 seven births with spina bifida were registered. The annual prevalence of 4.0 per 10,000 births was slightly below the basic prevalence of the years 1997-2006.

Whereas in the two years before births had been mainly registered in the districts, the prevalence in 2007 was markedly higher in the big cities.

Compared to EUROCAT data the prevalence value was within the middle range.

Additional Information:

Pregnancy outcome	3 x live birth 4 x termination of pregnancy
Sex	5 x male 2 x female
Number of isolated malformations/MCA	1 x isolated 6 x MCA

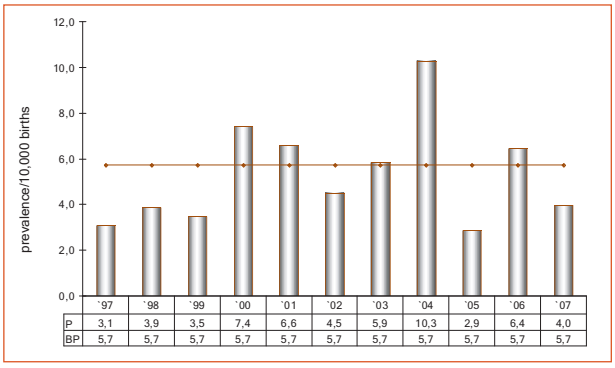
We were informed that all three live births exhibited a pathological result in the prenatal ultrasound screening. But in one case spina bifida could not be diagnosed before the 31st week of gestation.

The four induced abortions exclusively affecting male foetuses took place between weeks 20 and 22 of gestation.

One child exhibited an isolated lumbosacral spina bifida. Three infants/foetuses had a lumbosacral spina bifida with hydrocephalus; in two other cases sacral spina bifida with and without hydrocephalus was detected. Apart from lumbosacral spina bifida, one child additionally suffered from other CNS malformations. The six last-mentioned infants/foetuses exhibited an Arnold-Chiari malformation.

Malformation combinations (MCA) or superordinated syndromes detected:

- Arnold-Chiari malformation, schizencephalie, duplex kidney bilateral with dilated uropathy (DUP)
- Arnold-Chiari malformation, tethered spinal cord syndrome, subluxation of hip, pes adductus
- Arnold-Chiari malformation, clubfoot bilateral
- 3 x Arnold-Chiari malformation



	`97	`98	`99	`00	`01	`02	`03	`04	`05	`06	`07
P	3,1	3,9	3,5	7,4	6,6	4,5	5,9	10,3	2,9	6,4	4,0
BP	5,7	5,7	5,7	5,7	5,7	5,7	5,7	5,7	5,7	5,7	5,7

Fig. 9: Development of prevalence/10,000 births with spina bifida in the registration area since 1997

In 2007 one spina bifida per 2,510 births was registered in Saxony-Anhalt.

12.4 Encephalocele (Q01.)

	Number	Prevalence /10,000 births	Trend im comp. to basis prevalence
Major cities: 2 x Magdeburg	2	4.3	↑
Districts: 1 x Boerde	1	0.8	↓
Saxony-Anhalt	**3**	**1.7**	↔

Encephalocele (1997 to 2006)		
	Basic prevalence /10,000 births	Confidence interval (CI 95%) /10,000 births
Major cities	2.5	0.9 - 4.2
Districts	1.6	0.9 - 2.3
Region	1.8	1.1 - 2.5
EUROCAT 1996-2005	1.07	0.23 ECEMC (Spain)* 2.73 Mainz (Germany)**

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

Encephalocele as an isolated malformation was found in two live births and one termination of pregnancy in 2007.

After there had been no newborn with encephalocele in the big cities in the two years before, two live births with this diagnosis were registered in Magdeburg in 2007.

The annual prevalence of encephalocele amounting to 1.7 per 10,000 births was within the basic prevalence range of the years 1997-2006 and at the same time corresponded to the European average.

Additional Information:

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

In one case occipitocele with cerebellum prolapse was diagnosed during the prenatal ultrasound screening. This result was confirmed at autopsy.

Regarding one live birth with a rare frontonasal encephalocele the finding was not known prenatally. The child was born without complications after 39 weeks of gestation. Meanwhile, the child has been subjected to neurosurgical treatment. It might be of interest that the mother had taken periconceptional folic acid supplementation.

Regarding the third child we were not informed whether the pathological finding was detected already during pregnancy. But we know that the maternal grandfather also suffered from meningocele. The child was born in due time. Imaging diagnostics revealed meningocele of 3 x 3 cm in size, which was also subjected to immediate postnatal neurosurgical treatment.

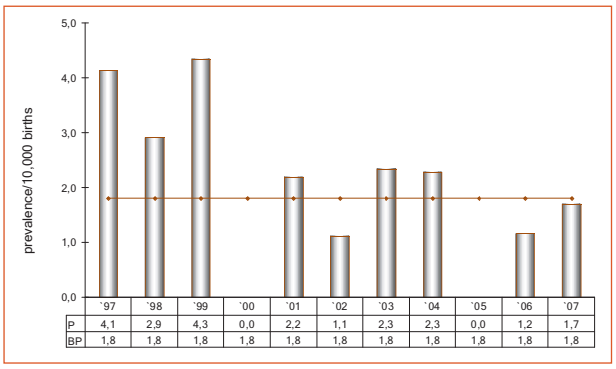


Fig. 10: Development of prevalence/10,000 births with encephalocele in the registration area since 1997

In 2007 one encephalocele per 5,856 births was registered in Saxony-Anhalt.

12.5 Microcephaly (Q02.)

	Number	Prevalence /10,000 births	Trend in comp. to basis prevalence
Major cities: 2 x Halle 3 x Magdeburg	5	10.9	↓
Districts 2 x Altmarkkreis Salzwedel 4 x Anhalt-Bitterfeld 1 x Burgenlandkreis 2 x Boerde 1 x Harz 1 x Jerichower Land 2 x Saalekreis 10 x Salzlandkreis	23	17.7	↑
Saxony-Anhalt	**28**	**15.9**	↔

Microcephaly (1997 to 2006)		
	Basic prevalence /10,000 births	Confidence interval (CI 95%) /10,000 births
Major cities	16.9	12.6 - 21.2
Districts	14.1	12.0 - 16.2
Region	14.7	12.8 - 16.6
EUROCAT 1996-2005	1.86	0.44 Norway* 11.33 Saxony-Anhalt (Germany)**

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

In 2007 28 infants/foetuses with microcephalus were registered, i.e. with a head circumference below the third percentile in relation to the gestational age. This number was clearly lower than in the year before.

The annual prevalence of 15.9 per 10,000 births was within the middle of the 1997-2006 basic prevalence.

A comparison with other European malformation registers is difficult since under-reporting of microcephalus must be assumed.

Additional Information:

Pregnancy outcome	22 x live birth 5 x stillbirth 1 x spontaneous abortion
Sex	10 x male 18 x female
Number of isolated malformations/MCA	15 x isolated 13 x MCA

Whereas the sex ratio of births with microcephalus was rather balanced over the two years before, a clear gynaecotropy could be observed in 2007.

Particularly remarkable was the high number of stillbirths with microcephalus. These are births from 26 to 36 weeks of gestation. In all stillbirths hypotrophy of the child could be detected. In four cases it was attributable to placenta insufficiency. In another case the pregnant women had not undergone preventive checkups.

Regarding the spontaneous abortion in the 19th week of gestation severe CNS malformations under an existing microcephalus were found.

A total of 13 births with microcephalus suffered from concomitant malformations as outlined below.

Malformation combinations (MCA) or superordinated syndromes detected:

- VATER association, anal atresia, epispadias, diphallus, duplex urinary bladder, duplex kidney, megauterer, split pelvis, wedge-shaped vertebra, rib malformations
- Esophageal atresia, VSD, total anomalous pulmonary venous connection, coloboma, coccyx appendix
- Down´s syndrome
- Turner syndrome, aortic valve stenosis, cholestasis
- Omphalocele
- Preaxial polydactyly
- Craniosynostosis, craniofacial and auricular dysmorphia, micrognathia
- 2 x Phenylalaninembryopathy
- ASD II, peripheral pulmonal stenosis, PFO
- ASD II, PFO
- PFO at full-term infants, retarded hip

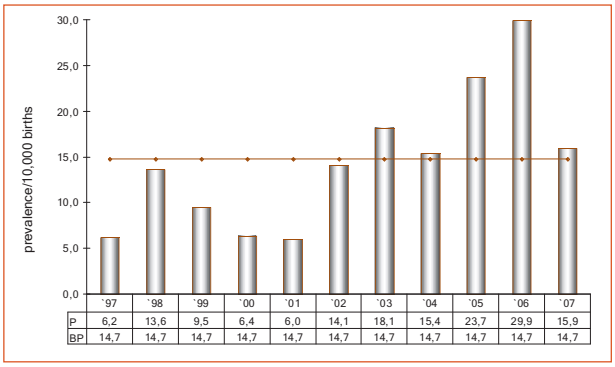


Fig. 11: Development of prevalence/10,000 births with microcephaly in the registration area since 1997

In 2007 one microcephalus per 627 births was registered in Saxony-Anhalt.

12.6 Congenital Hydrocephaly (Q03.)

	Number	Prevalence /10,000 births	Trend in comp. to basis prevalence
Major cities 2 x Halle	2	4.3	↓
Districts: 1 x Altmarkkreis Salzwedel 3 x Anhalt-Bitterfeld 1 x Burgenlandkreis 1 x Boerde 1 x Saalekreis	7	5.4	↓
Saxony-Anhalt	**9**	**5.1**	↓

Congenital Hydrocephaly (1997 to 2006)		
	Basic prevalence /10,000 births	**Confidence interval (CI 95%) /10,000 births**
Major cities	8.7	5.7 - 11.8
Districts	7.2	5.7 - 8.7
Region	7.5	6.2 - 8.9
EUROCAT 1996-2005	4.95	2.20 Dublin (Ireland)* 19.09 Mainz (Germany)**

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

Nine cases of a congenital hydrocephaly were registered in 2007, i.e. a higher number than in the previous year.

The annual prevalence of 5.1 per 10,000 births was below the basic value of the years 1997-2006, but corresponded to the European average.

Additional Information:

Pregnancy outcome	2 x live birth 1 x live birth deceased in the 1st week of life 2 x spontaneous abortion 3 x termination of pregnancy 1 x stillbirth
Sex	6 x male 3 x female
Number of isolated malformations/MCA	2 x isolated 7 x MCA

Most frequently, congenital hydrocephalies occurred in spontaneous and induced abortions.

Frequently, congenital hydrocephaly occurred in combination with other cerebric malformations. In two cases the congenital hydrocephaly occurred together with a cleft lip with cleft upper jaw and palate. In two cases a chromosomal disorder was detected and in one case the malformation had been caused by a cytomegaly virus infection.

Malformation combinations (MCA) or superordinated syndromes detected:

- Trisomy 13 (translocation), cleft lip with cleft palate bilateral, preaxial polydactyly
- Malformation of the cerebral aquaeduct, hypospadias
- Microcephaly, cerebral cortex hypotrophy, corpus callosum agenesis, hypoplasia of one cerebral part
- Corpus callosum agenesis, single cerebral cysts, ventricle asymmetry
- Cleft lip with cleft palate, ADAM-complex of upper and lower limbs, talipes equinovarus unilateral
- Chromosom 15q partial deletion, annular pancreas, stenosis of the duodenum, segmentation defect of the lung, malformation of the spleen, pelvic kidney
- Embryopathia caused by congenital cytomegaly with megaureter

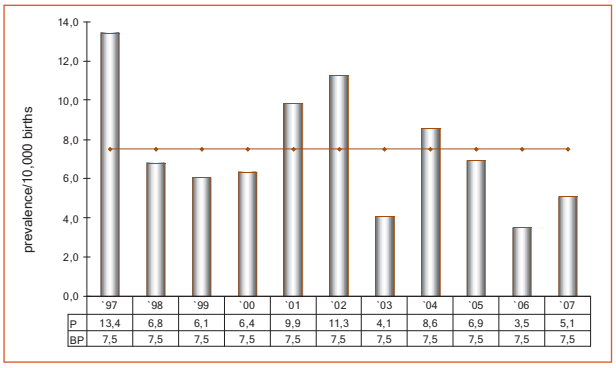


Fig. 12: Development of prevalence/10,000 births with hydrocephaly in the registration area since 1997

In 2007 one congenital hydrocephaly per 1,952 births was registered in Saxony-Anhalt.

12.13 Coarctation of Aorta (Q25.1)

	Number	Prevalence /10,000 births	Trend in comp. to basis prevalence
Major cities: 1 x Halle 2 x Magdeburg	3	6.5	↔
Districts: 1 x Harz 2 x Jerichower Land 1 x Mansfeld-Suedharz 1 x Saalekreis 1 x Salzlandkreis 1 x Stendal	7	5.4	↑
Saxony-Anhalt	**10**	**5.7**	↑

Coarctation of Aorta (1997 to 2006)		
	Basic prevalence /10,000 births	Confidence interval (CI 95%) /10,000 births
Major cities	4.8	2.5 - 7.1
Districts	3.2	2.2 - 4.2
Region	3.5	2.6 - 4.5
EUROCAT 1996-2005	3.13	0.81 ECEMC (Spain)* 9.97 Finland**

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

With ten births sufferring from a coarctation of aorta the number has slightly increased in comparison to the previous year.

Also the annual prevalence of 5.7 per 10,000 births exceeds the confidence interval of the years 1997 to 2006.

Compared to other European malformation registers the prevalence value lies within the average range.

Additional Information:

Pregnancy outcome	7 x live birth 3 x termination of pregnancy
Sex	6 x male 4 x female
Number of isolated malformations/MCA	4 x isolated 6 x MCA

Considering the present data of the prenatal diagnostics of the ten births with a coarctation of the aorta there was one child for which the diagnosis was correct. Another three children exhibited cardiac syndromes during the prenatal ultrasound screening. Regarding all the other cases we have no information on prenatal findings.

Four children suffered from an isolated coarctation of the aorta; all the other cases mainly exhibited concomitant-cardiac malformations or chromosomal aberrations.

The three induced abortions were carried out for conspicuous chromosomal results.

Malformation combinations (MCA) or superordinated syndromes detected:

- Edwards syndrome with: omphalocele, intestinal malrotation, VSD, ASD, segmentation defects of the lung, horseshoe kidney and additional typical external stigmata
- Edwards syndrome with: pulmonary artery stenosis, segmentation defects of the lung, horseshoe kidney
- Turner syndrome with: hypoplasia of the aorta, hypoplasia of great vessels, generalized hydrops, segmentation defects of the lung
- TGV, VSD, ASD, tricuspid insufficiency
- ASD, mitral, tricuspid and aortic insufficiency
- Tricuspid and mitral insufficiency, PFO, hydrocele

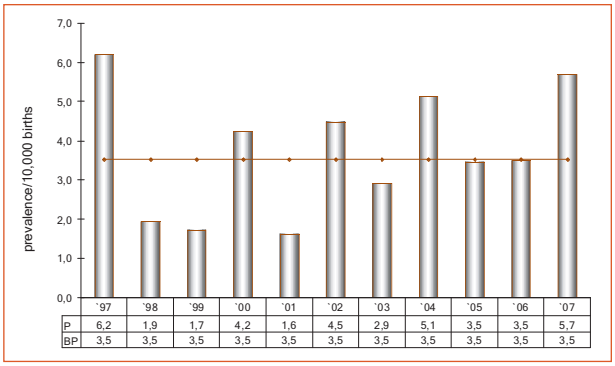


Fig. 19: Development of prevalence/10,000 births with coarctation of aorta in the registration area since 1997

In 2007 one coarctation of aorta per 1,757 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 basis prevalence
Major cities: 1 x Halle 3 x Magdeburg	4	8.7	↓
Districts: 2 x Altmarkkreis Salzwedel 3 x Anhalt Bitterfeld 5 x Burgenlandkreis 2 x Boerde 3 x Harz 2 x Jerichower Land 2 x Mansfeld-Suedharz 2 x Saalekreis 1 x Salzland 1 x Stendal	23	17.7	↔
Saxony-Anhalt	**27**	**15.4**	↔

Cleft Lip With or Without Cleft Palate (1997 to 2006)		
	Basic prevalence /10,000 births	**Confidence interval (CI 95%) /10,000 births**
Major cities	18.0	13.6 - 22.5
Districts	16.0	13.7 - 18.3
Region	16.5	14.5 - 18.5
EUROCAT 1996-2005	8.59	4.38 SE Ireland* 16.65 Saxony-Anhalt Germany**

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

The number of children with cleft lip or cleft lip with or without cleft palate was similar to the number of cases in 2007. For the first time the occurrence in the big cities was higher than in the districts last year.

The annual prevalence of 15.4 per 10,000 births lies within the confidence interval of the years 1997 to 2006.

Moreover, the region of Saxony-Anhalt has the highest prevalence of cleft lip or cleft lip with or without cleft palate in the European comparison.

additional information:

Pregnancy outcome	22 x live birth 1 x live birth deceased during 1st week of life 2 x spontaneous abortion 2 x temination of pregnancy
Sex	20 x male 7 x female
Number of isolated malformations/MCA	19 x isolated 8 x MCA

In the majority of cases the children were live births; only in two cases an induced abortion was carried out.

The clear androtropy described in the literature can be also confirmed this year.

A trisomy 13 (Patau's syndrome) was diagnosed in two cases; but also malformation combinations of the cerebral or limb malformations were reported.

Malformation combinations (MCA) or superordinated syndromes detected:

- Patau´s syndrome with: congenital hydrocephaly, preaxial polydactyly
- Patau´s syndrome with: arhinencephaly, hypoplasia of one cerebral part, polydactyly, low set ears
- Hyperphenylalaninemia
- PFO, ASD
- Clubhand, missing toes
- Corpus callosum hypoplasia, ASD, hearing loss by acoustic perceptual disorder
- Congenital pulmonal insufficiency, hip dysplasia
- ADAM complex of the upper and lower limbs, talipes equinovarus, congenital hydrocephaly

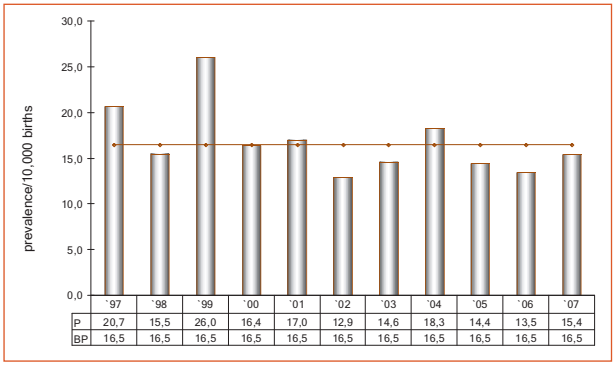


Fig. 20: Development of prevalence/10,000 births with cleft lip with or without cleft palate in the registration area since 1997

In 2007 one child with cleft lip with or without cleft palate per 651 births was registered in Saxony-Anhalt.

12.15 Cleft Palate (Q35.)

	Number	Prevalence /10,000 births	Trend in comp. to basis prevalence
Major cites: 1 x Halle 1 x Mageburg	2	4.3	↓
Districts: 1 x Altmarkkreis Salzwedel 1 x Anhalt-Bitterfeld 1 x Burgenlandkreis 2 x Harz 1 x Mansfeld-Suedharz 3 x Saalekreis 4 x Salzlandkreis	13	10.0	↔
Saxony-Anhalt	**15**	**8.5**	↔

Cleft palate (1997 to 2006)		
	Basic prevalence /10,000 births	Confidence interval (CI 95%) /10,000 births
Major cities	8.5	5.4 - 11.5
Districts	10.3	8.4 - 12.1
Region	9.8	8.3 - 11.4
EUROCAT 1996-2005	5.99	2.97 S Portugal* 13.51 Finland**

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

A cleft palate or a Pierre Robin-sequence falling under this category of indicator malformations, was detected in 15 births in 2007. This malformation mainly occurred in the districts.

The number of children affected has declined compared to the previous year. Thus, also the annual prevalence of 8.5 per 10,000 births is in the lower basic prevalence range of the years 1997 to 2006.

Despite the declining number of cases, our data are indicative of very high prevalences of the cleft palate in Saxony-Anhalt in the European comparison.

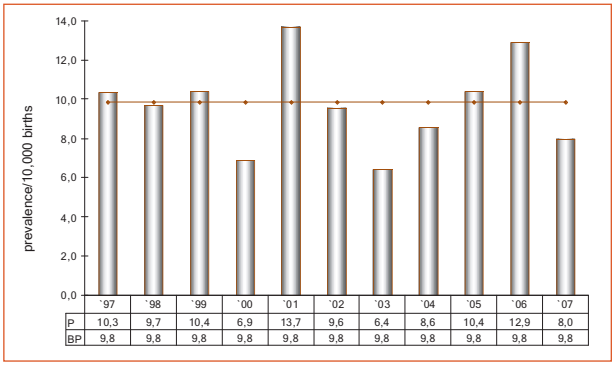
Additional Information:

Pregnancy outcome	13 x live birth 2 x stillbirth
Sex	6 x male 9 x female
Number of isolated malformations/MCA	6 x isolated 9 x MCA

More than half of the cases of cleft palates suffered from concomitant malformations. The sex ratio shows a slight gynaecotropism.

Malformation combinations (MCA) or superordinated syndromes detected:

- Anencephalus, diastematomyelia, exophthalmos, malformation of the retina, craniofacial dysmorphia, adrenal hypoplasia, talipes valgus
- Arthrogryposis multiplex congenita (Escobar-syndrome), hip luxation bilateral
- Arthrogryposis multiplex congenita, micro- and retrognathism, ASD, mitral and tricuspid insufficiency, talipes valgus, retarded hip
- Pierre Robin-sequence, congenital malformation of the larynx, not specified
- Partial trisomy 6p und partial monosomy 4q, ASD II, retrognathism, facial dysmorphia
- PFO at full-term infant
- Cleft of the hard palate with cleft lip, uvula cleft
- 2 x cleft lip with cleft palate, unilateral



	`97	`98	`99	`00	`01	`02	`03	`04	`05	`06	`07
P	10,3	9,7	10,4	6,9	13,7	9,6	6,4	8,6	10,4	12,9	8,0
BP	9,8	9,8	9,8	9,8	9,8	9,8	9,8	9,8	9,8	9,8	9,8

Fig. 21: Development of prevalence/10,000 births with cleft palate in the registration area since 1997

In 2007 one child with cleft palate per 1,171 births was registered in Saxony-Anhalt.

12.16 Choanal Atresia (Q30.0)

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

Choanal atresia (1997 to 2006)		
	Basic prevalence /10,000 births	Confidence interval (CI 95%) /10,000 births
Großstädte	0.3	-0.3 - 0.8
Landkreise	0.7	0.2 - 1.1
Region	0.6	0.2 - 1.0
EUROCAT 1996-2005	0.75	0.00 Cork & Kerry (Ireland)* 4.48 ISMAC (Italy)**

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

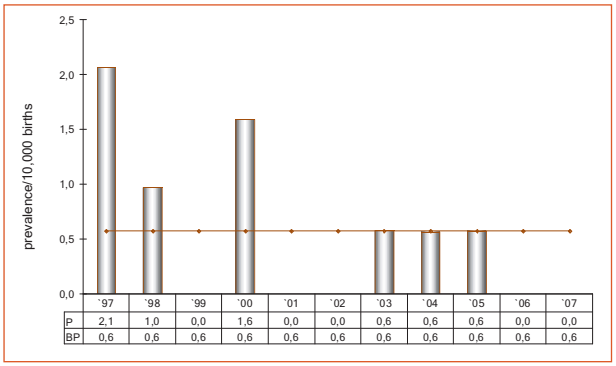


Fig. 22: Development of prevalence/10,000 births with choanal atresia in the registration area since 1997

In 2007 no child with a choanal atresia was registered in Saxony-Anhalt.

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

	Number	Prevalence /10,000 births	Trend in comp. to basis prevalence
Major cities:	0	0	↓
Districts: 2 x Burgenlandkreis 1 x Boerde 1 x Harz	4	3.1	↔
Saxony-Anhalt	**4**	**2.3**	↔

Oesophageal Atresia/Stenosis/Fistula (1997 to 2006)		
	Basic prevalence /10,000 births	**Confidence interval (CI 95%) /10,000 births**
Major cities	3.1	1.3 - 4.9
Districts	2.3	1.5 - 3.2
Region	2.5	1.7 - 3.3
EUROCAT 1996-2005 (Q39.0-Q39.1)	2.23	0.82 ISMAC (Italy)* 4.37 Odense (Denmark)**

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

As in the two years before oesophageal atresia only occurred in districts in 2007. Four live births were registered with this diagnosis.

With **2.3 per 10,000 births** the **annual prevalence** lies within the basic prevalence of the years 1997 to 2006, i.e. corresponding exactly to the European average.

Additional Information:

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

In three cases oesophageal atresia was diagnosed as early as during the prenatal ultrasound screening. Although one case exhibited polyhydramnios, a malformation was not suspected.

Two of the four children suffered from an oesophageal atresia with fistula. In another case no fistula was present. There is still another child where we do not know wether a fistula was present

Malformation combinations (MCA) or superordinated syndromes detected:

- Down´s syndrome, VSD
- Microcephalus, VSD, total anomalous pulmonary venous connection, bicuspid aortic valve, coloboma, skin tag
- ASD, PFO at full-term infant, PDA, pilonidal cyst

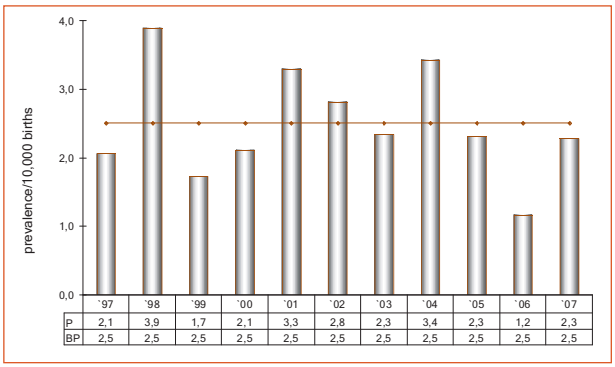


Fig. 23: Development of prevalence/10,000 births with oesophageal atresia/stenosis/fistula in the registration area since 1997

In 2007 one oesophageal atresia/fistula per 4,392 births was registered in Saxony-Anhalt.

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

	Number	Prevalence /10,000 births	Trend in comp. to basis prevalence
Major cities	0	0	↓
Districts: 1 x Burgenlandkreis 1 x Boerde 1 x Salzlandkreis	3	2.3	↔
Saxony-Anhalt	**3**	**1.7**	↔

Small instestine Atresia/Stenosis (1997 to 2006)		
	Basic prevalence /10,000 births	**Confidence interval (CI 95%) /10,000 births**
Major cities	1.4	0.2 - 2.6
Districts	2.3	1.4 - 3.1
Region	2.1	1.3 - 2.8
EUROCAT 1996-2005	0.65	0.00 Zagreb (Croatia)* 1.45 CARIS Wales (UK)**

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

In 2007 three births with small intestine atresia were registered in the districts. It should be noted that over the past three years all births with this malformation were registered in the districts.

With an annual prevalence of 1.7 per 10,000 births the value lies within the confidence range of the years 1997 to 2006.

But comparing the current prevalence figure to other European registers, this figure is clearly higher than that of the centre with the highest average prevalence.

Additional Information:

Pregnancy outcome	3 x live birth
Sex	2 x male 1 x female
Number of isolated malformations/MCA	2 x isolated 1 x MCA

The diagnosis of an intestine stenosis or atresia was prenatally known for two children. It was diagnosed after 27 and 38 weeks of gestation, respectively.
Regarding the third child a hydrops was suspected prenatally in the 27th week of gestation, which was not confirmed postnatally. After its birth clinical findings were indicative of meconium vomition or ileus requiring immediate operative invention.

Malformation combinations (MCA) or superordinated syndromes detected:

- Volvolus, retarded hip

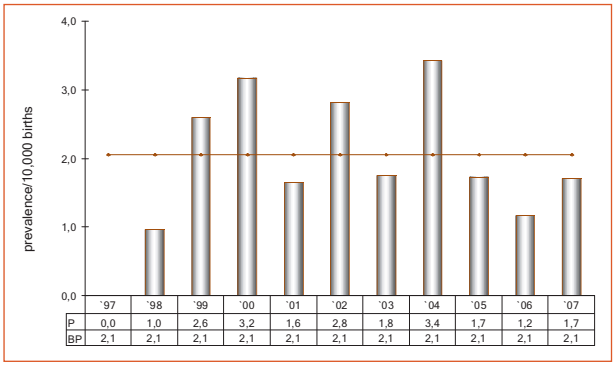


Fig. 24: Development of prevalence/10.000 births with small intestine atresia/stenosis in the registration area since 1997

In 2007 one small intestine atresia/stenosis per 5,856 births was registered in Saxony-Anhalt.

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

	Number	Prevalence /10,000 births	Trend in comp. to basis prevalence
Major cities: 1 x Halle 3 x Magdeburg	4	8.7	↑
Districts: 2 x Altmarkkreis Salzwedel 1 x Anhalt-Bitterfeld 1 x Burgenlandkreis 1 x Boerde 1 x Saalekreis	6	4.6	↑
Saxony-Anhalt	**10**	**5.7**	↑

Anorectal Atresia/-Stenosis (1997 to 2006)		
	Basic prevalence /10,000 births	**Confidence interval (CI 95%) /10,000 births**
Major cities	3.4	1.5 - 5.3
Districts	3.3	2.2 - 4.3
Region	3.3	2.4 - 4.2
EUROCAT 1996-2005	2.92	1.32 Asturias (Spain)* 8.18 Mainz (Germany)**

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

The number of births with anorectal atresia has been very high over the past years years. Ten children with this diagnosis were registered in 2007.

The annual prevalence of 5.7 per 10,000 births exceeded the confidence area of the years 1997 to 2006.

The actual prevalence is above the average European range.

Additional information:

Pregnancy outcome	9 x live birth 1 x termination of pregnancy
Sex	5 x male 5 x female
Number of isolated malformations/MCA	7 x isolated 3 x MCA

The sex ratio being balanced, anorectal atresia/-stenosis occurred isolated in most cases. One child was diagnosed as having a VATER association. One foetus suffered from trisomy 21 such that an induced abortion was carried out. The anorectal atresia was diagnosed by an autopsy later.

Six births exhibited an anorectal atresia with fistula; in three cases fistulas were not present. One child suffered from an anorectal stenosis.

Malformation combinations (MCA) or superordinated syndromes detected:

- VATER association with: microcephalus, complex urogenital malformation with diphallus, epispadias, duplex urinary bladder, double kidney, megaureter, dilatative uropathy with reflux, split pelvis, wedge-shaped vertebra
- Down´s syndrome
- Congenital subglottic stenosis, retarded hip

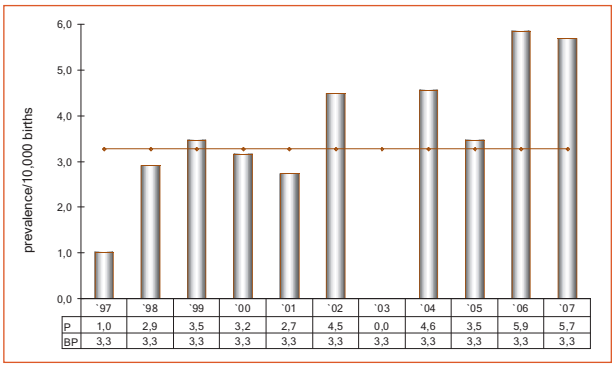


Fig. 25: Development of prevalence/10,000 births with anorectal atresia/-stenosis in the registration area since 1997

In 2007 one anorectal atresia/ stenosis per 1,757 births was registered in Saxony-Anhalt.

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

	Number	Prevalence /10,000 births	Trend in comp. to basis prevalence
Major cities: 1 x Magdeburg	1	2.2	↓
Districts: 1 x Altmarkkreis Salzwedel 2 x Boerde 1 x Harz 2 x Mansfeld-Suedharz 2 x Stendal	8	6.2	↓
Saxony-Anhalt	**9**	**5.1**	↓

Undescended Testis (1996 to 2005)		
	Basic prevalence /10,000 births	**Confidence interval (CI 95%) /10,000 births**
Major cities	22.3	17.4 - 27.2
Districts	8.5	6.9 - 10.2
Region	11.6	10.0 - 13.3
EUROCAT	no data	no data

A nondescensus testis is registered as a major malformation for full-term infants only. In 2007 nine boys with an unilateral or bilateral nondescensus testis were registered. In all cases the children were live births. It is interesting that this malformation is rarely registered in the big cities, which may be an indication of this malformation being underreported.

The actual annual prevalence of 5.1 per 10,000 births is clearly below the basic prevalence of the previous years.

Additional information:

Pregnancy outcome	9 x live birth
Sex	9 x male
Number of isolated malformations/MCA	6 x isolated 3 x MCA

Malformation combinations (MCA) or superordinated syndromes detected:

- Down´s syndrome with: canalis atrioventricularis communis, VSD, PFO, typical craniofacial dysmorphia
- Prader-Willi syndrome with: prognathism, typical craniofacial dysmorphia, hypoplastic scrotum
- Iris coloboma

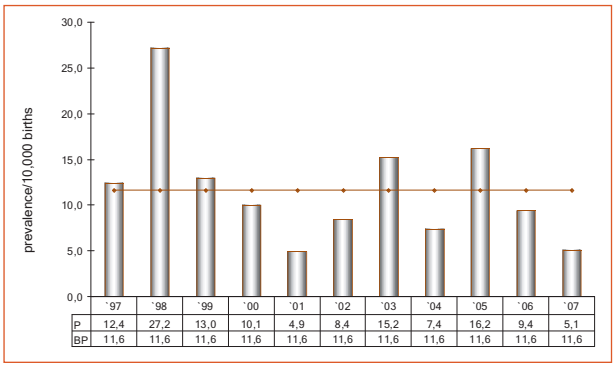


Fig. 26: Development of prevalence/10,000 births with undescended testis in the registration area since 1997

In 2007 one child with undescended Testis per 1,952 births (1,005 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 basis prevalence
Major cities: 1 x Dessau-Roßlau 3 x Halle 2 x Magdeburg	6	13.0	↓
Districts: 1 x Altmarkkreis Salzwedel 3 x Anhalt-Bitterfeld 4 x Burgenlandkreis 1 x Boerde 1 x Jerichower Land 1 x Mansfeld-Suedharz 2 x Saalekreis 3 x Salzlandkreis 1 x Stendal	17	13.1	↓
Saxony-Anhalt	**23**	**13.1**	↓

Hypospadias (1997 to 2006)		
	Basic prevalence /10,000 births	**Confidence interval (CI 95%) /10,000 births**
Major cities	20.0	15.4 - 24.7
Districts	18.1	15.7 - 20.5
Region	18.5	16.4 - 20.7
EUROCAT 1996-2005	11.72	1.87 NORCAS (UK)* 35.65 Malta**

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

In total, 23 boys with hypospadias were registered in 2007. Comparing the big cities with the districts, prevalences are almost identical.

The annual prevalence of 13.1 per 10,000 births is slightly below the confidence area of the basic prevalence of the years 1997 to 2006.
The actual prevalence of Saxony-Anhalt is within the average European range.

Additional information:

Pregnancy outcome	23 x live birth
Sex	23 x male
Number of isolated malformations/MCA	21 x isolated 2 x MCA

Considering the markedness of hypospadias, the glandular hypospadias was registered most frequently, i.e. in twelve cases. One child each suffered from coronal or penoscrotal hypospadias and two children exhibited a penile form. In seven cases we were not informed about the markedness of the hypospadias.

Malformation combinations (MCA) or superordinated syndromes detected:

- Congenital hydrocephaly
- Clubfoot

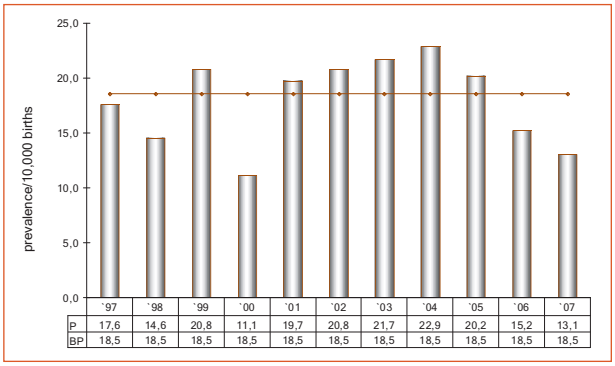


Fig. 27: Development of prevalence/10,000 births with hypospadias in the registration area since 1997

In 2007 one hypospadias per 764 births (393 boys) was found in Saxony-Anhalt.

12.22 Epispadias (Q64.0)

	Number	Prevalence /10,000 births	Trend in comp. to basis prevalence
Major cities:	0	0	↔
Districts: 1 x Saalekreis 1 x Stendal	2	1.5	↑
Saxony-Anhalt	**2**	**1.1**	↑

Epispadias (1997 to 2006)		
	Basic prevalence /10,000 births	**Confidence interval (CI 95%) /10,000 births**
Major cities	0.6	-0.2 - 1.3
Districts	0.3	0.0 - 0.5
Region	0.3	0.0 - 0.6
EUROCAT	no data	no data

This very rare malformation was registered for two boys in 2007.

The annual prevalence of 1.1 per 10,000 births is above the basic prevalence of the years 1997 to 2006.

Additional information:

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

One boy suffered from isolated epispadias. In another case it was part of a VATER association

Malformation combinations (MCA) or superordinated syndromes detected:

- VATER association with: anal atresia, microcephalus, complex urogenital malformation with diphallus, duplex urinary bladder, double kidney, megaureter, dilatative uropathia with reflux, wedge-shaped vertebra, split pelvis

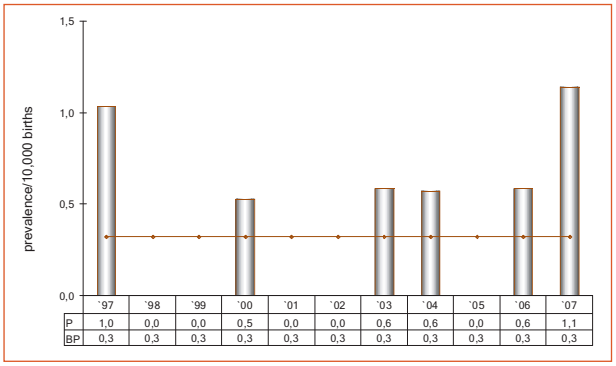


Fig. 28: Development of prevalence/10,000 births with epispadias in the registration area since 1997

In 2007 one epispadias per 8,785 births (4,523 boys) was registered in Saxony-Anhalt.

12.23 Indeterminate Sex (Q56.)

	Number	Prevalence /10,000 births	Trend in comp. to basis prevalence
Major cities:	0	0	↔
Districts: 1 x Jerichower Land	1	0.8	↔
Saxony-Anhalt	**1**	**0.6**	↔

Indeterminate Sex (1997 to 2006)		
	Basic prevalence /10,000 births	Confidence interval (CI 95%) /10,000 births
Major cities	0.6	-0.2 - 1.3
Districts	1.0	0.4 - 1.6
Region	0.9	0.4 - 1.4
EUROCAT 1996-2005	0.74	0.28 Basque Country (Spain) 2.01 SE Ireland**

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

The indeterminate sex was found in one birth only in 2007, the child dying after the first days of life because of multiple life-restricting malformations.

Similar to the previous year, the annual prevalence of 0.6 per 10,000 births is within the basic prevalence range and also within the average European range.

Additional information:

Pregnancy outcome	1 x live birth deceased during 1st week of life
Sex	1 x female
Number of isolated malformations/MCA	1 x MCA

A premature birth was reported after 32 weeks of gestation. After 31 weeks of gestation multiple malformations were prenatally diagnosed. There was also the suspicion of a chromosomal anomaly, which was postnatally confirmed as partial trisomy 1q.

Malformation combinations (MCA) or superordinated syndromes detected:

- Chromosomal aberration (partial trisomy 1q) with: Potter sequence, hypoplasia of the lungs, duodena stenosis, thymushypoplasia, VSD, preaxial polydactyly, dolichocephalus, microstomia

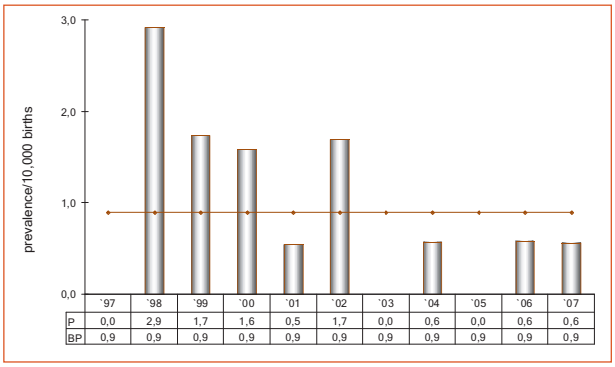


Fig. 29: Development of prevalence/10,000 births with indeterminate sex in the registration area since 1997

In 2007 one child with indeterminate sex per 17,569 births was registered in Saxony-Anhalt.

12.24 Potter Sequence (Q60.6)

	Number	Prevalence /10,000 births	Trend in comp. to basis prevalence
Major cities:	0	0	↓
Districts: 1 x Jerichower Land	1	0.8	↓
Saxony-Anhalt	**1**	**0.6**	↓

Potter Sequence (1997 to 2006)		
	Basic prevalence /10,000 births	**Confidence interval (CI 95%) /10,000 births**
Major cities	2.3	0.7 - 3.8
Districts	2.3	1.5 - 3.2
Region	2.3	1.6 - 3.1
EUROCAT	1.19	0.17 Zagreb (Croatia)* 6.97 Mainz (Germany)**

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

The only birth registered for a Potter sequence was the same child described in Section 12.23 as having indeterminate sex.

The annual prevalence is 0.6 per 10,000 births and ranges below the basic prevalence.

Additional information:

Pregnancy outcome	1 x live birth deceased during 1st week of life
Sex	1 x female
Number of isolated malformations/MCA	1 x MCA

Malformation combinations (MCA) or superordinated syndromes detected:

- Chromosomal aberration (partial trisomy 1q) with: indeterminated sex, hypoplasia of lungs, duodenal stenosis, thymushypoplasia, VSD, preaxial polydactyly, dolichocephalus, microstomia

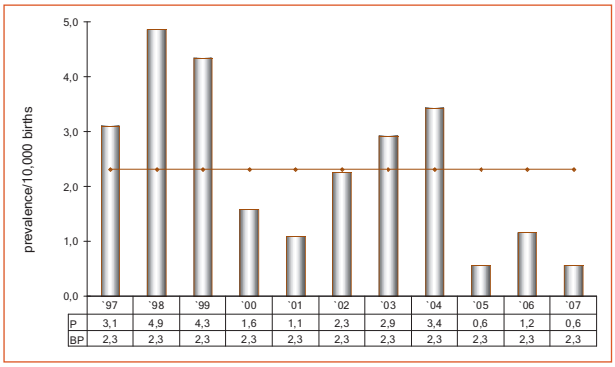


Fig. 30: Development of prevalence/10,000 births with Potte - sequence in the registration area since 1997

In 2007 one Potter sequence per 17,569 births was registered in Saxony-Anhalt.

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

	Number	Prevalence /10,000 births	Trend in comp. to basis prevalence
Major cities: 1 x Dessau-Roßlau 1 x Halle 1 x Magdeburg	3	6.5	↔
Districts: 1 x Anhalt-Bitterfeld 1 x Saalekreis 1 x Salzlandkreis 1 x Stendal 1 x Wittenberg	5	3.9	↓
Saxony-Anhalt	**8**	**4.6**	↓

Renal Agenesis, Unilateral (1997 to 2006)		
	Basic prevalence /10,000 births	Confidence interval (CI 95%) /10,000 births
Major cities	8.2	5.2 - 11.1
Districts	7.4	5.9 - 9.0
Region	7.6	6.2 - 9.0
EUROCAT	no data	no data

Eight births with unilateral renal agenesis were registered in 2007.

With an annual prevalence of 4.6 per 10,000 births the value ranges slightly below the basic prevalence of the years 1997 to 2006.

Comparative European data for unilateral renal agenesis is not available.

Additional information:

Pregnancy outcome	5 x live birth 3 x termination of pregnancy
Sex	5 x male 3 x female
Number of isolated malformations/MCA	4 x isolated 4 x MCA

Half of the births suffered from concurrent malformations. In three cases we received the information that renal agenesis had been suspected as early as during prenatal ultrasound screening.

Malformation combinations (MCA) or superordinated syndromes detected:

- Edwards Syndrome with: truncus arteriosus communis, VSD, dolichocephalus, polydactyly other syndrome typical external stigmata
- ADAM complex with: limb malformations (amelia und peromelia), thorax- and abdominal wall defect, unilateral lung aplasia, absence of diaphragm, total anomalous pulmonary venous connection, interrupted aortic arch, intestinal position anomaly
- Canalis atrioventricularis communis, unilateral double kindney, duplication of ureter, intestinal malrotation, segmentation defects of the lung
- Clubhand, absence of radius, VSD

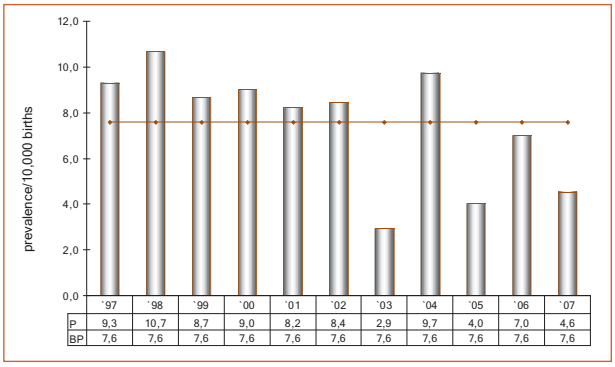


Fig. 31: Development of prevalence/10,000 births with unilateral renal agenesis in the registration area since 1997

In 2007 one renal agenesis, unilateral per 2,196 births was registered in Saxony-Anhalt.

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

	Number	Prevalence /10,000 births	Trend in comp. to basis prevalence
Major cities: 1 x Halle 6 x Magdeburg	7	15.2	↑
Districts: 2 x Anhalt-Bitterfeld 2 x Burgenlandkreis 2 x Boerde 1 x Harz 1 x Mansfeld-Suedharz 2 x Stendal	10	7.7	↔
Saxony-Anhalt	**17**	**9.7**	↔

Cystic Kidney (1997 to 2006)		
	Basic prevalence /10,000 births	**Confidence interval (CI 95%) /10,000 births**
Major cities	10.1	6.8 - 13.5
Districts	8.6	6.9 - 10.2
Region	8.9	7.5 - 10.4
EUROCAT 1995-2004	4.75	1.18 Zagreb (Croatia)* 17.65 Mainz (Germany)**

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

In 2007 17 births with cystic kidneys were registered. This number of births was similar to the registered number of the previous year.

The annual prevalence of 9.7 per 10,000 births is within the confidence area of the previous years.

Compared to the other EUROCAT registries the prevalences of Saxony-Anhalt continue to rane above the average, probably attributable to the fact that in several states prenatal and postnatal screening of the urinary tract is not common and, hence, cystic kidney diseases are diagnosed at an older age.

Additional information:

Pregnancy outcome	16 x live birth 1 x termination of pregnancy
Sex	11 x male 6 x female
Number of isolated malformations/MCA	15 x isolated 2 x MCA

Among the 17 births a total of 15 were diagnosed with a multicyctic dysplastic kidney disease (Potter II). The majority of them did not exhibit any concurrent malformations; only one case was diagnosed with a Meckel-Gruber syndrome.

In 11 cases the presence of cystic kidneys could be documented as early as during pregnancy (between 20 and 36 weeks of gestation).

Malformation combinations (MCA) or superordinated syndromes detected:

- Meckel-Gruber syndrome with: hypoplastic lung, polydactyly, micrognathia
- Ureterocele, megaureter

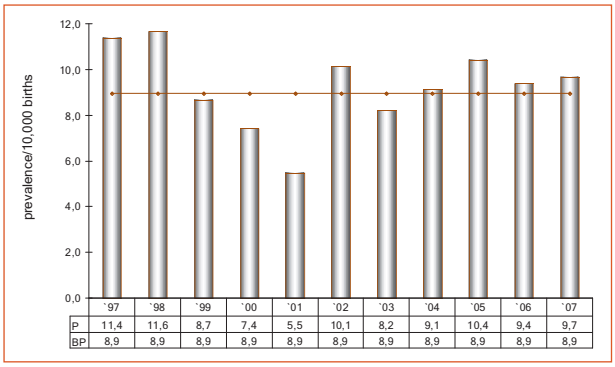


Fig. 32: Development of prevalence/10,000 births with cystic kidneys in the registration area since 1997

In 2007 one cystic kidney per 1,033 births was diagnosed in Saxony-Anhalt.

12.27 Bladder Exstrophy (Q64.1)

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

Bladder Exstrophy (1997 to 2006)		
	Basic prevalence /10,000 births	Confidence interval (CI 95%) /10,000 births
Major cities	0.0	0.0 - 0.0
Districts	0.3	0.0 - 0.5
Region	0.2	0.0 - 0.4
EUROCAT	no data	no data

Again in 2007 there was no birth registered with bladder exstrophy. A comparison of the data collected by the Monitoring of Congenital Malformations since 1980 shows that this rare malformation was found only twice since 2000. Between 1980 and 1999 ten births with bladder exstrophy were registered, five of them being live births.

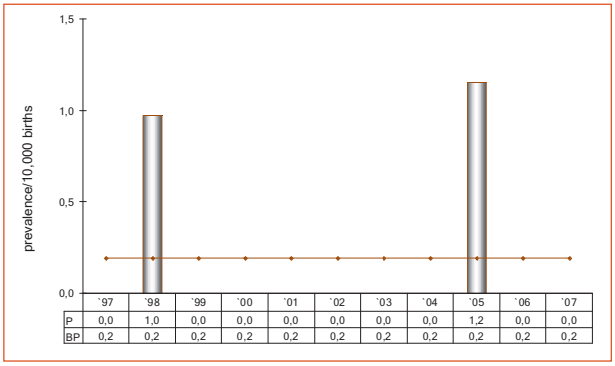


Fig. 33: Development of prevalence/10,000 births with bladder exstropy in the registration area since 1997

In 2007 no birth with a bladder exstrophy was registered in Saxony-Anhalt.

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

	Number	Prevalence /10,000 births	Trend in comp. to basis prevalence
Major cities: 2 x Halle 3 x Magdeburg	5	10.9	↑
Districts: 1 x Altmarkkreis Salzwedel 1 x Burgenlandkreis 3 x Jerichower Land 2 x Saalekreis 1 x Salzlandkreis 1 x Stendal	9	6.9	↑
Saxony-Anhalt	**14**	**8.0**	↑

Preaxial Polydactyly (1997 to 2006)		
	Basic prevalence /10,000 births	**Confidence interval (CI 95%) /10,000 births**
major cities	3.7	1.7 - 5.7
Districts	3.7	2.6 - 4.8
Region	3.7	2.7 - 4.6
EUROCAT	no data	no data

A total of 14 births with preaxial polydactyly was registered in 2007. All births suffered from an accessory thumb.

The 2007 annual prevalence of 8.0 per 10,000 births was clearly above the basic prevalence of the observation period (1997 to 2006).

Comparative EUROCAT data for preaxial polydactyly is not available.

Additional information:

Pregnancy outcome	11 x live birth 2 x live birth deceased during 1st week of life 1 x termination of pregnancy
Sex	10 x male 4 x female
Number of isolated malformations/MCA	8 x isolated 6 x MCA

The majority of cases were live births with an acessory thumb. In one case a Down´s syndrome was found (induced abortion), whereas in two cases the children died as a result of multiple malformations of Patau syndrome and partial trisomy 1q with Potter-sequence, respectively.

Malformation combinations (MCA) or superordinated syndromes detected:

- Patau syndrome with: congenital hydrocephaly, cleft lip with cleft palate bilateral
- Chromosomal aberration (partial trisomy 1q) with: indeterminate sex, Potter sequence, hypoplastic lung, duodenal stenosis, thymushypoplasia, VSD, dolichocephalus, microstomia
- Down´s syndrome
- Embryofetal valproate syndrome with cataracta congenita
- Microcephalus
- Dilatative uropathy second-grade bilateral

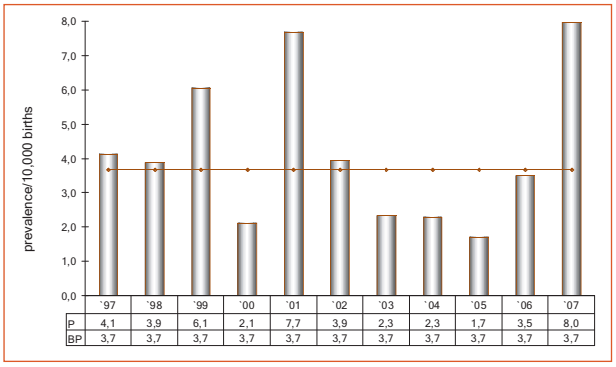


Fig. 34: Development of prevalence/10,000 births with preaxial polydactyly in the registration area since 1997

In 2007 one preaxial polydactyly per 1,255 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 basis prevalence
Major cities: 1 x Dessau-Roßlau 2 x Halle 4 x Magdeburg	7	15.2	↑
Districts: 2 x Anhalt-Bitterfeld 2 x Burgenlandkreis 1 x Boerde 2 x Harz 1 x Jerichower Land 1 x Mansfeld-Suedharz 3 x Saalekreis 1 x Salzlandkreis	13	10.0	↑
Saxony-Anhalt	**20**	**11.4**	↑

Limb Reduction Defects, in total (1997 to 2006)		
	Basic prevalence /10,000 births	**Confidence interval (CI 95%) /10,000 births**
Major cities	8.7	5.7 - 11.8
Districts	8.2	6.6 - 9.8
Region	8.3	6.9 - 9.7
EUROCAT 1996-2005	5.50	2.55 Zagreb (Croatia) / SE Ireland* 12.42 Mainz (Germany)**

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

In 2007 20 births with limb reduction defects were registered. These were all births with missing or underdeveloped limbs.

The actual annual prevalence of 11.4 per 10,000 births is very high compared to the basic prevalence of the years 1997 to 2006.

The annual prevalence was also very high on the European level in 2007.

Additional information:

Pregnancy outcome	15 x live birth 4 x termination of pregnancy 1 x spontaneous abortion
Sex	14 x male 6 x female
Number of isolated malformationsMCA	10 x isolated 10 x MCA

The majority of births were live births. In one case only we received the information that a limb malformation was diagnosed prenatally. Four induced abortions revealed severe and life incapacitating malformations.

Malformation combinations (MCA) or superordinated syndromes detected:

- Roberts syndrome (pseudothalidomide syndrome) with multiple limb malformations, genu recurvatum, dysmorphia
- ADAM-complex with: amelia, thorax- and abdominal wall defect, unilateral lung aplasia, unilateral renal agenesis, total anomalous pulmonary venous connection, interrupted aortic arch, intestine position anomaly
- ADAM complex with: peromelia, syndactyly
- Osteogenesis imperfecta
- Cleft lip with cleft palate, clubhand
- Unilateral renal agenesis, VSD
- Suspicion of syndrome with: clubfoot, segmentation defects of the lung, bifid uvula, craniofacial dysmorphia
- Clubfoot
- Osseous syndactyly
- Genu recurvatum

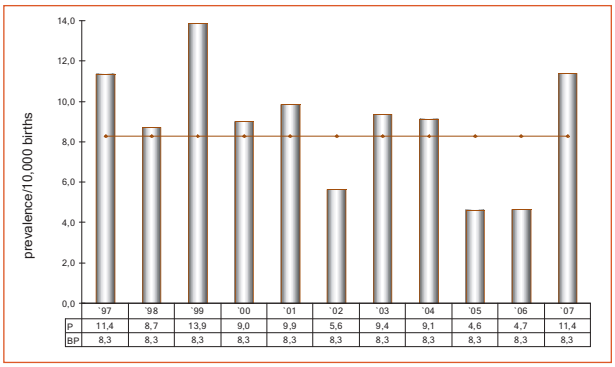


Fig. 35: Development of prevalence/10,000 births with limb reduction defects in total in the registration area since 1997

In 2007 one limb reduction defect per 878 births was registered in Saxony-Anhalt.

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

	Number	Prevalence /10,000 births	Trend in comp. to basis prevalence
Major cities	0	0	↓
Districts: 1 x Altmarkkreis Salzwedel 1 x Jerichower Land 1 x Saalekreis	3	2.3	↔
Saxony-Anhalt	**3**	**1.7**	↔

Diaphragmatic Hernia (1997 to 2006)		
	Basic prevalence /10,000 births	**Confidence interval (CI 95%) /10,000 births**
Major cities	3.9	1.9 - 6.0
Districts	2.0	1.2 - 2.8
Region	2.4	1.7 - 3.2
EUROCAT 1996-2005 (Q79.0)	2.31	0.95 Wielkopolska (Poland)* 4.99 Paris (France)**

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

A diaphragmatic hernia was diagnosed in three births from the districts in 2007.

The annual prevalence of 1.7 per 10,000 births was within the lower range of the basic prevalence of the years 1997 to 2006.

The 2007 prevalence was slightly below the average of the European malformation registries

Additional information:

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

In one case diaphragmatic hernia was not diagnosed prenatally. The child was born in the 38th week of gestation and developed respiratory insufficiency such that it had to be transferred to a perinatal centre. In another case the diagnosis was made prenatally facilitating immediate treatment of the newborn in a perinatal centre.

Malformation combinations (MCA) or superordinated syndromes detected:

- ADAM complex with: limb malformations (amelia and peromelia), thorax- and abdominal wall defect, unilateral lung aplasia, unilateral renal agenesis, total anomalous pulmonary venous connection, interrupted aortic arch, intestine position anomaly

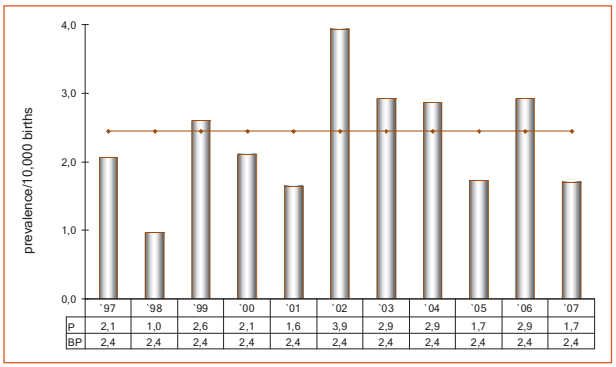


Fig. 36: Development of prevalence/10,000 births with diaphragmatic hernia in the registration area since 1997

In 2007 one diaphragmatic Hernia per 5,856 births was registered in Saxony-Anhalt.

12.31 Omphalocele (Q79.2)

	Number	Prevalence /10,000 births	Trend in comp. to basis prevalence
Major cities	0	0	↓
Districts: 2 x Harz 1 x Jerichower Land 1 x Mansfeld-Suedharz 1 x Saalekreis 1 x Salzlandkreis	6	4.6	↔
Saxony-Anhalt	**6**	**3.4**	↔

Omphalocele (1997 to 2006)		
	Basic prevalence /10,000 births	**Confidence interval (CI 95%) /10,000 births**
Major cities	3.4	1.5 - 5.3
Districts	3.6	2.5 - 4.7
Region	3.5	2.6 - 4.5
EUROCAT 1996-2005	2.40	0.50 ISMAC (Spain() 6.06 Mainz (Germany)**

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

With six births with omphalocele registered in 2007 the occurrence of this malformation remained constant. It is interesting that, as in the year before, omphalocele only occurred in births from the districts.

The annual prevalence of 3.4 per 10,000 births was within the middle range of the basic prevalence.

Comparing the annual prevalence with the average European prevalence, the value was also within the middle range.

Additional information:

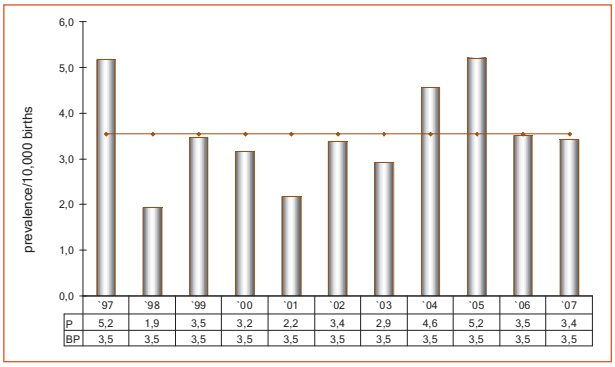
Pregnancy outcome	4 x live birth 2 x termination of pregnancy
Sex	2 x male 4 x female
Number of isolated malformations/MCA	3 x isolated 3 x MCA

Both terminations of pregnancy were carried out in the 15th and 20th week of gestation, respectively. The reason in the first case was trisomy 18 detected by amniocentesis. In the second case omphalocele occurred isolated.

We were informed that in one case of the live births omphalocele had been diagnosed prenatally. The child with the Down´s syndrome was sonografically diagnosed with a clubfoot as well as a pancreas anulare. The Down´s syndrome was diagnosed postnatally.

Malformation combinations (MCA) or superordinated syndromes detected:

- Edwards syndrome with: coarctation of aorta, intestinal malrotation, VSD, ASD, lung segmentation defects, horseshoe kidney and other typical external stigmata
- Down´s syndrome with: pancreas anulare, clubfoot, hearing loss
- Microcephalus



	`97	`98	`99	`00	`01	`02	`03	`04	`05	`06	`07
P	5,2	1,9	3,5	3,2	2,2	3,4	2,9	4,6	5,2	3,5	3,4
BP	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5

Fig. 37: Development of prevalence/10,000 births with omphalocele in the registration area since 1997

In 2007 one omphalocele per 2,928 births was registered in Saxony-Anhalt.

12.32 Gastroschisis (Q79.3)

	Number	Prevalence /10,000 births	Trend in comp. to basis prevalence
Major cities	0	0	↓
Districts: 1 x Anhalt-Bitterfeld 2 x Harz 1 x Mansfeld-Suedharz 1 x Salzlandkreis	5	3.9	↔
Saxony-Anhalt	**5**	**2.8**	↓

Gastroschisis (1997 to 2006)		
	Basic prevalence /10,000 births	**Confidence interval (CI 95%) /10,000 births**
Major cities	5.1	2.7 - 7.4
Districts	3.8	2.7 - 4.8
Region	4.1	3.1 - 5.1
EUROCAT 1996-2005	1.87	0.39 ECEMC (Spain)* 6.67 Mainz (Germany)**

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

Five live births from the districts with gastroschisis were registered in Saxony-Anhalt in 2007. Compared to the last year this was a slight decrease of births with gastroschisis.

Hence the actual annual prevalence of 2.8 per 10,000 births was slightly below the basic prevalence of the years 1997 to 2006.

However, compared to other European malformation registers the actual prevalence has remained within the middle and upper range.

Additional information:

Pregnancy outcome	5 x live birth
Sex	3 x male 2 x female
Number of isolated malformations/MCA	2 x isolated 3 x MCA

In all children gastroschisis was diagnosed during the prenatal ultrasound screening in the second trimester. All children were born as scheduled in perinatal centres (33 to 37 weeks of gestation).

Apart from Gastrochisis three children also suffered from at least one major concurrent malformation.

Malformation combinations (MCA) or superordinated syndromes detected:

- Intestinal atresia n.o.s.
- Duplex kidney, PFO at full-term infant
- ASD, malformation of a great vessel n.o.s.

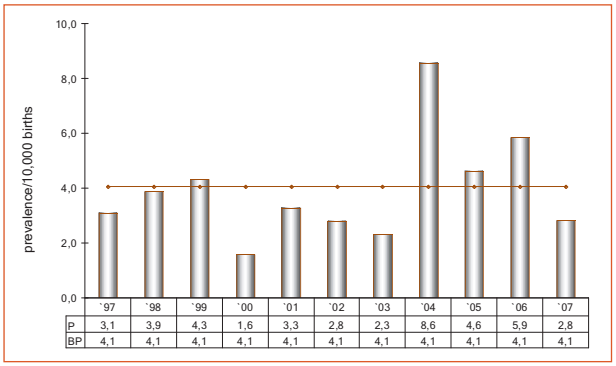


Fig. 38: Development of prevalence/10,000 births with gastroschisis in the registration area since 1997

In 2007 one gastroschisis per 3,514 births was registered in Saxony-Anhalt.

12.33 Prune Belly Sequence (Q79.4)

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

Prune Belly Sequence (1997 to 2006)		
	Basic prevalence /10,000 births	Confidence interval (CI 95%) /10,000 births
Major cities	0.8	-0.1 - 1.8
Districts	0.9	0.4 - 1.5
Region	0.9	0.4 - 1.4
EUROCAT	no data	no data

As in the year before there was no birth registered with abdominal wall aplasia in 2007.

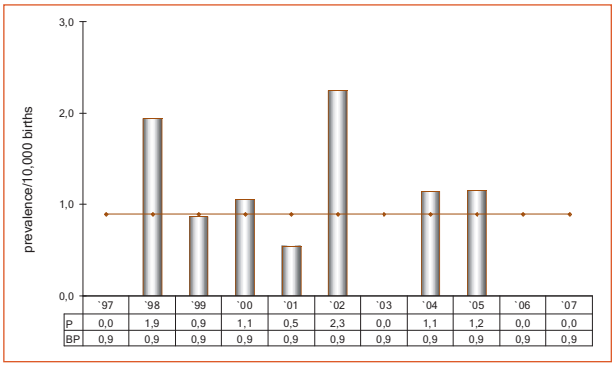


Fig. 39: Development of the prevalence/10,000 births with a prune belly sequence in the registration area since 1997

In 2007 there was no birth with prune belly sequence registered in Saxony-Anhalt.

12.34 Down´s Syndrome - Trisomy 21 (Q90.)

	Number	Prevalence /10,000 births	Trend in comp. to basis prevalence
Major cities: 1 x Dessau-Roßlau 5 x Magdeburg	6	13.0	↓
Districts: 2 x Altmarkkreis Salzwedel 3 x Anhalt-Bitterfeld 3 x Burgenlandkreis 2 x Boerde 6 x Harz 3 x Jerichower Land 1 x Saalekreis	20	15.4	↔
Saxony-Anhalt	**26**	**14.8**	↔

Down´s syndrome (1997 to 2006)		
	Basic prevalence /10,000 births	Confidence intervall (CI 95%) /10,000 births
Major cities	21.1	16.4 - 25.9
Districts	15.0	12.8 - 17.2
Region	16.4	14.4 - 18.4
EUROCAT 1996-2005	17.49	7.90 S Portugal* 37.97 Paris (France)**

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

In 2007 26 births with a Down´s syndrome were registered. A comparison between the big cities and the districts does not show any major difference.

The annual prevalence of 14.8 per 10,000 births was within the lower range of the basic prevalence of the years 1997 to 2006.

With reference to the prevalences of the EUROCAT centers, the value of Saxony-Anhalt was in the middle range.

Additional information:

Pregnancy outcome	14 x live birth 12 x termination of pregnancy
Sex	15 x male 11 x female
Number of isolated malformations/MCA	12 x isolated 14 x MCA

The average maternal age of live births with a Down´s syndrome was 30.7 years (21 to 38 years). The average maternal age of the termination of pregnancy was 33.3 years (24 to 42 years).

Twelve children/foetuses suffered from isolated Down´s syndrome, the other 14 births also exhibited major concurrent malformations in addition to the typical stigmata. Eight children/foetuses suffered from vitium cordis.

Malformation combinations (MCA) or superordinated syndromes detected:

- Omphalocele, clubfoot, pancreas anulare, hearing loss
- Anal atresia
- Preaxial polydactyly
- Microcephaly
- Canalis atrioventricularis communis, VSD, PFO at full-term infant, undescended testis
- Oesophagusatresia, VSD
- Atrial and ventrical septal defect, VSD, persistent vena cava superior
- VSD, pulmonary valve stenosis, PFO at full-term infant
- VSD, ASD, PDA, hydronephrosis
- VSD
- PFO at full-term infant
- Vitium cordis n.o.s.
- Turricephaly, lung segmentation defect
- Hearing loss

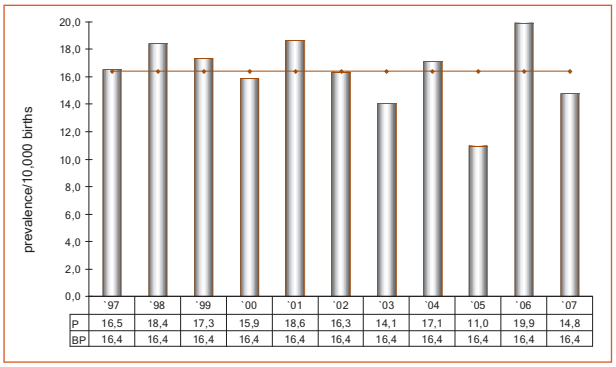


Fig. 40: Development of prevalence/10,000 births with a Down´s syndrome in the registration area since 1997

In 2007 one Down´s Syndrome (Trisomy 21) per 676 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 basis prevalence
Major cities:	0	0	↓
Districts: 1 x Altmarkkreis Salzwedel 1 x Burgenlandkreis	2	1.5	↔
Saxony-Anhalt	**2**	**1.1**	↔

Patau Syndrome(19967 to 2006)		
	Basic prevalence /10,000 births	Confidence interval (CI 95%) /10,000 births
Großstädte	2.0	0.5 - 3.4
Landkreise	1.1	0.5 - 1.7
Region	1.3	0.7 - 1.9
EUROCAT 1996-2005	1.38	0.24 Poland* 4.22 Paris (France)**

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

Two births from the districts with a Patau syndrome were registered in 2007.

The annual prevalence of 1.1 per 10,000 births is within the basic prevalence of the years 1997 to 2006 and also within the average European range.

Additional information:

Pregnancy outcome	1 x termination of pregnancy 1 x live birth deceased during 1st week of life
Sex	2 x male
Number of isolated malformations/MCA	2 x MCA

In one case, where the mother was older than 35, an invasive prenatal diagnostics was carried after 16 weeks of gestation. The diagnosis of the Patau syndrome could be genetically confirmed.
In the second case severe hydrocephaly was diagnosed after 20 weeks of gestation. Subsequent amniocentesis revealed Trisomy 13 with Robertsonian translocation. The child was born alive after 41 weeks of gestation but died immediately after the birth.
Both births suffered from typical multiple malformations.

Malformation combinations (MCA) or superordinated syndromes detected:

- Congenital hydrocephaly, cleft lip with cleft palate bilateral, preaxial polydactyly
- Arhinencephaly, cleft lip with cleft palate, polydactyly

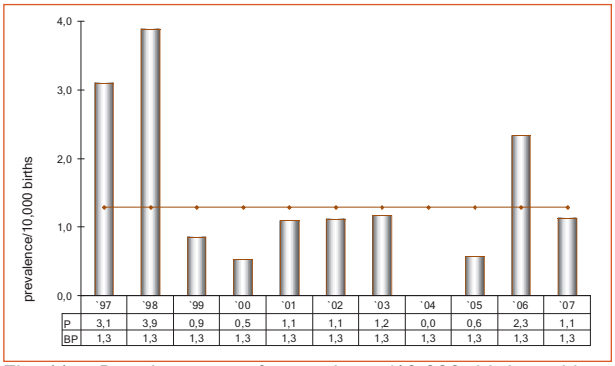


Fig. 41: Development of prevalence/10,000 births with a Patau syndrome in the registration area since 1997

In 2007 one Patau syndrome (Trisomy 13) per 8,785 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 basis prevalence
Major cities	0	0	↓
Districts: 1 x Altmarkkreis Salzwedel 1 x Boerde 1 x Harz 1 x Saalekreis 1 x Salzlandkreis 1 x Wittenberg	6	4.6	↑
Saxony-Anhalt	**6**	**3.4**	↔

Edwards Syndrome (1997 to 2006)		
	Basic prevalence /10,000 births	**Confidence interval (CI 95%) /10,000 births**
Major cities	4.6	2.1 - 6.4
Districts	2.7	1.7 - 3.6
Region	3.0	2.2 - 3.9
EUROCAT 1996-2005	3.43	0.63 ECEMC (Spain)* 10.87 Paris (France)**

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

Six births with an Edwards syndrome were registered in the year 2007.

The annual prevalence of 3.4 per 10,000 births was within the middle range of the basic prevalence of the years 1997 to 2006 as well as within the average European range.

Additional information:

Pregnancy outcome	5 x termination of pregnancy 1 x spontaneous abortion
Sex	1 x male 5 x female
Number of isolated malformations/MCA	2 x isolated 4 x MCA

In 2007 on case of gynaecotropism was confirmed. Five terminations of pregnancy were carried out between 18 and 21 weeks of gestation and one case there was a spontaneous abortion after 16 weeks of gestation with generalized hydrops. Another birth only suffered from minor stigmata. For the other foetuses concurrent malformations were documented.

Malformation combinations (MCA) or superordinated syndromes detected:

- Omphalocele, coarctation of aorta, VSD, ASD, horsesho kidney, hypoplastic lung, lung segmentation defect, intestinal malrotation
- Coarctation of aorta, vena cava inferior stenosis, pulmonal arterial dilatation, horseshoe kidney, lung segmentation defect
- Truncus arteriosus communis, VSD, agenesis of kidney unilateral, dolichocephalus, postaxial polydactyly
- Clubfoot, adrenal gland hypoplasia

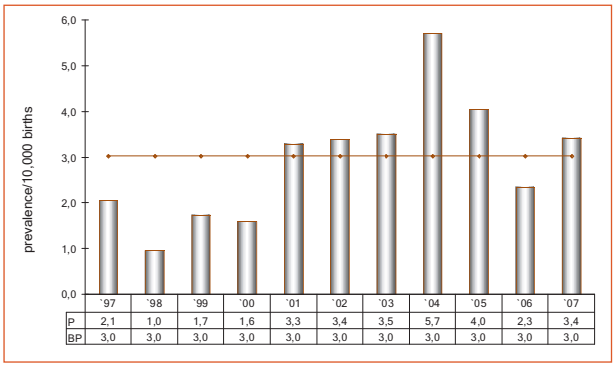


Fig. 42: Development of prevalence/10,000 births with Edwards syndrome in the registration area since 1997

In 2007 one Edwards syndrome (Trisomy 18) per 2,928 births was registered in Saxony-Anhalt.

12.37 Indicator Malformations - Summary

Considering the indicator malformations (as defined in Chapter 12.0), Saxony-Anhalt's 2007 rate of 1.4% (with reference to all births) was the lowest since 2000 (2006: 1.6%; 2005: 1.5%). A total of 243 births with indicator malformations was registered.

	Number	Percentage (%)
Major cities	62	1.3
Districts	181	1.4
Saxony-Anhalt	**243**	**1.4**

With a rate of 1.3% the occurrence in the big cities was lower than in the districts. Figure 43 shows a comparison between the big cities and the districts for the past years.

Comparing the three big city regions of Saxony-Anhalt in 2007, Magdeburg exhibited a clearly higher indicator malformation rate with 1.9% compared to Halle and Dessau-Rosslau with 1.0% each.

Among the individual districts the rate of Jerichower Land, i.e. 2.2%, was more than ten times higher than the indicator malformation rate of Wittenberg with 0.2% (Fig. 44 on page 65). This may be attributable to underreporting of indicator malformations in the latter districts, however these are also regions where the birth rate is rather low and, therefore, the occurrence of infrequent malformations strongly varies.

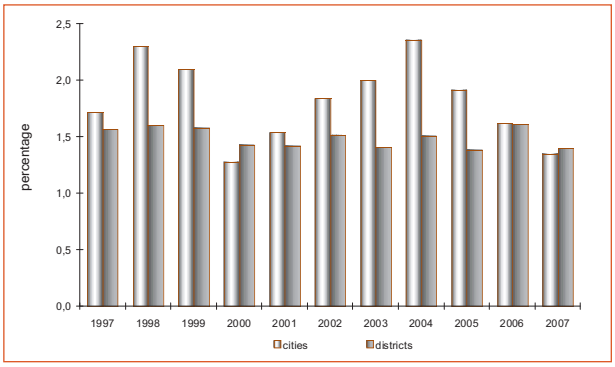


Fig. 43: Total number of indicator malformations of the ICBDSR (1997 to 2007), comparison of frequency (%) in the major cities and districts

The total number of births with indicator malformations was lower than in the previous year (2006: 275).

Considering indicator malformations, the annual prevalence was lower in a few cases, such as for microcephalus and tetralogy of Fallot.

Evidently very high prevalences were determined for preaxial polydactyly and limb reduction malformations. Therefore, we will elaborate on limb malformations separately in Chapter 16 of our Annual Report.

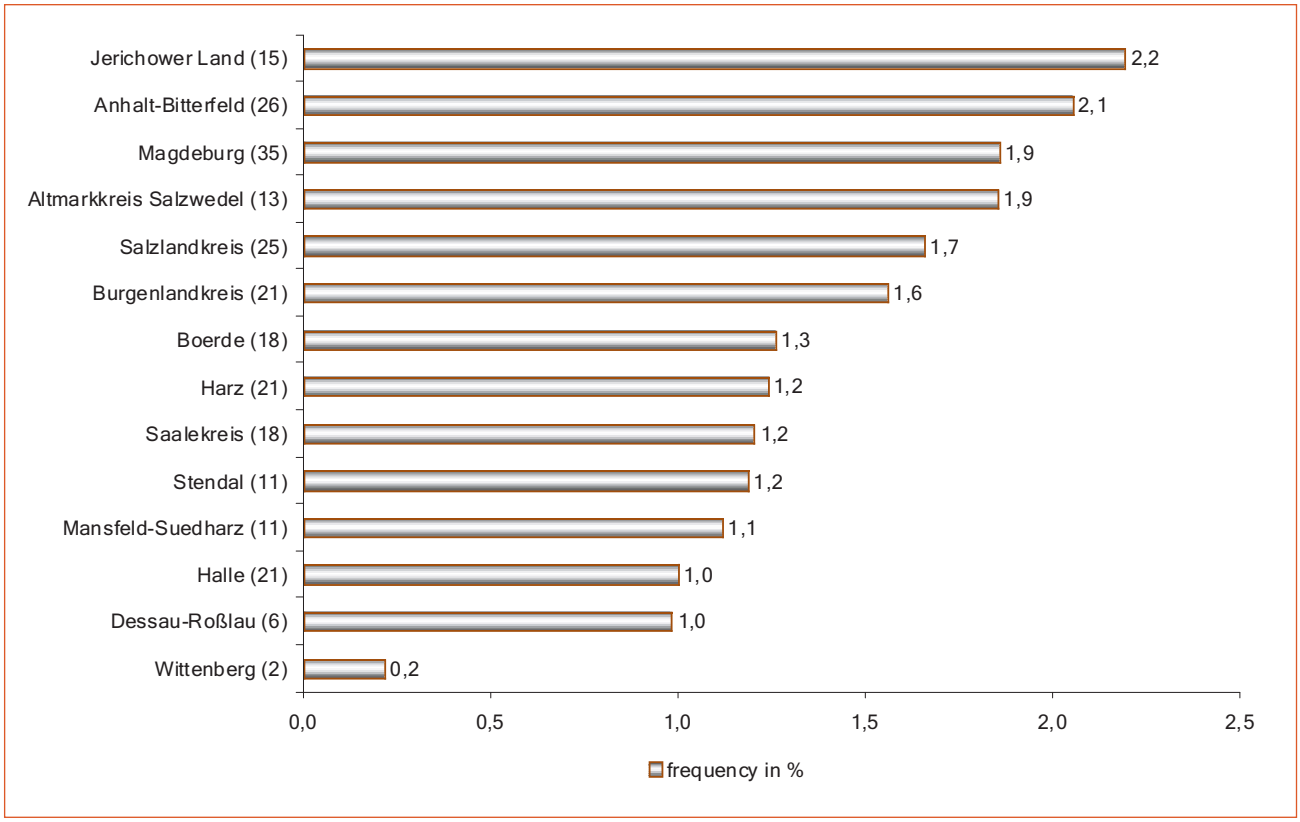


Fig. 44: Rate of all births with indicator malformations in the districts and big cities 2007

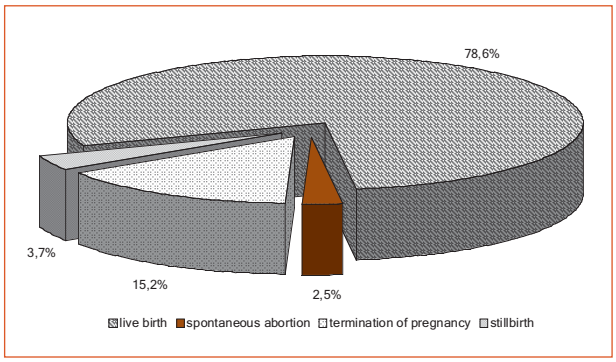


Fig. 45: Pregnancy outcome of births with indicator malformations in 2007

A total of 191 of the 243 births with indicator malformations were live births. This corresponds to a percentage of 78.6%.

The number of induced abortions due to an indicator malformation was 37, most of the cases being foetuses with chromosomal aberrations and CNS-malformations. With 15.2% the percentage of induced abortions was similar to the value of the previous year (2006: 15.6%).

Indicator malformations were found in six spontaneous abortions from 16 weeks of gestations (2.5%) and in nine stillbirths (3.7%).

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

	Number	Prevalence /10,000 births	Trend in comp. to basis prevalence
Major cities	0	0	↓
Districts: 1 x Burgenlandkreis 1 x Saalekreis	2	1.5	↔
Saxony-Anhalt	**2**	**1.1**	↔

Arhinencephaly/Holoprosencephaly (1997 to 2006)		
	Basic prevalence /10,000 births	**Confidence interval (CI 95%) /10,000 births**
Major cities	1.7	0.3 - 3.0
Districts	1.3	0.7 - 2.0
Region	1.4	0.8 - 2.0
EUROCAT 1996-2005	1.22	0.33 Wielkopolska (Poland)* 4.24 Mainz (Germany)*

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

In 2007 there was one live birth with diagnosed holoprosencephaly and one foetus with arhinencephaly. Both diagnoses are summarised in this indicator malformation.

The annual prevalence of 1.1 per 10,000 births lies within the basic prevalence of the years 1997 to 2006.

This annual prevalence is also within the average European range.

Additional Information:

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

During prenatal diagnostics a Dandy-Walker syndrome and a ventriculomegaly were diagnosed in the live birth with holoprosencephaly in the 17th week of gestation.

Due to the age of the mother of the foetus with Patau syndrome, i.e. > 35, invasive prenatal diagnostic tests were performed in the 16th week of gestation. After the chromosomal disorder had been established, pregnancy was terminated.

Malformation combinations (MCA) or superordinated syndromes detected:

- Patau syndrome with: cleft lip with cleft upper jaw and palate, polydactyly
- Corpus callosum agenesis, megacisterna magna

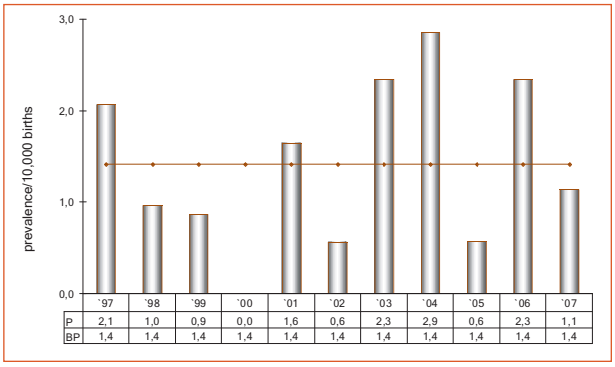


Fig. 13: Development of prevalence/10,000 births with arhinencephalie/holoprosencephalie in the registration area since 1997

In 2007 one case of arhinencephaly/holoprosencephaly per 8,785 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 basis prevalence
Major cities	0	0	↔
Districts: 1 x Saalekreis	1	0.8	↔
Saxony-Anhalt	**1**	**0.6**	↔

Anophthalmos/Microphthalmos (1997 to 2006)		
	Basic prevalence /10,000 births	**Confidence interval (CI 95%) /10,000 births**
Major cities	0.8	-0.1 - 1.8
Districts	0.8	0.3 - 1.4
Region	0.8	0.4 - 1.3
EUROCAT 1996-2005	1.10	0.34 Zagreb (Croatia)* 3.10 Odense (Denmark)**

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

In 2007 only one child was registered for microphthalmos.

The annual prevalence of 0.6 per 10,000 births lies in the lower confidence range of the years 1997 to 2006 in Saxony-Anhalt.

EUROCAT indicates an average prevalence of 1.1 per 10,000 births for this rare malformation

Additional Information:

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

The child with the bilateral microphthalmia was a premature birth of 32 weeks of gestation. Already in the 20th week of gestation the microphthalmos was diagnosed during the prenatal ultrasound screening. The malformation report we received suspected a teratogenic medicine effect. The mother of the child suffered from an anxiety disorder that was treated with an antidepressant suspected of causing congenital malformations.

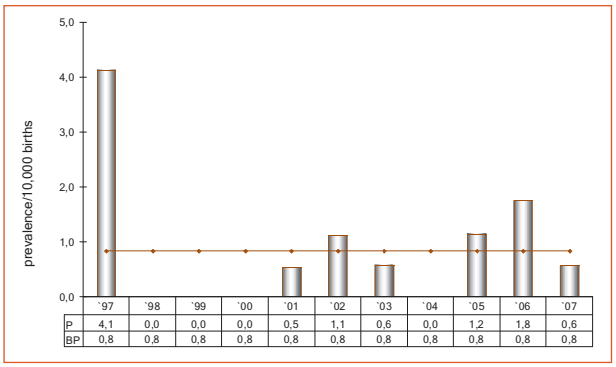


Fig. 14: Development of prevalence/10,000 births with anophthalmos/microphthalmos in the registration area since 1997

In 2007 one child with anophthalmos/microphthalmos per 17,569 births was registered in Saxony-Anhalt.

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

	Number	Prevalence /10,000 births	Trend in comp.to basis prevalence
Major cities: 1 x Magdeburg	1	2.2	↔
Districts: 1 x Anhalt-Bitterfeld	1	0.8	↔
Saxony-Anhalt	**2**	**1.1**	↔

Microtia/Anotia (1997 to 2006)		
	Basic prevalence /10,000 births	Confidence interval (CI 95%) /10,000 births
Major cities	1.1	0.0 - 2.2
Districts	1.3	0.7 - 2.0
Region	1.3	0.7 - 1.9
EUROCAT	no data	no data

Last year no child with a microtia/anotia was registered in Saxony-Anhalt, but in 2007 two children were born with this infrequent malformation.

The calculated current annual prevalence of 1.1 per 10,000 births lies within the basic prevalence of the years 1997 to 2006.

Unfortunately, EUROCAT has not published comparative figures for the anotia/microtia.

Additional Information:

Pregnancy outcome	2 x live birth
Sex	2 x male
Number of isolated malformations/MCA	2 x MCA

Both full-term infants registered suffered from an unilateral microtia. Suspicious facts are neither reported regarding the family anamnesis nor the course of pregnancy. Both children are undergoing pedaudiologic treatment.

Malformation combinations (MCA) or superordinated syndromes detected:

- 2 x unilateral acoustic meatus atresia with resulting conductive hearing loss, 1 x preauricular tag

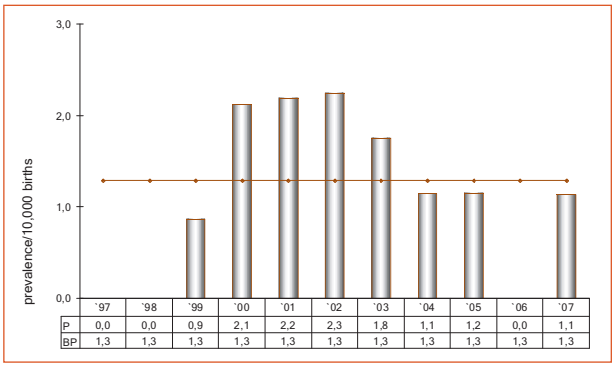


Fig. 15: Development of prevalence/10,000 births with microtia/anotia in the registration area since 1997

In 2007 one child with microtia/anotia per 8,785 births was registered in Saxony-Anhalt.

12.10 Tetralogy of Fallot (Q21.3)

	Number	Prevalence /10,000 births	Trend in comp. to basis prevalence
Major cities: 1 x Halle	1	2.2	↔
Districts: 1 x Altmarkkreis Salzwedel	1	0.8	↓
Saxony-Anhalt	**2**	**1.1**	↓

Tetralogy of Fallot (1997 to 2006)		
	Basic prevalence /10,000 births	**Confidence interval (CI 95%) /10,000 births**
Major cities	3.4	1.5 - 5.3
Districts	3.3	2.3 - 4.4
Region	3.3	2.4 - 4.3
EUROCAT 1996-2005	2.69	1.00 ECEMC (Spain)* 5.95 NORCAS (UK)**

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

With two births the occurrence of tetralogy of Fallot was comparatively rare in 2007.

The annual prevalence of 1.1 per 10,000 births was lower than in the previous years. Only in 2000 the same number of cases was registered. Therefore, the calculated annual prevalence is below under the confidence interval. As the European comparison shows, it occupies a lower position among the prevalences.

Additional Information:

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

The comparison of the sex ratio shows a homogeneous distribution; both children were live births.

Information about prenatal diagnostics are not available for both cases.

In one child postnatal diagnostic tests revealed a chromosomal disorder.

Malformation combinations (MCA) or superordinated syndromes detected:

- CATCH 22 (Deletion 22.q11.2)

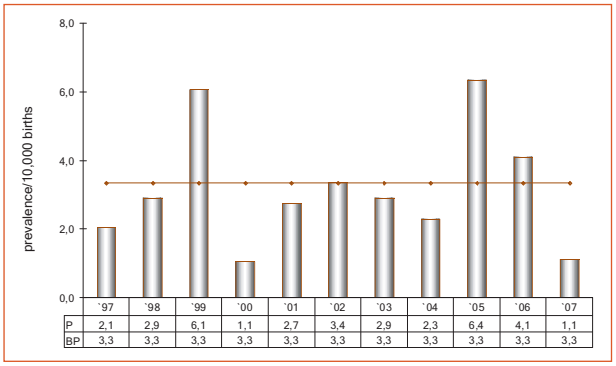


Fig. 16: Development of prevalence/10,000 births with tetralogy of Fallot in the registration area since 1997

In 2007 one tetralogy of Fallot per 8,785 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 basis prevalence
Major cities: 2 x Halle 1 x Magdeburg	3	6.5	↔
Districts: 1 x Anhalt-Bitterfeld 1 x Salzlandkreis	2	1.5	↓
Saxony-Anhalt	**5**	**2.8**	↓

Transposition of great vessels (1997 to 2006)		
	Basic prevalence /10,000 births	**Confidence interval (CI 95%) /10,000 births**
Major cities	6.5	3.8 - 9.1
Districts	5.1	3.8 - 6.4
Region	5.4	4.3 - 6.6
EUROCAT 1996-2005	2.73	0.82 Central East France* 5.24 Cork & Kerry (Ireland)**

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

Five births with transposition of great vessels were registered in 2007. The comparison of big cities and districts reveals a higher occurrence in the big cities.

The annual prevalence of 2.8 pro 10,000 births is rather low again compared to the previous year and even lower compared to the basic prevalence of the years 1997 to 2006; however, it is still within the average European range.

Additional Information:

Pregnancy outcome	5 x live birth
Sex	4 x male 1 x female
Number of isolated malformations/MCA	1 x isolated 4 x MCA

During prenatal diagnostics TGV was diagnosed sonographically in one birth as early as in the 23rd week of gestation. Additional malformations found in other births, included AV canal and hypoplastic left heart syndrome as well as multiple cardiac syndromes in one case.

One child was born in a peripheral hospital, and hence it must be assumed that the TGV diagnosis was prenatally not known.

Only one child suffered from an isolated TGV. In all the other cases it was mainly associated with additional cardiac malformations.

Malformation combinations (MCA) or superordinated syndromes detected:

- Hypoplastic left heart syndrome, atresia of the aorta
- Coarctation of aorta, VSD, ASD, right aortic arch, tricuspid insufficiency
- Canalis atrioventricularis communis, total anomalous pulmonary venous connection, pulmonary valve stenosis, persistent vena cava superior, ectopic situated liver, asplenia, dysplastic pancreas
- VSD, ASD, hypoplasia of the aorta

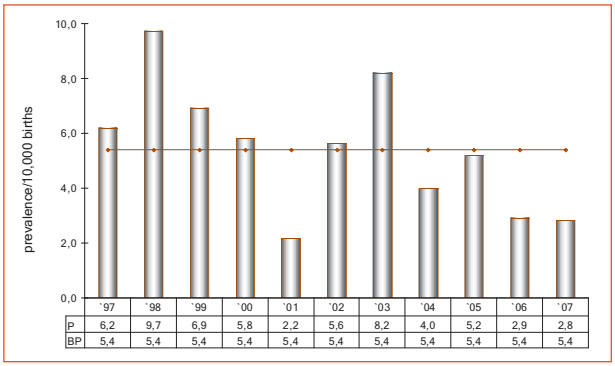


Fig. 17: Development of prevalence/10,000 births with transposition of great vessels in the registration area since 1997

In 2007 one transposition of great vessels per 3,514 births was registered in Saxony-Anhalt.

12.12 Hypoplastic Left Heart Syndrome (Q23.4)

	Number	Prevalence /10,000 births	Trend in comp. to basis prevalence
Major cities: 2 x Halle	2	4.3	↑
Districts: 1 x Anhalt-Bitterfeld 1 x Wittenberg	2	1.5	↓
Saxony-Anhalt	**4**	**2.3**	↓

Hypoplastic left heart syndrome (1997 to 2006)		
	Basic prevalence /10,000 births	**Confidence interval (CI 95%) /10,000 births**
Major cities	2.3	0.7 - 3.8
Districts	3.8	2.7 - 4.9
Region	3.5	2.5 - 4.4
EUROCAT 1996-2005	2.24	0.47 ECEMC (Spain)* 4.85 Mainz (Germany)**

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

The occurrence of the hypoplastic left heart syndrome was similar to the previous years. For the first time again a comparison between the big cities and the districts shows a higher rate for the big cities not observed in the years before.
The annual prevalence of 2.3 per 10,000 births is below the basic prevalence of the years 1997 to 2006.

Compared to the EUROCAT figures the annual prevalence of Saxony-Anhalt lies within the average range

Additional Information:

Pregnancy outcome	1 x live birth 1 x spontaneous abortion 1 x termination of pregnancy 1 x stillbirth
Sex	4 x male
Number of isolated malformations/MCA	3 x isolated 1 x MCA

The comparison of the sex ratio shows an androtropism; no female child was born.
In two cases the hypoplastic left heart syndrome was detected in the course of prenatal diagnostics. As a result, an induced abortion was carried out in one case; the second case was a stillbirth. In two cases we have no information about prenatal ultrasound screening results.

Malformation combinations MCA) or superordinated syndromes detected:

- Double outlet right ventricle

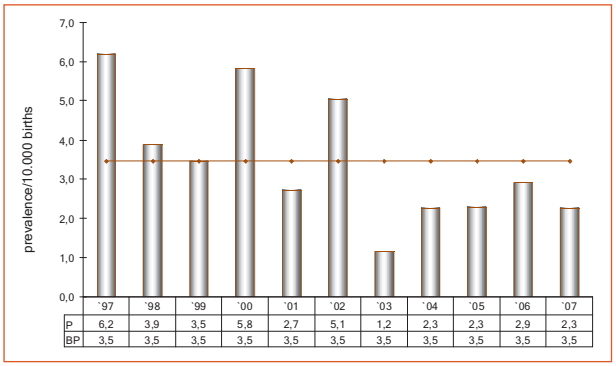


Fig. 18: Development of prevalence/10,000 births with hypoplastic left heart syndrome in the registration area since 1997

In 2007 one child with a hypolastic left heart syndrome per 4,392 births was registered in Saxony-Anhalt.

13 Analysis of the Registered Genetically Caused Diseases, Sequences, Complexes, Embryopathies and Chromosomal Aberrations

The analysis of the malformations resp. malformation combinations allows a classification into the above mentioned categories by the presence of additional information like, for example, genetic results, data of the pregnancy resp. neonatal period.

The sex ratio is outlined in the mentioned categories, the pregnancy outcome as well as the maternal age at the point of delivery resp. at the end of pregnancy.

13.1 Chromosomal Aberrations

Following chromosomal aberrations were registered:

- 26 x Down´s syndrome (trisomy 21), of them
  - 20 x meiotic nondisjunction
  - 6 x n.o.s. (exact karyotype unknown)
- 6 x Edwards syndrome (trisomy 18), of them
  - 6 x meiotic nondisjunction
- 2 x Patau syndrome (trisomy 13), of them
  - 1 x meiotic nondisjunction
  - 1 x translocation (46,XY, rob(13,14) (q10,q10), +13)
- 3 x Ullrich-Turner-syndrome, of them
  - 2 x 45,X0
  - 1 x mosaic 46,XX, 45,X0
- 1 x Klinefelter´s syndrome (47,XXY)
- 1 x partial trisomy 1q, (46,XX, the(13)t(1,13) (q31,34)) with Potter sequence
- 1 x mosaic, cell lines with different number of X-chromosomes, karyotype 46,XX/47,XXX
- 1 x partial monosomy at the long arm chromosom 4 and partial trisomy short arm chromosom 6, karyotype 46,XY,+6p?,4q-)
- 1 x Cri-du-chat syndrome; deletion short arm chromosom 5 and unbalanced translocation and insertion (4p), karyoptype 46,XY,+4p,del 5p15.2
- 1 x CATCH 22 (deletion 22q11.2) with tetralogy of fallot
- 2 x Deletions, only visible during the prometaphase
  - 1 x partial deletion chromosom 15, karyotype 46,XY, the(15)t(15:?)(q26.1:?)
  - 1 x partial deletion chromosom 15 with Prader-Willi-syndrome, karyotype 46,XY.ish del (15)(q11q13) (SNRPN-)
- 1 x Roberts syndrome (Pseudothalidomid syndrome)

A total number of 46 children/foetuses with chromosomal aberrations were registered. The sex ratio is nearly balanced.

Sex distribution:

Sex	Number	Percentage (%)
male	24	52.2
female	22	47.8
total	**46**	**100**

Sex ratio m : f = 1.1

The trisomies are forming a percentage of 76.1% of the chromosomal aberrations. The very high percentage of the trisomy 21 that was observed in the previous year (2006: 64.2%) amounts to 56.5% in the actual year and continues to be rated very high.

In 29 of 46 cases (63.0%) an amniocentesis took place. Because of the result a termination of pregnancy was effected in 21 cases (45.6%). A bit more than half of the children (52.2%) with a conspicuous chromosomal result were live births. It is to underline that in eight cases (33.3%) a pathologic chromosomal result was known after the amniocentesis and the women/families decided to deliver the child.

Pregnancy outcome:

Pregnancy outcome	Number	Percentage (%)
Live births	24	52.2
Terminations of pregnancy	21	45.6
Spontaneous abortions as from 16 weeks of gestation	1	2.2
Stillbirths	-	-
total	**46**	**100**

The average age of the affected women was about 31.8 years. In comparison to the previous years a development to a younger age is observed (2006: 32.9 years; 2005: 33.4 years). The percentage of women who are older than 35 lies constantly at 47.9%.

Age of the pregnant women:

Age group	Number	Percentage (%)
20 to 24 years	10	21.7
25 to 29 years	8	17.4
30 to 34 years	6	13.0
35 to 39 years	17	37.0
older than 40 years	5	10.9
total	**46**	**100**

13.2 Genetically Caused/Partly Caused Diseases

This chapter shows births with genetically caused diseases. But children with metabolic defects resp. endocrine disorders, which were registered by the newborn screening, are separately covered in chapter 18.

Following malformations resp. diseases were registered:

- 2 x Achondroplasia
- 1 x Aplasia cutis congenita
- 6 x Arnold-Chiari-syndrome (1 x with schizencephaly)
- 2 x Arthrogryposis multiplex congenita (of them 1 x Escobar-syndrome)
- 1 x Hirschsprung´s disease with Waardenburg-Shah-syndrome (WS type IV)
- 1 x Holoprosencephaly-syndrome
- 4 x Hypoplastic left heart syndrome
- 1 x Incontinentia pigmenti (Bloch-Sulzberger-syndrome)
- 1 x Joubert-syndrome
- 1 x Meckel-Gruber-syndrome
- 3 x Osteogenesis imperfecta (1 x type II Vrolik)
- 1 x Polysyndactyly
- 1 x Thanatophoric dyslasia type I

Sex distribution:

Sex	Number	Percentage (%)
male	17	68.0
female	8	32.0
total	**25**	**100**

Sex ratio m : f = 2.1

25 births with a genetically caused/partly caused disease resp. malformation were registered in the year 2007. For this reason the number of concerned births is higher than in the last year (2006: 20 births). An androtropism is clearly recognizable in the current year with a value of 2.1. In 2006 this was not observed.

56 % of the concerned births were live births, in 36 % of the cases a termination of pregnancy was effected. In contrast to the current year almost 80 % of the children were live births in the year 2006. The reason is a better prenatal diagnostics, elected by the women as a preventive examination. Thereby the diagnoses of an Arnold-Chiari syndrome in three cases, an arthrogryposis multiplex congenita, an osteogenesis imperfecta and a thanatophoric dysplasia type I was possible in one case.

Pregnancy outcome:

Pregnancy outcome	Number	Percentage (%)
Live births	14	56.0
Terminations of pregnancy	9	36.0
Spontaneous abortions as from 16 weeks of gestation	1	4.0
Stillbirths	1	4.0
total	**25**	**100**

Age of the pregnant women:

Age group	Number	Percentage (%)
20 to 24 years	4	16.0
25 to 29 years	15	60.0
30 to 34 years	4	16.0
35 to 39 years	1	4.0
no data	1	4.0
total	**25**	**100**

The age distribution is similar to the previous years, the average age of the concerned women lies at 27.2 years. Only 4 % of the women were older than 35 years. In total and in comparison to the chromosomal aberrations younger women are concerned more often.

13.3 Sequences/Associations/Complexes

The following sequences/associations/complexes were registered:

- 3 x ADAM-complex (2 x upper and lower limbs, 1 x upper limb)
- 1 x Goldenhar-syndrome
- 2 x Pierre-Robin-sequence (1 x with arthrogryposis multiplex congenita)
- 1 x VATER-association

Seven foetuses had the diagnosis of a sequence/association/complex. Boys are more often concerned than girls.

Sex distribution:

Sex	Number	Percentage (%)
male	4	57.1
female	3	42.9
total	**7**	**100**

Sex ratio m : f = 1.3

Pregnancy outcome:

Pregnancy outcome	Number	Percentage (%)
Live births	5	71.4
Terminations of pregnancy	2	28.6
Spontaneous abortions as from 16 weeks of gestation	-	-
Stillbirths	-	-
total	**7**	**100**

In more than 70 % of the cases the children were live births. In two cases a termination of pregnancy was effected because an ADAM-complex was diagnosed prenatal. One child with a VATER-association suffered from a singular umbilical artery that was diagnosed at the prenatal screening. The following amniocentesis showed a normal chromosomal result. The child was born alive with multiple malformations.

Age of the pregnant women:

Age group	Number	Percentage (%)
20 to 24 years	1	14.3
25 to 29 years	2	28.6
30 to 34 years	3	42.9
35 to 39 years	1	14.3
total	**7**	**100**

The average age of the women lies at 29.6 years. This value is similar to the values of the previous years.

13.4 Embryopathies/Fetopathies/Congenital Infections

As in the previous year only one child with an **alcohol embryopathy** was registered in 2007. An alcohol abuse was known of the child´s mother and father. The hypotrophic birth was born before 37 weeks of gestation and showed corresponding stigmata. As in the previous years the alcohol embryopathy is reported infrequently. In the European comparison our prevalences lie clearly in the lower region. The reason is for one thing a late identification of the concerned children and no later corresponding report. Further on, the sensitivity for this clinical picture should be increased.

In the previous year one case of a **congenital cytomegaly infection** was registered. This was a stillbirth after 40 weeks of gestation. The pathological examination showed among others a hydrocephalus occlusus, massive calcification and inflammatory infiltrates in the cerebellum, as well as a necrotising encephalitis. The mother has not attended the preventive examinations.

Two cases of an embryopathy/fetopathy resulting from the intake of antiepileptics were registered. Normally 50 % of all births of women with an anticonvulsive therapy have no anomalies or malformations. The reason is the direct teratogenic effect of the medicine. An **antiepileptics embryopathy** appeared after the intake of **Carbamazepine**. The mother already had three spontaneous abortions in the previous years. The embyofetopathy is associated with a hypoplasia of the distal phalanx of the fingers as well as a facial dysmorphia. In addition heart defects appeared, in this case a VSD and an ASD II were present.
After the intake of Valproate during the pregnancy an **embryofetal Valproate syndrome** was observed. Apart from a facial dysmorphia and gingival conspicuities, a preaxial polydactyly and a cataracta congenita existed. The frequency of malformation appearing after the intake of Valproate during the first trimester of pregnancy lies at 75%.
In both cases no folic acid prophylaxis took place.

Two births with a **phenylalanine embryopathy** were registered. In both cases the mothers receive a special treatement because of their PKU disease. In both cases a bad regulated metabolism was present. An increased phenylalanine level in the mother´s body significates a teratogen for the embryo. A correlation exists between the level of the phenylalanine and the severity of the microcephalus and other malformations. The appearance of a craniofacial dysmorphia and heart defects is possible.

Also in the year 2007 five cases of **embryopathies/fetopathies** resulting from a **gestational diabetes or maternal diabetes mellitus** were registered.
All children were live births. In two cases a fetopathia diabetica was observed. In two other cases a maternal gestational diabetes was diagnosed and dietary treated. In another case the postnatal glucose tolerance test was conspicuous and a gestational diabetes was diagnosed retrospectively.

Sex distribution:

Sex	Number	Percentage (%)
male	5	45.5
female	6	54.5
total	**11**	**100**

Pregnancy outcome:

Pregnancy outcome	Number	Percentage (%)
Live births	10	90.9
Stillbirths	1	9.1
total	**11**	**100**

14 Analysis of Malformation-Induced Induction of Abortion

Monitoring of Congenital Malformations received data about 47 medically induced abortions in 2007. All foetuses suffered from congenital malformations or fetopathies.

Following the approach applied over the past years, the medically induced abortions were analysed on the basis of present:
- CNS-malformations
- Chromosomal aberrations
- Multiple congenital anomalies (MCA) and other diagnoses

Notifications of induced abortions were mainly received from pathological institutes and surgeries as well as from human genetics institutes. Also colleagues sent us their findings obtained during precision ultrasound examinations.

We would like to extend our thanks to all our colleagues for having sent us their results.

14.1 Malformations of the Central Nervous System (CNS)

A total of eleven induced abortions were carried out due to the presence of a CNS malformation.

Following malformations were registered:
- Anencephalus, acrania
- Arnold-Chiari-malformation
- Spina bifida
- Encephalocele
- Congenital Hydrocephaly
- Holoprosencephaly

Sex ratio:
- 8 x male, 3 x female
  (Sex ratio m : f = 2.7)

Age of the pregnant women:

Age group	Number	Percentage (%)
under 20 years	1	9.1
20 to 24 years	2	18.2
25 to 29 years	4	36.3
30 to 34 years	2	18.2
35 to 39 years	1	9.1
older than 40 years	1	9.1
total	**11**	**100**

The average age of the pregnant women was 28.3 years.

Reported prenatal results:
- 11 cases of phatological ultrasound results between 13 and 21 weeks of gestation.
- In 10 cases prenatal findings were exactly confirmed, in one case examination was difficult due to strong autolysis.
- 2 cases of amniocentesis, of them one case exhibiting a pathological result.

Gestational age at the time of diagnosis:

Gestational age of the foetus at point of diagnosis	Number	Percentage (%)
9. to 16. WOG	1	9.1
17. to 19. WOG	4	36.3
20. to 21. WOG	5	45.5
22. to 24. WOG	-	-
after 24. WOG	-	-
no data	1	9.1
total	**11**	**100**

Gestational age at the time of abruptio:

Gestational age of the foetus at point of abruptio	Number	Percentage (%)
12. to 16. WOG	1	9.1
17. to 19. WOG	1	9.1
20. to 21. WOG	7	63.6
22. to 24. WOG	2	18.2
after 24. WOG	-	-
total	**11**	**100**

14.2 Chromosomal Aberrations

A total of 19 of the 47 registered induced abortions were carried out as a result of a chromosomal aberration of the foetus. Most of the cases exhibited a Down´s syndrome.

The following aberrations were reported for aborted foetuses:

- Down´s syndrome (12 x)
- Edwards syndrome (5 x)
- Patau syndrome (1 x)
- Turner syndrome (1 x)

Sex ratio:

- 8 x male, 11 x female
  (sex ratio: m : f = 0,73)

Age of the pregnant women:

Age group	Number	Percentage (%)
under 20 years	-	-
20 to 24 years	4	21.1
25 to 29 years	3	15.8
30 to 34 years	2	10.5
35 to 39 years	7	36.8
over 40 years	3	15.8
total	**19**	**100**

The mean age of the pregnant women was 32.8 years.

Gestational age at the time of abruptio:

Gestational age of foetus at point of abruptio	Number	Percentage (%)
10. to 16. WOG	-	-
17. to 19. WOG	7	36.8
20. to 21. WOG	6	31.6
22. to 24. WOG	6	31.6
after 24. WOG	-	-
no data	-	-
total	**19**	**100**

Reported prenatal results:

- 18 cases of amniocentesis before 22 weeks of gestation with pathological result.
- 1 case without invasive prenatal diagnostics, diagnosis of a Turner syndrome by means of the abortion material.
- 10 cases of prenatal pathological ultrasound results.
- 10 cases of detected softmarker.

14.3 Multiple Congenital Anomalies (MCA) and other Malformations Causing Women Terminate Pregnancy

A total of 17 foetuses suffered from complex malformations such that an induced abortion was carried out

The following malformations were reported for aborted foetuses:

- Meckel-Gruber syndrome
- Osteogenesis imperfecta
- Roberts´ syndrome (Pseudothalidomide syndrome)
- Thanatophoric dysplasia
- Arthrogryposis congenita multiplex
- ADAM complex
- Reduction malfomations of limbs
- Hypoplastic left heart syndrome
- Omphalocele
- Hydrothorax + hypoplasia of lung
- Hydrops fetalis
- multiple anomalies n.o.s.
- Segmentation defects of lung (+anhydramnios)
- Canalis atrioventricularis communis + intestinal- and urinary tract malformations

Sex ratio:

- 10 male, 5 female, 2 x cases not clear (sex ratio m : f = 2,0)

Age of the pregnant women:

Age group	Number	Percentage (%)
under 20 years	-	-
20 to 24 years	3	17.6
25 to 29 years	7	41.2
30 to 34 years	6	35.3
35 to 39 years	-	-
over 40 years	-	-
no data	1	5.9
total	**17**	**100**

The mean age of the pregnanat women was 28.3 years.

Gestational age at the time of abruptio:

Gestational age of foetus at point of abruptio	Number	Percentage (%)
before 12. WOP	-	-
12. to 16. WOP	3	17.6
17. to 19. WOP	5	29.4
20. to 21. WOP	5	29.4
22. to 24. WOP	2	
after 24. WOP	2	
total		

Reported prenatal results:

- 3 cases of amniocentesis between 17 and 19 WOG with normal result.
- 1 case of pathological AFP- and beta-hCG-level.
- 17 cases of prenatal pathological ultasound results (of them 15 cases between 13 and 23 WOG).
- 10 cases of detected softmarker.

- In 15 cases the prenatally suspected diagnosis was confirmed, whereas in 2 cases the prenatal diagnosis was not confirmed.

14.4 Summary of Malformation-Induced Induction of Abortion

For 2007 data about a total of 47 induced abortions are available. All foetuses suffered from one or more congenital malformations, fetopathies or chromosomal aberrations.

With reference to the total number of births with major malformations, the number of medically induced abortions amounting to 7.4 % was again slightly regressing compared to the previous years.

In eleven cases an induced abortion was carried out due to a CNS malformation. With 19 cases the number of abortions due to a chromosomal aberration was slightly higher. In 17 cases the examined foetuses exhibited other malformations or syndromes and multiple anomalies.

Regarding the sex ratio an androtropism can be found with 26 male and 19 female foetuses of the 47 foetuses reported. In two cases the sex is not known. A clear androtropism can be documented, in particular for the foetuses with CNS anomalies or MCA and other malformations. The chromosomal aberrations revealed gynaecotropism in 2007.

Concering the time when the induced abortions were carried out in 2007, 74.5% abortions occured until the 21st week of gestation. In ten cases the abortions were carried out between 22 and 24 weeks of gestation, in two cases in the 25th week of gestation. Later abortions were not reported. In one of the latter cases one foetus was extremely hypotrophic with multiple anomalies, including vitium cordis. In the other case a foetocide was carried out in the 25th week of gestation for massive hydrops fetalis resulting from parvovirus B19 infection of the mother.

A comparison of the data with those of the previous year shows that the number of pregnancies terminated till the 21st week of gestation was slightly higher in 2006 with 88.5%. In 2007 95.8% of the induced abortions were carried out before the 23rd week of gestation (2006: 96.2%).

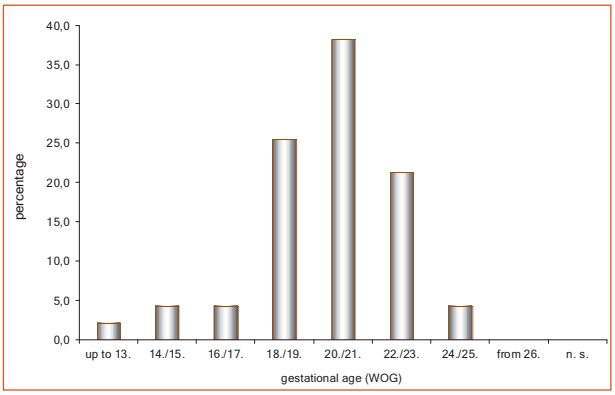


Fig. 46: Gestational age (WOG) at termination of pregnancy 2007

With reference to the total number of all induced abortions, the calculated mean average of the mothers was 30.1 years. The maternal average age regarding CNS malformations was 28.3 years (19 to 42 years) and 28.1 years (21 to 34 years) for MCA. As expected, the maternal average age regarding chromosomal aberrations was slightly higher with 32.8 years (23 to 42 years).

The following figure shows the distribution of the maternal age.

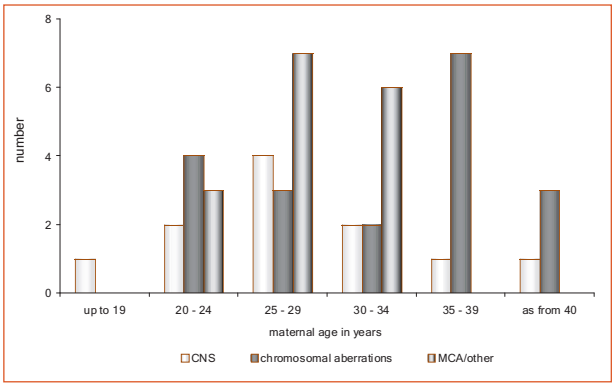


Fig. 47: Maternal age at term. of pregnancy 2007 (grouped)

According to a preliminary survey of the Statistical Federal Office a total of 4,389 abortions were carried out in Saxony-Anhalt in 2007. Compared to 2001, the figure has dropped by about one fifth.

Considering the number of medically induced abortions reported to the Monitoring of Congenital Malformations in 2007, their share amounting to 1.1% is rather low. Most of the abortions were carried out under the consultation procedure. The 2007 data reveals a percentage of 2.6% of medically induced abortions for entire Germany. This deviation may be attributed to the fact that not all medically induced abortions have been registered by Monitoring of Congenital Malformations since abortions are also carried out outside the Federal State, and hence are not reported.

15 Summary

The 2007 Annual Report of the Federal State of Saxony-Anhalt about the frequency of congenital malformations and anomalies as well as genetically caused diseases contains population-related data with reference to the entire Federal State and is the eight publication of this type.

According to the State Statistical Office in Halle **17,387 live births** were registered in the Federal State of Saxony-Anhalt in 2007. This marks a slight increase of 2.7% compared to the previous year. The number of **stillbirths** amounting to **83** also increased compared to the previous year (+ 45.6%). Therefore, the total number of live births and stillbirths together amounted to 17,470 in 2007.

In Germany a total number of 684,864 children were born alive in 2007. Compared to the previous year the birth rate increased by 1.8% (2006: 672,724 live births).

The share of live births in Saxony-Anhalt amounted to 2.54% with reference to the total number in the Federal Republic of Germany.

In addition to data about live births and stillbirths, Monitoring of Congenital Malformations registered data about **47 medically induced abortions** and **52 spontaneous abortions after 16 weeks of gestation** in 2007.

Calculations of malformation prevalences for the present report are based on **a total number of 17,569 births** (Chapter 2).

593 births suffered from at least one **major malformation**. This corresponds to **3.4%** of all births. Compared to the previous year, this figure has not changed. For big cities a major malformations rate of 4.2% was established, whereas the rate in the districts amounted to 3.1% (Chapter 8).

In 88.9% of the cases children with **major malformations** were live births (2006: 89.7%). Compared to the previous years, the number of induced abortions amounting to 7.4% decreased (2006: 8.5%). On the other hand, the rate of stillbirths with major malformations increased to 2.2% (2006: 0.3%) and reached its highest value since 2000 (Chapters 7 and 8).

The **most frequent single diagnoses** in 2007 were atrial and ventricular septal defect followed by congenital subluxation of hip. Due to the fact that Monitoring of Congenital Malformations assumed the function of a tracking centre for newborn hearing screening, clearly more births with congenital hearing disorder were registered in 2007. Hence, this diagnosis was the fourth most common diagnosis in 2007 followed by microcephalus, preaxial polydactyly and clubfoot (Chapter 11).

A total of 243 births with **indicator malformations** were separately registered in 2007. This corresponds to 1.4% (2006: 1.6%) (Chapter 12).

In **2007** the following **indicator malformations** reached **higher prevalences** compared to the basic prevalence during the time from 1997 to 2006: rectal and anal atresia/- stenosis, epispadias, preaxial polydactyly, reduction malformations of limbs.

A **lower prevalence** compared to the basis prevalence was established for the following indicator malformations: spina bifida, congenital hydrocephalus, Fallot tetralogy, transposition of the great vessels, left heart hypoplastic syndrome, cleft palate, choanal atresia, undescended testis, hypospadias, Potter sequence, renal agenesis unilateral, gastroschisis, Prune-belly syndrome.

The number of **medically induced abortions** amounting to 47 decreased compared to the previous year (2006: 52). This corresponds to 1.1% of all terminations of pregnancy carried out in Saxony-Anhalt in 2007. Most frequently medically induced abortions were carried out as a result of a chromosomal abberation of the foetus.

95.8% of all medically induced abortions were carried out before the 23rd week of gestation. Only in two cases an abruptio was necessary after the 23rd week of gestation and in one of these cases a foetocide was carried out (Chapter 14).

The average **maternal age** at the time of delivery in Germany was 31.8 years in 2006. In Saxony-Anhalt a maternal average age of 27.6 years was determined with reference to all live births. Current data for 2007 are not yet available.

The average maternal average age in the 46 registered cases of a **chromosomal aberration** was 31.8 years (2006: 32.9 years). Almost every second mother was older than 35 years (Chapter 13).

A total number of 25 births suffered from a **genetically caused/partly caused disease** in 2007. **Sequences, associations and complexes** were diagnosed for seven births. Eleven births suffered from congenital anomalies of **embryopathies/fetopathies**. This was mainly attributed to circumstances where, for instance, the mother took antieleptics, alcohol or phenylalanine due to maternal phenylketonuria, or the mother suffered from diabetes mellitus (Chapter 13).

As a new aspect the present report includes an analysis of **congenital hearing losses** (Chapter 18). A total of 17 children with mean up to serious sensorineural hearing loss was registered. With reference to the birth population examined, this means a frequency of 1/341 live births. Therefore, congenital hearing losses belong to the most frequent congenital anomalies.

Compilation of the present 2007 Annual Report was only possible due to ongoing voluntary reports about congenital malformations from various medical institutions of Saxony-Anhalt. We would like to thank all "senders" and hope that this excellent cooperation will continue.

16 Limb Malformations

Introduction

Congenital limb malformations are a great diagnostic and therapeutic challenge for attending physicians due to their frequency and wide clinical array ranging from anomalies of single limb parts up to complex multiple malformations. Often congenital limb defects cannot be diagnosed until after the child is borne. However, improvements in prenatal diagnostics have increased the opportunities for families to obtain interdisciplinary consultation and therapy planning.

The literature contains very different statements regarding the **prevalence** of limb malformations. Calculations of Monitoring of Congenital Malformations Saxony-Anhalt revealed a basic prevalence of 8.3 per 10,000 births for reduction malformations of the upper and lower limbs during the period from 1997 to 2006. For preaxial polydactyly as an indicator malformation a basis prevalence of 3.7 per 10,000 births was established for the same period.

An evaluation of the Register for National Registration of Congenital Limb Malformations in Aachen revealed a prevalence of 14 per 10,000 live births for reduction malformations as well as polydactylies and syndactylies. Considering all European countries, the prevalence of reduction malformations is 5.5 per 10,000 births, whereas anomalies of the upper limbs amounting to 1.9 per 10,000 births are less frequent than anomalies of the lower limbs amounting to 3.6 per 10,000 births.

Due to its frequency clubfoot occupies a special position among all limb malformations, reaching a prevalence of 19.7 per 10,000 births in the registration area of Monitoring of Congenital Malformations during the period from 1997 to 2006.

The following sections describe congenital malformations of the upper and lower limbs, not including limb malformations occurring as a result of systemic diseases, e.g. achondroplasia or osteogenesis imperfecta.

Embryology

The limb develops from a **limb bud** originating from the lateral plate mesoderm during a proliferation process and covered by ectoderm. At a later stage somite cells, neural crest cells, nerves and vessels are added. For the first time limb buds occur after **4 ½ weeks**. During the embryonic period the upper limb development is about two days ahead of the lower limb development. In general, the limb sections develop from proximal to distal. Malformations may occur during any stage of this development.

Each limb consists of four sections:

1. Girdle consisting of several skeletal elements, such as clavicula, scapula or os coxae;
2. Section consisting of of one single bone, such as humerus or the fermur;
3. Section with two parallel skeletal elements, such as radius/ulna or tibia/fibula; and
4. End section consisting of a sequence of short bones followed by long bones.

Causes

In the majority of cases the cause of a limb malformation is unknown. But genetical factors play a certain role. Obviously, most limb malformations are the result of a **multifactorial causality complex**.

As is known, the first damage occurs during the specific sensitive stage of development, i.e. the teratogenic termination period of the embryogenesis between the **22nd and 46th day post conception**.

Accumulated limb malformations have been observed after extreme radiation exposure (atomic bomb effects) and as a result of impacts of toxic chemicals.

The thalidomide (**Contergan®**) disaster in the 60s is an example of a teratogenic damage during the development stage of the limb buds. After the intake of thalidomide between the 22nd and 46th day post conception very typical symmetrical hypo- and agenetical malformations of all grades were registered. A total of about 7,000 people affected was registered worldwide.

Also an infection of the mother may cause the development of limb malformations. Limb malformations may occur as a result of varicella embryo-fetopathia. But also rubella, measles, mumps, influenza, toxoplasmosis and a spirochaetes infection may cause limb malformations.

Despite ample research a common cause, for instance, for the development of congenical clubfoot could not be established. But obviously, nicotine consumption by the mother is a risk factor.

Another possible cause for a prenatal damage is the disruption of the so-called ADAM complex, which may lead to circular constriction of single parts of the body (up to amputation), in particular of the limbs.

Limb malformations are seen as part of malformation syndromes; however this topic is not elaborated here (e.g. Cornelia de Lange syndrome, Smith-Lemli-Opitz syndrome, VATER association).

Clinical Aspects

Based on the common **Swanson classification** limb malformations are divided into seven categories:

I. No formation of limb parts or formation errors,
II. No differentiation of limb parts,
III. Double formation,
IV. Overdevelopment/gigantism,
V. Underdevelopment,
VI. Syndrome of amniotic constrictions,
VII. Generalised skeletal deformations.

I. No formation of limb parts:
This category includes **reduction malformations**. Since they occur in extremely variable forms of defects, medical orthopaedic and general human rehabilitation is often very difficult.

The Working Group of the International Society for Prothetics and Orthopaetics (ISPO) developed a merely descriptive nomenclature for congenital limb malformations. This nomenclature facilitates their classification on the basis of merely morphological aspects since doctors in clinical function are confronted first with the appearance of a malformation without aetiologically classifying them.

Limb malformations are divided into two main groups, i.e. **transversal** and **longitudinal malformations**.

Transversal limb malformations - also called **Peromelia** - are malformations where the limb or a part of a limb is completely absent, i.e. comparable with an amputation stump. The designation of these malformations was chosen with reference to the height from which the limb or limb part is absent. Thus, all intermediate stages according to the teratological order may be found from partial absence of a phalanx to the complete absence of the upper arm. The occurrence of transversal malformations of the upper limbs is about 8%, whereas this figure amounts to about 2% for the lower limbs with reference to all limb malformations.

Longitudinal limb malformations are malformations where the limb is developed incompletely, i.e. one or more bones of the limb are too short or completely absent. Also the hand or the foot may not be developed completely, however are rudimentarily present. This main group covers a wide variety of forms. The designation of these longitudinal malformations is based on absent skeletal elements. Moreover, it describes whether the affected skeletal elements are absent completely or partially only, referring to proximal and distal elements. Often, also combinations are found.

Considering all limb malformations, longitudinal malformations occur as follows: of the radius in 2.4%, of the fibula in 1.6%, of the tibia in 1.0% and of the ulna in 0.5% of all cases.

These malformations are also called **ectromelia** in the European language area, which is a a collective term for hypo- or aplasias of single or several long bones with consecutive malposition of the limb. Another example for this reduction type is the PFFD (Proximal Femoral Focal Deficiency), i.e. the congenital defect of the femur. The markedness of this defect varies from unilateral reduction up to an almost complete bilateral absence, and hence luxation of hip.

Amelia is the most marked congenital defect formation. Here the whole limb is missing on both sides or it occurs in unilateral form of a so-called hemimelia. **Phocomelia** is another severe longitudinal malformation. This malformation is characterised by a marked absence of the upper arm and forearm, with the hand directly attached at the pectoral girdle. Rudiments of humerus, radius and ulna are present.

The congenital radial clubhand is a malposition of the hand as the result of a radiusaplasia or hyplasia. The ulna is reduced and thickened and, in addition, the thumb with the metacarpal and carpal bones is often missing. During the thalidomide disaster this this malformation occurred in endemically high numbers.

In anatomical terms, the congenital idiopathic clubfoot (pes equinovarus adductus cavus supinatus) is a complex malposition of the subtalar joint complex with contracture of the articular capsule and shortened tendon. It is one of the most frequent skeletal malformations, occurring in 1 to 2 cases per 1,000 births.

The congenital **split hand/split foot** results from a radiation defect, i.e. fingers/toes and metacarpus/metatarsus parts are missing. The wedge-shaped malformation may extend up to the carpal/tarsal.

II. No differentiation of limb parts and III. Double formations:
Poydactylies and syndactylies of the hand and foot appear much more frequently, the cutaneous polydactyly of the hand having the largest share of 25% of all limb malformations. Medical treatment of polydactyly (exessive formation of fingerparts or toes) and syndactyly (partial or total differentiation lack of single fingers or toes up to connection of the whole hand or foot) is comparatively simple. This limb malformation belongs to the Swanson category of double formations or to the category of the missing limb part differentation.

IV. Overdevelopment:
Overdevelopment or gigantism involves a qualitatively excessive malfomation. Although a section of the skeleton has the correct form, it is too big. The Klippel-Trenaunay-symptom complex is accompanied, for instance, with macrodactyly and hyper- or hemihypertrophy of the skeleton parts of limbs.

V. Underdevelopment:
Underdevelopment or hypoplasia of a limb means a minor development of the skeletal section affected. An example of this malformation category is hypoplasia of the metacarpus and carpal.

VI. Syndrome of amniotic constrictions:
The category of the **amniotic constrictions (ADAM)** refers to the aetiology of this type of malformation. It involves constrictions of single parts of a limb up to amputations caused by maldevelopment of the amnion. Externally, if at all, they can be only differentiated from transversal reduction malformations by the so-called constriction rings. The ADAM complex also includes limb malformations resulting from constriction rings, constrictions and adhesions developed intrauterinely.

Therapy

Treatment of congenital limb malformations requires interdisciplinary cooperation of paediatrists, surgeons, orthopaedists and parents to achieve satisfying long-term results in functional and psychosocial terms. Although the subtle operation possibilities are constantly improving, it is not possible to operate all congenital malformations. The aim is to avoid secondary and functional disorders of the axial skeleton and provide best possible rehabilitation of appearance and function of the concerned limb. A specialist should be involved as early as possible. This does not only prevent the risk of delaying intervention, but also contributes to calm highly worried parents.

Even it is not always possible to establish a normal condition, there is a great many of interventions for improving function and aesthetics. Apart from gradual reconstruction, another important therapeutic option is the provision of auxiliaries. Most advanced prostheses are used to this end. In particular, prostheses with a certain grab function and myoelectronic control have proven to be successful for hand malformations.

Literature in possession of the authors

17 Projects of the Monitoring of Congenital Malformations in 2007

Malformation registration and evaluation also serve as the basis for concomitant scientific projects. Here we want to inform all our senders and interested parties about key activities of Monitoring of Congenital Malformations in 2007.

In addition to the continuous registration of malformations, the tracking of newborn hearing screening in Saxony-Anhalt was continued and expanded in cooperation with the Newborn Screening Center. Again, the results of the hearing screening in 2007 are separately outlined in our Annual Report of this year (Chapter 18).

For current data of Monitoring of Congenital Malformations we refer to our new website

www.angeborene-fehlbildungen.com.

For information about the newborn hearing screening please visit

www.stoffwechselzentrum-magdeburg.de.

Diploma Theses and Doctorates

"Aspects of the malformation prevention using the example of gastroschisis" was the topic of the diploma thesis successfully defended (18 December 2007) by Dipl.-Gesundheitswirt (FH) Sonja Großberndt.
Data of a retrospective case-control study was analysed and, as a result, the following risk factors for the development of gastroschisis were identified: young maternal age, nicotin abuse before and during pregnancy as well as an unbalanced nutrition or diet of the mother immediately before pregnancy.

In 2008 a doctoral thesis titled "Frequency of congenital malformations of newborns with surgical therapy possibilities: A retrospective study of the observation period 1987-2002 of Monitoring of Congenital Malformations Saxony-Anhalt" was filed for examination (Mrs. Daniela Grenz).

Also in 2008 Mrs. Simone Dröscher filed her doctoral thesis with the title "Investigation into neural tube defects - analysis of data of the Monitoring of Congenital Malformations Saxony-Anhalt" and defended it successfully on 26 June 2008.

The following list contains some of the doctorate topics presently investigated (working title):

- Investigation into the prevalence and risk factors of orofacial clefts in Saxony-Anhalt.
- Congenital kidney malformations - pre- and postnatal results
- Congenital malformations in ICSI-children
- Gastroschisis - a malformation with increasing prevalence?
- Correlation of prenatal screening results with postnatal result
- Congenital diaphragmatic hernia: epidemiology and outcome

Publications

Current epidemiological aspects of neural tube defects were outlined in the following publication:

- Pötzsch, S; Hoyer-Schuschke, J; Köhn, A: Gibt es Prävalenzänderungen bei den Neuralrohrdefekten? - 10 Jahre Empfehlung zur perikonzeptionellen Folsäureprophylaxe. (Has the prevalence of neural tube defects changed? - 10 years of recommended periconceptional folic acid prophylaxis.) In: MedReview. Blackwell, vol. 8.2007, 6, p. 6-7

Further publications assisted by the Monitoring of Congenital Malformations include:

- Rasinski, C; Vorwerk, W; Pötzsch, S; Bartel-Friedrich, S; Neumann, K: Newborn hearing screening in Saxony-Anhalt - current state. In: Archives of perinatal medicine. vol. 13. 2007, 2, p. 48-49
- Seliger, G; Kantelhardt, E; Wal, C; Keller, U; Eder, K; Pötzsch, S; Röpke, F; Scheler, C: L-carnitine level in neonates - a large, retrospective analysis. In: Archives of perinatal medicine. vol. 13. 2007, 2, p. 17-20
- von Rohden, L ; Wien, F; Pötzsch, S: Myosonographie neuromuskulärer Erkrankungen unter besonderer Berücksichtigung des Kindes- und Jugendalters. In: KlinischeNeurophysiologie. (Myosonography of neuromuscular diseases with a special regard to childhood and adolescence.) In: Clinical neurophysiology. vol. 38. 2007, 2, p. 141-150
- von Rohden, L; Pötzsch, S; Mohnike, K: Mikrosonographie der Schilddrüse im Kindesalter. (Microsonography of the thyroid gland in childhood) Marseille-Verlag München: ISBN 978-3-88616-128-7
- Pötzsch, S: Diagnoseeröffnung bei Eltern, deren Kind chronisch krank bzw. behindert ist - einige Gedanken aus kinderärztlicher Sicht. In: Gemeinsam leben. (Informing parents about the diagnosis that their child is chronically ill resp. disabled - some thoughts from a paediatrists view. In: Living together.). Juventa-Verl., vol. 15. 2007, 4, p. 211-214.

Based on the international cooperation with the ICBDSR, an analysis including data of the Monitoring of Congenital Malformations was published with the title "Gastrochisis and associated defects":
Mastroiacovo, P; Lisi, A; Castilla, E; Martínez-Frías, M; Bermejo, E; Marengo, L; Kucik, J; Siffel, C; Halliday, J; Gatt, M; Annerèn, G; Bianchi, F; Canessa, M; Danderfer, R; Walle, H; Harris, J; Li, Z; Lowry, B; McDonell, R; Merlob, P; Metneki, J; Mutchinick, O; Robert-Gnansia, E; Scarano, G; Sipek, A; Pötzsch, S; Szabova, E; Yevtushok, L: Gastroschisis and associated defects - an international study. In: American journal of medical genetics. vol. 143. 2007, 7, p. 660-671

Lectures/Advanced Trainings

In 2007 members of the Monitoring of Congenital Malformations held lectures about the following topics:

20.01.07: Tracking of the hearing screening - first results (Screening training, Magdeburg)
21.02.07: Newborn hearing screening (ENT-specialist training, Magdeburg)
01.03.07: Development disorders during the puberty (Nurse training, Berlin)
07.03.07: Newborn hearing screening (ENT-specialist training, Halle)
30.03.07: Newborn hearing screeening in Saxony-Anhalt (Annual meeting of the Society of children and youths medicine of Saxony and Thuringia, Halle)
05.05.07: Gastroschisis - a malformation with increasing prevalence? (ANPISA-meeting, Bad Suderode)
07.06.07: Gastroschisis – a malformation with increasing-prevalence? (Nurse training, Magdeburg)
23.06.07: Newborn hearing screening in Saxony-Anhalt (DGNS-annual meeting, Dresden)
02.07.07: Clinical syndrome diagnostics (Lecture for students, Magdeburg)
12.10.07: Congenital malformations (Lecture for students, Magdeburg)

On 27 October 2007 the Third Sender Meeting of the Monitoring of Congenital Malformations took place in the lecture hall of the paediatric clinic. On this occasion the 2006 Annual Report was presented to the about 60 participants and lectures were held about current aspects of congenital malformations.

Mrs. Simone Dröscher (Magdeburg) presented results of the analysis of neural tube defects with reference to the existing recommendation of a periconceptional folic acid prophylaxis. As was shown, the basic prevalence of neural tube defects has not changed in Saxony-Anhalt over the past ten years.

From 2002 to 2004 Mecklenburg-Western Pomerania systematically registered malformations due to an initiative of a group of neonatologists. Dr. Iris Illing (Güstrow) presented the registered data in a very illustrative manner.

Another key subject was gastroschisis. Results of the case-control study of risk factors performed by Mrs. Melanie Schulze and Mrs. Sonja Großberndt were presented.

Heart defects are one of the most frequent congenital newborn malformations. Results of the nationwide PAN study for the first registration year were presented by Dr. Schwedler from the Competence Network of Congenital Heart Defects (Berlin).

Experience from a materny clinic regarding critical congenital heart defects were presented by Dr. Hoyer-Schuschke (Magdeburg).

The Annual Sender Meeting of the Monitoring of Congenital Malformations is a place for exchanging information and experience with colleagues from various matery clinics and other prenatal diagnostic institutes and, in particular, to give a feedback about the analysis of reported malformations.

Poster

The following posters were presented by members of Monitoring of Congenital Malformation during various congresses:

30./31.03.07: „Ultrasound screening at Newborns: Pro and contra“
and
„Orofacial cleft formation - actual epidemiological aspects“
(Annual meeting of the Society of children and youths medicine of Saxony and Thuringia, Halle)

04./05.05.07 and 13.09.07: „10 years of recommendation of periconceptional folic acid prophylaxis – Does the prevalence of neural tube defects change?
(1. annual meeting of the Middle German Society of gynaecology and obstetrics, Dresden
as well as
annual meeting of the German Society of children and youths medicine; Nuremberg)

Further Activities and Cooperations

Several projects are performed on the basis of the international cooperation with our partners EUROCAT and ICBDSR. In 2007 the Monitoring of Congenital Malformations participated in the following studies (partially still in progress):

- Epidemiology of Cornelia de Lange syndrome in Europe
- Lamotrigine and orofacial clefts
- EUROCAT study on maternal diabetes
- EUROCAT study on eye malformations
- Prenatal diagnosis and outcome of pregnancy of specified sex-chromosome abnormalities in Europe
- Late terminations of pregnancy after prenatal diagnosis of fetal abnormality (TOPFA) in Europe
- Oro-facial Clefts. World-wide Recent Total Prevalence Data. A study based on the IPDTOC Database supported by WHO
- ICBDSR study on Very Rare Defects (amelia, acardius amorphus, bladder and cloaca exstrophy, cyclopia, conjoined twins)

In 2006 Germany initiated the so-called PAN study (Prevalence of Congenital Heart Defects of Newborns in Germany) within the Competence Network of Congenital Heart Defects. This study was continued in 2007.
The Monitoring of Congenital Malformations Saxony-Anhalt transmits to the Competence Network anonymously all data about live births with congenital heart defects reported by the materny clinics and cardiologic surgeries.

Also in 2007 several activities around the topic "folic acid prophylaxis" took place.

The Monitoring of Congenital Malformations was present with an information desk at the last Annual Meeting of the Society of Children and Youths Medicine of Saxony and Thuringia in Halle.

As a member of the working group "Folic acid and health" the Monitoring of Congenital Malformations participated in the meeting in December 2007.

Also a meeting of the regional working group "Folic acid for you - my child" took place in Magdeburg in 2007. If you are interested in supporting our regional working group for example, as a paediatrist or gynaecologist, you are very welcome to contact us.

Current information about congenital malformations and relating publications and studies are shown on our website:

www.angeborene-fehlbildungen.com.

Pleace contact us if you need information materials about folic acid, malformation prevention and other subjects.

If you have questions or critical remarks or wish to cooperate with us, we are available for you at any time.

18 Newborn Hearing Screening 2007

Introduction

Following the birth of a child, a number of examinations are performed for early detection of diseases. Apart from the neonatal metabolism screening, a general newborn hearing screening has been part of the recommendations for early detection examinations since 1 January 2009. For a couple of years a voluntary hearing screening after birth has been offered in Saxony-Anhalt thanks to the dedication of a number of paediatrists of the maternity clinics and ENT specialists as well as pedaudiologists. Therefore, Saxony-Anhalt is well prepared to meet the requirements of the Children Directive from January 2009.

Results regarding the efficiency of the newborn hearing screening are available from various pilot projects. The newborn hearing screening is aimed at identifying up to the third month of life all children with a permanent congenital hearing loss and starting a therapy if possible before the sixth month of life. Investigations have shown that a newborn hearing screening without tracking does significantly contribute to an earlier point of diagnosis and start of therapy.

As suggested by Reuter et al. (2007) a congenital hearing disorder can be diagnosed within the first three month of life if the children underwent a hearing screening after birth and suspicious children also participated in the trakking. On the contrary, the average time of diagnosis of a group of children undergoing the hearing screening but no tracking was their 12th month of life.
In August 2006 the Monitoring of Congenital Malformations Saxony-Anhalt initiated a pilot project in the maternity clinics of Magdeburg and thus established a tracking process of the newborn hearing screening. This was only possible by introducing the so-called screening ID and cooperating with the Newborn Screening Center. Since January 2007 other maternity clinics and ENT specialists have been involved in the registration process of the hearing screening results and tracking.
Selected results of the newborn hearing screening, including tracking in 2007, are presented below.

Participating Institutions

From 1 January 2007 to 31 December 2007 nine clinics of Saxony-Anhalt participated in the registration of screening results and tracking:

- Klinik St. Marienstift Magdeburg (01-01-07 - 31-12-07)
- Klinikum Magdeburg gGmbH (01-01-07 - 31-12-07)
- Universitätsklinikum Magdeburg A.oe.R., Universitätsfrauenklinik und Universitätskinderklinik (01-01-07 - 31-12-07)
- Universitätsklinikum Halle, Universitätsklinik und Poliklinik für Kinder- und Jugendmedizin und Universitätsklinik und Poliklinik für Geburtshilfe und Reproduktionsmedizin (01-01-07 - 31-12-07)
- AMEOS-Klinikum St. Salvator Halberstadt (01-03-07 - 31-12-07)
- Klimikum Bernburg GmbH (01-03-07 - 31-12-07)
- Sana Ohre-Klinikum Haldensleben GmbH (01-05-07 - 31-12-07)
- MEDIGREIF Krankenhaus Burg GmbH (01-05-07 - 31-12-07)
- Krankenhaus St. Elisabeth und St. Barbara Halle (Saale) (01-07-07 - 31-12-07)

All children born in the above institutions were postnatally assigned a screening ID. The screening ID is used for both the hearing screening and the metabolism screening and serves to unambiguously assign results to the respective child.

The hearing screening results are transmitted from maternity clinics to the Monitoring of Congenital Malformations and are registered there in a database.
The database is provided with a a reminder function if a child exhibited a suspicious result or has not participate in the hearing test at all. With this function letters can be send to the parents informing them about the importance of a hearing screening and motivate them to let their children participate in a (control) hearing test.

Results

From 1 January 2007 to 31 December 2007 a total of 17,224 children were born in Saxony-Anhalt. They all underwent a metabolic screening in Saxony-Anhalt. 6,050 children of them were born in the nine maternity clinics mentioned above. Information about the newborn hearing screening is available for 5,987 children.

96.9% of the children (N=5,803) underwent a hearing test after birth. 3.1% of the children (N=184) did not undergo a hearing test after birth. The reasons for not undergoing such test were:

- early discharge from the maternity clinic (N=61)
- ambulant delivery (N=44)
- defective hearing screening device (N=18)
- transfer of the child to another clinic (N=15)
- refusal by parents (N=6)
- child died before a hearing test could be performed (N=5)
- serious general disease preventing a hearing test (N=3)
- home birth (N=1)

In 13.2% of the cases we were not informed about the reason why a hearing test was not performed.

Time of the hearing screening

Considering the time of the first hearing screening, not all children were examined directly after birth. 86.3% (N=5,010) of the children underwent the hearing screening within the first week of their life and 12% (N=696) within the first 90 days of their life. 1.7% of the children (N=97) underwent the hearing test after the 3rd month of their life, i.e. at a time when the diagnosis of a hearing disorder should already have been made (Fig. 48).

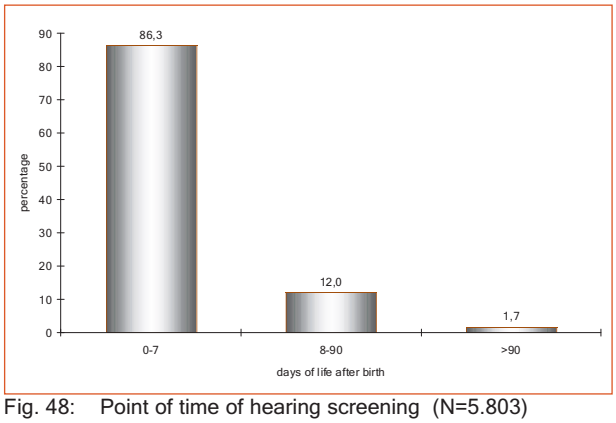


Fig. 48: Point of time of hearing screening (N=5.803)

Result of the first screening

94.2% (N=5,466) of the 5,803 children undergoing a hearing test after birth exhibited a normal result on both sides. 5.8% of the children (N=337) exhibited a suspicious result on one or both sides.

Follow-up results of suspicious children

64.7% of those children with suspicious results on one or both sides (N=337) during the first hearing screening exhibited normal results in the follow-up (N=218). In two cases the parents refused a follow-up and one child died before a follow-up could be performed.

In 49 cases (14.5%) we did not receive any feedback from parents about a possible follow-up although they had been asked to reply several times. This group of children is called the "Lost-to-Follow-up" group. 67 (19.9%) of the children with suspicious results during the first screening also exhibited suspicious results in the follow-up.

The parents of two of the 67 suspicious children in the re-screening refused further diagnostic examinations. In nine cases we were informed that an ENT specialist treatment was taking place; however we have not been informed about the outcome yet. In six cases we did not receive any information about the status of possible diagnostic tests since the parents did not respond to our letters. A follow-up-status could be determined in 50 of the 67 cases of the children with suspicious results during the re-screening.

Considering the 50 children with completed follow-up, a normacusius could be proved in the BERA follow-up test. In 20 cases a sensorineural hearing loss was established on one or both sides. Three of the children underwent a tympanum drainage operation during the first year of life and postoperatively exhibited a normacusis. In another six cases we were informed that the insertion of a tympanum drainage is planned. In two cases a sensorineural hearing loss was diagnosed in connection with congenital malformations (one child with a bilateral cleft lip with cleft palate and another child with unilateral acoustic meatus atresia).

We know that six children suffered from a hearing disorder, but we were not informed whether this was an acoustic conduction or an acoustic perception hearing loss and what type of therapy was started. These children are under regular ENT medical supervision.
We were informed that 8 of the 17 children with a unilateral or bilateral acoustic perception hearing loss received a hearing aid. In nine cases we were not informed about the detailed therapeutic consequence.

Diagnosis of a hearing disorder

Summarising the above, 5,803 children underwent a hearing test after birth and 17 of them exhibited a unilateral or bilateral acoustic perception hearing loss. This means that one out of 341 births is affected.
In 20 children suffered from an acoustic conduction hearing loss from their early infancy. In most of the cases this was attributable to a seromucotympanon or recurring tympanic effusion. Regarding the group analysed by us, one child of 290 births was affected by an acoustic conduction hearing loss.

Tracking methods and efforts

If the result of a hearing screening was missing or the follow-up appointments were not attended, letter were sent to remind parents or parents were contacted by telephone. In addition, outstanding results from the maternity clinics were requested, mainly by fax. In case of an unknown address inquiries were made to contact parents by mail.

In 2007 a total of 1,128 letters (one to five per family) were sent to 565 families and 61 telephone calls were made.

Regarding the tracking effort for obtaining information about the hearing screening of children born at home (N=44) or released from the maternity clinic before the hearing test was performed (N=61), 265 letters were sent to these families and 24 telephone calls were made. This means that one fourth of all tracking letters were sent to this rather small group.

Definitely, there are potentials for improving contacts by providing parents with relevant information and establishing better collection processes for hearing screening results from ambulatory ENT specialists.

Summary

In June 2008 the German Federal Joint Committee (G-BA) of health insurers adopted the resolution to establish a general newborn hearing screening system in Germany. Following its validation by the Federal Department of Health this resolution will take effect in January 2009.
Basically, every child after its birth will be entitled to a newborn hearing screening as an early detection examination. The parents having the care and custody of the child will have to be informed about the importance and the purpose of this examination. The parents may withhold their approval for the examination. This will have to be documented in writing. Attendance for newborn hearing screening and its performance will be monitored and documented by the attending peadiatrist in connection with the early detection examinations U2 to U5.

Within the framework of the Children Directive regarding newborn hearing screening, quality assurance measures are demanded. They include the check for completeness of examinations in maternity clinics and institutions providing confirmative diagnostic tests. Regulations specific for individual states are allowed for regarding the documentation of newborn hearing screening results.
In Saxony-Anhalt a tracking center was established at the Monitoring of Congenital Malformations documenting newborn hearing screening results and facilitating the follow-up of children not having been examined or having exhibited suspicious results.

Considering the results of the 2007 hearing screening tracking, the rate of 96.9% examined children shows that the requirements of the new Children Directive are already fulfilled. According to the Children Directive the examination rate should not be less than 95%.

The rate of children with a unilateral or bilateral suspicious result during the first screening amounting to 5.8% is rather high compared to other screening regions in Germany. This might be attributable to the fact that Saxony-Anhalt mainly relies on the measurement of otoacoustic emissions (OAE) as the screening method and this method yields a higher rate of false-positive results compared to the BERA method.

The Children Directive demands a hearing screening before the third day of life. This time was chosen since newborns are usually still in the maternity clinics at that time, facilitating better registration. Considering the number of maternity clinics participating in the tracking in 2007, the total number of non-examined children, i.e. 3.1% is low, however retrospectively it can be concluded

from the present results of the 2007 tracking that rather great efforts are necessary to contact parents of children delivered in an outpatient clinic or released prematurely from the materny clinic.

The results presented here do not detail the specific time of the first screening or the follow-up as well as the time of diagnosis. However, considering the group of children for which a hearing disorder was diagnosed, the earliest time of diagnosis in one case was the 33rd day of life. The latest time of diagnosis was the 367th day of life, i.e. much later than required by the Directive.

The newborn hearing screening requires a close interdisciplinary cooperation of paediatrists, ENT specialists and paedaudiologists. In future this cooperation should be even intensified to ensure, for example, that parents with their children attend appointments at the proper time and a professional diagnosis can be made.

Looking into the future, the Monitoring of Congenital Malformations expanded the newborn hearing screening in 2008. Currently, 19 of the 26 maternity clinics in Saxony-Anhalt participate in the tracking process. We hope to succeed in winning also the remaining maternity clinics in the next months.
Implementing the Children Directive, the Monitoring of Congenital Malformations can be provide maternity clinics with the quality assuring measures (e.g. documentation of the registration rate) of that Directive.

A possible objective may further be long-term tracking of children with a congenital hearing disorder to document the effects of early diagnosis and early therapy.

We will be at your disposal for all inquiries from colleagues in the maternity clinics as well as paediatrists and ENT specialists in outpatient clinics.
For current information and contact persons for the hearing screening please also visit the website:
www.stoffwechselzentrum-magdeburg.de

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According to Section 14 Appendix 2 of the Children's Directive, as amended

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Introduction

In 2007 the Federal Joint Committee (G-BA) of physicians and health insurances for the first time demanded a statistical annual report about the Associations of Statutory Health Insurance Physicians of the individual states from each screening center. Requirements included a highly detailed report about the number of blood tests analysed in each screening laboratory and the success of obtaining second submissions after early blood withdrawals or positive first results. All confirmed suspicious cases had to be documented on the basis of the diagnostic confirmation tests and the therapy introduced.
Also in 2007 our screening laboratory received all certificates for the external quality control of the parameters tested under the screening procedure (CDC Atlanta, German Society of Clinical Laboratory Diagnostics).
The tracking system including the control of pathologic results and the receipt of second submissions after early blood samples (full-term infant: blood withdrawal < 36 h; premature infant: blood withdrawal < 32 weeks of gestation) as well as the registration of all new-born could be improved in terms of the software programmes used. New modules were developed to compile statistics, based on the requirements of the Federal Joint Committee (GBA) and the German Society for Newborn Screening (DGNS).
In 2007 a total of 284 senders sent blood samples to the screening laboratory in Magdeburg (44 inpatient institutions, 136 physicians in private practices and 104 midwifes).

An inherent part of communication of our screening center with the senders is the annual meeting of senders, which took place on 20 January 2007.
The meeting focussed on news about the work of the International Screening Commission , thereport of a family with a child affected by a reduction disorder of the long-chain fatty acids as was deteted during the newborn screening, the annual statistics and several results of the newborn hearing screening in Saxony-Anhalt.
Family E. reported very descriptively about the time after the metabolic disorder of the son had been detected. After the family had not been sufficiently informed by the maternity clinic, they felt that they were in good hands when they attended the special metabolic consultation in Magdeburg. The family also searched for contacts with other affected parents and organised a meeting in Quedlinburg.
PD Dr. med. Spiekerkötter, Head of the Metabolic Center in Düsseldorf, gave an overview of metabolic disorders of the long-chain fatty acids. She presented impressively how the progress of disease has changed to the positive after the introduction of tandem mass spectrometry. Early diagnosis due to newborn screening and an early start of therapy have reduced the number of metabolic crises and prevented the death of many children.

Scope of screening

Compared to the previous years the scope of screening in Saxony-Anhalt has not changed (PKU, hypothyroidism, CAH, galactosemia, biotinidase deficiency, enlarged screening "TMS"). The methods, reference levels we used as well recall- and detection rates are depicted in the following two tables.

Tab. 1: Methods/analytics 2007

Parameter	Disease	Method	Reference values
TSH	Hypothyroidism	Fluorescence immunoassay	<15 mU/l
GALT	Galactosemia	fluorometric	>3.5 U/gHb
BIO	Biotindase deficiency	enzymatic	normal/reduced activity; qualitative method

Continuation tab. 1

Parameter	Disease	Method	Reference values
17OHP	Congenital adrenal hyperplasia (CAH)	Fluorescence immunoassay	depends on gestational age
AC*	see annotation	TMS***	99.9th resp. 0.1th percentile of the normal distribution
AS**	see annotation	TMS***	99.9th resp. 0.1th percentile of the normal distribution

AC* Acylcarnitine - Group of parameter to recognize fatty-acid oxidation disorders, organoaciduria and carnitine cycle defects
AS** Amino acids - to recognize von aminoacidopathy (PKU, MSUD)
TMS*** Tandem-mass spectrometry

Examination numbers, recall rates and verified cases

Table 2 shows the recall rates of the individual parameters and the verified cases. In 2007 a total of 53 recalls were necessary.

Tab. 2: Samples, assured cases, recall-rate 2007

	First test	Second test*	Recall rate** 2007	Assured cases	Incidence in Saxony-Anhalt 1992-2007
TSH	17,224	744	0.02 %	3	1/3,870
PHE***	17,224	744	0.02 %	4	1/6,721
GALT	17,224	744	0.06 %	0	1/127,708
BIO	17,224	744	0.01 %	0	-
17OHP	17,224	744	0.16 %	1	1/31,965##
AC, AS (TMS)	17,224	744	0.05 %	2 MCAD#	1/14,396###

* Second submissions required because of an early blood withdrawal in full-term infants < 36 h or premature infants < 32 weeks of gestation or a positive first result (recall).
** Definition of recall: invitation to send in a new blood sample due to a suspicious screening result when the first test took place at an age of > 36 h in full-term infants or >32 weeks of gestation in premature infants.
*** Phe = phenylalanine: parameter for the identification of phenylketonuria and hyperphenylalaninemia
# MCAD: medium-chain fatty acids metabolism disorder
Screening of congenital adrenal hyperplasia syndrome (in Saxon-Anhalt since 1997)
Extended screening (TMS) in Saxony-Anhalt since May 2001.

Registration Rates

For 2007 the following registration rates were determined in Saxony-Anhalt:
According to the Federal Statistical Office (als of 29 June 2008) 17,387 children were born in Saxony-Anhalt (based on the residence of the mother).

Tab. 3: Registration rates of first tests

	Number	Difference/Sum
first screening MD	17,224	
not born in Saxony-Anhalt	41	17,183
not screened in Saxony-Anhalt	18	17,201
descended before screening	6	17,207
screening refused by parents	1	17,208

The discrepancy between the number of live births and screened children amounts to 179.
The data of the Federal Statistical Office is based on the data submitted by the Statistical Office of Saxony-Anhalt. The latter is based on the number of births based on the mother's place of residence as reported by maternity clinics and registered by the registry offices. In the previous years preliminary numbers of births based on the birth place of the child could still be used - an approach, which was probably more appropriate. The screening statistics of our centre do not include the number of mothers living in Saxony-Anhalt but giving birth to their children in other federal states if the newborn screening was performed in another federal state. Children screened in another federal state (despite having been born in Saxony-Anhalt) were only included when they could be clearly assigned.

The control of second examinations revealed the following result:
All necessary 771 second submissions (including controls of positive first submissions) were tracked.

Tab. 4: Registration rates of second tests

	Early withdrawal <36 h.	Premature infants <32 WOG	Controls of positive first transmissions
Second screening necessary: **771**	513	205	53
Control in the own laboratory: **744**	502	190	52
Descended before Screening	0	14	1
Screening in another Federal State	6	1	0
remaining	5*	0	0

* in spite of a letter to the parents of these 5 children no information about a second screening could be gained

Children screened in another federal state were children living near the border with another federal state and blood samples were taken by midwifes and physicians in private practices, who did not sent the blood samples to Magdeburg.

Tab. 5: All registrations in per cent

Reason for registration control	%
completeness	98.97
necessary second screening	99.40
controls of positive first screening	100.00

Process Times

Time of taking blood samples

In 86.1% of the cases the optimum time for taking blood as required by the Children's Directive for the newborn screening (2nd to 3rd day of life) was complied with. The required period was not complied with for 13.9% of all newborns. In 9.7% of these cases the blood sample was taken on the 4th day and in 1.1% even after the 4th day of life.

Note: Figures only include data of newborns for which all necessary details were available (dae and time of birth as well as date and time when the blood sample was taken).

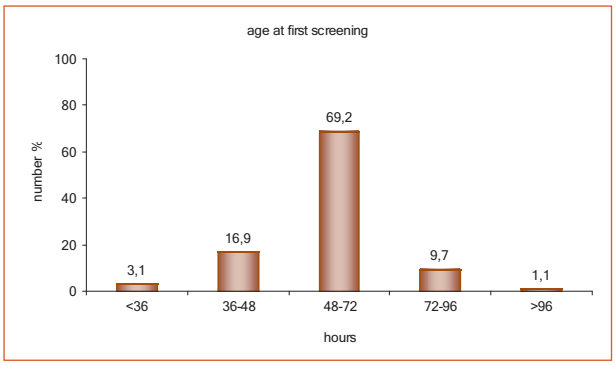

Fig. 1

Time of submission

Figure 2 shows that 43.5% of all submissions were received by the laboratory as late as more than two days after the blood sample had been taken. 4.4% of all blood samples were received more than four days later.

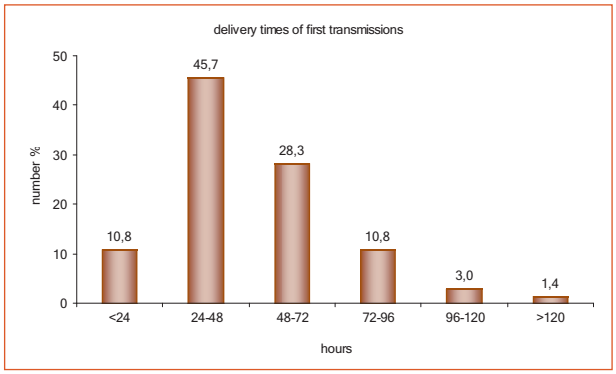

Fig. 2

According to the requirements of the Children's Directive a sender needs to be notified of a pathologic result by the laboratory within 72 hours after the blood has been taken. The limiting factor here is the time from taking the blood sample until it is received by the lab (shipping time). Therefore, we refer again to Children's Directive requiring that any blood sample needs to be dispatched on the day when it is taken.

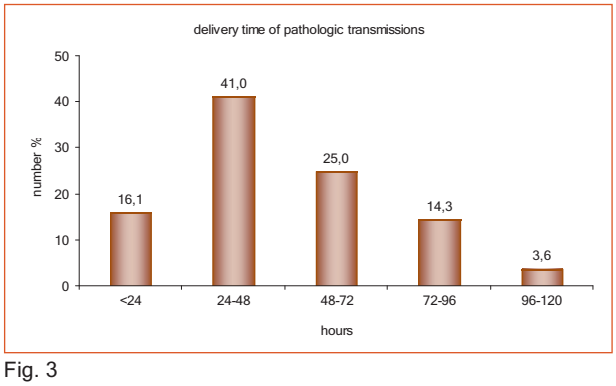

Fig. 3

Figure 3 shows the shipping time of the 53 recalls made in 2007 (blood sample taken from full-term infant > 36 h or premature infant > 32 weeks of gestation).

17.9% of the blood samples classified as pathologic by the laboratory were not received by the laboratory before three or more days after they had been taken!
This also affected the notification of the pathologic result.

In 30 cases the sender could be informed about the result as late as 72 to 204 hours (3 to 10 days) (Fig.4). This means that 53.6% of the pathologic results were transmitted too late with reference to the Directive - a clearly worse result compared to 2006 (21.4%).

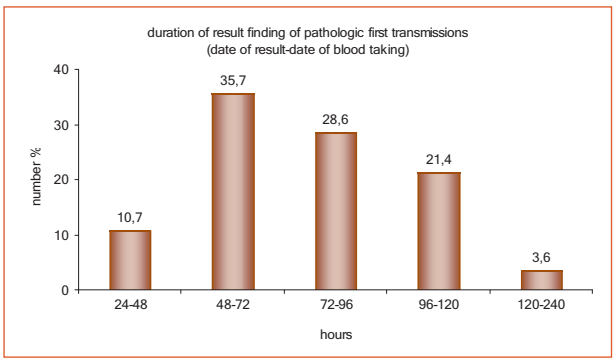

Fig. 4

Notification of result

FFigure 5 shows the age of the children at the time of notification of the result. Major factors influencing this time were the time of blood taking, shipping time and the duration of diagnostic examinations.

The most negative result: the screening result was not available before the 10th day of life for 0.7% of all births (127 children, these are 23 children more than in 2006!). Most of the blood samples were taken in time, but reached the laboratory delayed.

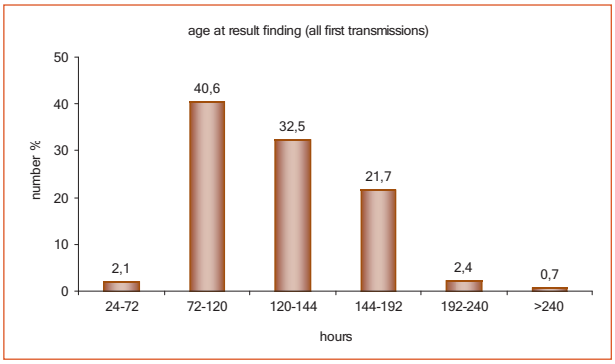

Fig. 5

Duration of diagnostic tests

The duration of diagnostic tests is influenced by factors, such as internal repetitions (necessary if the first result is classified as pathologic) and malfunction of devices.

A total of 97.7% of all results were obtained and communicated within 48 hours (the decisive date for normal results is the printing date and for results requiring a control the date of oral communication documented by entering the time in the dataset of the child.)

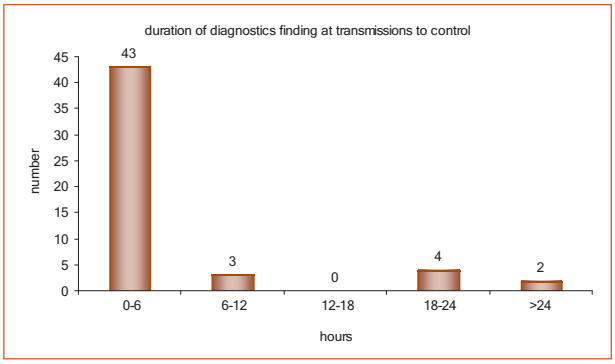

Fig. 6

Pathologic results

The following figure shows the time from the oral communication of the 53 pathologic results (recalls) until the second taking of blood by the sender. Basically all pathologic results are immediately notified in oral form after having been internally checked in the laboratory and there after faxed as a preliminary result. All these activities are documented.

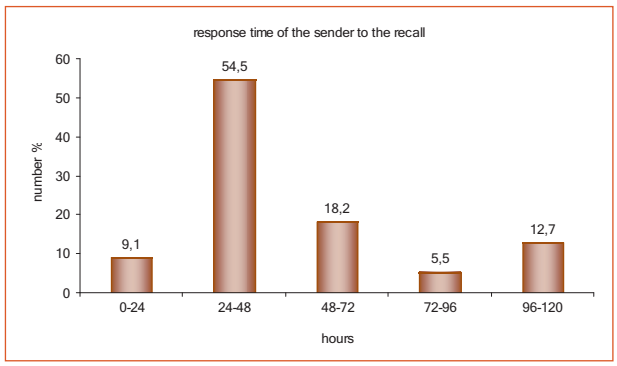

Fig. 7:

For 50 recall samples received (control was made in another federal state) results could be obtained on the day of receipt. Two laboratory tests (control of the biotinidase activity) the result could not be obtained before 24.5 and 25 hours, respectively, because of methodological reasons (Fig.8).

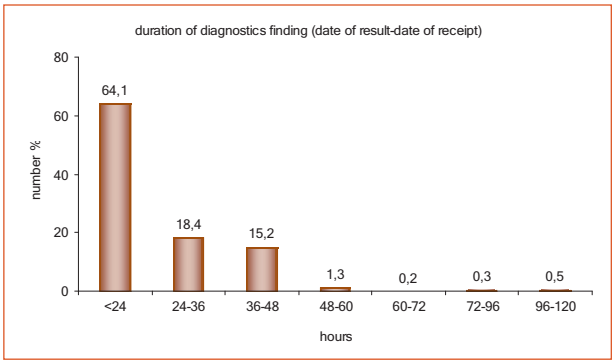

Fig. 8

17 of the demanded recalls were confirmed in the screening. Three children suffered from hypothyreosis, four children from phenylketonuria/hyperphenylalaninemia (HPA), two children from medium-chain fatty acids metabolic disorders (MCAD), one child from congenital adrenal hyperplasia (CAH) and seven children from a mild form of galactosemia.

Commencement of therapy of screening-positive patients

Tab. 5: diagnosis, confirmation diagnostics and therapie starting

Diagnosis	Confirmation diagnostics	Age at start of therpy
3 x Hypothyroidism	Serum-TSH, T4, sonography	5-7 days
3 x Phenylketonuria / HPA	Serum-Phe, BH4-test	8-20 days
1 x Congenital adrenal hyperplasia	Serum-17-OHP, ACTH, renin	10 days

For seven patients therapy was indicated. Two children with MCAD were referred to an outpatient clinic for metabolic diseases. One child with HPA does not need a therapy, but is also attended to in an outpatient clinic for metabolic diseases. Children with mild galactosemia do not need therapy according to the current state of knowledge.

Summary

In 2007 the procedures as to the registration of target diseases and newborn screening were continued without modifications.
However, there are still weak points revealed already in previous years in terms of organisation, i.e. very long shipping time of blood samples to the screening laboratory. All patients with a positive first screening result were followed up and their diagnosis was either confirmed or excluded. In all cases the confirmation of the positive screening result by the attending medical institution and the start of a therapy were also documented.

In 2007 the calculated incidence with reference to all target diseases of the newborn screening in Saxony-Anhalt was 1/1.013 and not considering the mild form of galactosemia 1/1.722.
For further information about the Metabolic Screening Center of Magdeburg visit our website:

www.stoffwechselzentrum-magdeburg.de

Senders, parents and interested parties will find details about the newborn screening and hearing screening here for information and downloading.