

Assisted reproductive technology in Europe, 2007: results generated from European registers by ESHRE

J. de Mouzon*, V. Goossens, S. Bhattacharya, J.A. Castilla, A.P. Ferraretti, V. Korsak, M. Kupka, K.G. Nygren, and A. Nyboe Andersen: The European IVF-Monitoring (EIM)[†] Consortium for the European Society on Human Reproduction and Embryology (ESHRE)

ESHRE Central Office, Meerstraat 60, B-1852 Grimbergen, Belgium

*Correspondence address: Université Paris Descartes, Faculté de Médecine, Assistance Publique – Hôpitaux de Paris (AP-HP), Groupe Hospitalier Universitaire (GHU) Ouest, Centre Hospitalier Universitaire (CHU) Cochin Port Royal, Service de Gynécologie Obstétrique II et Médecine de la Reproduction (Professeur Chapron), Paris, France, 82 avenue Denfert Rochereau 75014 Paris, France. Tel: +33-6-62-06-22-74; or +33-1-58-41-22-68; or 58-41-15-29; Fax: +33-0-1-58-41-18-70; E-mail: jacques.demouzon@inserm.fr

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BACKGROUND: This 11th European IVF-monitoring report presents the results of assisted reproductive technology (ART) treatments initiated in Europe during 2007.

METHODS: From 33 countries, 1029 clinics reported 493 184 treatment cycles: IVF (120 761), ICSI (256 642), frozen embryo replacement (91 145), egg donation (15 731), preimplantation genetic diagnosis/preimplantation genetic screening (4638), *in vitro* maturation (660) and frozen oocytes replacements (3607). Overall, this represents a 7.6% increase since 2006, mostly related to an increase in all registers. IUI using husband/partner's (IUI-H) and donor (IUI-D) semen was reported from 23 countries: 142 609 IUI-H (+6.2%) and 26 088 IUI-D (+7.2%).

RESULTS: In 18 countries where all clinics reported, 376 971 ART cycles were performed in a population of 425.6 million (886 cycles per million). The clinical pregnancy rates per aspiration and per transfer were 29.1 and 32.8% for IVF, and 28.6 and 33.0% for ICSI. Delivery rate after IUI-H was 10.2% in women aged < 40 years. In IVF/ICSI cycles, 1, 2, 3 and ≥ 4 embryos were transferred in 21.4, 53.4, 22.7 and 2.5% of cycles, with no decline in the number of embryos per transfer since 2006. The proportion of multiple deliveries (22.3: 21.3% twin and 1.0% triplet), did not decrease compared with 2006 (20.8%) and 2005 (21.8%). In women < 40 years undergoing IUI-H, twin deliveries occurred in 11.7% and triplets in 0.5%.

CONCLUSIONS: In comparison with previous years, the reported number of ART cycles in Europe increased in 2007; pregnancy rates increased marginally, but the earlier decline in the number of embryos transferred and multiple births did not continue.

Key words: European Society of Human Reproduction and Embryology / assisted reproduction technology / intrauterine insemination / register data

Introduction

This report is the 11th annual European Society of Human Reproduction and Embryology (ESHRE) publication on European data on

assisted reproductive technology (ART). The 10 previous reports, also published in Human Reproduction (ESHRE, 2001a,b, 2002, 2004, 2005, 2006, 2007, 2008; Nyboe Andersen *et al.*, 2009; de Mouzon *et al.*, 2010), covered treatment cycles from 1997 to 2006.

[†] EIM Committee 2009–2011: Chairman: J. de Mouzon; Chairman elect: A.P. Ferraretti; Past chairman A. Nyboe Andersen; Members: S. Bhattacharya, J.A. Castilla, V. Korsak, M. Kupka, K.G. Nygren (special advisor). V. Goossens is Science Manager at ESHRE Central Office, Brussels. See also Appendix for contributing centres and contact persons representing the data collection programmes in the participating European countries. ESHRE pages content is not externally peer-reviewed. The manuscript has been approved by the Executive Committee of ESHRE.

As in the last report, the printed version contains the four most important tables. Additional tables are available online, making the whole report consistent with those from previous years. In the published report, these tables will be referred as 'Supplementary data, Tables SI–SXVIII'. The main results of this report were presented at the annual ESHRE congress in Rome, July 2010.

Materials and Methods

Data collection

Data on ART have been collected from 33 European countries, covering IVF, ICSI, frozen embryo replacement (FER), egg donation (ED), *in vitro* maturation (IVM), pooled data on preimplantation genetic diagnosis (PGD) and preimplantation genetic screening (PGS) and frozen oocyte replacements (FOR). In addition to ART, data on intrauterine inseminations using husband/partner's semen (IUI-H; 22 countries, 2 more than in 2006) and donor semen (IUI-D; 18 countries, as in 2006) were also included. The report includes treatments started between the 1 January and the 31 December 2007. Follow-up data on pregnancies and deliveries are cohort data, based on the reported cycles.

The forms were the same as in 2006, making all tables comparable. As in previous years, data were directly entered in ESHRE's computer system by each country co-ordinator, through software developed by ESHRE. Data analysis was performed in ESHRE headquarters by V. Goossens.

Results

Participation

The present report includes data from an additional country (Bosnia) (Table I). The proportion of reporting clinics (86%, 1029 out of 1204 clinics, listed in Supplementary data) was the same as in 2006. In 18 countries, the coverage, as in 2006, reached 100%. Two countries (Ireland and Switzerland) were able to report data from all but a single Centre, but participation was limited (25–50%) in six others (Bosnia, Bulgaria, Hungary, Lithuania, Poland and Serbia) and very low ($\leq 25\%$ of clinics) in Greece and Latvia.

Number of treatment cycles

In total, 493 184 cycles were reported, 34 425 more than in 2006 (+7.5%). Among the 377 403 fresh cycles (+7.8%), 120 761 were IVF (+2.9%) and 256 642 ICSI (+10.3%). The proportion of ICSI thus reached 68.0% of 'fresh' ART cycles (66.5% in 2006). The proportion of FER cycles compared with 'fresh' cycles was 24.2%—a figure comparable to the figure of 2006 (24.6%). The number of ED cycles, reported by 22 countries, increased more than that observed in fresh IVF/ICSI cycles, reaching 15 731 (+24.4%), the main contributor being Spain (7985 cycles, +22%). PGD was reported by 14 countries, with fewer cycles (4638, –29.3%) recorded in 2007. The main reason was absence of data from Turkey, who contributed 2308 cycles in 2006. Higher rates of IVM were reported (660, +267% compared with 2006). Finally, 3607 FOR cycles were reported (+1.0%), the majority from Italy ($n = 2994$). Table I also shows the number of cycles per million women of reproductive age (15–45 years) and per million inhabitants, in the 18 countries where data coverage was 100%. The highest availability of ART cycles was reported from Nordic countries, particularly in Denmark (14 067 and 2558),

followed by Belgium, Finland, Iceland, Sweden, Norway and Slovenia, all of which provided over 8000 per million women aged 15–45 years and 1700 cycles per million inhabitants, respectively. More details are reported in Supplementary data, Table SI.

Reporting methods and size of the clinics

Among the 18 countries with complete reporting (Supplementary data, Table SII), the register was compulsory for 14 [10 held by a National Health Authority (NHA) 3 by a medical organization (MO) and 1 by personal initiative] and voluntary for 4 (three held by a MO and one by a NHA). Only seven registers were based on individual forms, i.e. cycle by cycle.

Among the 15 countries with partial coverage, 6 were held by an NHA/NGO and 3 were based on individual forms.

The distribution of clinics according to the number of cycles varied considerably among the countries (Supplementary data, Table SIII). For example, in Italy 44.1% of the clinics provided fewer than 100 cycles annually, whereas in Belgium and in the Netherlands 61% of the clinics performed more than 1000 cycles a year.

Pregnancies and deliveries after treatment

Table II shows pregnancy and delivery rates per aspiration for IVF, ICSI and FER. Three countries provided outcome only per embryo transfer, while three did not provide data on deliveries. Thus the mean pregnancy rate and delivery rate were computed for countries providing the relevant information. There were huge variations across the countries. On average, pregnancy rates were 29.1% (+0.1% compared with 2006) and 28.6% (–1.3%) per aspiration for IVF and ICSI, and 20.1% per thawing for FER (+1.0%). Mean delivery rates per aspiration (per thawing for FER) were 21.1, 20.2 and 13.5%, respectively (–0.4, +1.8 and +0.8%). The detailed numbers of cycles, aspirations, transfers, pregnancies, deliveries and the corresponding rates per technique are reported in Supplementary data, Table SIV for IVF, Supplementary data, Table SV for ICSI and Supplementary data, Table SVI for FER.

In total, 96 690 babies were recorded as having been born in the 29 countries where the reporting from IVF, ICSI and FER included newborns (+8185). In countries with complete reporting, the percentage of babies conceived through ART varied from 0.5% of the national births in Turkey to 4.9% in Denmark. More details are provided in Supplementary data, Table SI, showing that the percentage of ART babies was above 3.0% in most of the Nordic countries, whereas this percentage was between 1.2 and 1.8% in the largest European countries (Germany, France, UK and Italy).

ED was reported by 22 countries (Supplementary data, Table SVII). In total, 6628 clinical pregnancies (+1112) resulted from 143 34 embryo transfers (+1649), with pregnancy rates of 46.2% per transfer versus 43.5% in 2006. The mean delivery rate was 30.8% per transfer ($n = 4448$) in the 21 countries reporting deliveries.

Age distribution

The age distribution of women treated with IVF varied across countries (Supplementary data, Table SVIII). In four countries, more than 20% of women were aged 40 years or more (Greece, Ireland, Italy and Switzerland), whereas it was <5% in Albania, Poland and Slovenia. As expected, pregnancy rates decreased with age, from

Table I ART in European countries in 2007.

	IVF clinics in the country		Treatment cycles								Cycles/million*	
	Total	Reporting	IVF	ICSI	FER	ED	IVM	PGD	FOR	All	Women 15–45 years of age	Population
Albania	3	1	66	79		16				161		
Austria	26	26	1172	4050	306	0				5528	3252	674
Belgium	18	18	3852	12 357	7499	751				24 459	12 230	2352
Bosnia	5	2	31	131	0					162		
Bulgaria	15	7	574	708	79	8	0	0	0	1369		
Cyprus	7	5	482	823	155	112	2	16		1590		
Czech Republic	24	24	1947	7225	4169	1221		498		15 060	6845	1476
Denmark	23	23	6054	4981	2668	140	111	113		14 067	14067	2558
Finland	18	18	2931	1793	3529	314	23	25	320	8935	11 169	1718
France	104	104	20 211	31 635	14 772	742	88	124		67 572	5363	1061
Germany	118	118	11 811	33 371	17 140					62 322	3944	756
Greece	38	9	829	1360	193	92	5	9	15	2503		
Hungary	10	5	594	1843	620	48	0	6	17	3128		
Iceland	1	1	215	174	244	32	0	0	0	665	11 083	2217
Ireland	7	6	1768	1096	692	9	0		0	3565		
Italy	202	202	8792	31 213	709				2994	43 708	3834	751
Latvia	4	1	104	75	113	60	0		0	352		
Lithuania	4	2	181	198	46					425		
Macedonia	3	3	504	475	29					1008	2520	504
Montenegro	2	2	25	253						278	2780	397
Norway	11	11	2805	2794	2250	0	22	0	0	7871	8746	1711
Poland	38	17	237	4639	2238	347	51	0	3	7515		
Portugal	22	22	1536	2960	524	101	0	115	0	5236	2380	494
Russia	69	55	12 568	9269	3084	1367	299	382	14	26 983		
Serbia	12	6	670	450		6				11 26		
Slovenia	3	3	885	1997	521	7	0	16	2	3428	8570	1714
Spain	182	111	3476	31 023	9089	7985	28	2785	234	54 620		
Sweden	16	16	5423	4768	4500	281	6	83		15 061	8859	1673
Switzerland	26	25	1038	3465	3312	0	0	0	0	7815		

The Netherlands	13	13	9113	7050	3536			19 699	5969	1187
Turkey	92	92	785	34 601				35 386	1944	473
Ukraine	18	11	1848	2098	579	345	0	4899		
United Kingdom	70	70	18 234	17 688	8549	1747	25	46 688	3735	763
All	1204	1029	120 761	256 642	91 145	15 731	660	493 184	4286	879

IVF and ICSI: For Belgium, France, Iceland and Turkey treatment cycles refers to 'aspirations', for Czech Republic and Lithuania it refers to 'transfers'.

FER: For France, Iceland, Lithuania and Norway treatment cycles refers to 'transfers'.

ED: For Czech Republic and Iceland treatment cycles refers to 'aspirations'.

PGD and FOR: For France treatment cycles refers 'transfers'.

*Cycles per million calculated for the countries with 100% clinics participating.

34.0% through 26.5–13.9% for women aged ≤ 34 , 35–39 years and ≥ 40 years, respectively, and the same trend was seen for delivery rates (26.2, 19.5 and 9.2%, respectively). Similar findings were found for ICSI (Supplementary data, Table SIX). For FER (Supplementary data, Table SX), only 12.6% of women were aged 40 years or more at transfer. In ED (Supplementary data, Table SXI), the recipient was aged 40 years or more in 55.3% of cases on average, and only a few countries had a proportion lower than 50%: Albania (37.5%), Belgium (41.3%), Denmark (35.0%), Hungary (31.6%), Serbia (33.3%), Sweden (9.2%) and Ukraine (44.1%). Pregnancy and delivery rates in oocyte recipients were comparable across different age groups.

Number of embryos transferred and multiple deliveries

Table III shows the number of embryos transferred after IVF and ICSI combined. The total percentage of single embryo transfers (SETs) was 21.4% (22.1% in 2006), double embryo transfers (DETs) 53.4% (57.3% in 2006), triple embryo transfers 22.7% (19.0% in 2006) and four or more embryo transfers 2.5% (1.6% in 2006). Information about numbers of elective single transfers is not yet available. As indicated in this table, major differences were seen between countries. In 2007, several countries reported a high number of SETs. The highest levels were found in Sweden (69.9%), Finland (57.8%) and Belgium (50.2%). The proportion of triple embryo transfers ranged from zero in Sweden to 58.6% in Greece. Transfer of four or more embryos ranged from zero in 10 countries and $< 1\%$ in 3 to 18.3% in Macedonia.

In fresh cycles, the percentages of multiple deliveries were 21.3% for twins (19.9% in 2006) and 1.0% for triplets (0.9% in 2006). After FER, the percentages were 13.1% for twin deliveries (13.4% in 2006) and 0.3% for triplets (0.4% in 2006). Additional data on pregnancy outcome, singleton and multiple deliveries are provided in Supplementary data, Table SXII (for fresh cycles) and Supplementary data, Table SXIII for FER.

Risks and fetal reductions

Supplementary data, Table SXIV shows the risk of preterm deliveries according to the number of newborn. Data were available from 15 countries. It shows that the risk of extreme preterm birth (gestational Week 20–27) increases from 1.0% for a singleton delivery, to 3.2% for twins and 11.8% for triplets. The same trend was noted for very preterm (28–32 weeks), from 2.7 to 11.1 and 35.7%, respectively, and for preterm (33–36 weeks), from 9.2 to 38.3 and 44.5%, respectively.

Ovarian hyperstimulation syndrome (OHSS) was reported in 26 of the 33 countries (Supplementary data, Table SXV). In total, 2470 cases of OHSS were recorded, corresponding to a risk of OHSS of 0.7% in those countries (0.8% in 2006) of all stimulated cycles. Supplementary data, Table SXV also includes other adverse outcomes, such as fetal reductions ($n = 364$).

Preimplantation genetic diagnosis/preimplantation genetic screening

PGD/PGS activity was recorded from 14 countries (Table I) and involved 4638 cycles, 4274 aspirations, 2882 embryo transfers and 706 deliveries (16.5% per aspiration), the main contributors being Spain (2785 cycles).

Table II Results after ART in 2007.

Country	Cycles IVF + ICSI	IVF			ICSI			FER			ART infants ^a	ART infants per national births (%)
		Aspirations	Pregnancies per aspiration (%)	Deliveries per aspiration (%)	Aspirations	Pregnancies per aspiration (%)	Deliveries per aspiration (%)	Thawings FER	Pregnancies per thawing (%)	Deliveries per thawing (%)		
Albania	145	65	40.0	33.8	78	37.2	29.5				64	
Austria	5222							306	30.7			
Belgium		3852	29.8	22.4	12 357	28.4	20.6	7499	15.3	11.3	4925	4.1
Bosnia	162	28	32.1	14.3	114	19.3	12.3				19	
Bulgaria	1282	532	33.8	25.6	675	31.6	25.8	79	15.2	8.9	378	
Cyprus	1305	457	39.2		792	40.2	0.0	155	23.9			
Czech Republic								4169	23.5	15.9		
Denmark	11 035	5819	26.1	21.3	4952	26.0	21.3	2668	16.5	13.5	3156	4.9
Finland	4724	2830	27.3	20.6	1759	27.9	22.4	3475	21.2	16.0	1875	3.2
France		20 211	24.6	19.2	31 635	25.9	20.5				14 710	1.8
Germany	45 182	10 995	29.4	16.0	32 124	28.2	16.1	17 140	18.3	9.9	10 483	1.5
Greece	2189	780	36.8	26.5	1295	32.8	24.2	193	22.8	14.0	764	
Hungary	2437	544	27.4	21.5	1787	28.2	22.8	620	23.1	13.2	776	
Iceland		215	25.1	21.9	174	28.2	23.0				168	3.7
Ireland	2864	1466	33.9	27.4	974	29.0	26.3	692	22.4	15.5	958	
Italy	40 005	7570	22.0	15.2	28 075	22.0	14.3	709	14.7	8.3	6575	1.2
Latvia	179	104	42.3		75	29.3		113	7.1		20	
Lithuania												
Macedonia	979	491	30.3	24.2	461	29.1	21.0	29	31.0	20.7	287	1.2
Montenegro	278	24	20.8	20.8	246	22.8	20.3				66	0.8
Norway	5599	2685	30.2	26.1	2703	27.3	23.2	2250	19.7	16.0	1509	
Poland	4876	220	33.2	28.2	4547	35.4	29.0	2238	20.9	16.0	2164	
Portugal	4496	1329	30.6	23.7	2692	27.9	20.4	524	16.4	11.8	1186	1.2
Russia	21 837	12 171	35.2	24.1	9002	33.1	20.4	3084	23.9	14.9	7197	
Serbia	1120	648	24.5	17.3	426	34.5	29.8				277	
Slovenia	2882	844	33.9	25.7	1932	28.5	23.7	521	18.8	14.2	913	4.6
Spain	34 499	3041	34.6		27 905	33.6		9089	23.1		12 647	
Sweden	10 191	5011	32.0	24.7	4500	28.4	22.4	4500	23.2	17.2	3260	3.1
Switzerland	4503	886	28.1	20.9	3235	27.4	20.1	3312	18.7	12.6	1467	
The Netherlands	16 163	8399	27.6	20.5	6659	31.8	25.1				4616	2.5
Turkey		785			34 601						5262	0.5
Ukraine	3946	1790	40.3	29.8	2028	37.4	30.9	579	29.2	22.8	1812	

United Kingdom	35 922	15944	30.1	26.4	17 615	31.1	27.5	8549	20.9	18.1	13 838	1.8
All ^b	264 022	108 390	29.1	21.1	199 950	28.6	20.2	72493	20.1	13.5	96 690	1.5

The recording of deliveries is incomplete. Data on initiated cycles for IVF and ICSI are not available for Belgium, Czech Republic, France, Iceland, Lithuania and Turkey. Data on aspirations in IVF and ICSI are not available for Austria, the Czech Republic and Lithuania. Data on deliveries for IVF and ICSI are not available for Austria, Cyprus and Turkey. No data on FER available for France, Iceland, Lithuania, Montenegro, Serbia, the Netherlands and Turkey.

Proportion of infants born through ART among the total number of births is only computed for countries with 100% participation.

ART infants per national births (%); only given for countries with complete coverage.

Latvia: data on deliveries removed because not complete.

Data on deliveries must be considered with some caution, because of difficulties met by some units/countries in gathering pregnancy outcome.

^aART infants also include ED.

^bTotals refer to these countries where data on aspirations, pregnancies and deliveries were all reported for the given technique.

In vitro maturation

IVM was recorded in 11 countries, three more than in 2006 (Table I). A total of 660 aspirations (241 in 2006) were recorded, resulting in 74 pregnancies and 44 deliveries (6.7% per aspiration).

Intra-uterine inseminations

Table IV provides data on IUI-H and IUI-D, reported by 23 countries (one more than in 2006), with 1 country reporting only donor insemination (Sweden), whereas 5 countries did not report/practice IUI-D (Albania, Bosnia, Italy, Lithuania and Serbia).

For non-donor insemination (IUI-H), 142 609 cycles were reported (+8348), the main contributors being France, Italy and Spain. Among the countries reporting deliveries, the mean delivery rate was 9.2% per cycle (+0.7), 11.4% of deliveries being twin (+0.8%) and 0.6% triplet deliveries (−0.2%).

For donor insemination (IUI-D), 26 088 cycles were reported (+1749), the main contributors being Denmark, Spain and France. The delivery rate was 13.8% per cycle (+1.4%), with multiple delivery rates similar to IUI-H.

Data were also divided in two female age groups, below 40 years (upper panel) and 40 years or more (lower panel), both for IUI-H (Supplementary data, Table SXVI) and IUI-D (Supplementary data, Table SXVII). For France, stratification for age was not possible. The delivery rate associated with IUI-H declined with age (10.2% below 40 years versus 6.3% above), and the multiple delivery rate decreased slightly from 11.7 to 9.9% for twins, and from 0.5 to 0.0% for triplets. Similar findings were seen in IUI-D, where delivery rates decreased from 14.6 to 6.1%, twin deliveries from 10.2 to 6.5%, and triplets from 0.5 to 0.0%.

Cumulative delivery rates

Supplementary data, Table SXVIII gives an estimation of the cumulative delivery rates per initiated fresh stimulated cycle. This is not the true cumulative delivery rate per couple per cycle but shows the number of deliveries obtained from the FER cycles added to the deliveries from the stimulated cycles during the same year. Additionally, the table shows the rate of multiple deliveries after the 'fresh' cycles and the FER combined. It shows that adding the deliveries after FER increases the delivery substantially (Finland +11.8%, Iceland +12.8%, Sweden +7.7% and Switzerland +9.2%). The overall multiple delivery rate was particularly low in Sweden and Finland: 5.3 and 10.9%, respectively, with relatively high cumulative DR (29.7 and 32.5%).

Discussion

The present report is the 11th consecutive, annual European report on ART data. Together, these reports cover treatment cycles from 1997 to 2007. It can be argued that as long as data are incomplete, lack uniformity in terms of clinical definitions and are generated through different methods of data collection, they should be interpreted carefully, and the focus should primarily be on specific country data. Nevertheless, summary data reveal important trends in practice and outcomes.

As seen in the tables, registers from a number of countries have been unable to provide some of the data. In order to standardize

Table III Number of embryos transferred and deliveries after ART in 2007.

Country	IVF + ICSI					FER					
	Transfers	1 embryo (%)	2 embryos (%)	3 embryos (%)	4 + embryos (%)	Deliveries	Twin (%)	Triplet (%)	Deliveries	Twin (%)	Triplet (%)
Albania	131	25.2	29.0	44.3	1.5	45	17.8	2.2			
Austria	4912	20.3	68.7	9.8	1.2						
Belgium	14 876	50.2	39.6	8.4	1.7	3386	11.8	0.3	845	13.1	0.1
Bosnia	123	49.6	13.8	25.2	11.4	18	5.6	0.0			
Bulgaria	1126	8.3	35.6	44.2	11.9	310	14.8	1.6	7	14.3	0.0
Cyprus											
Czech Republic						2711			662		
Denmark	9226	39.6	55.7	4.5	0.1	2298	16.6	0.1	361	14.1	0.0
Finland	4131	57.8	41.9	0.3	0.0	977	11.3	0.2	560	9.6	0.2
France	44 453	23.2	62.3	13.2	1.3	10 359	18.9	0.4	1913	11.3	0.2
Germany	41 615	12.5	66.9	20.6	0.0	6950	21.2	0.6	1702	15.1	0.6
Greece	1852	11.9	19.3	58.6	10.3	521	25.7	0.8	27	3.7	0.0
Hungary	2146	10.1	45.3	35.7	8.9	524	22.5	2.1	82	18.3	0.0
Iceland	322	46.6	46.0	7.5	0.0	87	17.2	0.0	50	12.0	0.0
Ireland	2221	13.6	77.4	9.0	0.0	658	24.3	0.9	107	17.8	0.0
Italy	30 780	20.4	30.5	49.1	0.0	5158	20.6	2.8	59	6.8	1.7
Latvia	173	15.0	53.8	31.2	0.0						
Lithuania											
Macedonia	750	23.9	26.9	30.9	18.3	216	26.4	1.4	6	33.3	0.0
Montenegro	258	14.3	32.2	41.1	12.4	55	16.4	1.8			
Norway	4821					1324	13.4	0.3	361		
Poland	4338	16.6	67.9	15.1	0.4	1382	20.3	0.6	359	12.8	0.0
Portugal	3585	17.4	69.2	13.3	0.2	863	21.6	0.9	62	17.7	0.0
Russia	19 510	16.2	59.6	19.8	4.4	4526	26.0	1.5	460	17.2	1.7
Serbia	911	13.3	77.1	6.9	2.7	239	8.8	3.3			
Slovenia	2462	27.6	69.7	2.6	0.0	674	23.0	0.0	74	6.8	0.0
Spain	27 155					5990	27.1	0.7	1092	17.3	0.4
Sweden	8529	69.9	30.1	0.0	0.0	2246	4.6	0.1	776	6.7	0.1
Switzerland	3731	12.8	65.3	21.9	0.0	830	18.9	0.5	417	12.0	0.7
The Netherlands	13 375					3396	15.1	0.1	629	11.0	0.0
Turkey	31 808	11.5	24.1	52.8	11.7	3727	32.9	4.1			
Ukraine	3510	11.3	44.2	33.1	11.4	1160	25.0	1.6	132	22.7	0.0
United Kingdom	31 114	12.8	82.3	4.9	0.0	9094	24.1	0.3	1548	17.6	0.3
All*	263 681	21.4	53.4	22.7	2.5	63617	21.3	1.0	11212	13.1	0.3

*Totals refer only to these countries where data on number of transferred embryos and on multiplicity were reported. Transfers: data on transfers not available for Austria, Cyprus, Czech Republic, Lithuania, Norway, Spain and The Netherlands. Belgium: 6 more cycles without data (not included), Russia: 1878 more cycles without data (not included), Switzerland: 1 more cycle without data (not included). FER: for 1 delivery multiplicity is not known. Belgium, IVF + ICSI: for 21 deliveries, multiplicity is not known, FER: for 8 deliveries multiplicity is not known. Russia, IVF + ICSI: for 243 deliveries multiplicity is not known, FER: for 47 deliveries multiplicity is not known. Turkey: underestimation of the deliveries, no data for FER.

Table IV Intrauterine insemination with husband (IUI-H) or donor (IUI-D) semen in 2007.

Country	IUI-H						IUI-D					
	Cycles	Deliveries	Deliveries (%)	Singleton (%)	Twin (%)	Triplet (%)	Cycles	Deliveries	Deliveries (%)	Singleton (%)	Twin (%)	Triplet (%)
Albania	36	4	11.1	100.0	0.0	0.0	0					
Austria												
Belgium												
Bosnia	108	21	19.4	85.7	9.5	4.8						
Bulgaria	846	72	8.5	90.3	9.7	0.0	211	32	15.2	90.6	9.4	0.0
Cyprus												
Czech Republic												
Denmark	9176	1112	12.1	86.1	13.8	0.2	6254	749	12.0	90.0	9.9	0.1
Finland	3782	318	8.4	93.7	6.0	0.3	822	112	13.6	93.8	6.3	0.0
France	49 240	4923	10.0	88.1	11.4	0.5	4307	661	15.3	86.4	13.0	0.6
Germany												
Greece	936	123	13.1	97.6	2.4	0.0	234	36	15.4	100.0	0.0	0.0
Hungary	2112	203	9.6	82.3	15.8	2.0	176	28	15.9	82.1	17.9	0.0
Iceland												
Ireland	1217	138	11.3	90.6	8.7	0.7	170	39	22.9	82.1	10.3	7.7
Italy	31 551	2076	6.6	88.2	10.7	1.1						
Latvia	36						64					
Lithuania	610											
Macedonia	773	53	6.9	90.6	9.4	0.0	33	7	21.2	85.7	14.3	0.0
Montenegro												
Norway	380	35	9.2	96.9	3.1	0.0	165	26	15.8	84.6	15.4	0.0
Poland	5534	565	10.2	93.6	6.2	0.2	1139	162	14.2	93.8	6.2	0.0
Portugal	1719	152	8.8	88.2	11.8	0.0	236	50	21.2	84.0	14.0	2.0
Russia	3697	465	12.6	89.8	9.8	0.4	1534	233	15.2	88.0	11.1	1.0
Serbia	161	12	7.5	91.7	0.0	8.3						
Slovenia	625	41	6.6	92.7	4.9	2.4	8	1	12.5	100.0	0.0	0.0
Spain	22 917	2059	9.0	84.8	14.5	0.6	5917	831	14.0	86.6	12.8	0.6
Sweden							492	72	14.6			
Switzerland												
The Netherlands												
Turkey												
Ukraine	1365	125	9.2	93.6	5.6	0.8	741	139	18.8	92.8	7.2	0.0
United Kingdom	5788						3585	423	11.8	92.7	6.9	0.5
All ^a	142 609	12497	9.2	88.0	11.4	0.6	26 088	3601	13.8	89.0	10.5	0.5

For the UK: the Human Fertilisation and Embryology Authority only started collecting data for IUI-H from 05/07/2007 onwards. The number of IUI-H cycles submitted for the UK (5788) is therefore not for a full year.

Data on deliveries were removed for Lithuania.

^aTotal refers to these countries where data were reported and mean percentage were computed for countries with complete information. IUI-H: For Austria, Belgium, Cyprus, Czech Republic, Germany, Iceland, Montenegro, Sweden, Switzerland, The Netherlands and Turkey, no data available. France: 1187 cycles excluded due to unknown age of women, in 90 deliveries multiplicity is not known. Ireland: one clinic did not provide data. Italy: underestimation of the number of deliveries due to lost follow-up. Norway: in three deliveries multiplicity is not known. Russia: For 24 deliveries multiplicity is not known. UK: no data on deliveries. IUI-D: For Austria, Belgium, Bosnia, Cyprus, Czech Republic, Germany, Iceland, Italy, Lithuania, Montenegro, Serbia, Switzerland, The Netherlands and Turkey, no data available. France: for 6 deliveries multiplicity is not known. Russia: For 25 deliveries multiplicity is not known. Sweden: in all 72 deliveries multiplicity is not known.

definitions and reporting, the ICMART (International Committee for Monitoring Assisted Reproductive Technologies) glossary has been published (Zegers-Hochschild et al., 2006a,b), and recently revised with the World Health Organization (Zegers-Hochschild et al., 2009a,b). It is likely that these recommendations were not perfectly implemented in all reporting countries in 2007, meaning that, as in every registry report, the data must still be interpreted with some caution.

In 2007, the number of countries reporting to ESHRE's EIM Consortium increased to 33, covering the whole of Western Europe. Bosnia joined the consortium from this year but reporting was patchy in Eastern and South Eastern Europe. No data were available from Estonia, Romania and Slovakia, and Croatia was unable to provide data for 2007.

In 2007, the coverage was 86.0% of all clinics—a figure similar to 2006. However, the coverage was still low in a few countries, such as Greece (9 of 50 clinics), Poland (17 of 38 clinics) and Spain (111 of 182 clinics). The implementation of new regulations may result in an improvement in the coming years.

Overall, the number of reported cycles increased by 7.8% since 2006—reaching a total of 493 184. This was due an overall increase in ART, rather than more intensive coverage, as participation remained at the same level and only a few cycles were contributed by the new country that joined the Consortium. The present report also includes data from almost 169 000 IUI cycles—9000 more than in 2006. Within Europe, the largest numbers of ART cycles were reported from France (68 000), Germany (62 000), Spain (55 000), the UK (47 000) and Italy (44 000). Elsewhere in the world in 2007, 138 198 cycles were reported from the USA (CDC, 2009), and 56 817 cycles from Australia and New Zealand (AIHW, 2009).

Reduction in the re-imburement for ART had resulted in a sharp decline in the number of cycles from Germany between 2003 and 2005 (from 102 000 to 53 000). There has been a slow but gradual increase since then up to 62 000 cycles. The German example provides good evidence that a public re-imburement policy of ART has a major impact on the number of treatments.

As shown in Table I in countries with a full report, the average number of treatment cycles per million inhabitants ranged from 397 in Montenegro to 2558 in Denmark. A better way to define the availability of ART is to report ART cycles in women of reproductive age (15–49 years), which eliminates the impact of age differences across the countries (Table I). Again, there were huge differences, from 1944 cycles per million women in Turkey, to 14 067 in Denmark (Table I). Finally, the percentage of newborns conceived through ART varied from 0.5% in Turkey to 4.9% in Denmark (Supplementary data, Table SI). It is difficult to explain those differences which may be related to several factors, such as cost, reimbursement, legal or social aspects, as well as medical strategies relating to the use of ART. These issues also may play a role in the differences observed in pregnancy and delivery rates between countries.

A further question relates to the choice of a suitable denominator in reporting outcomes per cycle. There is general agreement in favour of reporting the number of deliveries (or clinical pregnancies) per initiated cycle. However, from Supplementary data, Tables SIV and SV, it can be noticed that the cancellation rate (average 8.4% for IVF and 5.9% for ICSI) shows huge variations (from 0 to 17%), making it difficult to compare outcomes of started cycles. Efforts still

need to be made to better register initiated cycles if we want to analyse this marker.

The proportion of ICSI versus conventional IVF procedures continues to increase (49% in 2004, 66.5% in 2006 and 68% in 2007). A similar trend has been observed in the USA (Jain and Gupta, 2007). As recently reviewed, the trend towards increased use of ICSI has been observed throughout the world (Nyboe Andersen et al., 2008; ICMART et al., 2009). In Australia and New Zealand, 61.8% of all cycles used ICSI in 2007 and in the USA the corresponding figure was 63%, so there is a uniform development in those three regions. However, within Europe a marked variation exists regarding the distribution between IVF and ICSI. As can be seen in Table I, 11 countries used ICSI in more than 75% of cases, the highest being Turkey (97.8%). In contrast, in the Nordic countries, the Netherlands, Russia, Ireland, the UK, and a few other countries, IVF remain the dominant technology. As recently analysed (Nyboe Andersen et al., 2008), the marked increase in the use of ICSI cannot be explained by a similar increase in male infertility but rather to a more liberal use of this technique in cases with mixed caused of infertility, unexplained infertility, mild male factor infertility and fertilization failures. Thus, the observed differences can be at least partly explained by differences in professional strategies and clinical decision making.

The trend towards the transfer of fewer embryos was no longer observed in 2007 and cycles where three or more embryos were transferred increased from 20.6 to 25.2% (Table III). The mean percentage of SETs decreased from 22.1% in 2006 to 21.4%, and the proportion of DETs decreased by almost 4% since 2006. However, these findings were mostly explained by the inclusion of data from Turkey, which contributed a large number of treatment cycles. Turkey had not reported the number of transferred embryos in 2006 but, in 2007, 52.8 and 11.7% of transfers involved three and four or more embryos. Exclusion of these data reveals the overall percentages of transfers of 1, 2, 3, and 4 or more embryos to be 22.8, 57.5, 18.5, and 1.2%, respectively, which are more in keeping with the trend seen over the last 10 years.

The same explanation can be given for the increase in multiple pregnancies (21.3% twins and 1.0% triplets). When recalculating data after excluding Turkish ART data, the mean percentages were 20.5 and 0.8%. Thus, the remarkable reduction in triplet deliveries observed previously may persist (3.6% in 1997 to 0.8% in 2007).

There are clearly many differences across the countries. As seen in Table III, five countries reported transfer of a SET in more than 45% of all transfers (one more than in 2006): Sweden (69.9%), Finland (57.8%), Belgium (50.2%), Bosnia (49.6%) and Iceland (46.6%), all with an increase from 0.3 to 11.5% since 2006. In contrast, more than 10% of transfers involved four or more embryos in seven countries (Bosnia, Bulgaria, Greece, Macedonia, Montenegro, Turkey and Ukraine), and the transfer of three embryos reached 58% in Greece, 53% in Turkey and 49% in Italy. This resulted in 4.1 and 32.9% triplet and twin deliveries in Turkey.

In comparison with the situation in Europe, data from other registers show that SET was performed in 63.7% of cycles in Australia and New Zealand (AIHW, 2009), and in 9.4 and 13.1% of transfers at Day 3 and 5, respectively, in the USA (CDC, 2009).

This report is unable to discriminate between elective SET (eSET) versus SET in general but the rise in the number of transfers of one

embryo is undoubtedly related to a rise in eSET and not a rise of cycles with only one embryo obtained.

As evident from Table III, major differences in triplet rates are still evident across countries. We have included data describing preterm birth rates according to the number of fetuses of the pregnancy (Supplementary data, Table SXIV), which was provided by 15 countries. The risk of extreme preterm birth (<28 weeks) was increased 3-fold for twins and by almost twelve fold for triplets. The risk of very preterm (28–32 weeks) birth was increased almost four for twins and 13-fold for triplets.

Fetal reductions are always performed in triplet or higher order gestations. Thus, when analysing the range of triplet delivery rates in different countries, the number of fetal reductions should also be considered. A total of 364 procedures were reported (82 fewer than in 2006). However, the total number is likely to be an underestimate since several countries, including large countries such as France, Germany and the UK, did not report fetal reductions in 2007. Without this intervention, the proportion of triplet deliveries would have been much higher than the number of recorded triplet deliveries (615 in total), given that a number of countries did not report on fetal reductions.

Finally, delivery rates per aspiration showed a marginal increase for IVF (21.9%) and ICSI (19.9%) compared with figures from 2006 (21.5 and 18.4%), as did the delivery rate per thawing for FER (13.5% in 2007 versus 12.7% in 2006).

The delivery rates in Europe remain lower than in the USA where 33.3 and 32.5% of aspirations for IVF and ICSI, respectively, from non-donor cycles resulted in a delivery (CDC, 2009).

However, the delivery rates in Europe are very similar to those achieved in Australia and New Zealand, where the delivery rate per transfer was 23.9% after fresh cycles and 16.0% after FER transfers in 2007 (AIHW, 2009).

The effect of women's age on treatment outcome has been reported since 2006. In 2007, the pregnancy rates per initiated IVF cycle decreased from 34.0% in women aged less than 35 years, to 13.9% in those aged 40 years or more (Supplementary data, Table SVIII). Similar trends were noted for ICSI (from 33.3 to 12.2%, Supplementary data, Table SIX) and FER (from 21.7 to 14.4%, Supplementary data, Tables SX), but not for ED (Supplementary data, Table SXI). These supplementary tables also provide delivery rates per cycle. It is important to consider these tables since they better allow comparing the countries, as age is a major prognostic factor that is unequally distributed across the countries.

With the noticeable decline in the number of embryos transferred, the cumulative delivery rate per started cycle may be a most relevant end-point for ART (Supplementary data, Table SXVIII). In fact, the present method of calculation of this cumulative delivery rates is methodologically flawed because it represents the sum of fresh and FER pregnancies obtained in the same calendar year, rather than the FER pregnancies accruing from a single oocyte aspiration procedure. It should, however, be stressed that the precise figure, which can only be obtained a few years after the initial oocyte aspiration, is likely to be rather similar to our estimate. In several countries, the addition of FER deliveries contributed a substantial increase to the delivery rates per cycle: Finland (20.7–32.5%), Iceland (22.4–35.2%), Sweden (22.0–29.7%) and Switzerland (18.6–27.8%), justifying their transfer and freezing policies.

PGD/PGS activity was recorded from 14 countries, and included 4638 cycles resulting in 706 deliveries (15.2% per aspiration). Detailed analysis of PGD/PGS in Europe will be published separately by ESHRE's PGD Consortium (Sermon *et al.*, 2007).

The major differences between countries in terms of the provision of certain techniques, such as ED and PGD, must be viewed as markers of cross-border reproductive care where couples who do not have access to ART in their home countries, travel elsewhere for treatment. This phenomenon raises important public health concerns and underlines the need for more information in order to facilitate a detailed evaluation. This will be addressed by EIM in the coming year.

Regarding direct risks of ART, OHSS was recorded in 0.7% of cycles, at the same level as in 2006 (0.8%). However, there may be a degree of under-reporting, since the rate varies between 0.3 and 13% in the countries reporting OHSS.

For the sixth consecutive year, the present report includes European data on treatments with IUI-H (143 000 cycles) and IUI-D (26 000 cycles), thus showing an increase in IUI-H (+8000) and in IUI-D (+2000), compared with 2006. The coverage of IUI activities by the national registers is less comprehensive than for the *in vitro* techniques. In women below 40 years of age the delivery rate was 10.2% for IUI-H and 14.6% for IUI-D.

After IUI (both partner and donor insemination), twin pregnancies were observed in approximately half as many cases when compared with IVF/ICSI but triplet rates were comparable.

In summary, the present 11th ESHRE report on ART for Europe in 2007 shows a continuing expansion of numbers of participating clinics, countries and treatment cycles reported. The rise in the use of ICSI continued and reached 68.0% in 2007. Delivery rates after IVF and ICSI increased marginally in comparison with figures from 2006, with minor differences in the number of embryos transferred per cycle and rates of multiple birth.

Supplementary data

Supplementary data are available at <http://humrep.oxfordjournals.org/>.

Authors' roles

V.G. and J.M. made the calculations. J.M. wrote the paper. All other co-authors reviewed the document and made appropriate corrections and suggestions for improving the document. Finally, this document represents a really collaborative work.

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Conflict of interest

None declared.

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Appendix

Contact persons representing data collection programmes in participating European countries, 2007

Albania

Prof. Orion Glozheni, University Hospital for Obst & Gynecology, Obstetrics & Gynecology. Bul. B. Curri, Tirana, Albania. Tel: +355-4-235-870; Fax: +355-4-257-688; E-mail: giorion@icc-al.org.

Austria

Prof. Dr Heinz Strohmer, Kinderwunschzentrum Private Hospital Goldenes Kreuz, Lazarettg, 16-18, 1090 Wien, Austria. Tel: +43-1-40111-1400; Fax: +43-1-40111-1401; E-mail: heinz.strohmer@kinderwunschzentrum.at.

Belgium

Dr Kris Bogaerts, I-Biostat, Kapucijnenvoer 35 bus 7001, 3000 Leuven, Belgium. Tel: +32-16-33-68-90; Fax: +32-16-33-70-15; E-mail: Kris.Bogaerts@med.kuleuven.be.

Bulgaria

Prof. Stanimir Kyurkchiev, Inst. Biology & Immunology of Reproduction, Molecular Immunology, 73, Tzaritgradsko shosse, 1113 Sofia, Bulgaria. Tel: +359-2-723-890; Fax: +359-2-720-925; E-mail: kyurkch@hotmail.com.

Cyprus

Dr Michael Pelekanos, Fertility Centre Aceso, I, Pavlou Nirvana str., 3021 Limassol, Cyprus. Tel: +357-99645333; Email: Pelekanos@akeso.com.

Czech Republic

Dr Karel Rezabek, Charles University Prague, Gyn/Ob departement, Apolinarska 18, 12000 Prague, Czech Republic. Tel: +420-271028301; Email: krezabek@vfn.cz.

Denmark

Dr Karin Erb, Fertility Clinic, Odense University Hospital, Sdr. Boulevard 29, 5000 Odense C, Denmark. Tel: +45-65-41-23-24; Fax: +45-65-90-69-82; E-mail: Karin.erb@ouh.regionsyddanmark.dk

Finland

Dr Mika Gissler, Nat. Research and Develop. Centre for Wa, P.O. Box 220, 00531 Helsinki, Finland. Tel: +385-9-39672099; Fax: +385-9-9672459; E-mail: mika.gissler@thl.fi.

France

Dr Jacques de Mouzon, INSERM, 15, Rue Guilleminot, 75014 Paris, France. Tel: +33-1-5841-2268; Fax: +33-1-5841-1539; E-mail: jdemouzon@noos.fr; jacques.demouzon@inserm.fr.

Prof. Dominique Royère, Agence de la Biomédecine, 1 Av du stade de France, 93212 Saint-Denis La Plaine Cedex, France. Tel: +33-1-55-93-65-50; E-mail: dominique.royere@biomedecine.fr.

Germany

Dr Klaus Bühler, Center for Gynaecology, Endocrinology and Repr Med, Ostpassage 9, 30853 Langenhagen, Germany. Tel: +49-511-97230-40; Fax: +49-511-97230-18; Email: k.buehler@kinderwunsch-langenhagen.de.

Greece

Prof. Dr Basil Tarlatzis, Papageorgiou Hospital, Unit of Human Reproduction, Periferiakis Odos, Neas Efkarpas, 56403 Thessaloniki, Greece. Tel: +30-231-09-91508; Fax: +30-231-0991510; E-mail: basil.tarlatzis@gmail.com.

Hungary

Prof. G. Kosztolanyi, University of Pecs, Dept. of Medical Genetics and Child development, Jozsef A.u 7., 7623 Pecs, Hungary. Tel: +36-7-2535977; Fax: +36-7-2535972; E-mail: gyorgy.kosztolanyi@aok.pte.hu.

Iceland

Mr H. Bjorgvinsson, Art Medica, IVF Unit, Baejarlind 12, 201 Kopavogur, Iceland. Tel: +354-515-8100; Fax: +354-515-8103; E-mail: Hilmar@artmedica.is.

Ireland

Dr Edgar Mocanu, HARI Unit, Rotunda Hospital, Dublin 1, Ireland. Tel: +35-31-8072-732; Fax: +35-31-8727831; E-mail: emocanu@rcsi.ie.

Italy

Dr Guilia Scaravelli, Registro Nazionale Medicalmente Assistita, CNESPS, Istituto Superiore de Sanita, Viale Regina Elena, 299, 00161, Roma. Tel: +39-49904319; Fax: +39-49904324; E-mail: guilia.scaravelli@iss.it.

Latvia

Dr Maris Arajs, EGV Clinic, Dept. of IVF, Gertrudes Str. 3, LV 1010 Riga. Tel: +371-7-27-81-83, +371-26-55-64-66; Fax: +371-7-31-64-67; E-mail: maris_arajs@inbox.lv.

Lithuania

Dr Zivile Gudleviciene, Baltic American, IVF Laboratory, Nemencines rd 54A, 10103 Vilnius, Lithuania. Tel: +370-52342020; E-mail: zivile.gudleviciene@gmail.com.

Macedonia

Dr Slobodan Lazarevski, SHOG 'Mala Bogorodica', Londonska 19, 1000 Skopje, Macedonia. Tel: +389-2-30-73-335; Fax: +389-2-30-73-398; E-mail: dr.lazarevski@mbogorodica.com.mk

Montenegro

Dr Tatjana Motrenko Simic, Medical Center Cetinje, Human Reproduction, Vuka Micunovica 4, 81310 Cetinje, Montenegro. Tel: +382-86232690; Fax: +382-86231336; Email: motrenko@t-comm.me.

The Netherlands

Dr Cornelis Lambalk, Free University Hospital, Reproductive Medicine, de Boelaan 1117, P.O.Box 7057, 1007 MB Amsterdam, The Netherlands. Tel: +31-20-444-00-70; Fax: +31-20-444-00-45; E-mail: cb.lambalk@vumc.nl.

Norway

Dr Johan T. Hazekamp, IVF-klinikken Oslo AS, PB 5014 Maj., 0301 Oslo, Norway. Tel: +47-2250-8116; Fax: +47-2320-4401; E-mail: hazekamp@ivfoslo.nhn.no.

Poland

Prof. Rafael Kurzawa, Pomeranian Medical Academy, Department of Reproductive Medicine and Gynaecology, 2 Siedlecka Street, 72-010 Szczecin, Poland. Tel: +48-91-487-37-55; Fax: +48-91-425-33-12; E-mail: Kurzawa@ams.edu.pl.

Portugal

Prof. Dr Carlos Calhaz – Jorge, Faculdade de Medicina de Lisboa, Human Reproduction Unit - Dept. of Ob/Gyn – Hosp. de Santa Maria; Av. Prof. Egas Moniz, 1649-035 Lisboa, Portugal. Tel: +351-217-264-229; Fax: +351-217-805-621; E-mail: calhazjorgec@gmail.com.

Russia

Dr Vladislav Korsak, International Center for Reproductive Medicine, General Director, Liniya 11, Building 18B, Vasilievsky Island, 199034 St-Petersburg, Russia C.I.S. Tel: +7-812-328-2251; Fax: +7-812-327-19-50; E-mail: korsak@mcrm.ru.

Serbia

Prof. Nebojsa Radunovic, Institute for Obstetrics and Gynecology, Visegradska 26, 11000 Belgrade. Tel: +38-111-36-15592; Fax: +38-1113615603; E-mail: radunn01@gmail.com.

Slovenia

Dr Tomaz Tomazevic, University Medical Centre Ljubljana, Obstetrics Gynecology Reproduction, Slajmerjeva 3, 61000 Ljubljana, Slovenia. Tel: +386-1-522-60-13; Fax: +386-1-431-43-55; E-mail: tomaz.tomazevic@guest.arnes.si.

Spain

Dr Juana Hernandez Hernandez, Hospital San Millan, Servicio de Ginecologia y Obstetricia, Avda. Autonoma de la Rioja 3, 26001 Logrono,

Spain. Tel: +34-94-12-73-077; Fax: +34-94-12-73-081; E-mail: jhernandezh@telefonica.net.

Sweden

Dr Per-Olof Karlstrom, Akademiska Hospital, Dept. Of Ob/Gyn, 751 85 Uppsala, Sweden. Tel: +46-611-2838; Fax: +46-211-31611; E-mail: per-olof.karlstrom@karolinska.se.

Switzerland

Ms Maya Weder, Administration FIVNAT, Postfach 89, 3122 Kehrsatz, Switzerland. Tel: +41-31-819-76-02; Fax: +41-31-819-89-20; E-mail: administration.sgrm@bluewin.ch.

Turkey

Prof. Dr Timur Gurgan, Gurgan Clinic, Infertility, Cankaya caddesi, 20 / 3, 06680 Cankaya-Ankara, Turkey. Tel: +90-312-4427404; Fax: +90-312-4427407; E-mail: tgurgan@gurganclinic.com.tr.

Ukraine

Dr Viktor Veselovsky, Clinic of Reproductive Medicine Nadija, 28-A, Andriivskyyuzviz str., 01025 Kyiv, Ukraine. Tel: +380-50-311-47-38; Fax: +380-44-5327-75-99; E-mail: v.veselovskyy@ivf.com.ua.

UK

Mr Richard Baranowski, Deputy Information Manager, Human Fertilization and Embryology Authority (HFEA), 21 Bloomsbury Street, London WC1B 3HF, UK. Tel.: +44-20-7539-3329; Fax: +44-20-7377-1871; E-mail: Richard.baranowski@hfea.gov.uk.