

Table V. Referrals for monogenic diseases

Autosomal recessive	No. of referrals	Autosomal dominant	No. of referrals	X-linked	No. of referrals
Cystic fibrosis	109	Myotonic dystrophy	88	Fragile-X syndrome	75
Thalassemia	53	Huntington's disease	73	Duchenne/Becker's muscular dystrophy	69
Spinal muscular atrophy	50	Charcot-Marie-Tooth disease	20	Haemophilia	26
Other	78	Other	73	Other	124
Total	290	Total	254	Total	294

Table VI. Centre decision

	Yes	No	Undecided/unknown
Suitable for IVF	1160	115	260
Technically possible	1184	240	137
Ethically acceptable	1272	61	228
PGD accepted	1070	292	199

PGD = preimplantation genetic diagnosis.

Table VII. Most important reasons for declining

Inconvenience/burden of IVF or ICSI	60
Spontaneous pregnancy	38
Low success rate	36
Cost	17
Donor spermatozoa needed	6
Donor oocytes needed	5

AT (acid Tyrode's) drilling were used in almost an equal number of cases. From 768 oocytes, 414 fertilized (54%), 314 were suitable for biopsy, and 312 of these were successfully biopsied (100%). The diagnosis was successful in 252 cases (81% of embryos successfully biopsied), and 85 embryos were diagnosed as transferable (11% of oocytes collected). Thirty-eight embryo transfer procedures were conducted (74% of OR), and 11 clinical pregnancies resulted (22% of OR and 29% of embryo transfer).

For the reciprocal translocations, a total of 96 cycles reached the OR stage, and the average female age was 34 years. In this case, only 25 patients were infertile, which was much lower than in the case of Robertsonian translocations. ICSI was undertaken in most cases. All embryo biopsies were performed at the cleavage stage, using mostly blastomere aspiration. The majority of clinics used acid Tyrode's for zona drilling, which is also different to the cases of Robertsonian translocations. From 1570 oocytes, 1016 fertilized (65%), 866 were suitable for biopsy and 856 of these were successfully biopsied (99%). The diagnosis was successful in 789 cases (92% of embryos successfully biopsied), and 195 embryos were diagnosed as transferable (13% of oocytes collected). Seventy-three embryo transfer procedures were conducted (76% of OR), and 17 clinical pregnancies resulted (18% of OR and 23% of embryo transfer). The karyotypes of the

Table VIII. Overall data for PGD only (no PGD-AS or social sexing)

Indication	PGD 2001	1999 + 2000	PGD cumulative All 3 years
Cycles to OR	426	771	1197
Female age	34 years	Not known	–
No. infertile	164	Not known	–
IVF	64	154 ^a	218
ICSI	363 ^b	619	982
Cancelled post OR	13	13	26
Cycles to PGD	413	758	1171
FISH	232	381	613
PCR	181	377 + 9 ^c	558
AT drilling	211	602	813
Laser drilling	199	146	345
Mechanical	3	10	13
PB biopsy	2 ^d	4 ^d	6
Cleavage aspiration	378	755	1133
Cleavage extrusion	35	0	35
COCs	5985	10 267	16 252
Inseminated ^e	5274	9090	14 364
Fertilized	3703	6465	10 168
Biopsied	2874	5224	8098
Successfully biopsied	2844	5041	7885
Diagnosed	2452	4323	6775
Transferable	997	1838	2835
Transferred	708	1340	2048
Cycles to embryo transfer	349	639	988
Frozen	130	360	490
HCG-positive	107	174	281
Positive heart beat ^f	81 (19)	141 (16.5)	222 (17.3)

^aSome had IVF and ICSI

^bTwo FISH cycles had IVF and ICSI.

^cNine cycles involved PCR and FISH diagnosis.

^dOne cycle PCR diagnosis had polar body biopsy and cleavage-stage aspiration; diagnosis involved PCR and FISH.

^eNumber of oocytes inseminated not accurate as some centres did not record this information. In cycles where data were not recorded, the figure entered was the same as the number of oocytes collected.

^fValues in parentheses are % per oocyte retrieval.

AT = acid Tyrode's; COC = cumulus-oocyte complex; OR = oocyte retrieval.

chromosomal rearrangements for which PGD has been performed are listed in Table IXB.

Twenty-five cases of PGD were performed for other chromosome abnormalities, with four clinical pregnancies.

The cumulative data for all three years show that 368 cycles have now been performed, with 689 embryos being suitable for transfer (13% of the oocytes collected), 290 embryo transfer procedures and 62 clinical pregnancies (17% per OR and 21% per embryo transfer).

着床前診断を受けた延べ96回の内25例が
不妊症だったという事で患者数ではない

Table IXA. Preimplantation genetic diagnosis (PGD) for structural chromosomal abnormalities

Chromosome abnormality	Robertsonian translocation	Reciprocal translocation	Other chromosome abnormality	Total 2001	1999+2000	Cumulative for 3 years
cycles to OR	51	96	25	172	196	368
Female average age	34	34	32	34	Not known	—
<u>No. Infertile</u>	41	25	19	85	Not known	—
IVF	7 ^a	29	5	41 ^a	45 ^a	86
ICSI	45 ^a	67	20	132 ^a	152	284
Cancelled after OR	0	2 ^b	0	2	3	5
AT drilling	23	78	9	110	157	267
Laser drilling	28	14	16	58	36	94
Mechanical	0	2	0	2	0	2
Polar body biopsy	0	0	0	0	3	3
Cleavage aspiration	37	90	23	150	190	340
Cleavage extrusion	14	4	2	20	—	20
COCs	768	1570	307	2645	2732 ^b	5377
Inseminated	656	1389	274	2319	2327	4646
Fertilized	414	1016	182	1612	1722 ^c	3334
Biopsied	314	866	143	1323	1471	2794
Successfully biopsied	312	856	140	1308	1393	2701
Diagnosed	252	789	128	1169	1254	2423
Transferable	85	195	60	340	349	689
Transferred	75 ^c	155	39	269	308	577
Cycles to embryo transfer	38	73	20	131	159	290
Frozen	5	30	5	40	13	53
HCG positive	14	22	5	41	40	81
Positive	11	17	4	32	30	62
heart beat				18.6%	15.3%	16.8%
lost to follow up	0	0	0	0	3	3

^aOne cycle with IVF and ICSI.

^bOne cycle with 23 embryos frozen (OHSS), one cycle with only three embryos which were transferred without biopsy.

^cTwo cycles where embryos without diagnosis were transferred (failed diagnosis).

AT = acid Tyrode's; COC = cumulus-oocyte complex; OR = oocyte retrieval.

Sexing by FISH for X-linked disease

Almost all clinics performing sexing for X-linked disease use FISH. Table X shows the FISH results of sexing for X-linked disease and other non-specific X-linked conditions, e.g. autism. For sexing for X-linked disease in 2001, a total of 64 cycles reached the OR stage. The patients had an average age of 35 years, and only 17 cycles were for infertile patients. ICSI was used in most of the cases ($n = 42$). For all cycles, cleavage-stage biopsy was performed using aspiration to remove the blastomere, and equal numbers used acid Tyrode's or a laser for zona drilling. A total of 852 oocytes was collected, 535 fertilized (63%), 413 were successfully biopsied (98%) and 356 of these were successfully diagnosed and 153 considered transferable (18% of oocytes retrieved). Embryos were transferred in 57 cases, with a clinical pregnancy rate of 20% per OR and 23% per embryo transfer.

The cumulative data show that 254 cycles have reached the stage of OR, 219 embryo transfers been performed, and a clinical pregnancy rate of 16% per OR and 19% per embryo transfer has been achieved.

PCR diagnosis for single gene disorders

Last year it was disappointing that the exact diseases for which some centres had performed PGD using PCR could not be evaluated; hence, only one overall table of PCR PGD was reported, without a list of diseases that had been diagnosed. Due to alterations in the data collection to ensure that centres

made it clear which disease they were diagnosing, this year it was possible to present a breakdown of the data (Table XIA) and a list of diseases diagnosed (Table XIB).

The data have been divided into autosomal recessive, autosomal dominant, X-linked recessive-specific, X-linked dominant-specific, autosomal recessive combined with X-linked disease (i.e. patients carrying two abnormalities) and mitochondrial disease. For the autosomal recessive diseases, 98 cycles were started, and 91 reached the stage of OR. The average maternal age was 32 years, and 47% were infertile. In one cycle, IVF was performed. As the Consortium has confirmed in previous publications, ICSI should be used in all cases of PCR-PGD to avoid sperm contamination. Most cycles used acid Tyrode's for drilling, 79 cycles used cleavage-stage aspiration, and 10 used cleavage-stage extrusion. From 1221 oocytes collected, 749 fertilized (61%), embryo biopsy was performed on 607 embryos (and was successful on 600 of these; 99%), 490 embryos were successfully diagnosed (82%) and 294 were diagnosed as transferable (normal or healthy carriers)(60%). From 98 cycles started, 86 had embryo transfer procedures (88%) and 20 resulted in a clinical pregnancy (22% per OR and 23% pregnancy rate per embryo transfer procedure).

For the autosomal dominant diseases, 72 cycles were started, and 69 reached the stage of OR. The average maternal age was 31 years, and only 8% were infertile. Most cycles used the laser for drilling, 64 cycles used cleavage-stage aspiration and three used cleavage-stage extrusion. From 929 oocytes