

Are Obstetricians and Gynaecologists in Singapore in favour of stem cell research and cloning? - A survey of their views

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ABSTRACT

Aim: To study the views of obstetricians and gynaecologists in Singapore on stem cell research and cloning.

Method: A postal survey of local practising obstetrics & gynaecology (O&G) specialists conducted in December 2001.

Results: Sixty-two (28.6%) of the 217 O&G specialists surveyed, responded within 3 weeks from the time of posting. The majority were in favour of animal cloning (71.0%), adult stem cell research (88.7%) and embryonic germ stem cell research (from aborted fetuses) (67.7%). Opinions were about equally divided with regards to embryonic stem cell research (early embryo <14 days) (46.8% in favour) and therapeutic cloning (50.0% in favour). Only a minority was in favour of reproductive cloning (8.1%). Specialists who had conscientious objection to participate in treatment to terminate pregnancy under Termination of Pregnancy Act of Singapore, were more conservative as were female O&G specialists. Though more liberal in their views on most aspects, senior specialists were inclined to be conservative on reproductive cloning. Regression analysis showed with statistical significance, that the specialists who were not conscientious objectors were more supportive on therapeutic cloning, and embryonic stem cell research. Conscientious objector status was more influential than sex or seniority status in determining the view on therapeutic cloning and embryonic stem cell research.

Conclusion: There was a diversity of views among obstetricians and gynaecologists in Singapore. There was strong support for animal cloning and adult stem cell research but support for embryonic stem cell research and therapeutic cloning was equivocal. The majority of respondents were against reproductive cloning.

Keywords: Therapeutic Cloning, Reproductive Cloning, Embryo, Termination of Pregnancy

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INTRODUCTION

Singapore has been in the forefront of stem cell research.¹ Obstetricians and gynaecologists in Singapore are closely involved with basic and applied research of reproductive medicine, stem cell research and assisted reproductive techniques.^{2,3} As health care practitioners who engaged regularly with human reproduction, life, birth and abortion in the nature of their work, they frequently face related ethical, legal and social issues as well. Their perspectives are therefore important to consider when formulating or fine-tuning guidelines relating to stem cell research and cloning.

On 8 November 2001, Bioethics Advisory Committee (BAC) of Singapore invited the Obstetrical & Gynaecological Society of Singapore (OGSS) to give feedback, as part of a thorough public consultation process on human stem cell research in Singapore. OGSS circulated the BAC paper among the members, invited written comments and conducted a meeting for members to air their views. OGSS also conducted a survey to determine the views of obstetricians and gynaecologists on human stem cell research and cloning on 5 December 2001.

METHODS

A questionnaire form "Survey on Stem Cell Issues" (Fig. 1) was sent by post to all 217 local practising O&G specialists who were also members of OGSS for their views of Human Stem Cell Research. More than 90% of O&G specialists in Singapore were OGSS members. The information paper by the BAC on stem cell research was sent to them for background reading. The survey was also conducted for young O&G specialists in training and O&G related scientists who were members of the society but those results were analysed separately and not presented here.

In the survey form, views and attitudes on 6 categories relating to stem cell research were sought namely: Animal Cloning (AC); Adult Stem (AS) Cell Research (bone marrow, umbilical cord blood, brain etc); Embryonal Germ (EG) Stem Cell Research (from aborted fetuses); Embryonic Stem (ES) Cell Research (Early Embryo <14 days); Therapeutic Cloning (TC); and Reproductive Cloning (RC). There were 3 options for each category allowed: (Yes – in favour), (No – not in favour) and (No but would not object to others pursuing this research within guidelines). The last 2 options were also combined as one in the statistical analysis. Therapeutic cloning is defined as the production of cloned cells to produce tissues and/or organs, mainly to improve healthcare treatments. Reproductive cloning is the process from replacement of the cloned embryo into the womb of a surrogate

mother, to allow for pregnancy and a live-birth.

In addition, the questions (Is there a constant need to review policies on a regular basis in view of rapid development in this area? and Do you have conscientious objection to participate in termination of pregnancy under the Termination of Pregnancy Act?) were surveyed using a 'Yes or No' option for each question.

Only one mailing was sent (on 5 December 2001) and there was no reminder letter. Responses were sent back by post or by fax. The year which they attained the specialist qualification was defined as the year which they attained MRCOG or MMed(O&G) whichever was earlier. Background information on sex, race, clinic location and the year which they obtained specialist qualification, relating to 217 specialists who were sent the questionnaire form, was obtained from the society's register. Senior specialists were defined as those with 14 years or more since specialist qualification while junior specialists were those with 13 years or less since specialist qualification.

STATISTICS

The statistical analysis was performed by SPSS (Statistical Package for Social Sciences Version 10.0). The distributions of respondents' background relating to sex, race and specialist status (junior or senior) were compared with population by chi-square test. The associations between views on the issues of stem cell research and respondent background (sex, race, conscientious objector status and specialist status) were tested by the Fisher's exact test. A further analysis of multiple logistic regression was carried to determine the relative influence of conscientious objector status (yes or no) on the views of various issues of stem cell research and cloning, adjusted specialist status (junior or senior specialists) and sex. As the distribution of race was very unbalanced in the respondent population (majority are Chinese), the race of respondents was not adjusted in the logistic regression.

RESULTS

The main population of 217 O&G specialists who were sent the questionnaire form, comprised 160 (73.7%) male and 57 (26.3%) female O&G specialists. There were 192 (88.5%) Chinese, 21 (9.7%) Indians, 1(0.5%) Malay and 3(1.4%) Others. The mean number of years after obtaining specialist qualifications was 16.9 years (S.D. 9.9 years with a range of 1 to 42 years). They were based in East Shore Hospital 4 (1.8%), Gleneagles Hospital 23 (10.6%), KK Women's and

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Fig 1. Survey on stem cell issue

Name of Member:

Date:

Opinion

Yes in favour (Y)

No not in favour (N)

No but would not object to others pursuing this research within guidelines (P)

Survey on Stem Cells Issues

Options – (Y, N or P)

- 1. Animal Cloning -
- 2. Adult Stem (AS) Cells Research (bone marrow, umbilical cord blood, brain etc) -
- 3. Embryonal Germ (EG) Stem Cells Research (from aborted fetuses) -
- 4. Embryonic Stem (ES) Cells Research (Early Embryo <14 days) -
- 5. Therapeutic Cloning -
- 6. Reproductive Cloning -
- 7. Constant need to review policies (on a regular basis in view of rapid development in this area) Y or N
- 8. Conscientious Objection to participate in TOP Under Termination of Pregnancy Act Y or N

Table I. Characteristics of Respondents and Population in sex, race and seniority.

	Respondents (n=62)	Main Population (n=217)	P
Sex			
Female	21 (33.9%)	55 (25.3%)	0.184
Male	41 (66.1%)	162 (74.7%)	
Race			
Chinese	53 (85.5%)	192 (88.5%)	0.525
Non Chinese	9 (14.5%)	25 (11.5%)	
Specialist Status			
Junior	34 (54.8%)	88 (40.6%)	0.046
Senior	28 (45.2%)	129 (59.4%)	

Table 2. Views of All Respondents (n=62)

	Stem Cell Research & Cloning Issues	NO (%)	NO but would not object to others pursuing this research within guidelines (%)	YES (%)
1.	Animal Cloning	12 (19.4)	6 (9.7)	44 (71.0)
2.	Adult Stem Cells Research (bone marrow, umbilical cord blood, brain etc)	4 (6.5)	3 (4.8)	55 (88.7)
3.	Embryonal Germ Stem Cells Research (from aborted fetuses)	10 (16.1)	10 (16.1)	42 (67.7)
4.	Embryonic Stem Cells Research (Early Embryo <14 days)	22 (35.5)	11 (17.7)	29 (46.8)
5.	Therapeutic Cloning	18 (29.0)	13 (21.0)	31 (50.0)
6.	Reproductive Cloning	47 (75.8)	10 (16.1)	5 (8.1)
7.	Constant need to review policies	1 (1.6)	-	61 (98.4)
8.	Conscientious Objection to participate in treatment to terminate pregnancy under Termination of Pregnancy Act	32 (51.6)	-	30 (48.4)

Table 3. Number of supports (yes option) on stem cell research issues

	AC	AS	EG	ES	TC	RC
All (n=62)	44 (71.0)	55 (88.7)	42 (67.7)	29 (46.8)	31 (50.0)	5 (8.1)
Sex	p=0.037 (OR=3.8)	p=0.214	p=0.570	p=0.180	p=0.031 (OR=3.9)	p=0.654
Female (n=21)	11 (52.4)	17 (81.0)	13 (61.9)	7 (33.3)	6 (28.6)	1 (4.8)
Male (n=41)	33 (80.5)	38 (92.7)	29 (70.7)	22 (53.7)	25 (61.0)	4 (9.8)
Race	p=1.000	p=0.580	p=0.705	p=0.722	p=0.473	p=1.000
Chinese (n=53)	37 (69.8)	46 (86.8)	35 (66.0)	24 (45.3)	25 (47.2)	5 (9.4)
Non Chinese (n=9)	7 (77.8)	9 (100.0)	7 (77.8)	5 (55.6)	6 (66.7)	-
Conscientious Objector Status	p=0.266	p=0.249	p=0.103	p=0.013 (OR=3.9)	p=0.005 (OR=5.1)	p=0.355
Yes (n=30)	19 (63.3)	25 (83.3)	17 (56.7)	9 (30.0)	9 (30.0)	1 (3.3)
No (n=32)	25 (78.1)	30 (93.8)	25 (78.1)	20 (62.5)	22 (68.8)	4 (12.5)
Specialist Status	p=0.026 (OR=4.2)	p=1.000	p=0.598	p=1.000	p=0.444	p=0.366
Junior (n=34)	20 (58.8)	30 (88.2)	22 (64.7)	16 (47.1)	15 (44.1)	4 (11.8)
Senior (n=28)	24 (85.7)	25 (89.3)	20 (71.4)	13 (46.4)	16 (57.1)	1 (3.6)

AC - Animal Cloning, AS - Adult Stem Cell Research, EG - Embryonal Germ Stem Cell Research, ES - Embryonic Stem Cell Research, TC - Therapeutic Cloning, RC - Reproductive Cloning

Table 4. Logistic Regression Analysis of the Views on Stem Cell Research Issues (n = 62)

View	β	SE	OR	95% CI of OR	P
Animal Cloning					
Conscientious objector status (Yes, No)	0.367	0.623	1.444	0.426 to 4.895	0.555
Sex (Female, Male)	0.945	0.633	2.574	0.744 to 8.900	0.135
Specialist status (Junior, Senior)	1.143	0.672	3.136	0.840 to 11.702	0.089
Adult Stem (AS) Cells Research					
Conscientious objector status (Yes, No)	0.916	0.915	2.499	0.416 to 15.033	0.317
Sex (Female, Male)	0.993	0.896	2.698	0.466 to 15.637	0.268
Specialist status (Junior, Senior)	-0.372	0.893	0.689	0.120 to 3.964	0.677
Embryonal Germ Stem Cells Research					
Conscientious objector status (Yes, No)	0.959	0.584	2.608	0.829 to 8.200	0.101
Sex (Female, Male)	0.106	0.622	1.112	0.329 to 3.760	0.865
Specialist status (Junior, Senior)	0.130	0.595	1.139	0.355 to 3.657	0.827
Embryonic Stem Cells Research					
Conscientious objector status (Yes, No)	1.299	0.564	3.665	1.213 to 11.074	0.021
Sex (Female, Male)	0.695	0.626	2.004	0.588 to 6.832	0.266
Specialist status (Junior, Senior)	-0.466	0.586	0.627	0.199 to 1.979	0.426
Therapeutic Cloning					
Conscientious objector status (Yes, No)	1.453	0.572	4.275	1.394 to 13.109	0.011
Sex (Female, Male)	1.086	0.640	2.961	0.844 to 10.391	0.090
Specialist status (Junior, Senior)	0.040	0.595	1.041	0.324 to 3.338	0.947
Reproductive Cloning					
Conscientious objector status (Yes, No)	1.507	1.190	4.512	0.438 to 46.522	0.206
Sex (Female, Male)	0.883	1.221	2.418	0.221 to 26.462	0.469
Specialist status (Junior, Senior)	-1.740	1.196	0.176	0.017 to 1.830	0.146

Note: The two interaction terms: one between conscientious objector status and sex and one between conscientious objector status and specialist status, are included one by one in each logistic regression. Only interaction of conscientious objector status and sex is marginally statistically significant in the determination of view on embryonal stem cell research ($p = 0.056$). The model with interaction term is compared with the corresponding model without interaction by the log likelihood ratio test. No significant difference is observed.

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Children's Hospital 34 (15.7%), National University Hospital 22 (10.1%), Singapore General Hospital 12 (5.5%), Thomson Medical Centre 13 (6.0%) and Specialist O&G Clinics not located in any hospitals 63 (29.1%). The proportion of female specialists was 40.9% (34 of 88) for the junior specialists compared with 16.3% (21 of 129) for the senior specialists in the main population.

The response rate was 28.6% (62/217). The 95% CI for the response rate is 0.225 to 0.347. All the responses were received within 3 weeks from the time of posting. The respondents comprised 41 (66.1%) male and 21 (33.9%) female O&G specialists. There were 53 (85.5%) Chinese, 8 (12.9%) Indians, and 1 (1.6%) Others. The mean number of years after obtaining specialist qualifications was 13.9 years (S.D. 10.3 years with a range of 1 to 42 years). The respondents were based in Gleneagles Hospital 8 (12.9%), KK Women's and Children's Hospital 24 (38.7%), Mount Elizabeth Hospital 8 (12.9%), National University Hospital 4 (6.5%), Singapore General Hospital 6 (9.7%), Thomson Medical Centre 3 (4.8%) and Specialist O&G Clinics not located in any hospitals 9 (14.5%). About half (48.4%) of the respondents had conscientious objection to participate in abortion under Termination of Pregnancy Act. The proportion of female specialists was 47.1% (16 of 34) for the junior specialists compared with 17.9% (5 of 28) for the senior specialists in the respondent population.

There was no statistical significant difference in the sex ratio and in the ethnicity between the respondent population and the main population. There were more junior specialists among the respondents and this just reached statistical significance (Table I).

As shown in Table 2, the majority of the respondents were in favour of animal cloning (71.0%), adult stem (AS) cell research (88.7%) and embryonic germ (EG) stem cell research (from aborted fetuses) (67.7%). Opinions were about equally divided with regards to embryonic stem (ES) cell research (early embryo <14 days) (46.8% in favour) and therapeutic cloning (50.0% in favour). Only a minority was in favour of reproductive cloning (8.1%). Almost all (98.4%) felt that there would be a constant need to review recommendations, policies and regulations in human stem cell research.

The respondents who had conscientious objection to participate in treatment to terminate pregnancy under Termination of Pregnancy Act, were more conservative in their views on stem cell research and cloning than their colleagues who had no conscientious objection (Table 3). Female O&G specialists were also more conservative in their views

specialists were also more conservative in their views compared to their male counterparts but a higher proportion of female specialists were conscientious objectors as well. The male group comprised 25 non-objectors (61.0%) and 16 conscientious objectors (39.0%) while the female group comprised 7 non-objectors (33.3%) and 14 conscientious objectors (66.7%).

The senior specialists comprised 17 (60.7%) non-objectors and 11 (39.3%) conscientious objectors with a sex ratio of 23 (82.1%) males and 5 (17.9%) females. The junior specialists comprised 15 (44.1%) non-objectors and 19 (55.9%) conscientious objectors with a sex ratio of 18 (52.9%) males and 16 (47.1%) females. Senior specialists were more liberal than the junior specialists in their attitudes on animal cloning, adult stem cell, embryonic germ stem cell, and therapeutic cloning but appeared to adopt a more conservative stance on reproductive cloning (Table 3).

Logistic regression analysis confirmed that the specialists who were not conscientious objector were more positive on therapeutic cloning and embryonic stem cells research. In addition, conscientious objector status was more important than sex or years of specialist qualification in determining the view on therapeutic cloning, and embryonic stem cell research (Table 4).

DISCUSSION

Although much has been published on personal views, public opinions, religious doctrines and organisational perspectives on stem cell research and cloning⁴⁻¹², there has to date very few published surveys of the collective views and attitudes of health care providers.¹³ This survey conducted in December 2001, was to our knowledge the first ever performed on a group of health care practitioners in Asia on their attitudes towards stem cell research and cloning.

Although the response rate was not high, this was expected as there was only one mailing sent (with no reminder). With the invited written comments from O&G specialist members and a prior meeting organized to discuss on stem cell issues, OGSS was able to formulate a stand quickly on this evolving controversial issue. Indeed this survey gave a quick gauge of members' views and allowed the society to confirm its organizational viewpoint, within 3 weeks from the start of the survey. The position of the society was published in the book "Ethical, Legal And Social Issues In Human Stem Cell Research, Reproductive And Therapeutic Cloning. A Report From The Bioethics Advisory Committee Singapore" dated 21 June 2002.¹⁴

It is useful for professional organizations with

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heterogeneous population to conduct a survey on the views of its members to help in formulating, fine-tuning or confirming their organizational viewpoint. In this survey, it was felt that with more than a quarter of the O&G specialist population responding from one mailing, it was sufficient for OGSS to confirm its viewpoint. Although there were stronger representations from some hospitals and from junior specialists among the respondents, the mix of the respondents in terms of sex and race was similar to the main population of O&G and this helped to reduce the bias when extrapolating the conclusions to the main O&G specialist population in Singapore. In addition, analyses of views of respondent subgroups with respect to sex, race and years of specialist experience helped when extrapolating the conclusions to the main group after adjusting for the differences in sex, race and years of specialist experience.

Stem cell research and technology are controversial and imposes complex challenges for many countries to balance the needs of science in advancing our understanding and treatment of serious diseases with moral, social and ethical concerns.¹⁵⁻¹⁷ With regards to the positions on research of adult stem (AS) cells and on reproductive cloning, this survey showed that Singaporean obstetricians and gynaecologists were in general agreement with the position of BAC. The majority of the respondents was supportive of research of adult stem cells but was not in favour of reproductive cloning. This strong stance against reproductive cloning was in contrast to the very liberal views of practitioners of assisted reproductive techniques (ART) in a USA survey by Katayama¹³ in 2001. Although human reproductive cloning has been prohibited in many countries, this USA survey showed that more than three-quarters of ART practitioners responding indicated that they would be willing to provide human reproductive cloning in indicated cases if it were legally permissible to do so.

With regards to the views on research of embryonic germ (EG) cells, embryonic stem (ES) cells and on therapeutic cloning, the respondents in this local survey had quite differing (for, neutral or against) views, reflecting a diversity of opinions among our members. This would not be surprising, considering that Singapore O&G specialists, though medical professionals with the same specialist training and scientific perspectives, had differing backgrounds in terms of age, sex, race and religion. Therefore it became obvious to OGSS that it is unlikely or rather it

is impossible to forge a strong consensus opinion on these 3 issues among its members, especially when developments within these issues are also rapidly evolving in the whole world.

Respondents of this survey like the main O&G specialist community had differing views on abortion. About half of the respondents had conscientious objection to participate in treatment to terminate pregnancy under section 6 of the Termination of Pregnancy Act (Cap 324), Singapore.¹⁸ The status of conscientious objection or non-objection to perform legal termination of pregnancy in Singapore with its liberal abortion laws, is a reflection of the religious background and personal belief of the specialist. In this survey, the conscientious objectors with their 'pro-life' attitude showed a more conservative stance, despite similar professional training. It is likely that religious faith and personal belief has a greater influence than professional medical specialist training, on the attitude towards stem cell research and cloning. The sex of the specialist was also another important factor as female specialists were more conservative in this study although they tended to be conscientious objectors as well.

Senior specialists while being more liberal than the juniors in their attitudes on animal cloning, embryonic stem cell and therapeutic cloning, adopted a more conservative stance on reproductive cloning. This perhaps reflected their more pragmatic approach towards stem cell research and their realistic appreciation of the possible extent of such research ethically permissible in Singapore at that time.

It is timely that the BAC has looked closely at issues involving stem cell research in Singapore. There would be a constant need to review recommendations, policies and regulations in human stem cell research, in view of the very rapid developments in this area, around the world. Similarly, attitudes towards stem cell research and cloning may change over the years and it is important to keep track of them.

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