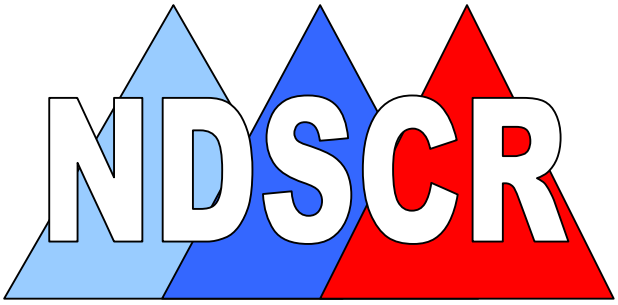
The National Down Syndrome Cytogenetic Register

2003 Annual Report

(funded by the National Screening Committee)



Web site: www.smd.qmul.ac.uk/wolfson/ndscr
Phone: 020 7882 6274/ 6217/ 6220
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Foreword

This 2003 annual report contains information about the NDSCR – who we are and what we do as well as detailed data on all cases of Down syndrome diagnosed cytogenetically from 1989 to 2003.

The NDSCR has undergone several changes over the last year:

- This is the first annual report that will include some data on diagnoses of Edwards syndrome (trisomy 18) and Patau syndrome (trisomy 13) which we began collecting in November 2003.
- We have re-applied for and been successful in obtaining ethical approval to continue collecting our data (from the Trent MREC and PIAG) through being a member of BINOCAR.
- Annabelle Stapleton has joined us to assist Haiyan Wu in running the register.

We would like to thank all the individuals who contribute to the NDSCR to make it such a valuable resource. We hope that we can continue to count on their collaboration.

Joan Morris – Director NDSCR
Eva Alberman
Wayne Huttly
David Mutton
Annabelle Stapleton
Haiyan Wu

December 2004

Contents

Introduction

Welcome to the 2003 annual report of the National Down Syndrome Cytogenetic Register.

The NDSCR is based at the Centre for Environmental and Preventive Medicine, Wolfson Institute of Preventive Medicine, Queen Mary's in London. The register is funded by the National Screening Committee.

Aims of the NDSCR

The NDSCR was started in 1989 and we aim to collect all cytogenetic or DNA reports of trisomies 21, 18 and 13 and their cytogenetic variants occurring in England and Wales. These data can then be used to help:

- monitor the Down syndrome antenatal screening and diagnostic services and the effect they have on the diagnoses of trisomies 18 (Edwards syndrome) and 13 (Patau syndrome);
- provide data on annual numbers of affected births to help those planning for their health, educational and social care;
- provide information for research into the epidemiology of Down, Edwards and Patau syndromes.

How the NDSCR works

All cytogenetic laboratories in England and Wales collaborate with the NDSCR, and provide, on standard forms, a notification of all prenatal and postnatal diagnoses of Down, Edwards and Patau syndromes. Appendix A gives a list of all 21 laboratories and a copy of the form is shown in Appendix B. The form is self-copying and has 4 pages. The top copy is sent to the NDSCR by the laboratory, the 2nd (blue) and 3rd (green) are sent to the referring clinician and the 4th (pink) sheet is retained by the laboratory. The clinicians are asked to forward the 3rd (green) copy to the local screening co-ordinator.

The number of Down syndrome pregnancies notified annually has risen from around 1000 in 1989 to 1415 cases in 2003. In November 2003 we first requested notifications of Edwards and Patau syndromes. A total of 35 diagnoses of Patau syndrome and 93 diagnoses of Edwards syndrome were recorded in this first year. These data are not yet complete and we will have to wait for the 2004 data to have an accurate picture of the diagnoses of these syndromes in England and Wales.

What data are collected

The notification form contains details of the chromosome analysis and some information on the mother and child, including postcode of residence, mother's age, length of pregnancy, the reason for referral for diagnosis was made and antenatal screening information. To preserve anonymity, the data do not include full names or addresses, but include enough information to enable us to identify duplicate registrations.

Data completion and processing

Follow-up of prenatal diagnoses
Only about 8% of prenatal diagnoses of Down syndrome end as a birth. We request the referring physicians to inform us of the pregnancy outcome (birth, termination or miscarriage) and the date and gestational age where a prenatal diagnosis has been made. **No direct contact is ever made with the mothers by the NDSCR.**

How the data are stored
The data are entered onto password-protected computers in locked offices. The full data are accessible only to the research team.

Validation of data
In order to ensure high levels of ascertainment, the data are matched with those held by the National Statistics Congenital Anomaly System and some of the Regional Congenital Anomaly Registers. In previous years this has shown the NDSCR data on births to be over 94% complete. Annual lists are sent to the laboratories for them to check that all cases have been registered.

Data quality
The Table in Appendix C gives the proportion of missing data on forms for the years 1989 to 2000 combined; and separately for 2001, 2002 and 2003. This is always highest in the most recent data where the clinicians have not yet been contacted. Requests for missing data are sent out regularly. The major problem is to ascertain the outcome of prenatally diagnosed pregnancies, particularly where the referral has been from a centre other than that where the mother was booked. Missing data for variables other than outcome are rare, with the exception of the numbers of previous pregnancies, a question that may not be seen as relevant to the clinicians, although it is important in terms of risk of recurrence. There have been many changes in postcodes since the start of the register and the same is true for health authority definitions. Regular recoding is carried out to keep these up-to-date.

Speed of reporting
Although most laboratories provide data within six months of the diagnoses we are hopeful that the involvement of the National Screening Committee and local screening co-ordinators will speed up the provision of outcome data, and the provision of more complete information on pregnancy history.

Data confidentiality and informed consent

Personal information held on a computer system is safeguarded by the Data Protection Act 1998 and the NDSCR is registered under this Act.

The Government has made it clear that informed consent is a fundamental principle governing the use of patient identifiable information. However it also recognises that situations arise where informed consent cannot practicably be obtained. Section 60 of the Health and Social Care Act 2001 provides a power to ensure that patient identifiable information needed to support essential NHS activity can be used without the consent of patients. The Act requires that the National Patient Information Advisory Group (PIAG) consider applications to use patient identifiable information without full informed consent. In 2003 the NDSCR as a part of the British Isles Network of Congenital Anomaly Registers (BINOCAR) was given permission to operate without informed consent. This permission was successfully re-applied for in 2004. In 2004 the NDSCR as part of BINOCAR also applied to Trent multi-centre research ethics committee (MREC) for ethical approval, which was granted.

How the data are used

Audit of Down Syndrome Screening

- All local screening co-ordinators should receive the green copy of the NDSCR form which will assist them in their audit requirements.
- Annual reports are produced describing numbers of prenatal and postnatal diagnoses, and the methods of prenatal screening which led to prenatal diagnoses.
- More detailed information is regularly published in medical journals.

Feedback

- NDSCR leaflets giving information on the trends in Down syndrome diagnosis are produced annually and distributed to cytogenetic laboratories, local screening co-ordinators and clinicians.
- The NDSCR web site is regularly updated.

Recent special studies

In-house studies

1) By combining data from the NDSCR and data from registries who are members of EUROCAT (European Concerted Action on Congenital Anomalies and Twins) (Morris et al, in press) we demonstrated that the age related risk of a Down syndrome pregnancy does not continue increasing over the age of 45 years.

2) We are investigating the peak of Down syndrome cases occurring in 1997. This peak cannot be explained by the increase in pregnancies in 1997, the maternal age distribution or the number of prenatal diagnoses.

3) We are using data on mothers who have a history of more than one Down syndrome pregnancy to develop newer and simpler estimates of maternal age-specific recurrence risks.

Collaborative studies

1) David Neasham from SASHU (Small Area Health Statistics Unit) has used relevant NDSCR data for his PhD thesis which shows that residence in wards designated as low social class appears to increase the risk of a Down syndrome pregnancy in mothers under 35. The opposite social class gradient exists in older mothers (Neasham, D. PhD; University of London, 2003).

2) We are continuing our collaboration with the National Childhood Cancer Register, to estimate the age-specific risk of leukaemia in children with Down syndrome, where we are able to provide denominator data for children on their register.

3) We are collaborating with Dr Kovaleva from St Petersburg who is studying the epidemiology of double aneuploidy involving trisomy 21.

4) We have helped Dr Jill Ellis of the Institute of Child Health, Great Ormond Street Hospital for Sick Children, with a study of the effect of special diets on the development of children with Down syndrome.

A list of publications based on, or using NDSCR data, are given in Appendix D.

The Data in the NDSCR

Down syndrome cases diagnosed in 2003

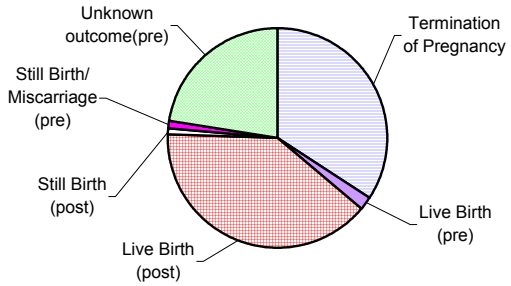
There were 1415 Down syndrome diagnoses made in 2003, 831 (59%) made prenatally and 584 (41%) postnatally (Table 1 and Figure 1). If we assume that of the prenatal diagnoses with unknown outcomes the proportion terminated remains as before 2003, the likely number of Down syndrome live births in England and Wales in 2003 would have been 624 (28 + 570 + 8% of 324), a birth prevalence of 1 per 1000 livebirths.

Table 1: Down syndrome cases diagnosed in 2003* by time of diagnoses and outcome

		No.	%
Prenatal	Termination of pregnancy	466	33
	Live Birth	28	2
	Still Birth / Miscarriage	13	1
	Unknown outcome†	324	23
Postnatal	Live Birth	570	40
	Still Birth	14	1
Total		1415	100

* 2003 data are provisional.
† About 8% of those with unknown outcomes are likely to result in a live birth.

Figure 1: Down syndrome diagnoses in 2003*
(pre - prenatal diagnosis, post - postnatal diagnosis)



* 2003 data are provisional.

Indication for prenatal karyotyping

The indications for karyotyping reflect the different methods of prenatal screening occurring. In 62% of all prenatally diagnosed cases the indication mentioned was the result of an ultrasound scan. 39% of these were carried out before 15 weeks, and were probably nuchal translucency measurements. Unfortunately we cannot determine this precisely from the form used in 2003. This information should be available for 2004 from the revised form. In 25% of prenatally diagnosed cases the indication was a maternal serum test, in 11% it was maternal age and in 1% a previous Down syndrome pregnancy. More than one reason can be given and therefore the reasons do not add up to 100%.

Gestational age at prenatal diagnoses

Of the 831 prenatally diagnosed cases, 25% were diagnosed before 13 weeks, 72% before 17 weeks and only 7% over 20 weeks gestation (Table 2). This pattern reflects the type of screening that had led to the prenatal diagnosis.

Table 2: Down syndrome cases diagnosed prenatally according to gestational age at diagnoses in 2003*

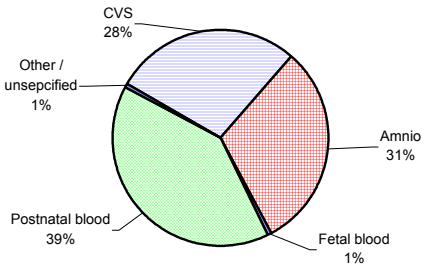
Gestational age (wks)	No.	%
<13	210	25
13-	177	21
15-	218	26
17-	125	15
19-	42	5
21+	59	7
Total	831	100

* 2003 data are provisional.

Tissue used for karyotyping

The most common source of sampling fetal cells in 2003 was amniocentesis, with chorionic villus sampling being almost as common (Figure 2). The median time from CVS sampling to termination of pregnancy was 7 days compared with 9 days for amniocentesis. 91% of all terminations following CVS were within 14 days of the procedure compared with 74% for amniocentesis.

Figure 2: Tissue used for karyotyping in 2003*

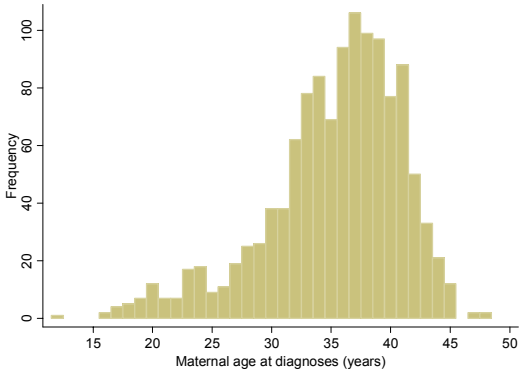


* 2003 data are provisional.

Maternal age at diagnoses

The average age of the mother at the time of diagnosis of fetal Down syndrome was 36; the most common age was 37 years (Figure 3) and a third were between 35 and 39 years old (Table 3).

Figure 3: Maternal age at diagnosis in 2003*



* 2003 data are provisional.

Table 3: Down syndrome cases diagnosed in 2003* according to maternal age at diagnosis

Maternal age (years)	No.	%
<20	19	1
20	63	5
25	90	6
30	304	22
35	475	34
40	274	19
45	16	1
missing	174	12
Total	1,415	100

* 2003 data are provisional.

Patau and Edwards syndrome cases diagnosed in the latter part of 2003

The data on Patau and Edwards syndrome are from a few laboratories from November 2003. Around 90% of both the Patau and Edwards syndrome diagnoses were made prenatally (Table 4).

Regional differences in Down syndrome cases diagnosed in 2003

Tables 5 and 6 show the patterns of diagnoses of Down syndrome across England and Wales. The proportion of cases diagnosed prenatally varies from 47% in North West NHS Region to 76% in Wales. The completeness of the data also varies by region with only 9% of outcomes being unknown in Trent compared to 34% in London. Table 5 shows that women in the regions with a higher proportion of referrals due to an ultrasound scan (probably mostly nuchal translucency measures in the first trimester) are more likely to have had a CVS than an amniocentesis.

Table 4: Patau and Edwards syndrome cases by time of diagnoses and outcome in 2003*.

		Syndrome	
		Patau	Edwards
Prenatal	Termination of pregnancy	23	46
	Live Birth	0	4
	Still Birth / Miscarriage	0	6
	Unknown outcome	8	31
Postnatal	Live Birth	4	4
	Still Birth	0	2
Total		35	93

* 2003 data are provisional.

Table 5: Down syndrome diagnoses by NHS Regional Office Area in 2003*

Region	No. of diagnoses	% of prenatal	Median maternal age (years)	% of missing maternal age+	% of Unknown outcome+
North & Yorkshire	138	53	36.1	12	18
Trent	127	63	36.4	3	9
West Midlands	112	53	37.6	22	10
North West	171	47	36.3	24	28
Eastern	140	65	37.3	13	26
London	317	63	37.4	13	34
South East	230	57	36.5	7	22
South West	121	60	37.6	7	19
Wales	59	76	38.2	5	17
Total	1415	59	36.9	12	23

* 2003 data are provisional.
+ Data currently being updated.

Table 6: Prenatal diagnoses by NHS Regional Office Area, indication and tissue used for diagnoses in 2003*

Region	No. of prenatal diagnoses	% of indication for Karyotyping+				Median gestational age (wks)	% of tissue sampled	
		Ultrasound scan < 15 wks	Ultrasound scan ≥ 15wks	Serum	Age		CVS	Amnio
North & Yorkshire	73	30	34	36	14	16	42	55
Trent	80	13	21	41	6	16	41	56
West Midlands	59	24	34	41	22	16	27	71
North West	81	19	25	22	11	16	16	83
Eastern	91	40	21	31	11	15	41	58
London	199	62	19	11	8	13	68	31
South East	130	57	14	18	9	13	62	37
South West	73	29	22	19	19	15	44	55
Wales	45	22	33	36	9	16	13	87
Total	831	39	23	25	11	15	46	52

* 2003 data are provisional.
+ More than one indication may be mentioned.

Trends over time in Down syndrome diagnoses

Since the register started collecting data on 1st January 1989 there has been a dramatic increase in the proportion of Down syndrome cases detected prenatally from 30% in 1989 to 59% in 2003, and numbers detected prenatally from 321 to 831 in 2003 (Table 7 and Figure 4). There is a corresponding decrease in the numbers of live births reported although this trend is now plateauing.

The total number of Down syndrome diagnoses has increased steadily due to the trend of women to have their children later in life and also to the increase in earlier prenatal diagnoses and subsequent terminations. Many of the fetuses diagnosed prenatally would have miscarried naturally. Therefore although the numbers of Down syndrome diagnoses are rising annually, the maternal age-related risk of having a Down syndrome birth has remained constant since 1989.

There was an increase in the proportion of mentions of a serum test as an indication for karyotyping from only 6% in 1989 to just under 40% from 1992 to 1997 (Table 8). This proportion then decreased with the introduction of nuchal translucency measurements as a screening test. In 2003 a serum test was mentioned as an indication for prenatal diagnosis in 25%, 39% mentioning ultrasound results before 15 weeks gestation as an indication. The use of maternal age alone as an indication for karyotyping is decreasing steadily, although even in 2003 it was given as an indication in 11% of prenatal diagnoses.

As the screening tests are being done at earlier gestations, an increasing number of women are having chorionic villus sampling (CVS) instead of amniocentesis, the ratios being 18% CVS to 77% amniocentesis in 1989, and 46% to 52% respectively in 2003 (Table 8).

Figure 4: The number of prenatal and postnatal diagnoses according to year of diagnosis

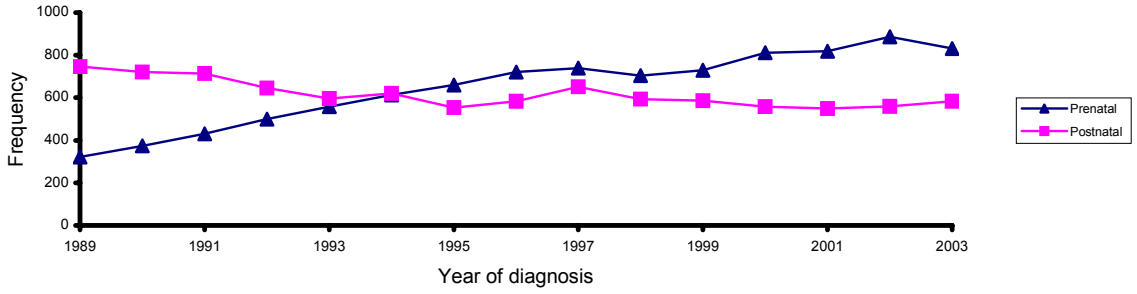
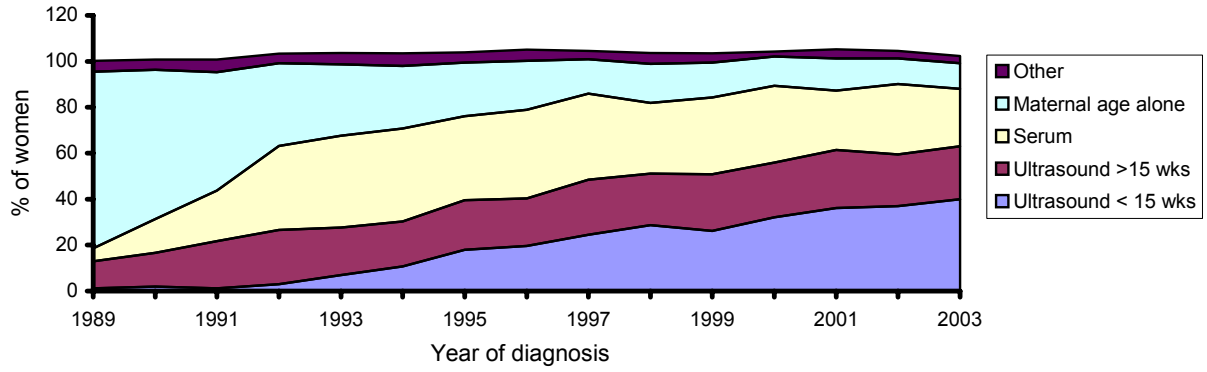


Figure 5: Indication for karyotyping according to year of diagnosis
(may exceed 100% due to more than one indication being given)



2003 data are provisional.

Table 7: Down syndrome diagnoses and outcomes in England and Wales from 1989 to 2003*

Year	No. diagnoses	% prenatal	No. liveborn	No. TOP	No. Misc[+]/ Still	No. Unknown outcome
1989	1067	30	750	293	16	8
1990	1095	34	738	328	17	12
1991	1144	38	735	369	31	9
1992	1146	44	662	442	24	18
1993	1155	48	622	507	18	8
1994	1234	50	638	542	29	25
1995	1214	54	579	578	32	25
1996	1304	55	606	651	31	16
1997	1390	53	667	658	40	25
1998	1297	54	632	609	21	35
1999	1315	55	606	642	31	36
2000	1370	59	592	677	23	78
2001	1368	60	570	568	28	202
2002	1446	61	585	534	38	289
2003*	1415	59	598	466	27	324
Total	18960	51	9580	7864	406	1110

[+] Only miscarriages after prenatal diagnosis are included.
* 2003 data are provisional.

Table 8: Down syndrome prenatal diagnoses 1989 to 2003*

Year	No. of prenatal diagnoses	% of Indication for Karyotyping[+]				Median gestational age (wks)	% of tissue sampled	
		Ultrasound scan <15 wks	Ultrasound scan ≥15wks	Serum	Age		CVS	Amnio
1989	321	1	12	6	77	16	18	77
1990	374	2	15	15	65	16	16	76
1991	430	1	21	22	51	17	15	73
1992	500	3	24	37	36	17	11	79
1993	558	7	21	40	31	17	17	77
1994	613	11	19	41	27	17	23	69
1995	660	18	22	37	23	16	25	69
1996	721	20	21	38	21	16	30	65
1997	739	25	24	38	15	16	35	61
1998	704	29	22	31	17	16	35	61
1999	729	26	25	34	15	16	33	60
2000	812	32	24	33	13	16	37	59
2001	819	36	25	26	14	15	45	52
2002	886	37	23	31	11	15	43	55
2003*	831	39	23	25	11	15	46	52
Total	9697	23	22	31	24	16	31	63

* 2003 data are provisional.
[+] More than one indication may be mentioned.

Appendix A

List of Cytogenetic Laboratories in England and Wales

NORTHERN GENETICS SERVICE
Institute of Human Genetics, International Centre For Life, Central Parkway, Newcastle Upon Tyne. NE1 3BZ Tel: 0191 241 8700

REGIONAL GENETIC SERVICE, MANCHESTER
St Mary's Hospital, Hathersage Road, Manchester, M13 OJH Tel: 0161 276 6553

ROYAL MANCHESTER CHILDREN'S HOSPITAL
Hospital Road, Pendlebury, Manchester, M27 4HA Tel: 0161 727 2567 (now merged with the Regional Genetic Service based at St Mary's Hospital in Manchester)

CHESHIRE AND MERSEYSIDE GENETICS SERVICE
Liverpool Women's Hospital, Crown Street, Liverpool, L8 7SS Tel: 0151 702 4229

YORKSHIRE REGIONAL GENETICS SERVICE
Ashley Wing, St James's University Hospital, Beckett Street, Leeds, LS9 7TF
Tel: 0113 206 5550

NORTH TRENT GENETIC SERVICES
Sheffield Children's Hospital, Western Bank, Sheffield, S10 2TH Tel: 0114 271 7015

NOTTINGHAM GENETIC SERVICE
City Hospital, Hucknall Road, Nottingham, NG5 1PB Tel: 0115 962 7617

LEICESTERSHIRE GENETICS CENTRE
University Hospitals of Leicester NHS Trust, Leicester Royal Infirmary, Leicester, LE1 5WW Tel: 0116 258 5637

WEST MIDLANDS REGIONAL GENETICS SERVICE
Birmingham Women's Hospital, Edgbaston, Birmingham, B15 2TG Tel: 0121 627 2710

OXFORD REGIONAL GENETICS SERVICE
Oxford Radcliffe Hospitals NHS Trust, The Churchill, Old Road, Headington, Oxford, OX3 7LJ Tel: 01865 226 001

EAST ANGLIAN REGIONAL GENETICS SERVICE
Regional Genetics Laboratories, Kefford House, Maris Lane, Trumpington, Cambridge, CB2 2FF Tel: 01223 550 700

NORWICH MOLECULAR AND CYTOGENETICS SERVICE
Norfolk and Norwich University Hospital, Colney Lane, Norwich NR4 7UY Tel: 01603 286 038

SOUTH WESTERN REGIONAL GENETICS SERVICE
St Michael's Hospital, Southwell Street, Bristol BS2 8EG Tel: 0117 959 5570

NW THAMES REGIONAL GENETICS SERVICE
Kennedy-Galton Centre, NWLH NHS Trust Level 8v, Watford Road, Harrow, Middlesex, HA1 3UJ Tel: 020 8869 3154

NE THAMES REGIONAL GENETICS SERVICE
Clinical Genetics Unit, Institute of Child Health, 30 Guilford Road, London, WC1N 1EH
Tel: 020 7829 8870

SW THAMES REGIONAL GENETICS CENTRE
Medical Genetics Unit, St George's Hospital Medical School, Cranmer Terrace, London, SW17 0RE Tel: 020 8725 5332

GUY'S AND ST THOMAS' HOSPITAL NHS TRUST
Cytogenetics Department, 5th Floor, Guy's Tower, Guy's Hospital, London, SE1 9RT
Tel: 020 7955 8719

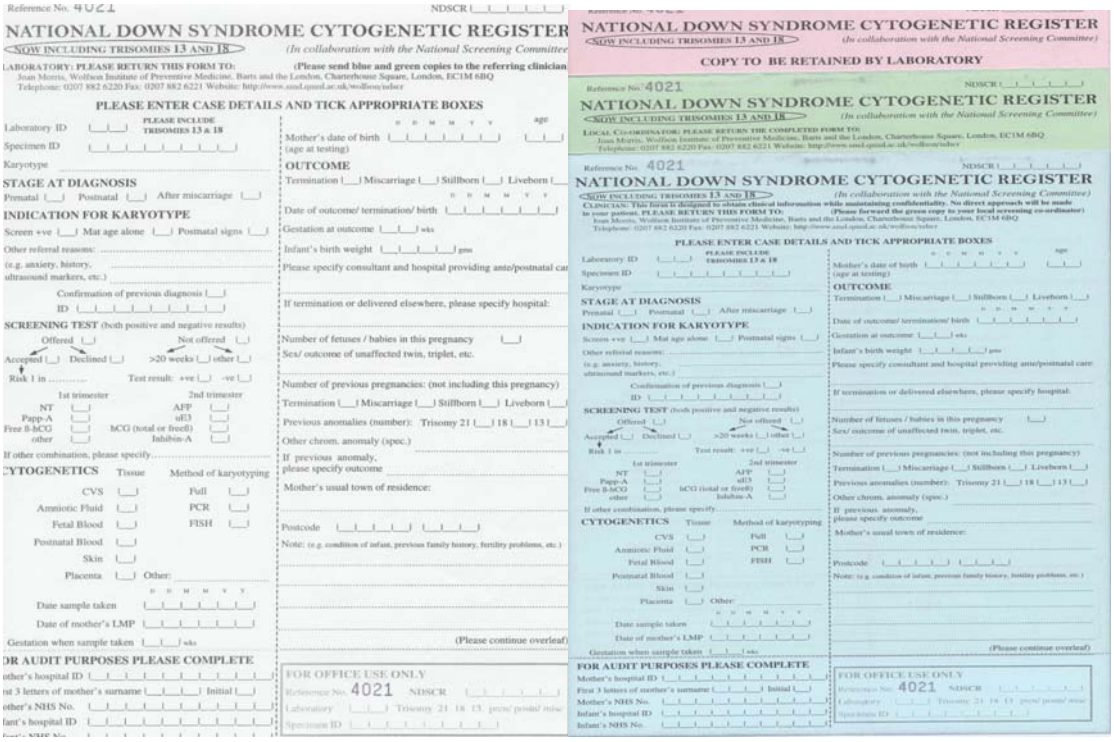
WESSEX CLINICAL GENETICS AND LABORATORY SERVICE
Salisbury District Hospital, Salisbury, Wiltshire, SP2 8BJ Tel: 01722 429080

WALES
Institute of Medical Genetics, University Hospital of Wales, Heath Park, Cardiff, CF14 4XW
Tel: 02920 744 054

CYTOGENETICS SERVICES
(TDL Genetics as from 20/02/04)
3rd Floor North, 60 Whitfield Street, London W1T 4EU Tel: 020 7486 1322

Appendix B

New form


NATIONAL DOWN SYNDROME CYTOGENETIC REGISTER

NOW INCLUDING TRISOMIES 13 AND 18

(In collaboration with the National Screening Committee)

PLEASE ENTER CASE DETAILS AND TICK APPROPRIATE BOXES

COPY TO BE RETAINED BY LABORATORY

Appendix C

Data Completeness

The following table gives the completeness of different data items for the years 1989 to 2000, 2001, 2002 and 2003. We are still following up the missing data for 2002 and 2003. The data from 1989 to 2000 are included for comparison purposes to demonstrate the levels of completeness we are aiming to achieve for the 2001,2002 and 2003 data.

Table C1: Completeness of data from 1989 to 2003*

	Percentage complete			
Data Item	1989-2000	2001	2002	2003*
Reason for referral for karyotyping	100	100	99	100
Type of tissue karyotyped	100	99	100	100
Sex of fetus (some DNA based diagnoses such as FISH and q-PCR do not include sex chromosome analysis)	100	100	98	98
Maternal age	97	92	91	89
Gestational age at sample for prenatal diagnosis	100	100	100	100
Outcome of pregnancy	97	85	80	77
Gestational age at outcome for prenatal diagnosis	84	66	61	56
Number of previous pregnancies	66	58	52	52
Post Codes (some information)	92	94	95	90
(complete postcodes)	84	85	84	88

* 2003 data are provisional.

Appendix D

NDSCR Publications

1. Mutton DE, Alberman E, Ide R, Bobrow M. Results of first year (1989) of a national register of Down's syndrome in England and Wales. *BMJ* 1991; **303**:1295-7
2. Mutton DE, Ide R, Alberman E, Bobrow M. Analysis of National Register of Down's syndrome in England and Wales: trends in prenatal diagnosis. *BMJ* 1993; **306**: 431-2.
3. Morris JK, Mutton DE, Ide R, Alberman E, Bobrow M. Monitoring trends in prenatal diagnosis of Down's syndrome in England and Wales, 1989-1992. *J Med Screening* 1994; **1:** 233 -7.
4. Alberman E, Mutton D, Ide R, Nicholson A, Bobrow M. Down's syndrome births and pregnancy terminations in 1989 to 1993: preliminary findings. *Br J Obstet Gynarcol* 1995; **102**; 445-7.
5. Huang T, Watts HC, Wald NJ, Morris JK, Mutton D, Alberman E. Reliability of statistics on DS notifications. *J Med Screen* 1997; **4**: 94-97. Subsequent letter in same journal.
6. Williamson P, Harris R, Church S, Fiddler M, Rhind J.Prenatal genetic services for Down's syndrome: access and provision. Steering Committee of the National Confidential Enquiry into Counselling for Genetic Disorders. *Br J Obstet Gynaecol* 1996; **103:**676-83.
7. Smith-Bindman R, Waters J, Mutton D, Alberman E. Trends in the effectiveness and efficiency of prenatal Down syndrome (DS) screening in England and Wales, 1989-1999. *J Med Genet* 2001: Supplement 1 SP33.
8. Mutton DE, Alberman ED, Hook EB. (The National Down Syndrome Cytogenetic Register and the Association of Clinical Cytogeneticists) Cytogenetic and epidemiological findings in Down syndrome: 1993. *J Med Genet* 1996; **33**: 387-394.
9. Hook EB, Mutton DE, Ide R, Alberman ED, Bobrow M. The natural history of Down syndrome conceptuses diagnosed prenatally which are not electively terminated. *Am J Human Genetics* 1995; **57**: 875-881
10. Morris JK, Wald NJ, Watt HC. Fetal loss in Down's syndrome pregnancies. *Prenat Diagn* 1999; **19**:142-145
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13. Hook EB, Cross PK, Mutton DE. Female predominance (low sex ratio) in 47, +21 mosaics. *Am J Med Genet* 1999; **84**:316-319.
14. Vrijheid M, Dolk H, Armstrong B, Abramsky L, Bianchi F, Fazarinc I, Garne E, Ide R, Nelen V, Robert E, Scott JES, Stone D, Tenconi R. Chromosomal congenital anomalies and residence near hazardous waste landfill sites. *Lancet* 2002; **359**, 320-3.
15. Morris JK, Mutton DE, Alberman E. Revised estimates of the maternal age specific live birth prevalence of Down's syndrome. *J Med Screening*, 2002, **9**,2-6
16. Alberman E. The National Down Syndrome Cytogenetic Register (NDSCR) *J Med Screening* 2002, **9**, 97-98 (Editorial)
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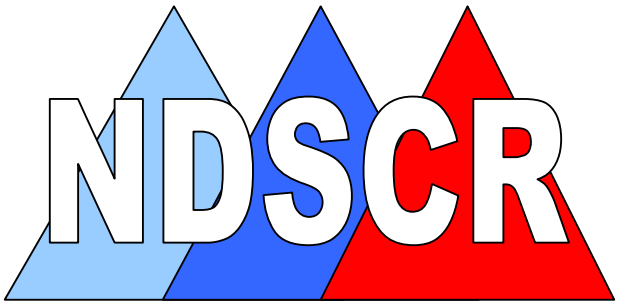
Conclusions

- The NDSCR is approved to gain support under Section 60 of the Health and Social Care Act 2001 and has ethical approval from Trent MREC.
- The NDSCR has continued to maintain a near complete record of all Down syndrome diagnoses in England and Wales in 2003.
- In 2003 there were 1,415 diagnoses of Down syndrome, of which 59% were prenatally diagnosed.
- In 2003 the Down syndrome live birth rate was around 1 per 1000 (this figure is provisional as there are a large number of missing outcomes).
- At present the large number of missing outcomes is unacceptable. We hope that by working with the local screening co-ordinators we will be able to reduce this and prevent it from occurring in future years.
- The NDSCR is funded by the National Screening Committee and is working with the regional and local screening co-ordinators to help them fulfil their audit function.
- Some diagnoses of Edwards and Patau syndrome diagnoses have been included in this report for the first time.



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