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Letter to the Editor

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Totipotency/Pluripotency and Patentability

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ABSTRACT

In their article entitled "Commentary: Is totipotency of a human cell a sufficient reason to exclude its patentability under the European law" (Stem Cells 2007; 25: 3026-3028), K. T. Vrtovec and B. Vrtovec conclude that arguments based on differentiation potential should not be an obstacle to patenting human embryonic stem cells (and related cells addressed as totipotent or pluripotent). While concentrating on formal legal aspects, however, these authors fail to consider a major biological and ethical argument already found in the literature, namely that an obstacle to patenting is to be seen in the potential of cells (e.g., of embryonic stem cell lines), if this potential allows (re)constitution of an embryo when tetraploid complementation is performed. STEM CELLS *2008; 26: 1656-1657*

The article by Vrtovec and Vrtovec (1) concludes that arguments based on the differentiation potential should not be an obstacle to patenting human embryonic stem cells (and related cells referred to as totipotent or pluripotent). The authors propose that, in contrast to existing U.K. and European rulings, human totipotent cells should be considered patentable depending on their location and their method of derivation. In developing their argument, these authors refer to a publication of mine in a way that, unfortunately, is completely misleading because they fail to indicate the main message of it. The authors first cite correctly the European Commission and the U.K. Patent Office ("… human totipotent cells have the potential to develop into an entire human body. In view of this potential, such cells are not patentable because the human body at the various stages of its formation and development is excluded from patentability (…). The Patent Office will therefore not grant patents for human totipotent

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cells"). They then continue, "An identical view is supported in legal and ethical literature" and cite here, in addition to two other papers, my article (2) (their Ref. 11, p. 3026).

Although it is correct to state that I consider totipotent cells non-patentable, the focus of that article of mine (2) and its main message are that ethical problems (which in fact argue against patentability) are connected not only with the use of totipotent cells freshly isolated from embryos but even with totipotent/omnipotent/pluripotent cells that are produced following artificial ("alternative") procedures and that the same holds true for their derivatives (e.g., embryonic stem cell lines). These ethical problems always become obvious when cells show the ability to (re)constitute viable individuals via tetraploid complementation (TC). TC capability is a peculiar property shared only by early embryonic cells and embryonic stem cells (and, as shown more recently, by induced pluripotent stem cells, iPS (3)). My article (2) concludes that the ethical problem seen here is indeed due to the peculiar potentiality of those cells (addressed as pluripotency, omnipotency or totipotency, depending on the author). Also very relevant is that TC capability is found not only in cells originally isolated from embryos but likewise in embryonic stem cell lines, irrespective of the mode of their derivation (i.e., starting with single or multiple cells taken from naturally conceived or in vitro fertilization-derived embryos or with, for example, reprogramming somatic cells such as fibroblasts), and also irrespective of cell location (outside the uterus or in the laboratory). The at least theoretical possibility to clone individuals with TC must clearly preclude patentability of such highly potent cells, it is argued, and this obstacle against patenting remains as long as the cells must be suspected of possessing TC capability. It appears mandatory to apply a tutioristic attitude here and to remain restrictive even if success of TC has not been shown directly for a pluripotent/totipotent cell line in question, since it is ethically not defensible to perform TC in the human. This call for cautioning does not apply, however, to the use of all types of human cells, only to pluripotent/omnipotent/totipotent cells that, according to existing literature, should be expected to possess TC capability. To induce genetic or epigenetic modifications of the cells does not necessarily circumvent the ethical problem, in contrast to the rulings of the Biopatent Directive, as long as this high developmental potential has not been eliminated. This conclusion was developed and discussed in more detail in another publication (4), which Vrtovec and Vrtovec would have had good reason to refer to, but which they neither mentioned nor discussed. These arguments would indeed have been relevant for Vrtovec and Vrtovec's discussion, since those authors come to the opposite conclusion that "the exclusion from patentability is probably not justifiable for human totipotent cells that are produced outside the human body by (…) 'techniques which human beings alone are capable of putting into practice and which nature is incapable of accomplishing by itself' " ((1), p. 3028).

Thus, although the immediate context in which my article (2) was cited may appear appropriate at the first sight, the main message of the article with respect to ethics and patenting contradicts what Vrtovec and Vrtovec (1) conclude. On the other hand it should be of interest to the readers that ways of dealing technically with the potentiality problem are indeed being discussed (5).

Disclosure of Potential Conflicts of Interest

The author indicates no potential conflicts of interest.

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