

models but on different argumentations that people mobilize in their experience of time.

In the fourth part, studies give account of the fact that the technological risk has not replaced the social risk. In the analysis of the trajectory of tuberculosis, the phenomenon of resistance to antibiotics is not qualified as “iatrogene” by health institutions but it is connected to a misuse of the technology by users and to problematic social contexts. In another example, which compares two experiences of epidemiological crisis in XVIII century and at our time, the human conditions seem to be at the base of the epidemics, beyond any rational technical tool of risk management. Finally, climate change represents the greatest challenge to the notion of risk and to the research in social science. Its exceptional character consists in its planetary dimension, its irreversibility and its close link to governance questions.

Even though some of the argumentations mobilized in this text are not completely new and despite a certain difficulty in finding a *file rouge* among all the texts, the readers of *Tecnoscienza* may appreciate the polysemy of contributions stemming from different disciplinary approaches. Beyond all criticisms and attempt to overcome the notion of risk society, the expression introduced by Beck still represents one of the *grand récit* of our time and this book provides a further confirmation of it. At the same time, this contribution speaks for the difficulty of finding a new coherent *grand récit*, under the banner of “threat”, “catastrophe” or something else.

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### **Peter Keating and Alberto Cambrosio**

*Cancer on Trial. Oncology as a New Style of Practice*

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What do prizes donated by General Motors, oncomice, molecules, patients, the acronym VAMP, statisticians and oncology have in common? Apparently very little. They are, however, some of the elements and objects that, throughout a complex and articulated convergence process, laid the foundations for the birth of the composite and diverse biomedical transnational movement for cancer research and treatment.

The history of this particular and heterogeneous convergence is the subject of the latest book by Alberto Cambrosio and Peter Keating, two of the most eclectic and prolific authors who have worked at the inter-

stice of history and social studies of science and technology. Without ever giving in to the illusion of producing a teleological narrative that subsumes, as in a “total history”, the emergence and development of scientific research in oncology, the authors describe, in a detailed and meticulous way, the genealogy – in the sense conferred by Foucault (1963) – of a portion of contemporary biomedicine that has significantly contributed to innovate and transform biomedical practice *tout court*.

Through a narrative comprising 12 dense chapters divided into 3 different sections, the volume offers an interpretation of the practices, the economic, institutional, organisational, epistemological and technological dimensions, and the political implications of scientific research in support of cancer care and treatment. These are dimensions that give depth to the analysis of the pillar, now taken for granted, of contemporary oncology practice: cancer clinical trials, which the authors define in terms of a new “style of practice”.

This latter concept is discussed in the introductory chapter of the text and is inspired by a well-known article published in 2007 in the *Bulletin of the History of Medicine* by the authors themselves (Keating, Cambrosio 2007). In this sense, the introductory consideration to the volume constitutes the theoretical framework of the empirical analysis that runs through a plot which is densely populated by human and animal actors, biological entities, technical objects and epistemological assumptions.

The authors, approaching the tradition of social studies on science and technology, take up the classic concept of *style of reasoning* in an innovative way. Proposed by Ian Hacking in the early '90s, the notion of *style of reasoning* (1992a; 1992b) indicates a particular configuration of institutions and organisations in relation to scientific practices and technologies aimed at investigating specific research questions, elaborating convincing answers, evaluating and disseminating the results to the scientific community, and regulating research activities. In reference to the thought of Hacking, however, Cambrosio and Keating suggest a semantic shift by proposing the term *style of practice*, in order to clear the notion of *style of reasoning* from its particular “cognitive” connotation. Furthermore, while Hacking's analytical perspective has a long-term historical reference, the volume proposed by Cambrosio and Keating seeks to explore the processes of innovation in the biomedical field through a few decades.

Each of the three sections making up the text explores in great detail the three historical moments identified by the authors, through which the methodology of conducting cancer clinical trials has emerged, developed and partially stabilised as the new style of practice in the biomedical disciplinary domain. Although the boundaries between the three main historical periods when this new style of practice was developed are relatively unclear, the authors identify peculiar elements of discontinuity that allow a precise and clear characterisation.

The first historical phase (chapters II-V), which evolved from the mid-

50s to the mid-60s of the last century, saw the emergence of chemotherapy as a potential third treatment course for the cure of cancer, in addition to surgery and radiotherapy. 1955 is perhaps to be considered as a landmark year for cancer research, which in previous decades was rather characterised by a “scientific Tower of Babel” where simple qualitative observations wouldn’t go beyond medical anecdotes. In this first part of the text, the authors thoroughly analyse the emergence and development of chemotherapy practice, medical oncology and clinical experiments incorporated in *clinical trials*. This first phase is marked by what Cambrosio and Keating define as the experimental *turn* that led to the emergence of a new style of practice generated by chemotherapy, which would soon involve all aspects of cancer treatment and care (radiotherapy, chemotherapy and surgery).

While avoiding the banal empiricism that regards clinical research as a mechanism of linear implementation of “objective” laboratory results, the authors take into account two important experimental protocols (so-called VAMP and 6313 protocols) in order to show how, since the mid-50s, a new and completely unique style of research has emerged. This is based on a highly experimental design that lays its roots in biostatistics, careful selection of patients and treatment procedures, and unequivocal criteria of correlation between variables. In this sense, VAMP and 6313 protocols offer a privileged analytical perspective on the complex institutional and cooperative network that allowed the emergence and implementation of clinical trials. In the first section of the book, the authors emphasise the cooperative nature that marked the beginnings of clinical research in oncology. As a result, Cambrosio and Keating coined the term “epistemic organisations” in order to stress the importance of integrating experimental and clinical research and the organisational methods developed in support of the research itself. It is a fact that, despite the great interest among historians and sociologists in the subject of oncological trials, only few studies mentioned the key role of cooperation. Historians mainly based their work on archives and investigated institutions such as hospitals, professional associations or commercial enterprises that produced and filed such records. Furthermore, the distributed/fragmentary, flexible and provisional nature of the cooperative activity of cancer groups and the lack of records that testify its importance, led social sciences as a whole to overlook this specific method of carrying out scientific investigation. As a matter of fact, in the attempt of establishing a strong link between science and industry and self-verifying the sterile paradigm where “science discovers” and “industry applies”, social sciences have traditionally seen chemotherapy and cancer research as the outcome of a well-defined industry research program. However, the first part of the volume shows how cooperative groups from both sides of the Atlantic were particularly differentiated and quite far from the organisation of industry research as it was conceived, for example, in the making of the atomic bomb.

The second section of the book (chapters VI-IX) is dedicated to the analysis of the development processes taking place from the mid-60s through the 80s that involved some of the most significant institutions arising from the birth and stabilisation of cooperative groups – such as ECOG (Eastern Cooperative Oncology Group) or EORTC (European Organisation for Research and Treatment of Cancer) – as protagonists of cancer research in the previous decades. This second historical stage is dominated by large-scale clinical trials having the objective of comparing the potential of new therapeutic regimens based on the combination of several pharmacological substances, and recursively problematising neoplastic diseases against which these regimens were designed. These trials shared the fractional efficacy of chemotherapeutic drugs to hinder the replication of cancer cells (the cell kill hypothesis) along with a number of assumptions about the growth and replication of cancer cells (cell kinetics).

Accordingly, the authors focus on how the design and experimental implementation of the clinical trials discussed in the first part of the volume have changed. Cambrosio and Keating describe the transition from a first phase, mainly characterised by clinical screening of anti-tumour substances being tested on a relatively small number of patients, towards clinical research on a very large scale. Although the clinical protocol analysed in this section (ECOG 0971) differs from the previous protocol (VAMP), it cannot be considered as a novelty in itself, since it took over and showed standard features of the new practice style that had already emerged in the previous phase. This new phase, whose importance is symbolically expressed by the ECOG 0971 protocol, is seen as part of a broader research strategy based on the alignment of a number of related institutions within a transnational network, including data centres and protocol review committees that helped streamline the work of cooperative groups. In addition to these innovations, there is the development of new strategies for statistical analysis (sequential statistics, centralised randomisation) in support of experimental design and analysis of data produced by cancer clinical trials. This contributed to the development of a complex distributed network involving a range of different professionals, such as doctors, data managers and biostatisticians, who gave the impulse to further strengthen the emerging evidence from clinical research with the aim of reshaping anticancer therapeutic practices. Keating and Cambrosio describe the development of a clinico-experimental network going beyond the rigid institutional and national borders and establishing a new biomedical space where oncologists and biological entities cooperate within the framework established by the new style of practice. The authors show how the methods of cooperation and partnership involving researchers from both sides of the Atlantic has become extremely complex and varied through the incorporation of an increasing number of stakeholders, including, for example, the pharmaceutical industry. This led to the emergence of new organisational processes subjected to the

production of scientific knowledge in oncology and constituting what has been called *oncopolitics*, described as the method for governing the processes of production and sharing of knowledge about cancer(s).

During the 80s, however, a sense of crisis pervaded the international community of oncologists. Some of them even argued that cancer research had come to a *plateau* and no trial could significantly increase the chances of curing and treating cancer. The end of the 80s, with the so-called molecular turn, marks the beginning of the third historical phase, which is dealt with in the last part of the volume (chapters X-XII). The authors show how the innovations in the field of molecular biology reinvigorated cancer research, transforming the epistemological assumptions and the management of experimental practices. In 1984 the first human oncogene was isolated and, at the same time, that complex and controversial process that would then lead to the sequencing of the entire human genome began (M'charek 2005). These are the elements peculiar of the third phase identified by the authors of the book, which is characterised by the hybridisation of different disciplines for the consolidation of oncogenic theory within the study, prevention and treatment of cancer. In particular, clinical research would no longer focus, as was the case in previous decades, on strategies for the prevention of cancer cells replication. The episteme passes from a cellular level to a sub-cellular one, in order to develop new therapeutic regimens capable of interfering with the biochemical processes that take place in sub-cellular interactions. Therefore, the hybridisation between cancer clinical trials and molecular biology gave rise to the idea that the ever-increasing gap between basic and clinical research could be further reduced. Under the aegis of what was defined as *translational research* in biomedical circles, a number of researches and new funding programs had reinstated the rhetoric of the so-called “unity between care and clinical research”, expressed by the all-embracing concept of *biomedicine* (Clarke *et al.* 2010). Therefore, the consolidation of the oncogenetic theory opens the doors to new research strategies and new ways of treating cancer patients. Biomedical strategies regard *translational research* and *targeted therapies* as the two most interesting approaches so far available and encourage the redefinition of the new style of practice, in order to achieve a greater synergy between research laboratories and the clinical domain.

Overall, the work of Cambrosio and Keating is difficult to categorise with a specific disciplinary label. The book is mainly a work of history of science that also examines the processes of innovation in the biomedical field from a distinctively sociological perspective. Of particular interest for STS researchers is that both the historical and sociological perspectives are fully involved in the narrative and provide theoretical thickness to a work with a strong empirical structure, which is based not only on the traditional archive sources generally accessed by historians, but also on biomedical literature, interviews to leading names in the field, as well as an interesting and innovative bibliometric analysis of scientific produc-

tion. For this reason, this book shows a renewed methodological option that STS should take into careful consideration: the genealogical perspective.

While contemplating a genealogical approach and a particular sensitivity to the social dimensions of science and technology, this book also stresses the importance of complementing a processual and contingent analysis of the production and sharing of scientific knowledge (typical of ethnographies) with a diachronic dimension. This would allow to account in an articulated way for the historical dimension of how different genealogies of actants converge, diverge and rearrange, creating a technoscientific balance, as precarious as it may be.

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