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## ETHICAL DEBATE ON STEM CELL RESEARCH AND ROMAN CATHOLIC INSIGHTS

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### SUMMARY

*The paper examines four important topics surfaced in the ethical debate concerning stem cell research. After having briefly considered, first, scientific and, second, therapeutic expectations as well as, third, the possible sources of stem cells, finally the issues related to embryonic stem cells receive a greater attention. Three insights from the Roman Catholic moral tradition are proposed as possibly related to this issue in particular. First, we refer to those conditions that allow for research on cells taken from organs or tissues as well as from aborted fetuses. Recent decisions taken in the USA and Germany concerning stem cell research are read in relation to this first insight. Second, the definition of what is material cooperation appears to be relevant. Third, the emphasis on social justice and the promotion of the common good express concerns shared within society.*

### Expectations

The current research concerning stem cells captures our attention for its novelty and opportunities. It could allow us to increase our understanding of cell differentiation process, how it is controlled and how we could reproduce it. This is expected to transform biology and medicine. Further, even more relevant are the possible benefits we could gain from therapeutic applications that would be based on knowing the characteristics of these cells. Each of these benefits is largely expected and strongly welcomed—as it has been confirmed by the increasing media frenzy on stem cells, and their potential uses, in the recent months.

The first element that characterizes the ethical debate is, therefore, the fact that stem cells seem to offer to us the possi-

*Key words:* Stem cell - Ethical debate - Roman Catholic - Embryo

bility of radical, definitive healing for many pathologies that afflict humankind. Just to give an example, we could think to pathologies that depend on nerve damage, on cell necrosis, as well as circulatory suffering and metabolic diseases.

As a consequence, some authors are suggesting that these opportunities require from us to strongly promote research<sup>1</sup>. In particular, this approach would allow us to address the issue of stem cell sources by permitting, even promoting, research on a particular source that seems to be more promising, that is, embryonic stem cells<sup>2</sup>.

#### *Ignorance*

A second element that surfaces in the ethical debate concerns our limited knowledge of stem cells<sup>3</sup>. We are only at the beginning of this research. We are not sure yet what will be the real potential of these cells in terms of their ability to differentiate and to become each cell type. We need to research in order to verify both our hypotheses as well as the first data that are coming from animal studies.

Among what needs to be confirmed stands the hypothesis that embryonic stem cells, placed in culture dishes with growth factors, cannot become embryos<sup>4</sup>. These cells divide in two identical cells for an indefinite number of times (probably not infinite, as it was earlier suggested) before mutations occur. Later, in a specific growing milieu, each of these cells can differentiate in one of the many cell types. It seems that the ability to differentiate would go beyond differences in embryonic development<sup>5</sup>.

Scientists, bioethicists, ethical committees and commissions consider our ignorance on stem cells' properties as a major argument in favor of research. This could explain the willingness to promote research in various countries, with or without regulations<sup>6</sup>. It is an approach not only understandable but that can be shared by simply considering the possible expected benefits that are at stake. However, discussions and disagreements surface when we consider possible preferential directions of research or limits that should be proposed and kept. Again, this is the case of stem cell sources, that we consider more in detail shortly.

From an ethical point of view, it is relevant to reflect on issues in a research field in which many questions are raised and need to be answered, many hypotheses are advanced and need to be confirmed or dismissed. On the one hand, caution is required. On the other hand, it is necessary to make ethically sound suggestions that can guide decisions and improve our knowledge.

#### *Sources*

In the ethical debate on stem cells, the third, and largely discussed topic concerns the sources of human stem cells. Embryonic stem cells are at the center of this debate, particularly when they are produced from embryos stored in fertility banks, or made for research purposes, or obtained from voluntary abortions.

On the contrary, the other sources of human stem cells do not raise significant ethical problems, provided that informed consent is given and standards for safety on research are followed. I am not aware of any bioethicist arguing against using stem cells that are found in adults (adult stem cells), in blood as well as various tissues, or umbilical cord blood stem cells, or from spontaneously aborted embryos and fetuses<sup>7</sup>. However, all these sources, compared to embryonic stem cells do not appear to be 'first choice', each one for specific reasons. Within the sources in this group, studies based on umbilical cord blood stem cells have not yet been published—at least at my knowledge. Therefore, it is not clear yet whether these cells have the same degree of potency and plasticity that characterize embryonic stem cells.

In the case of stem cells obtained from aborted embryos and fetuses, it has been argued that they are not particularly indicated for research intended to therapeutic applications. In fact, we should suppose that their development was stopped because of genetic mutations or metabolic problems. Hence, they are not regarded by researchers as an appropriate stem cell source.

Adult stem cells are not easily found in blood and tissues. Then, it is not simple to cultivate, multiply, and keep them dividing. Further, contrasting findings are proposed concerning their ability to differentiate in many cell types<sup>8</sup>. In fact, recent works, that showed their versatility and plasticity, have been challenged because other scientists could not reproduce the

same results<sup>9</sup>. Even more recent findings are questioning these reports. Two independent works, published by *Nature* on April 5<sup>th</sup>, 2002, show that adult stem cells cannot differentiate in many cell lines.<sup>10</sup> What appeared to be their ability to differentiate in many cell types could depend on hybrids formed with embryonic stem cells in culture. But these hybrids have a double cario-type and it is still uncertain what they will become (i.e., the cells' chromosomes return to their normal number; these hybrids die; they differentiate in functioning normal cells; etc.).

From a scientific point of view, embryonic stem cells appear to be the choice source. They multiply and differentiate. They are easily collected and cultivated (often in mouse fibroblasts' feeders). Further, usually researchers have a good experience working with them because of their studies on lab animals (e.g., mouse).

Embryonic stem cells seem to offer to us more information concerning the cell differentiation process that can be used to study their possible therapeutic uses. At the same time, they require we dispose of embryos to produce them, at least initially, until we have a sufficient number of lines. We are all aware that, within the public forum, the embryos' status is a highly debated issue. It is enough to remember the public debate on abortion in the recent decades, in the USA and European countries, and how it can still divide society (e.g., in the USA). Then, we all know that the Roman Catholic church joined, even led, those within society and scientists who oppose any use of embryos to produce stem cells.

Roman Catholic official teaching looks with interest and hope to any scientific progress that can improve human health and living conditions on earth. Scientific development is even supported and promoted—provided it occurs without violating human dignity and justice<sup>11</sup>. The reason for this endorsement is that technical and technological progress can be used to promote the common good of humankind—a goal that is quite largely sought within society, not exclusively in Catholic milieux. At the same time, the defense of human life since its beginning has been, and still is, a major Catholic moral choice. Further, Roman Catholic teaching strongly aims at making such a de-

fense part of the moral *ethos* in contemporary societies, well beyond the limits of the Catholic church.

I mentioned healing as key ethical criterion in dealing with scientific progress. However, the implications of choosing it can lead to different, even opposing conclusions and decisions. In particular, those who see healing as a value *prior* to due respect for embryos argue that spare embryos from fertility banks could—even should—be used in order to promote healing as a good. They compare the discarding of embryos—that probably will occur anyway in a matter of years since their storage—to the benefits in terms of possible therapies and treatments for, they affirm, millions of sick persons who are suffering today. The argument is compelling. Together with rhetoric that should be unmasked<sup>12</sup>, this balancing of values is largely shared within society, and strongly opposed by Roman Catholic official teaching.

What we have described so far seems to end up in an *impasse*. On the one hand, scientists lean to work on human embryonic stem cells because of their expected qualities and the hopes that they raise in terms of possible therapeutic applications. On the other hand, the Roman Catholic church<sup>13</sup> has repeatedly joined her voice to that of those who want research on stem cell to progress, but without destroying any embryos on the way<sup>14</sup>.

#### *The human embryo*

To examine the human embryo's status within Roman Catholic magisterial teaching, we need to make an important clarification. This teaching seems to acknowledge that it is difficult, probably impossible, to determine exactly from biological, philosophical, and theological points of view when human life begins during embryo development. Then, in order to defend as much as possible human life since its earlier stages, the Roman Catholic magisterium has chosen the position that gives to us major warranties, that is, the zygote<sup>15</sup> is considered an individual.<sup>16</sup> This position, that is affirmed by the Congregation for the Doctrine of the Faith in the 1987 document *Instruction on Respect for Human Life in Its Origin and on the Dignity of Procreation: Replies to Certain Questions of the Day (Donum vitae)*<sup>17</sup>, has been reaffirmed in more recent magisterial documents—for

example, John Paul II's 1995 encyclical letter *The Gospel of Life*<sup>18</sup>.

### *Impasse?*

How is it possible to combine the ethical stance that requires respect toward human life since its earlier stages with the stance that aims to promote healing as much as possible, even by using discarded embryos to produce embryonic stem cell lines? In other words, is it possible to find ways in which we can hold both the Roman Catholic position on respecting embryos and continue to go ahead with research on stem cells?

### *Three solutions*

A first solution is to stand on ethically certain ground. The Pontifical Academy for Life, for example, has repeatedly supported scientists in their research on stem cells, but it has asked from them to avoid using embryonic stem cells<sup>19</sup>.

A second possibility could be to explore new ways of doing research on stem cells by avoiding using embryos. Again, as an example, the Pontifical Academy for Life has showed its interest on scientific developments that make possible to produce stem cells by using adult somatic cells<sup>20</sup>. The technique, called autologous somatic nuclear transfer, has been suggested as a way in which scientists could obtain stem cells by avoiding producing embryos. The proposal was advanced by the Commission, chaired by the Nobel Prize Prof. Renato Dulbecco, named by the Italian Health Minister of the time, Prof. Umberto Veronesi, and published on December 28<sup>th</sup>, 2000<sup>21</sup>. This Commission proposed, as ethically acceptable, the autologous somatic nuclear transfer (ASNT). The technique requires a human oocyte, to which it has been removed the nucleus to replace it with a somatic cell nucleus from another person. In absence of appropriate boosts, this cell would multiply without becoming an embryo but an 'embryoid sphere,' from which it should be possible to obtain stem cells. This hypothesis—that has been defined by the Italian media 'the Italian way to producing stem cells'<sup>22</sup>—needs to be scientifically confirmed and it has been harshly criticized. In fact, it needs to be clarified whether what has been

proposed is merely a semantic distinction or a more substantial possibility.

After having suggested a first pragmatic solution, and a second scientific possibility, a third way could be offered by exploring both the Roman Catholic moral thought and tradition for cases that could offer to us insights on today's issue concerning research on embryonic stem cells. In the case it would be possible to confirm the finding that human stem cells, even from embryos (taken from blastocysts and placed in culture to become cell lines) cannot develop in embryos, any research that uses these cells would be analogous to studying cells taken from organs or tissues as well as from an aborted fetus<sup>23</sup>. Then, the standing moral problem would be the destruction of blastocysts in order to obtain a sufficient number of cells to create cell lines. I address this issue later by discussing the issue of material cooperation.

It is well known how the Roman Catholic church opposes voluntary abortion. However, research on voluntarily aborted fetuses can be considered morally licit if six conditions are respected<sup>24</sup>:

1. We are certain of the fetuses' death.
2. No previous agreements have occurred between the woman performing abortion and the medical professionals involved in the abortion; in any way abortion has been promoted in order to obtain specimens for research purposes.
3. A free informed consent has been given by both the parents or the fetus' mother.
4. There is a scientific need to examine and study the dead fetus for diagnostic, therapeutic, and research purposes that cannot be achieved in any other way.
5. It is granted due respect to every human corpse.
6. It is excluded any possible commerce and economic advantage.

In other words, it could be possible to affirm that, while holding the Roman Catholic care for defending human life since its beginning, it could exist a way in which a limited space for research on embryonic stem cells could be ethically allowed.

*Two decisions*

The further step of our reflection on the ethical debate concerning embryonic stem cells concerns the possibility of relating this approach from the Roman Catholic moral tradition to contemporary ways of addressing the ethical issues raised by stem cell research. Two recent decisions have some interest in this regard.

Two countries have taken a twofold approach. First, they affirmed that research on human stem cells should go ahead by preferentially choosing stem cells from sources that are not ethically problematic. Second, researchers should also have access to information that can be gained by studying human embryonic stem cells. Limits can be set to achieve this goal, that is, by limiting researchers to use stem cell lines that are already available around the world.

The USA and Germany are the two states I refer to. Decisions on this matter were taken, respectively, by President George W. Bush, Jr., and by the German Parliament (*Bundestag*)<sup>25</sup>. Both in the USA, on August, 9<sup>th</sup>, 2001, and in Germany, on January, 30<sup>th</sup>, 2002, it has been decided to limit and control the number and type of research done on human embryonic stem cells. It has been accepted the argument, both scientific and moral, that it is necessary to acquire a deeper knowledge of these cells, particularly in what they are and how they differentiate. At the same time, there is awareness that any decision concerning the use and disposal of embryos require respect and cannot be taken lightly. In both States, research has been limited to human embryonic stem cells from about sixty cell lines existing around the world, already available at those dates. Researchers are not allowed to produce new human embryonic cell lines, at least with government funding<sup>26</sup>. The existing lines result from spare human embryos stored in fertility clinics. Initially produced as extra embryos for assisted fertilization purposes<sup>27</sup>, later these couples, with their informed consent, allowed researchers to use their embryos for research, because they neither intended continuing to cryopreserve their embryos for further reproductive purposes, nor disposing of them.

*Material cooperation*

Critics argue that such a solution does not show a real respect for embryos, but it uses them by considering them as a means for a specific end. The need to boost research on human embryonic stem cells, or to avoid that our country is not left behind in this promising research field, is such an end. The presence of limits set is not considered as ethically relevant<sup>28</sup>.

Further, critics could also point that researchers using those cell lines are responsible of complicity with destroying embryos, that is, with what has been necessary to produce them<sup>29</sup>. The Pontifical Academy pro Life defines this *material cooperation*<sup>30</sup>. It is a traditional moral category that concerns participating in an action that is ethically good or indifferent. This action can have a result that is morally good together with one that is morally bad. The morally evil consequence that can depend on this action is neither intended nor wanted. Material cooperation is applied to morally serious situations. The Roman Catholic moral tradition makes the hypothesis that, whenever there is a good intention, it is possible to cooperate, even materially<sup>31</sup>. Again, this could mean that the Roman Catholic moral tradition could provide an approach and an argument to be used in addressing the issue of embryonic stem cell research<sup>32</sup>.

*To verify*

We can now verify the six conditions—required by the Roman Catholic moral tradition to research on voluntarily aborted fetuses—by applying them to stem cell research in the case of the decisions made in the USA and Germany<sup>33</sup>.

1. It seems that the available human embryonic stem cell lines cannot develop in embryos.
2. The embryos that have been destroyed to produce these lines were not created to produce stem cells for research purposes.
3. The couples involved in producing the embryos, and that do not intend to use them any longer, expressed their informed consent, allowing for the embryos to be used for research.
4. As at today, scientists do not seem to have any comparable alternative to using human embryonic stem cells.

5. Respect is presupposed while manipulating embryos and stem cells.
6. Commercial inducements are not present.

This last condition is problematic because scientists, biotech companies, and laboratories involved in this research field are aware that stem cells could offer us enormous potential benefits both in terms of medical applications as well as in terms of profits they could generate.

#### *The market*

The awareness that stem cell research is expected to create 'great business' has been present in the ethical debate<sup>34</sup> and it characterizes a major ethical concern within the Roman Catholic moral tradition, together with that on the embryo status.

Together with 'love for knowledge and scientific progress', economic interests lead private companies and state research agencies to be involved and invest in stem cell research. This draws us to reflect on the ethical principles, values, and virtues we should refer to within the market economy, particularly in the most economically advanced countries, where this research is currently promoted and financed, and where the necessary technology and investments are available.

It is evident that in other countries and continents health priorities are so limited, compared to their needs and urgencies, that the available funding is absorbed by primary health projects, that are vaccinations, reduction of infant mortality, etc.

Consequently, many authors have drawn our attention to the need for examining ethical issues concerning stem cell research not only by focusing on the research itself, but by considering the wider social context that should benefit from this research results.<sup>35</sup> For example, it is not sufficiently addressed that the therapeutic application of this research could benefit, first and foremost, the financial, cultural, and political *élites* that probably will have access to them. Of course, this is not only a matter of concern, but a reality in countries like the USA in which a large number of citizens cannot benefit of minimal and basic health services. However, this could become a more generalized issue in the case the

tendency that is currently surfacing will be confirmed, that is, to limit the number and quantity of free services offered to citizens by National Health Services—where they are in place.

#### *Questions*

The ethical debate on stem cell research should help us to clarify what are the overall goals pursued. What is the place assigned to address the health needs of those who find themselves ill or in a situation of limited social development because of problematic, even dramatic health conditions? Are we assisting to the spreading of a rhetorical discourse that largely uses the 'goodness of humankind' theme, but that is mostly dominated by less explicit motivations?

We cannot exclude a positive answer to this question, probably betraying a hermeneutic of suspicion—more Christian than Roman Catholic. It stands the urgency of supporting stem cell research because of the expected benefits in terms of promotion of human health. But this support includes choices, concrete involvement, and projects aimed at reducing health inequality. A major unjust gap exists between North and South of the world, between countries more technologically advanced and those less industrialized, as well as within rich countries, e.g., between inner cities and suburbs.

Therefore, I am highlighting an ethical approach that reflects on stem cell research without separating it from a critical analysis of our global health system and in light of health needs. This qualifies a social justice perspective and the goal to be pursued is the common good of humankind.

Both social justice and the promotion of common good are typically, but not exclusively, Roman Catholic<sup>36</sup>. It is a good that includes the person's good, because of one's dignity, as well as that of associations, groups, local and international institutions, nations, and the whole humankind. Of course, it is a good that needs to be spelled out and traduced in concrete projects—tasks that still lay ahead.

#### *Conclusion*

At the beginning of these pages I highlighted the current initial development of scientific research on stem cells, in which

our knowledge on these cells' properties is still growing and in the process of being updated. From an ethical point of view this assumption could lead us to promote research, in order to improve our information, but by setting limits. The Roman Catholic moral tradition supports scientific progress, strives for appropriate therapies for the ill, requires respect for embryos, works for promoting social justice—particularly for those who are healthy, socially, culturally, and economically less well-off<sup>37</sup>—and aims to the common good of humankind. Resources from this tradition could be used to argue that a careful, limited and controlled use of already available embryonic stem cell lines could be considered morally licit, at least in terms of material cooperation. The approach currently set in the USA, and in the process of becoming operative in Germany, could be examples. Of course, we should be ethically vigilant and ready to verify their application as well as their ability to provide what they are aimed at, that is, a new possibility for treating diseases and, in such a way, promoting the common good of humankind.

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2. Later, I consider in detail the debate concerning stem cell sources.
3. On a similar approach focusing on these two areas of ethical interest, see SHANNON T. A., *Human Embryonic Stem Cell Therapy*. Theological Studies 2001; 62 (4): 812-814.
4. Usually, embryonic stem cells are taken from embryos at the blastocyst stage. The ability to develop as embryos seems to be present only before this stage.
5. These differences depend on the location in the three embryonic germ layers. These layers are: mesoderm, endoderm, ectoderm. Just to give an example, a blood stem cell, that is classified as belonging to the mesoderm, could become a neuron, that is a cell from the ectoderm.
6. The United Kingdom appears to be the leading country in this research field, at least from the point of view of the legislation in place. Israel is emerging too, while in other countries (USA, France, Germany, Canada, Australia) laws have been recently introduced or are in the process of being proposed. For an overview, see VICINI A., *Ethical Issues and Approaches in Stem Cell Research: From International Insights to a Proposal*. The Journal of the Society of Christian Ethics 2002 (manuscript to be published).
7. As I indicated above, the debate focus more on *who* should decide. See ROBERTSON J. A., ref. 1.

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12. The historical and critical study of the rhetoric associated with major scientific endeavors reveals an often quite uncritical and biased use of rhetorical arguments. Their presence seems to be motivated by the willingness to influence public opinion and political powers. Besides the risk of manipulation and critical naïveté, these rhetorical choices often betray the need for financing that could be greatly favored by popular and political support. An example could be the Human Genome Project. See KELLER E. F., *Nature, Nurture, and the Human Genome Project*. In: KEVLES D. J., HOOD L. E., *The Code of Codes: Scientific and Social Issues in the Human Genome Project*, Cambridge, MA, Harvard University Press, 1992, pp. 281-299. NELKIN D., *Promotional Metaphors and Their Popular Appeal*. Public Understanding of Science 1994; 3: 25-31; NELKIN D., LINDEE M. S., *The DNA Mystique: The Gene as a Cultural Icon*. New York, W. H. Freeman and Company, 1995.
13. Of course, healing is largely emphasized within society and churches. See, for example, TEOLOGI EVANGELICI, *Superare le rigide contrapposizioni*. Il Regno-Documenti 2002; 47, no. 900. However, this group of evangelical theologians allows for the use of spare embryos from fertility treatments because, by aging, these embryos have lost their ability to be implanted (see at p. 256). See also MEILAENDER, G., *The Point of a Ban: Or, How to Think About Stem Cell Research*. Hastings Center Report 2001; 31: 9-16.
14. See DOERFLINGER R. M., *The Ethics of Funding Embryonic Stem Cell Research: A Catholic Viewpoint*. Kennedy Institute of Ethics Journal 1999; 9: 137-150.
15. The zygote results from fertilization of a human oocyte by a human sperm.
16. This approach is tutiorist, that is, among the possible alternatives it is chosen that offering the surest ethical approach, in this case both for the individual as well as society.
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18. See JOHN PAUL II, *The Gospel of Life: Evangelium vitae*. Pauline, St. Paul Books & Media, Boston, 1995: no. 60. From the point of view of the Roman Catholic moral tradition, procreation should take place only in the context of married relationships and it expresses the spouses' love. The married relationship it is considered as the appropriate context for welcoming the gift of life. The consequence is that technical interventions that modify fertilization and reproduction are perceived with suspicion or rejected. This occurs even when the purpose is to allow infertile couples to reproduce. These reproductive technologies are even more opposed when they produce embryos for reproductive purposes, cryopreserve and store them, or suggest they could be produced for research.
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  21. See MINISTERO DELLA SANITA', *Le Conclusioni Della Commissione Dulbecco*. Il Regno-Documenti 2001; 46, no. 872.
  22. See LORENZETTI L., ref. 20, p. 1.
  23. See CASALONE C., *Cellule Staminali: La Decisione Del Presidente Bush*. Aggiornamenti Sociali 2001; 52, no. 9-10: : 705-710, 708.
  24. See, *ibid*. The author refers to: TETTAMANZI D., *Nuova Bioetica Cristiana*. Casale Monferrato, Piemme, 2000, pp. 260 ff. Tettamanzi also points to the consensus between the Roman Catholic approach and Recommendation 1046 by the Council of Europe's Parliamentary Assembly (1986), that concerns the use of embryos and human fetuses for diagnostic, therapeutic, scientific, industrial and commercial purposes. See TETTAMANZI D., pp. 604-607.
  25. See BUSH G. W., *Remarks by the President on Stem Cell Research*, 9 August 2002; available from <http://www.whitehouse.gov/news/releases/2001/08/20010809-2.html>; VOGEL G., *Biomedical Policy: Bush Squeezes between the Lines on Stem Cells*. Science 2001; 293, no. 5533. German scientists can neither produce human embryonic stem cells, nor import them, nor work on them abroad, but researchers could be allowed to import these cells if they prove that they do not have any other way to realize their research and reach the aimed goals. Each decision concerning these imports is going to be made by an *ad hoc* national commission that should be in place in Summer 2002. See VOGEL G., *Stem Cells: German Researchers Get Green Light*, *Just*. Science 2002; 295: 943. An., *Germany Outlaws Stem-cell Research While Abroad*. Nature 2002; 417, no. 6884.
  26. Currently, in the USA it is not possible to limit research that does not need government funding and that, therefore, can avoid constraints imposed by Federal agencies. This dual standard within the same country raises ethical concerns. To address this issue goes beyond the limits of this paper.
  27. In the case of In Vitro Fertilization with Embryo Transfer (IVF-ET), it is part of the usual procedure of fertility clinics throught the world to produce extra embryos, and cryopreserve them, in order to avoid harvesting more oocytes in a further occur-

- rence, whenever it is necessary to repeat the embryo transfer (e.g., for a failed or extra attempt).
28. See FIORENZA J. A., *The Stem Cell Decision*. 24 August 2001; available from <http://www.diocese-gal-hou.org/bishop1mess-080101.asp>. See also ID., *The Stem Cell Debate*. 26 July 2001; available from <http://www.diocese-gal-hou.org/bishop1mess-070101.asp>.
  29. See OUTKA G., ref. 1.
  30. PONTIFICIA ACCADEMIA PER LA VITA, ref. 19.
  31. See, CASALONE C., ref. 23, p. 707. The author refers to ROSSI L., *Carità*. In: ROSSI L., VALSECCHI A., *Dizionario Enciclopedico Di Teologia Morale*. Roma, Paoline, 1973, p. 99. In the case of formal cooperation, the evil is wanted. "Such cooperation occurs when an action, either by its very nature or by the form it takes in a concrete situation, can be defined as a direct participation in an act against innocent human life or a sharing in the immoral intention of the person committing it." JOHN PAUL II, ref. 18, no. 74.
  32. On cooperation, see also SHANNON T. A., *Human Embryonic Stem Cell Therapy*, ref. 3, pp 819-820.
  33. See, CASALONE C., ref. 23, pp. 708-709.
  34. On the relation between market economy and scientific research, see CAHILL L. S., *The New Biotech World Order*. Hastings Center Report 1999; 29: 45-48. ID., *Genetics, Commodification, and Social Justice in the Globalization Era*. Kennedy Institute of Ethics Journal 2001; 11: 221-238.
  35. See CAHILL L. S., *Social Ethics of Embryo and Stem Cell Research*. Women's Health Issues 2000; 10: 131-135; HOLLAND S., *Beyond the Embryo: A Feminist Appraisal of the Embryonic Stem Cell Debate*. In: HOLLAND S., LEBACQZ K., ZOLOTH L., *The Human Embryonic Stem Cell Debate: Science, Ethics, and Public Policy*, Cambridge, MA and London, England, MIT Press, 2001: 73-86; ID., *Contested Commodities at Both Ends of Life: Buying and Selling Gametes, Embryos, and Body Tissues*. Kennedy Institute of Ethics Journal 2001; 11: 263-284; SHANNON T. A., *From the Micro to the Macro*. In: HOLLAND S., LEBACQZ K., ZOLOTH L., *The Human Embryonic Stem Cell Debate: Science, Ethics, and Public Policy*, Cambridge, MA and London, England, MIT Press, 2001; ID., *Human Embryonic Stem Cell Therapy*, ref. 3, pp. 822-824.
  36. The analysis of Roman Catholic official teaching on social issues from 1891 to our days could confirm it.
  37. Among them, we should not forget women and minorities.

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