

Lorenzo Tomatis: A Great Doctor in the Broadest Sense

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DOI: 10.2427/11213

ABSTRACT

Lorenzo Tomatis was a great doctor in the broadest sense: he gave a major contribution to cancer research, devoting himself to study cancer causes and prevention. His job was not only to serve Public Health but to denounce social and health inequalities without threats by political and economic constraints.

The medicine, like all sciences, has as its goal the acquisition and expansion of knowledge, but also it has as its main task the protection, care and well-being of the individual [...]. Having an ethical value medicine is, as many seem to forget, an atypical science" wrote Lorenzo Tomatis, one of the leading oncologists worldwide, in 2005 [1]. This statement can be considered as his best business card. Lorenzo Tomatis was born in Ancona in 1929 and he graduated in Medicine and Surgery in Turin in 1953, before specializing in occupational medicine. Because he was already interested in the role of chemicals as potential carcinogens, in 1959 he chose to join the researchers of the Division of Oncology at Chicago Medical School, led by Philippe Shubik.

The Shubik's group had an international reputation in the field of chemical carcinogenesis and Tomatis was rapidly absorbed into the group. According

Shubik, even then Tomatis showed excellent skills in basic research: he was a careful and thoughtful researcher with a great capacity to understand the direction of the research before many others. Tomatis's enthusiasm and his inclination to challenge involved also his private life. Shubik recalls an incident dating back to the early days of the life of the Italian scientist overseas. Tomatis and his wife went to visit Shubik in his house on the lake in Canada, driving an old Chevrolet, from Chicago. Shubik recalls that "the car had mechanical problems after their arrival, so that local mechanic was not sure that he could back home. Later he knew that not only Tomatis and his wife had returned to Chicago, but then they had driven it to the Yukon and were continuing to explore North America!" [2]

Tomatis's first two publications from Chicago were on induction of tumors in mice with o-amino-azotoluene and on the role of croton oil in skin carcinogenesis. These publications marked the beginning of the scientific path that the scientist would develop and pursue thereafter. Tomatis continued to publish during his stay in Chicago, but in 1965, his research took an important new direction with an article on an increased incidence of tumors in the first and second generation of offspring of mice exposed during pregnancy to a polycyclic hydrocarbon, the dimethylbenzanthracene. Tomatis continued to study, as a pioneer, this new aspect of carcinogenesis, so in the years 1965-66 he was awarded an Eleanor Roosevelt International Cancer Fellowship to study the response neonatal exposure to carcinogens. At the end of this fellowship, in 1967, Tomatis joined the International Agency for Research on Cancer (IARC), that it was born in Lyon in 1963, and transplacental carcinogenesis was one of the themes that he pursued with his new colleagues.

It was a time of great agitation in international fight against cancer, led by influential personalities as oncologist Antoine Lacassagne and architect Le Corbusier, who urging President De Gaulle to pursue a universal strategy to defeat cancer. Main objectives of the Agency were to identify cancer causes and to coordinate primary prevention worldwide. For both objectives, Tomatis's contribution - director from 1982 to 1993 - were substantial. Interventions, in his view, had to necessarily move by finding of scientific laboratory evidence, also long-term, to identify the carcinogenic effects of substances before being placed in the environment, as first step. Eventual epidemiological evidence had to be a definitive confirm. [1]

Lorenzo initiated the "Monographs" program, that is his most widely recognized project inside and outside the research world. In the early seventies, there was a substantial dispersed amount of data, both experimental and epidemiological, about chemical, physical and biological carcinogens, but there was not any list widely accredited by the scientific community. World Health Organization suggested the IARC to create a list, completing by few months or a few years. This was a prestigious work, certainly, but Lorenzo didn't care to please diplomatically to this legitimate request, first of all, he wondered how to do it in the best way possible. It was necessary to be able to observe reality (that is the researcher's first quality) as it actually presented itself: how was it possible to produce a list without conducting a critical assessment and including all the existing evidence on an agent? And how was it possible to conduct this type of in-depth evaluation without bringing together experts and interacting each area of relevant research? Therefore, in this way, the "list" could only be elaborated after a long interdisciplinary assessment. But the Monographs were born in a counter-current sense.

Colleagues and researchers told Lorenzo that the "list" was a nice but unachievable idea. The most optimistic colleague predicted that, after the evaluation of one or two agents (asbestos, aromatic amines), the program

would collapse because of data lack and if the IARC approved that Lorenzo and some collaborators dedicated a part of the time to the project, Lorenzo had to find funds to develop it beyond the resources of the regular budget. However, already in 1976, the program had instead happily passed childhood and it began to realize the need of a coherent structure. Therefore, the Monographs evolved rapidly and became an international reference.

Maybe the Monographs have been an evidence-based program before its time or rather Lorenzo's method and scientific rigor allowed him to do, without special labels and copying anyone, an authentic work evidence-based. [3]

The union between an evidence-based work and effective multidisciplinary job was particularly advanced for those years. In this way Tomatis contributed to increase the knowledge on various chemicals carcinogenicity, as asbestos, cadmium, DDT, trichlorethylene, benzene. Exposure to environmental carcinogens is not the same for everyone, but certain categories of workers have a greater risk of contracting cancer and only the primary prevention, in essence, can act on the causes reducing the risk. This ambitious project animated the IARC work and covered entirely twenty years since 1969. This work intended to evaluate carcinogenic risks of different substances to humans but Tomatis's particular approach aimed to study and compare levels of carcinogenicity where the results did not reflect actual differences but they were the result of a lack of sufficient data and investigations. In fact, the group classification of human carcinogens as likely human carcinogens or possible human carcinogens was not necessarily a guarantee of greater or lesser danger, but often it depended on lack of experimental or epidemiological trials about them. Other possible limitations came from the constraints of industries and their strong powers on research: Tomatis defined *business bias*, studies funded by industry and directed to deny the evidence of carcinogenicity of certain substances brought to light from independent research. [4]

Tomatis fought for entire human wealth and for medical sciences integrity, not only as doctor but also a writer. In fact, he saw that medicine were going toward an increasing technological thought and aimed at the care, often forgetting diseases etiology. He always kept in mind and remembered, in the scientific community, the legacy of Bernardino Ramazzini: ultimate goal is overall health, that is one with justice and social equity. His personality combined scientific rigor, ethical commitment and political sensitivity, so he became an awkward, ready to talk about many influences of economic and political interests on medical research. Lorenzo Tomatis was a pioneer of relevant instances: preliminary biohazard assessments had to be formulated for industry substances released to the environment and the precautionary principle had to be considered to protect the population from environmental pollutants, also waiting for incontrovertible evidence of harm, and it was necessary the declaration of conflicts of interest by researchers and consultants. Nowadays all principles are accepted: at first in the REACH Program approved by the European Commission and at last in the leading scientific and international organizations. To fight his battle, Tomatis faced the biggest giants of his days: the dogmas. Tomatis hated dogma: "Researchers resemble more to sociologists to revolutionary innovators, identify, and end up loving the dogmas. As sociologists find great difficulty imagining real changes that would force them to question dogma. Heretics are rare among sociologists as are among researchers for years and those who dared to claim that there were fundamental mechanisms outside the nuclear genome risked ostracism, if not the stake." [5]

Consistent with his approach, as well reflected in the design of the IARC Monographs, his interest was mainly to study agents which were suspected, but not proven, carcinogenicity, such as electromagnetic fields and emissions from incinerators.

Lorenzo Tomatis had always strenuously supported in his life the defense of Public Health through the Primary Prevention, as researcher and scientist, and he was firmly contrary waste incineration in Italy. Tomatis immediately understood that the big business around them was the real reason for the spread of this practice. Tomatis was not a pure scientist separated from the social, political and economic context, but he was a doctor on the side of citizens. In fact, about this topic, he gave the total and immediate solidarity to all those - citizens, doctors, associations - who were opposed to incineration. Tomatis exposed his position about waste incineration in a meeting at Forlì. His speech was always humble, discreet, quiet, but absolutely ruthless in denouncing the mingling of science and business, the unreliability of the legal limits, the drift of Public Health and the unfairness of a society based solely on profit and on the market. Also he said that the incineration of waste would have damaged the future generations. His attention to the problem of waste disposal and particularly his strong aversion to any practice of incineration can be found in two arguments: the problem of childhood and the problem of the neutrality of Science. His concern for children's health resounded at the beginning of his speech at the City Council in Forlì: "The coming generations will not forgive us the damage that we they're doing." [6] These plants, like many other practices currently in use, represented a source of toxic, persistent and bioaccumulative pollutants that they pass from mother to fetus and they exert the their effects directly on children, the most vulnerable part of the population. Tomatis was always concerned for the children, in fact in 1987 he wrote: "the deliberate ruthlessness with which the population workers has been used to increase the production of consumer goods and the profits that stem has now extended over the entire population of the planet, is engaging the component which are fragile children, both with "direct exposure to the plethora of carcinogenic, mutagenic and toxic substances present in the water, air, soil, food, and with the consequences of systematic and relentless destruction of our habitat." [7]

These words appear prophetic in the light of recent data on brain and psychiatric damages and on the cancer incidence in children. We can just remember the alarm raised in November 2006 from the Lancet [8] "The Silent Pandemic" to denounce the brain effects of chronic exposure to toxic agents and collective pollutants on children: "One in six children would have documented damage to the nervous system and functional and behavioral problems, which ranging from intellectual deficit, the hyperactivity syndrome, autism." Considering the cancer incidence in children, we can find the recent Italian data: the incidence rates for all cancers, as a whole, have increased by an average of 2% a year in Italy, with an increase twice that recorded in Europe (+ 1.1% per year) and in children aged under one year the increase is as much as 3.2% per annum.

Tomatis had a marked attention to ethics and morals of our society. He had the same interest for the Science integrity. Generally science is considered to be above the parties. He well noticed that Science is often victim of conflicts of interest and behind an alleged "third party", in many cases scientist were acquiescent in condescension toward power holders. [9] He discovered the dark side of Science and, about this problem, he said: "Research is a goose that produces golden eggs and gold is all on the table of those in power". [1]

His scientific rigor and his acumen were always accompanied by a vision of science, medicine and research at the service of humanity. He deeply focused on relations between social inequalities and health risks. "When it comes to cancer prevention, everyone thinks the so-called early diagnosis, but there is a prevention that can be done upstream, trying not to limit the damage of the disease diagnosticandola as soon as possible, but rather to prevent the occurrence of cancer preventing exposure to substances that cause it. Primary

prevention is concerned with this: do research on natural or synthetic substances to understand which are carcinogenic and, once identified, to suggest to the health authorities of public health measures to remove them from circulation. It is a strategy that protects all - the rich as the poor - but unfortunately it is mistreated by scientists, politicians and health authorities.” [10]

Moreover, Lorenzo was concerned about the brain drain from Italy during these years. In an interview, Gianfranco Delle Fave, an Italian scientist employed in USA, denounced, in addition to brain drain, also the economic damage suffered by Italy for the dramatic delay in research. “Italy does not have patents. The miracle of the Italian Northeast is not technology, is commercial. Do not spend for research is a waste of money: no research, no patents. And in the end it costs more.”

This accusation was not new, and fitted into a general observation of a country for decades managed with myopia by the different governments. Lorenzo Tomatis was among frontrunners of intellectual Italian mass emigration. Because of studies and long stay in the USA, he knew very well these problems, and focused them in his literary activity, another great expression of his personality. Tomatis was not only a great doctor and a great researcher, but also a great writer and in his novels he reveals his deepest humanity. Essays such as *The Laboratory* (Einaudi, 1965), *Research Unlimited* (Feltrinelli, 1974), *Natural History of the researcher, The research world seen from the inside* (Garzanti, 1985) and *The Re-election* (Sellerio, 1996). His first book, *The Laboratory*, in particular, criticized and put mercilessly bare the Italian academic system. In *The Laboratory*, written in 1965, he described his experience in the laboratories in Chicago. The work recounts, in an accessible language the daily work of a young researcher, comparing Italian mentality with the American one. This book got some success, especially among the young colleagues. Firstly, Lorenzo was appreciated for his lucid and open critique of Italian scientific and academic immobility. He refused the temptation to succumb to indifference. We can see often in his writings the truth, by definition linked to the concept of science, as a youth illusion although often he wrote that there were reasons not to despair. His pages represent a good breviary for the future scientists in Italy. One of his sad conclusions was that Italian academic researchers were not always the best ones or those produce the best scientific results but the scientists, whose integrity could have doubts, had often good careers.

In later works, *La Ricerca Illimitata* (*Unlimited Research*), 1974, and *Storia naturale del ricercatore. Il mondo della ricerca visto dall'interno* (*Natural History of a researcher. Research world seen from within*), 1985, Tomatis explored the social implications of science to question the real goal of researchers, in the balance between their aspirations and the general interest. *Il Fuoriuscito* (*The Spill*), 2005, is an autobiographical novel that sums up his experience of life, a sort of spiritual testament. Lorenzo described the decision to leave Italian baronial academic dynamics to reach American dream, the disillusionment on the supposed autonomy of research, the final choice to dedicate himself interely to clinical practice in Trieste, away from the world of compromises with the big corporations.

According Manrico Guerra, a member of the Association of Parma Doctors for the Environment, the legacy left by Tomatis is “to continue to believe in this mission, not to succumb to the indifference of the world, especially because the insensitivity of the vast majority of our colleagues, seems at times to consume the best of intentions”. [11]

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