

News on Regenerative Medicine in Brazil: The Quality of Press Reports

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ABSTRACT

Mass media acts as a bridge between science, medicine and the public. The article discusses the quality of press news, within the context of international journalism and contributes to the understanding of media impact on the public understanding of science and medicine as well as upon collective health. A text analysis of recent stories in regenerative medicine within the two principal elite newspapers of wide national circulation in Brazil, *Folha de São Paulo* and *O Globo*, is carried out. The theoretical approach to Science, Technology and Society is applied and the qualitative sociological theory of frames/framings as initially formulated by Entman. The work is based on a methodological matrix built to study textual devices-metaphors, examples, catch or effect phrases and representations – and reasoning elements – origins, causes/effects and appeal to principles. It applies a modified version of the one developed by Gamson and Modigliani. Within a surprisingly general scarcity of news on this pioneer topic at the local and global levels, two principal framings stand out: the scientific and medical frame and the social one, with the first as predominant. It tends to reflect an idea of linear scientific progress, an exaggerated optimism within the stories, as well as, a strong pride about the role of local discoveries and treatments in Brazil. The quality of information appears deficient, with considerable biases and dependent on international sources for its legitimation. This situation can contribute towards the development of false expectations on collective health in the present phase of cell-based therapy application, as well as, to a certain extent, misguide public understanding of science.

Keywords: Regenerative medicine, Mass media, Cell-based therapy, Collective health, Public understanding of science, Press news

INTRODUCTION

The public accesses the media as a privileged source of information in science and medicine [1]. Newspapers co-produce information in culturally specific ways and these are processed within civic epistemologies: patterns of meanings that the ‘publics’ use to verify data and act upon it within society [2]. However, the effect of this information upon the individuals’ scientific opinions depends, to a great extent, on the way it is organized and presented in the news reports published.

The present study intends to evaluate the quality of press reports and offer a contribution to the understanding of the eventual impact of the press on collective health. It undertakes the analysis of news in a pioneering scientific and medical area: regenerative medicine (RM) in Brazil. Some concepts within the theoretical approach to Science, Technology and Society (STS) are applied to research the following questions:

- What is the quality of information in RM reported by the local press?

- Which are the main framings used in the news reports?

substantively the quality of the articles produced.

- What place is assigned to social topics within press coverage?

Global quality of scientific news coverage: The context

The content of the information presented to the population impacts the way it visualizes the contributions of science and the manner in which public understanding of science unfolds. Some of the characteristics considered as pertaining to adequate scientific and medical journalism include: the relevance of the news selected, the precision of the information transmitted, the recognition of the limitations of reports and journalists, as well as, the professionals’ capacity to critically assess data. The global context in which journalistic practice develops can also influence

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Another important factor intervenes in the information accessed and transmitted by scientific journalism. The relationship between science and journalism has been historically uncomfortable; a difficult collaboration has been established between scientists, science communicators and journalists [3]. The languages, work routines and data presentation of the three social sectors are quite different and that makes their integration difficult [4].

In New Zealand, for example, communication consultants and scientists evaluate the quality of science coverage as poor. Bauer et al. [5] found that two thirds of American scientific journalists consider their colleagues as lacking a critical perspective regarding the topics researched. In the United Kingdom, 71% of the public believes that the media transmits a sensationalist perspective on science [6].

The language used also substantively affects the quality of the articles published. A study on meta-cognition developed by Bullock et al. [7], proved that the use of scientific jargon increases people's difficulties in knowledge processing. It hinders the public perception of the risks involved in the discoveries and diminishes their support for new treatments. Some authors have also found that lay publics tend to become irritated when confronted with uncertain research results or adverse health effects and risks derived from therapeutic applications [3]. This type of public reaction can influence the way risk and uncertainties are reported in the newspapers.

Quality of news' content is also substantively influenced by the structure of work within journalism as a profession: journalists' training and specialization opportunities, as well as, working conditions. In some developed countries, a professional crisis has been reported by science journalists [5]. As significantly intervening factors, they have emphasized that newspapers' circulation has been affected by a global decline in readership, due to an increase in television news programs and online coverage. It has also been shown that many newspapers have opted for online platforms to recover costs [8]. A well-known fact is that, at the international level, newspapers have reduced employment [9].

Among the journalists that are still working in their profession, there is then a higher pressure to develop articles in shorter periods of time [5]. The growth of online platforms also demands from them a variety of different versions of their articles. A research piece published in *Nature*, that interviewed 493 journalists, found out that, 59% believed that the number of products per week expected from them had grown in the last five years [10].

Within this general context, scientific journalists face specific challenges to develop their work effectively. For example, the time required to check the veracity of facts has been significantly reduced and partly, due to an increase in the amount of scientific production [11]. Many of them have

tended to choose just a small number of influential and trustworthy sources to filter the news' contents [4, 12]. For example, public relation professionals (PR) are increasingly becoming the spokesmen for research institutions and journalists require them more frequently as sources and filters of information [1]. These PRs are generally communication professionals, instead of science specialists and function as gatekeepers for the access to scientific institutions. This range of changes in the profession and the market contributes to diminish the quality of the articles published.

The Brazilian press is far from exempt from the consequences of these global trends, as reflected in some of the studies by local authors [13, 14]. Moreover, in Brazil, the lack of specialized training in scientific journalism can further accentuate the scarce scrutiny of the information published.

CONCEPTUAL AND METHODOLOGICAL APPROACH

This article is indirectly based in constructivist concepts central to the area of Science, Technology and Society (STS), as those on the co-production of science in society and of the definition of 'civic epistemologies': tacit and culturally-specific 'forms of knowing', that citizens use in the public sphere to verify knowledge and demand adequate public policies [2]. These approaches help in the understanding of how the press contributes to mold public knowledge on science and medicine.

More specifically, this study is based on the sociological approach to the study of frames/framing. Frames were initially defined by Entman [15], and they entail journalists' selection of some aspects of reality to be emphasized in the communicational text, as a way to promote a specific definition of a question, a certain causal interpretation, an ethical or moral evaluation, as well as, recommendations that can solve the problem. Some aspects of the topic in question become salient and others are relegated, hidden or made invisible. Specific attributes, judgements and decisions within the report are being suggested. A framing is then an organizational and structuring endeavor, that is, it becomes a topic in itself within a news report.

A qualitative study of the main framings in RM news in Brazil has been carried out. It is based on textual or discourse analysis of various dimensions in the narratives found in the articles selected. Representation styles or "interpretative packages" were depicted in the articles and defined: as central organizational ideas that mold a theme and create meaning [16].

The matrix developed by the authors mentioned was used to study its interaction with different elements from the narratives. In this matrix, two wider themes-to be later discussed-were analyzed in relation to: a) the devices for the construction of framings (metaphors, examples, visual icons,

effect phrases and representations); b) the reasoning categories applied (origins/roots, consequences or type of specific effects, appeal to moral principles and demands; e.g. rationality, faith, causes). Only two main framings were found during the classification of the articles' themes: **the scientific-medical frame**—reports on conferences, research discoveries and novelties—and **the social frame**—articles that discuss socio-ethical controversies, public policy initiatives, economic aspects and the humanistic or humanitarian perspective, that focuses on the narratives of individuals who could be potential RM beneficiaries.

To process the information gathered, firstly, the selected texts were repeatedly read, classified and codified manually and this process was checked by a second codifier. Secondly, the tones of the reports were defined, using a modified version of the categories developed by Yoon [17] for studies on stem cell research. Each article was classified as optimistic, pessimistic or neutral/descriptive. Keywords such as, success, confidence, help and benefit, were selected in the news reports, to define them as optimistic; versus, fear, critique, preoccupation, doubt, risk/danger and setback, to illustrate the pessimistic versions. When the article presented a balance between optimistic and pessimistic attributes, it was considered as neutral/ descriptive.

The case-study is based on 39 articles on RM published in the period between January 2012 and May 2019 in the two main newspapers: *Folha de São Paulo* and *O Globo* [Three of them were subsequently discarded as irrelevant]. The search in the newspapers' websites: <https://www.folha.uol.com.br/> and <https://oglobo.globo.com/>, was carried out using two keywords: "cell-based therapy" and "stem cell therapy".

The two newspapers selected are those of widest national circulation and have an important impact upon Brazilian society. They have specific sections and staff dedicated to scientific and medical coverage. These elite newspapers contribute to agenda-setting for the non-elite newspapers and tend to use a greater number of sources and amount of resources. The keywords used and the time-period of the sample analyzed reflect the present stage of the RM field at the local and global levels, as it focuses upon the clinical phase of cell therapy, after having during previous decades developed mainly basic and preclinical research.

RESULTS AND DISCUSSION

Main framings: Scientific/medical and social

A total of 36 newspaper articles were analyzed and distributed between two different main framings: scientific/medical (22 cases, 61%) and social (14 cases). Among the subcategories of the social framings, the majority of articles refer to public policy (9 in total), three of them are economic reports and it is surprising that only one of them presents a humanistic perspective and another one, an ethical approach. This can be a problem when evaluating the public

impact of the RM press as, on the one hand, it can diminish public awareness on existing ethical debates and, on the other hand, limit the identification of the readers with other citizens or patients.

The scarcity of humanistic/humanitarian perspective in the sample contrasts with trends documented in other RM contexts [18] and can reflect the priority attributed within elite newspapers, to 'hard' news versus 'soft' news, that is, those that report difficulties faced by patients [19]. But the lack of moral and ethical debates in the local reports echoes similar trends at the global level, once regulatory controversies regarding embryo status have been overcome by many countries [20].

Textual devices used in the news reports

An optimistic evaluation predominates in more than half the cases analyzed [19], while the rest of the reports are evenly distributed between those of pessimistic and of neutral tones.

In the scientific coverage, benefits and successes are emphasized versus risk and uncertainties, with the use of metaphors, such as: "key to the mystery", "rebirthing" and "key that reinitiates the computer". In the description of scientific and medical advances and discoveries, cell-based therapy is represented as: "very promisory"; "renewing hope"; "bringing benefits throughout life". In the effect phrases, the idea that novelties "repair" or "intervene" in a "broken piece" within the human body, or else, "fix an irreparable loss of health", is repeatedly found. The bluntest effect phrase applied by journalists describes the transformations produced by cell-based therapy as: "propelling cancer cells to commit suicide", that is, a description of a radical extinction of cancer cells and the injected stem cells symbolically becoming the main subject for this transformation.

However, many of the scientists quoted in the reports who express a basic optimism in the discoveries, are somewhat cautious in the use of effect phrases. They explain: "nothing falls from the sky" (in reference to the amount of research and effort required to develop cell-based therapies). They also admit that they, "sometimes have more doubts than answers" and that, as scientists, they must "be responsible" in the way scientific progress is publicly announced.

The examples and cases mentioned, in general, are accompanied by visual material of high social and cultural impact. Among them, there are photographs of: the kick given to a ball by a patient using a bionic skeleton, in order to open the World Football Cup of 2014 in Brazil; a quadriplegic individual sitting on a wheel-chair is shown as able to move a hand due to cell-based therapy; a patient recovered from Crone disease is reported as the "only patient in the world". Some of the other texts only describe the positive results of the initial phases of clinical trials in cell-based therapy.

Many articles refer to international journals of prestige, such as: Nature, Science, MIT Technological Review, and New England Journal of Science, as a way to value the local novelties or interventions and not only as sources of news reports. Also, in order to legitimize the content of the articles, emphasis is placed on the role of foreign institutions and/or professionals participating in local research, or else, upon the fact that some of the therapies in experimentation in Brazil have already been approved in developed countries.

Within predominantly scientific reports, there are very few references to associated political or social themes. Sometimes, novelties are presented as the only health solutions for patients: “there was no more to offer them”; “we tried to draw luck”. Reflections and analogies are made in relation to peripheral or subordinate science in an emerging country, for example, “being towed by what is done in foreign countries”; “a hard race”, (in reference to the existing competition to obtain original research results and their publication).

In contrast, metaphoric language in the social framings tends to be of an ontological and analogical type. Discoveries are described as: “playing the role of the Creator”; “a gene with multiple personalities” (in reference to gene capacity to change its expression); “revealing the secret of life”, or else, as a novelty that “opens doors”. Effect phrases, in many cases, reflect common concerns in global RM, for example, the existence of an endless regulatory loop-“the reduction of regulating times”- the illegal commercialization of therapies-“we are volunteers and are not looking for profit”- risks in the use of experimental products as if they were approved-“people need to know what they are paying for” and , also, the need “to attract foreign investment”, as a way to progress in science and medicine in an emerging country. Narratives’ representations refer to “promises of rejuvenation”- a central aspect of RM- as well as an opposite evaluation as, “deceitful propaganda”. The examples offered are mostly based upon testimonies and photos from “the famous”, and they occupy a central place in the reviews. For example, it is the case of the football player, Neymar, with the perspective of curing his damaged foot through cell-based therapy.

The social reports show big differences with those published in initial periods in the field of stem cell research in Brazil. In previous decades, relevant local academics had detected a tendency to report differences in opinions in the news in terms of “wars” and “battles” between opposite sides [21,22]. Instead, in only three cases in these recent articles, there is any explicit reference to relevant political or ethical struggles. These are mainly related to: current contrasting positions on blood storage held between the National Agency for Health Vigilance -ANVISA- and the public cord blood banks, on the one side, and the private banks on the other.

However, social and political controversies are salient in a large proportion of the social framing articles (71%, 10

cases). In these cases, journalists formulate only subtle suggestions and veiled critiques. Even when they are able to report both sides of the debates, they present only partially relevant arguments. This is the case of critical commentaries on the delays in ethical committees’ approvals of clinical trials attributed to an excess of bureaucracy, or else, to unsatisfactory regulation for the accreditation of clinics and scientific activities.

Results from studies in developed countries, show local journalists as highly attracted to focus upon scientific controversies [23]. However, in our sample, this trend only appears in articles classified within the social framing. Otherwise, few scientific reports illustrate scientific debates frequent at the global level, for example, controversies on the best types of stem cells for specific research projects - e.g. induced pluripotent cells (iPS) versus embryonic stem cells (ESC)-, or else, on medical choices to apply a new stem cell treatment to patients or maintain the conventional therapy.

Examples and cases tend to be used more extensively in the social than in the scientific and medical framings. Quotations of individuals’ testimonies are intended to familiarize readers with the present state of patients’ health. The subjects mainly reported are: the processes of patients that were successfully treated with cell-based therapy, or else, began to be hopeful about symptom alleviation through these treatments, as well as, the opinions of famous individuals who, when confronted with positive results of the new therapies, changed their mind in relation to the RM field or offered donations.

Most specially within the social frame, narratives show great differences between the way scientists and journalists describe the new developments in RM. Journalists express themselves in more optimistic tones and use effect phrases such as: “a radical change”; “it renews hope”; while scientists are more cautious in their descriptions of scientific and medical progress and use phrases like: “nothing is miraculous”; “one should stay close to reality” and “a lot still needs to be evaluated”.

However, scientists tend to be ambiguous and unspecific when they consider the moment when these therapies will be definitively tested and approved. They apply phrases such as: “in the short term”; “soon”, “in a brief period of time”, “in some time”. Only in very few articles they explicitly mention a probable timespan for market release; e.g. “between 5 and 10 years”; “almost in 15 years’ time”. The “hyped” promises of cures that were predominant in the RM press coverage in the last two decades seem to have been overcome, to some extent [24]. But journalists still make too many optimistic predictions, partly based on the unclear time-periods informed by scientists on when their discoveries might become products. This situation may eventually induce a certain level of false expectations among readers.

Reasoning elements within news reports

Reasoning elements found in the news reports mainly appeal to scientific rationality and technological development, especially in relation to local progress in RM. A secondary kind of appeal involved—one of the types of cause and effect—responds to an interest in the solution of human suffering, i.e., the acceptance of its existence and adequate actions to transform it. Ethical and moral appeals are extremely limited within the news. This section illustrates the reasoning elements prevalent in the articles through a brief presentation of commented quotations from the newspaper *Folha de São Paulo*.

In relation to the appeal to scientific rationality, a review article dated April 6, 2018, expresses caution when it describes a research project on the creation of bones and cartilage “à la carte”:

“The procedure being developed by Bonus is still under experimentation. It involves ‘*in vivo*’ culture of bone tissue from stem cells derived from the patient’s own fat tissue and extracted through liposuction, that is, **no artificial inserts** [are being used]. Technology will allow **any person to order, for example, the bone he/she needs** in case of trauma, infection or cancer (...) Tissue engineering, researchers warn that it is important to be cautious during experimentation. **‘Validation of this type of research is very important. One cannot accelerate clinical tests’.**” (own emphasis).

The journalist’s optimism in stating that, any person will be able to develop this type of treatment, contrasts with the more cautious rhetoric used by the scientist quoted. The journalist judges the consequences of the discovery from a viewpoint based upon a universal logic.

An appeal to Brazil’s future technological development in the field is transmitted, for example, by a review published on January 23, 2019 and related to partnership building between the firm Novartis and the prestigious private Institute Butantan in São Paulo. The report specifies that Novartis has invested around 40 million US dollars in local research during the last three years and it comments on a meeting that took place between the São Paulo mayor, João Doria, and the President of the Novartis Institute of Medical Research, James Bradner:

“(…) the objective declared by Doria in Davos, **is the attraction of foreign investment to São Paulo**. One of the aims is to form partnerships with the private sector **so that Butantan becomes the main world producer of vaccines**” (own emphasis).

The report is highly presumptuous regarding the potential consequences of partnership building for Brazil’s future in vaccine production; the aims established show a lack of reality criteria as well as appealing to national identity and pride. This news report is the only one among the 52.7% of

articles (19 in total) on public/private strategic partnerships in RM; a governmental strategy for health promotion that started in the last decade.

In a review dated September 11, 2018, present regulatory obstacles for the development of cell-based therapy are reported by a top manager at a firm willing to invest in Brazil:

“ANVISA intends to reduce regulatory stages, but **we still have to bear longer waiting times than those in other contexts**. (...) the interval for a clinical trial approval used to be of two years and has now been reduced to one year. (...) **we could have more local research if we operated more closely to European standards that allow for approvals in 4 to 5 months.**” (Own emphasis)

The report offers an open critique of inefficiencies in the present regulatory system. Its underlying motivation is to propose regulatory flexibility and it indirectly promises major future investments, if approval conditions emulated more closely those in European. Otherwise, it follows, investment resources and periods will be limited and conditioned to regulatory transformation.

Cause/effect appeals regarding patients’ suffering can be exemplified with the following quotation from a report published on April 6, 2018, about new stem cell techniques for cartilage regeneration. The patient in recovery explains:

“Two surgical procedures were necessary, as well as, many physiotherapy and body-building sessions. The size of the scar in my right knee-25 stitches in total-is not bigger than my relief. At present, I cannot run, but I am able to return gradually to my normal life.”

However, the narrative mentions solely the positive effects of the treatment. It also exemplifies the use of innovation to provide a better quality of life versus to ensure a definite cure, the focus of many cell-based therapies at the global level [20].

A review dated May 15, 2014, on the treatment of a patient cured from Crone disease, develops a humanitarian perspective: “The method used-technically a blood stem cell transplant-has not yet been approved by Brazilian local authorities. (...) But it is being used for severe cases in hospitals in Europe and the US”.

The therapy acquires legitimacy based on international experience and it is applied in a humanitarian way, given the severity of the disease and the lack of alternative solutions. The quotation also illustrates the global trend towards the implementation of regulatory flexibilities in RM, a practice much less frequent in Brazil.

Ethical appeals are quite absent from the news reports. One exemption is that of an article dated August 2nd, 2019, on the controversial technique CRISPR-Cas9, for gene-editing of human germinal cell-lines (e.g. Ledford, 2015) [25]. Two

antithetic ethical positions are discussed by the review and then, the following explanation is provided: “In March 2017, The American National Academy of Science considered that new developments of the technique (...) ‘open up realistic possibilities that deserve serious consideration’ ”.

A change in the recommendations of respected international scientific associations is perceived as exclusively linked to the progress achieved in technique development. Moreover, its future use appeals to an ambiguous ethical principle: ‘to leave options open’. This allows for the potential application of the technique, until new considerations on risks and uncertainties are clarified, instead of taking into consideration, for example, the precautionary principle.

CONCLUSION

Beyond the situation described for journalism in the international context and its potential influence upon the Brazilian society, the news reports’ analysis reflects some local cultural characteristics and the subordinate character of scientific journalism in an emerging country. Substantial differences in the languages employed by journalists and local scientists are found in the description of discoveries, the way of making topics salient and evaluating them, as well as, imprecisions in the journalists’ narratives and a scarce scrutiny of data veracity and validity. The general adverse conditions of professional journalism in Brazil vis-à-vis those in developed countries, can undoubtedly influence carelessness within reporting and could become the subject of further research.

Research results reveal a deficient quality of RM information in the press, presenting quite a lot of biases and dependent on international sources for its legitimation. The total number of news reports seems surprisingly small, considering that RM has become a pioneer scientific and medical sector at the local and global levels.

The reports produced by journalists are too optimistic in relation to successes and accomplishments of local medical discoveries and hardly discuss scientific risks and uncertainties that, at the global level, are portrayed as still very significant in RM [26]. This situation can contribute to the shaping of exaggerated expectations among the local public, even though, maybe to a lesser extent than in previous decades.

Narrative interpretations present a reasoning that appeals principally to scientific rationality and progress of RM in Brazil, in a linear fashion and from a universalistic perspective that frequently boasts about national scientific and medical identity. Only in a secondary sense, do texts appeal to collective health and the experiences of the sick.

The constructivist method adopted by this study-based on the Gamson and Modigliani [16] matrix-allows to reveal the persistent interpretative patterns in the reports on RM and contributes to understand the thinking processes involved in

narrative building. Interpretative methods are extremely useful to address the integration of scientific meanings into the shaping of civic epistemologies and the construction of the public understanding of science and medicine.

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