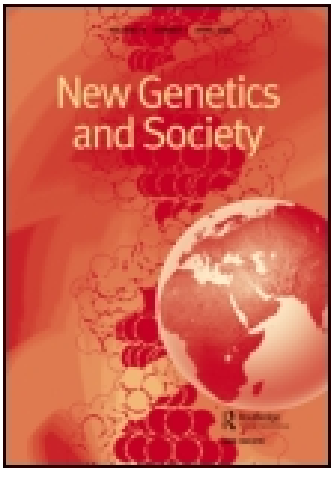

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Modalities of value, exchange, solidarity: the social life of stem cells in China

Achim Rosemann [a]
[a] Department of Social Anthropology , University of Sussex , Brighton, UK
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Modalities of value, exchange, solidarity: the social life of stem cells in China

Achim Rosemann*

Department of Social Anthropology, University of Sussex, Brighton, UK

The donation of embryos for human embryonic stem cell (hESC) research is commonly framed as an act of solidarity, exemplifying a selfless expression of help from present-day citizens for public health improvements in the future. As I will show at the case of hESC research in the People's Republic of China, however, such discourse conceals the complexities of contemporary stem cell distribution and exchange systems, as well as the concrete forms of value and benefit that the derivation, use and circulation of these tissues has for user communities already in the here and now. While it is clear that the medical, scientific and commercial hopes of hESC research have not yet materialized, I will show that the current regulatory approach of hESC line distribution in China enables the usage of these materials as a resource of power that can be used strategically for the accrual of various forms of influence and value.

Keywords: hESC research; embryo donation; biovalue; open source biology; regenerative medicine

Introduction

The technological ability to alter the human embryo, to open up and redirect its biological potential for therapeutic and economic projects, has given rise to significant alterations of the meanings and manifestations commonly associated with classical terms of economic analysis, such as value, labor, exchange and (re)distribution (Franklin and Lock 2003, Waldby and Mitchell 2006). These processes are accompanied, and simultaneously enabled and legitimized, by transformations in cultural expectations, as well as by reconceptualizations of forms of sociality and subjectivity (*cf.* Hogle 2005).

In this article I shall explore these processes through an analysis of donation and exchange systems of human embryos and their biological derivates in the People's Republic of China. Research findings are based on observations and interviews with 15 stem cell researchers and 15 IVF clinicians in three large cities in Southeast

*Email: ar253@sussex.ac.uk

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and Central China. The research was conducted between December 2007 and March 2008.

I shall argue that under the current regulatory conditions of embryo donation and hESC distribution in China, a fundamental rift exists between ideas of therapeutic value as they are raised among embryo donors in the context of IVF, and the actual forms of value that are generated by the use of donated embryonic tissues. As I shall exemplify, this is the case not only in present-day systems of hESC exchange and distribution, but is highly likely also in future modalities of therapeutic application. This problem, I argue, is not restricted to China alone, but is endemic to virtually all countries in which scientific, medical and financial achievements of hESC research are likely either to serve only a comparably small segment of the national population, or to create benefits far from their original regional context of production.

The value in and of stem cells

The donation of embryos for hESC research is usually based on a logic of dispossession, which is grounded in a rationality of solidarity and benefit sharing (*cf.* Hayden 2003). The embryo is exchanged for the prospect of future improvements of public health, an outcome that – potentially at least – might benefit others as well as the embryo donor itself. This promissory invocation of healthier futures, as has been widely reported, is closely related to the hope of the generation of economic profits, which has set free considerable flows of capital into speculative therapeutic ventures (*cf.* Helmreich 2008).

Hope thus has emerged as a central element in the discursive, regulatory and performative choreographies through which hESC research is legitimized, governed and financed, and biological materials are procured and distributed (*cf.* Rubin 2008). Brown (2005) has suggested in this context that the reliance of emerging therapeutic markets on expectations of promissory future value signifies a shift from "regimes of truth," in which behavior is structured and resources are mobilized on the basis of established evidence, to "regimes of hope," in which speculative and imaginative invocations of future benefits are elevated to a source of authority and to a guiding principle for economic and scientific action.

Harvey (2009, p. 54), in a related argument, suggests in this context that human embryonic stem cells, if conceived in terms of their bare materiality, have hardly any value, and that it is exclusively their inestimable potential value that elevates them to objects of intensive hope, regulation and investment. Franklin (2007, p. 53), on the other hand, in her discussion of stem cells as a form of "livestock," provides a more encompassing discussion of the value of hESCs, which addresses also their present-day value. Similar to the ways in which sheep formed the "stud stock capital of the world" in the nineteenth century, the careful husbandry and banking of stem cells today form an important source of research and capital value that constitutes the indispensable basis for contemporary bioresearch industries to function. But also for Franklin, the full realization of the capital value of the

currently existing stock of stem cells depends largely on the successful translation of the inherent biological potentialities of these cells into projects of life and health enhancement; a process whose outcomes are still to be proven.

In this article, I propose to abandon, at least temporarily, an analytical perspective that focuses on the promissory and future aspects of hESC research. Instead, in this article, it is the immediate and tangible value of human embryonic stem cells I am interested in: their capacity as research materials endowed with direct forms of use value and emotions, exchanged among laboratories and used by skilled hands in interlinked chains of culturing and experimentation. More concretely, by looking into the specificities of this particular material domain, and into the precise ways in which these cellular materials are employed in daily laboratory routines, I shall illustrate how hESCs become the basic substance for the creation of emerging cultural practices, and for the actualization of new forms of value (*cf.* Miller 2002). First, however, I shall draw the attention to the ways in which the value of embryos is communicated to donors in the context of IVF.

Forecasting hope to donors: healthier futures and the solidaric self

The crucial role played by women to bring the embryos used in hESC research into being is often neglected in debates on the value of hESCs. In contrast to the contribution of sperm, the induced maturation and removal of oocytes in the IVF clinic is a physically risky and emotionally demanding process that involves long-drawn-out regimes of medical examination and drug administration, which end up in a dicey surgical procedure. In fact, it is this arduous process of "women's reproductive labor" (Dickenson 2006, p. 43) that forms the vital core of a new and rapidly increasing research economy and which lies at the center of all present-day and future benefits (*cf.* Waldby and Cooper 2006, Svendsen and Koch 2008).

A crucial question that arises here is: what ideas are projected into the minds of embryo donors, so that the donation of their spare embryos appears not only justifiable, but reasonable, or even desirable? While there is no space here to discuss these points in detail, and a more inclusive analysis can be found elsewhere (Rosemann 2009), I shall highlight here some central characteristics that seem exemplary for the situation in China as a whole.

A quasi-universal core claim of hESC research is, of course, that the embryos provided are used for the finding of cures for severe and today still incurable diseases. In the context of China, at least in the institutes I visited, these projected scenarios of healthier futures were usually defined in terms of a clearly demarcated national citizenry and territory. As one of the doctors with whom I spoke put it: "We tell our patients that *the whole society* may benefit from the donation of their embryos in the future" (emphasis mine). Embryo donation, thus, is framed here clearly as an act of altruism and solidarity, a selfless expression of help from present-day citizens for improving the health of fellow citizens in the future.

As I intend to show in the following sections of this article, these representations of the future value of donated embryos, in terms of their contributions to an imagined national community, offer both a one-sided but also distorted picture of the real and potentially real benefits and beneficiaries of hESC research in China. Three points of contemplation deserve attention here.

Complexifications

First, the scattering of places in which research is carried out implies also the spatial dispersion of therapeutic applications. As I shall show, the distribution of stem cell lines across borders is about to result in the extraction of benefits that are shared beyond the relations of national citizenship, events that are considerably at odds with the expectations that have been raised among embryo donors, who are made to believe that research findings contribute in the first place to the public health of the national community. A well-grounded concern here is that access to these developing therapeutic possibilities will be highly selective, not only across national borders but also within. Unlike the donation of blood, for example, which benefits people regardless of their socio-economic status, the donation of embryos for labor-, technology- and capital-intensive hESC research is likely to benefit more wealthy population segments only. While it is true that the development of stem cell based therapies is foreseen to reduce healthcare related costs in the future, in low income countries with highly selective access to high quality healthcare, such as China or India, larger parts of the populations may attain access to these stem cell therapies only under severe constraints and sacrifice. This may include the majority of people who had once donated their embryos for research (Cooper 2008).

Second, the one-sided focus on the communication of the health value of stem cell research neglects in fact all other forms of potential value that are likely to be extracted on the basis of hESC research in the future, among which are: (a) the accrual of financial profits on the part of biotech or pharmaceutical companies; (b) the realization of political ambitions and projects; and (c) the career prospects and financial gains of individual scientists and research institutes.

Third, the narrow focus on the communication of the future therapeutic value of hESC research neglects completely to account for the concrete forms of value and benefit that the derivation, use, distribution and circulation of hESC lines generates among scientific user communities in the present. These tangible, but from the public eye largely hidden, forms of value, as I shall illustrate, range from expanding workforce to an augmented number of publications, to the initiation of national and international research collaborations that bear the potential to result in sustained and mutually beneficial chains of exchanges. These matters have remained entirely unspecified not only in the everyday practice of embryo donation, but also in the academic literature.

Embryonic value and the role of state regulation

To better understand how scientists succeed in transforming hESCs into a tool through which resources and particular forms of value and influence are mobilized at present, it is first necessary to gain insights into the concrete regulatory conditions under which the transfer and exchange of established stem cell lines are carried out (*cf.* Sleeboom-Faulkner and Patra 2008). Compared to the UK, where the distribution of hESC lines is organized entirely through the centralized control of the UK Stem Cell Bank (UK-SCB), the movement of hESC lines in China occurs in a more open and, in a regulatory sense, also a less stringent system.[1] But let us first look at the situation in the UK. In the UK the transfer of hESC lines is permitted only after the completion of a wide range of meticulously prescribed check-up procedures, which range from informed consent protocols to standardized assessment procedures for cell characterization and quality control. The UK-SCB steering committee plays a crucial role here, as it checks the license, qualifications, reputation, research objectives and capacities of applicant centers. In case of requests from centers abroad, the committee still evaluates the legality of the proposed research project in the acquiring country (Stephens *et al.* 2008, p. 49). A further responsibility of the committee is to negotiate with applicant centers the precise conditions and terms of use of the attained cell materials. Agreed conditions must fully comply with the UK-SCB's code of practice. Transgression is punishable in law (Warrell *et al.* 2009).

This situation differs significantly from China, where individual research institutes manage the distribution of hESC samples, and regional government branches carry out the necessary controls. Furthermore, a huge difference exists in China regarding the transfer of hESC materials within and across national borders. While transfers of hESC samples within China seem to occur on the basis of the institutes' internal approval procedures, a considerably more complex regulatory picture emerges in the case of transfers of hESC samples abroad.[2] Here, two basic requirements must be met. The first is to obtain approval from the Chinese Inspection and Quarantine Bureau, which handles an online registration system, and which has specified the conditions that apply to the transfer of human tissue in the "Work Norms for the Health Quarantine Examination and Approval of the Entry/Exit of Special (Biological) Items," a nationally binding memorandum issued in 2006.[3] No distinct set of specifications, however, exists for the transfer of hESC samples in this document, which fall under the same category as blood, bone marrow, cord blood and other tissue commonly used for medical purposes. Documentation requirements for this category include a range of standard operation procedures for the identification of cell identity, quality and the presence of microbial contaminants and biohazards. Further requirements include a description of research purposes and potential risks.

The second requirement is the setting up of a Material Transfer Agreement (MTA), a document that has to be signed by the Chinese Human Genetic Resources Control Office (HGCO). The MTA specifies the conditions and terms of use of exchanged

tissue as negotiated and agreed upon between the exchange partners. Besides issues related to intellectual property and benefit sharing, the document must include a technical description of the research, and a risk assessment and safety evaluation form. The HGCO checks also the license and qualifications of the tissue recipient abroad. Once the MTA has been authorized, a local branch of the Inspection and Quarantine Bureau issues a final approval document (Warrell *et al.* 2009).

A key difference from the UK is that neither the HGCO nor the Inspection and Quarantine Bureau carry out controls of issues relevant to the ethical oversight of the transfer of hESC samples, such as the documentation of appropriate informed consent. Furthermore, while research purposes and related risks, together with the license, reputation and capacities of tissue recipients are assessed in case of international transfers, in domestic transfers such controls are performed by individual research institutes. As shall be shown in the next section, these differences have wide-ranging consequences.

Stem cell distribution in China

A key purpose of the UK-SCB is to operate as a "neutral intermediary," which fulfills important functions of ethical oversight, but simultaneously maximizes open and fast access to cell lines for qualified researchers (Glasner 2005, p. 357). As my data indicate, such a model of open access to hESC lines as established in the UK is far from being attained in China, where only a relatively small number of institutes can establish these lines, of which even fewer are willing to share their resources unreservedly with others. Not surprisingly then, it was a frequently heard complaint among Chinese researchers that it was extremely difficult to obtain hESC lines in China – a fact that might explain why a larger number of researchers rely primarily on stem cell lines imported from the US. Hence, compared to the centrally regulated distribution system of hESC lines in the UK, the institute-centered distribution approach in China clearly privileges those nstitutes that can establish stem cell lines themselves, but it creates dependency structures and disadvantages for those who have to rely on the supply by others.

As I shall show in the following sections, as a result of the scarcity of fully characterized hESC lines and of the absence of a regulatory approach that allows open access to these materials, hESC samples are turned into a strategic resource of power that can be used in well-calculated ways for the accrual of various forms of value and influence. These hidden and in the literature largely unexplored forms of value extraction of hESC exchange systems can be accounted for in the regulatory environment of China at least in four different ways.

Strategic games of inclusion and exclusion

If a research institute or hospital department that intends to carry out hESC research does not preside over the technical, biological or financial resources to derive hESC

lines itself, it is entirely dependent on the supply of cell materials by others. Research centers that have created hESC lines, in turn, decide very carefully to whom and for which purposes they provide their lines. As was mentioned by researchers in several of the institutions I visited, requests to obtain or distribute lines were frequently rejected. While one reason behind this reluctance arises from the fear that distributed hESC lines might be used in irresponsible or unqualified ways, another cause is constituted by concerns about the rise of potential competitors. A senior researcher in one of the centers I visited put it as follows:

> In this field there is strong competition. Everyone wants to get more results and publish papers faster than others. Some centers think, if they give you a line, this might endanger their own position, so … they just don't want to give it to you.

Researchers in China are not alone in experiencing such kinds of fears. Similar assumptions underlie, for example, the conclusions of research by McCormick *et al.* (2007) on hESC line distribution systems in the US, who wonder whether the widespread and global distribution of hESC samples from US labs (especially from the universities of Wisconsin and Harvard) do not provide researchers elsewhere with the resources that in the final instance might harm the domestic research environment in the US (2007, p. 1).

In China's research community, however, such ideas on the strategic withholding of stem cell materials (but expressed in a scenario not of international, but interinstitutional competition) are not shared unanimously. At least three of the scientists I spoke to strongly opposed such forms of calculated inclusion or exclusion, arguing that such practices would prevent scientific progress rather than promote it. As one of these researchers put it, the only criteria that should apply in deciding on the request of another center are the institute's financial situation, its technical abilities and scientific credibility.

However, in a regulatory environment in which open access to hESC materials is not institutionally anchored, the opportunities of exploiting the assumed benefits of a particularistic mode of hESC distribution may, for some researchers at least, simply be too tempting. Accordingly, strategies of calculated withholding or, as shall be explored in the next sections, the tactical delivery of cell materials to mobilize resources and initiate research collaborations, seems, at least in the centers I visited, a common pattern rather than an exception.

Influencing research agendas, harvesting labor

The scarcity of fully characterized hESC lines in a context of high demand elevates these tissues to a central element in the creation of research alliances, collaborations and networks. Sometimes, centers that possess sufficient cell materials to distribute samples to other institutes can strategically use these exchanges to advance their own research interests. This is true in particular in the case of more renowned centers that, in addition to their command over biological resources, also possess

the technologies, skills, knowledge and experience required to work with the hESC lines they distribute. In collaborations with local partners these features may function as important resources of control. As was mentioned by the director of one of the larger institutes I visited:

> We distribute lines to several universities, they collaborate with us and then we need to transfer techniques, we need to transfer cell lines, and we also control the different phases of the research. But if we send our lines out of our city, to Beijing for example, they have their own ideas; they just do it by themselves. We just collaborate in [the sense of] – if you publish, then you mention that the cell lines are from us.

Possession of and command over hESC lines, in combination with the knowledge, skills and technology of how to conduct state of the art research, thus seem to provide these centers with a certain degree of authority. Dependency structures that result from the limited access to hESC lines are used to indirectly determine and profit from the research and manpower of collaborating partner institutes – at least, if these are located in the same geographic area.

In the case of the above-mentioned center, for example, influence is exerted through the selection of associates whose research interests correlate positively with their own research agenda, as well as through regular meetings and seminars with collaborating partners, which are used for processes of feedback, coaching and the provision of additional training, in addition to the presentation and sharing of research findings. Another way in which the institute that provides hESC lines to collaborating partners generates value is by laboratory training of research students from affiliated or partner institutes. To understand this point better, it is important to know that the laboratory training of postgraduate students in China lasts up to two full years (at Master's level, which lasts three years altogether). In this period, it is a common practice for students, besides their coursework and own experiments, to carry out large quantities of work for the research of senior staff in the host institute. As several young career researchers told me, only in year three of their Master's training did they get more freedom and were able to concentrate on their own research more extensively.

HESC lines as building blocks of international collaborations

A third way in which the inherent capacities of hESC lines are translated into benefits and value for the research centers that possess and distribute these materials, is by using these lines as initial gifts in the initiation of research collaborations with research institutes abroad, especially with prestigious centers in the US, Europe, or Japan. Collaborations with international partners not only raise the status of a particular center, but they bring with them a wide range of opportunities, such as an increased likelihood of attracting funding, better opportunities for high profile publications and improved chances for the discovery of significantly outstanding findings.

An example in China is a recently established research collaboration between a center in China and a center in the US. The pivotal point of this partnership is formed by the distribution of a disease-specific hESC line, which has been derived on the basis of embryos from persons who are carriers of a monogenetic disease that is relatively widespread in China. The line, created in the Chinese center, is the first of its kind in the world, and due to the scarcity of embryos with these characteristics its replication is rather difficult. The transfer of the line has enabled the initiation of a larger and long-term research project that for technical and financial reasons could not have been carried out by the center in China alone. The results and benefits of this project are shared equally among the partners: an agreement that, according to the director of the Chinese partner institute, is clearly advantageous for his center.

HESC line transfer as starting point of longer exchange chains

If, as in the previous example, an initial collaborative project between international partners has been successful, it can happen that the partnership is prolonged and extended to additional domains of activity. The transfer of stem cell lines, at least when these actually formed the initial point of that alliance, have then instigated a longer chain of exchanges that comprises persons, goods and services of several kinds. Such international partnerships produce value for a variety of reasons, but key factors here are the exploitation of differences in regulatory structures as well as the stratification of prices and labor costs across spatial boundaries. As I realized in the instance of another intensive and long-term China–USA research collaboration, the USA partner profited from the alliance in at least two ways: the carrying out of experiments in a low cost environment, and the exploitation of regulatory differences concerning the usage of research animals. This advantage is made possible because the Chinese regulations on animal use offer more freedom than those in the US.

The benefits from this intercontinental hESC collaboration flow, at least in this case, evenly in both directions. Forms of value generated by the Chinese laboratory include a general improvement of status, the exchange of researchers, the receiving of biological materials, lab equipment, technologies, information, and a significant increase in joint publications in high impact journals. Furthermore, joint applications for funding in China have strongly increased the financial basis of the center, which now has succeeded in fostering its position in a regional and national, as well as international, context.

While it is important to realize that in this case the exchange of hESC lines was preceded by a strong interpersonal bond between the heads of these two centers, it is also clear that here the distribution of hESC lines has constituted an initial and central action on which basis further exchanges and collaborative practices were built. In this case, however, the initial gift was provided from the center in the US: a sample of a hESC line derived by James Thompson, which was used for

the characterization of at least six newly derived lines in China, which are now used in experiments across both sides of the Pacific Ocean.

Conclusions

In this article I have shown that under the specific regulatory conditions through which the distribution of human embryonic stem cells is carried out in China, these materials are turned into a resource of influence and value that can be used strategically for the extraction of various forms of symbolic, social, scientific and capital value, that include the influencing of research agendas, the receiving of additional manpower, increased numbers of publications, the opening of possibilities for international collaborations as well as extended exchange chains among long-term partners that comprise technology, knowledge, access to research animals and the like.

The integration of hESC lines into new relational networks and systems of exchange does not mean, of course, their integration into a purchase economy, in which the use value of these tissues is transformed into monetary forms of exchange value, and traded on a market. Instead, the exchanges referred to display characteristics typical of informal patronage systems on the one hand, and reciprocal gift economies on the other. Boundaries between gift and commodity economies in these described exchange patterns, however, were highly blurred (*cf*. Waldby and Mitchell 2006). By forming the initial step in longer chains of exchanges and interactions, the distribution of hESC lines from one laboratory to another as a gift can be seen to constitute a strategic form of action through which collaborating partners aim to foster the position and functioning of their laboratories in a political research economy that increasingly aims toward the commercialization of scientific findings according to corporate principles. Human embryonic stem cell lines play an interesting part in these processes. In their role as a primary gift, they function as a sort of "exchange token," that is, as a symbolic carrier of value, whose distribution results in the return of goods, information or services at a later point in time.

In the light of these findings, Harvey's assessment (2009, p. 54), referred to above, that human embryonic stem cells, before the successful translation of their biological potential into therapeutic and monetary value, hardly have any value, cannot be maintained in this way. While it is clear that the belief in the promissory future potential of these tissues underlies and animates present-day systems of hESC exchanges, it is equally clear that these materials, in the immediate context of their production and (international) circulation, do simultaneously, acquire and generate forms of value – long before the translation of their inherent biological potentialities into new therapeutic projects and economies is realized.

Taken together, these insights do not only refer to the blank spaces in contemporary informed consent procedures, but they clarify also that further research into the use of stem cells as "open" or "closed" biological sources is needed (*cf*. Hope

2008), in order to understand how institutionally imposed proprietary restrictions shape the present-day realities of the scientific projects that take us into our regenerative futures.

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Notes

1. This situation is about to change with the construction of five stem cell banks in China, which shall be taken into service in 2013.
2. Two researchers told me they had distributed various hESC samples to other labs, entirely without any form of official approval. These transfers were solely based on the setting up of a Material Transfer Agreement between the two labs.
3. The document can be found online at http://wsjyjgs.aqsiq.gov.cn/xzxk/rcjtswpwsjysp/200610/t20061024_2192.htm [Accessed 10 April 2011]. Many thanks at this point to one of the two anonymous reviewers for providing me with this information.

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