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After 20 years! Experiences of 20 years publication in the field of radiological sciences. The need for continued researches and global contributions

Hossein Mozdarani

Founder Editor and Editor in Chief

Department of Medical Genetics, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran,
Email: mozdarah@modares.ac.ir

Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less

Marie Curie (1867 - 1934)

Current state of radiation research

Around the end of the 19th and at the close of the 20th century, three nearly simultaneous events i.e., the discovery of X-rays by Roentgen (1895), natural radioactivity by Antoine-Henri Becquerel (1896) and isolation of Radium by the Curies in (1898) opened up the nuclear era. These fundamental discoveries changed broadly the worlds of physics, biology and medicine. However as more basic discoveries are made, these separate scientific eras merged to contribute to the conquest of disease, especially cancer.

With the development of new technologies during more than a century, revolutionary methodological and conceptual improvements have been made, that have led to an unparalleled explosion of information. The exponential growth of data has been so impressive that the conceptual evaluation of the material has seemed almost an insignificant part of the scientific process. The progress and achievements in fundamental discoveries in biology at molecular level and radiological sciences, often appear to overshadow the earlier works. All these achievements have allowed researchers to ask new questions or to rephrase old ones. The result is a virtual avalanche of new formed knowledge.

Human is under constant exposure to ionizing radiation from natural or manmade sources. Biological effects of low doses and high doses of ionizing radiation has been the subject of research at cellular and molecular levels for many years and still is. Apart from radiation sickness and syndromes occurring after receiving high doses of radiation, low dose stochastic effects expressing as genetic defects and cancer has been major concern for numerous individuals exposed naturally or occupationally. Therefore montoring areas for.

Although radiobiological findings paved the ways for cancer radiotherapy, radiation protection and risk assessment; during the last three decades there have been a major shift from a DNA-centric view of radiation induced damages, to a biological view that appreciates the importance of cellular macro- and microenvironment and underlying genetics. Radiobiological phenomena such as radiation hormesis or so-called radio-adaptation, bystander effect and inherent radio-sensitivity have changed classical belief of linear non threshold (LNT) model. While the mechanisms underlying these effects and responses are not clear enough, it is apparent that their implications are much wider than the field of radiobiology. These biological paradigms might have major implications in radiation carcinogenesis and cancer radio- and chemo-therapy.

The trend of cancer incidence is increasing worldwide. As highlighted previously, we still do not know the impact of health effects of low dose natural radiation received by population; is it really beneficial or harmful? Radiation dose received by the population is increasing due to medical radiology exposures because of increased demands from physicians for radiologic procedures, but we do not know the impact of low doses received by population on their ill-health. Although, radiation induced carcinogenesis is considered as a stochastic effect, but we are well aware of the involvement of ionizing radiation in increasing cancer risk. During covid-19 pandemic, a large number of population were exposed to significant level of ionizing radiation for chest CT scan which can contribute more to the risk of cancer incidence in future. Moreover, one of the main modalities for cancer treatment is using ionizing radiation externally or internally. However, in spite of years and year's hard work of scientists; there are still many unsolved questions in the field of radiation research. In addition to conventional

radiotherapy with megavoltage linear accelerators to improve local tumor control, the search for new radiation treatment modalities such as proton and ion therapy continues to represent a major challenge in the management of localized human cancer. Although, the introduction of three- and four-dimensional conformal radiation therapy (3D or 4D-CRT) has been major advancement in radiotherapy and it is now possible to plan and prescribe radiation doses with desired dose distribution to the entire tumor using computer aided techniques, we are still far from achieving a personalized cancer treatment. Targeted therapy is not a routine cancer treatment modality yet. After years of introducing Boron Neutron Capture therapy (BNCT), it is not a routine procedure yet. In spite of advancement of monoclonal antibody technology to deliver radioactive materials to tumor cells and also advancement in nano-technology, targeted cancer therapy is still in its infancy and the insight is not clear.

At present, our knowledge of molecular pathways involved in relation to adverse responses to cancer radiotherapy is fairly poor. In recent years, progress has been made toward identifying genetic risk factors linked with late radiation-induced adverse effects. However, development of high throughputs technologies in molecular biology and genetics led to achievement of big data that entered radiobiology into radiogenomics era. Radiogenomics has emerged as a new field that investigates the role of genetics in treatment response to radiation therapy. The early studies of radiogenomics focused on single nucleotide polymorphism (SNPs) to show patient specific variability in gene or protein function related to radiation damage. MicroRNA and other small regulatory non-coding RNA molecules, might have a role in radiosensitivity of normal tissues through pathways involved in IR responses such as changes in signaling pathway, DNA damage repair, cell differentiation, cell cycle arrest, alternation of gene expression patterns, mutations of important genes, genomic instability and initiation of carcinogenesis. Omics and functional approaches may synergise if they are integrated into radiogenomics 'systems biology' to facilitate the goal of personalized radiotherapy. Radiomic analysis can reveal novel image features that could provide useful diagnostic, prognostic or predictive information, such as tumour size and volume. These imaging-derived phenotypes can be linked with clinical and genomic data, i.e., radiogenomics, in order to understand the prediction accuracy of clinical outcomes.

In case of nuclear and radiological accidents a large number of individuals would be exposed to a substantial dose of ionizing radiation. Therefore, dosimetry is essential to distinguish between those who are exposed and are not exposed to radiation in order to provide them with timely medical treatment. Thus, accurate assessment of the radiation dose in shortest possible time is especially important for successful and effective triage and medical management. Biological dosimetry has become a valuable tool when a person does not have personal radiation measuring devices or when those devices cannot provide important information due to the inter-individual variation in biological response to radiation. However, we still need to search for biomarkers suitable for biological dosimetry to estimate radiation dose received by victims for triage and treatment. Also, we need to search for potent chemical radio-protectors for using in cancer radiotherapy and in the events of nuclear or radiological accidents in spite of 70 years efforts. Large scale nuclear accidents such as that happened in Chernobyl and in Fukushima, not only threatened many lives but also provided a need for continual risk assessment from exposure due to radioactive pollution in the environment. Health hazards of non-ionizing radiation in which their applications are increasing rapidly, should also be borne in mind when combined with the effects of ionizing radiation.

Radiological research and the need for publication

There are many scientists in various institutes, colleges and universities throughout the world that are involved in research programs in the field of radiation sciences both from basic and from applied aspects. All these efforts are towards better radiation protection, risk assessment and development of strategies for better use of ionizing radiation for diagnostic and therapeutic purposes. Therefore, the results of their research should be shared with other scientists throughout the world in order to make benefits from the results and improve or not to repeat such research. To achieve this goal, a platform should exist for the exchange of detailed scientific information concerning the latest developments in the fields. The aim of a new publication is to create a public record of original contributions to knowledge and to encourage scientists to speak directly to one another. It also builds corporate enthusiasm and supports ongoing education, when you share your published articles internationally.

Although very high-quality journals are published in these fields in the developed countries, there is not enough space to encompass all important research findings generated by scientists in developing and third-world countries. This made us to think about publication of a new journal in the field of radiation research in the year 2002.

The International Journal of Radiation Research

This journal is the mouth piece of shared idea of Dr Shahram Akhlaghpoor and me (Dr. Hossein Mozdarani), which was established way back in 2002. At that time the main emphasis of the founder members was to make the subject of radiation research attractive and interesting, especially for combating cancer and risk assessment. By the help of

Dr Seyed Mahmood Aghamiri, necessary official permissions were obtained and with the partial financial help of the Novin Medical Radiation Institute, publication of a new journal was made possible.

The journal was first published as the *Iranian Journal of Radiation Research* (IJRR) in June 2003 quarterly. This journal was initiated to bring together the various disciplines of radiation oncology, radiation biology, medical physics, nuclear medicine and other related subjects to intensify the dialogue between basic and clinical researchers especially those working in Iran. This was a unique journal in the field of radiation research in Iran and in the Middle East region, meeting the needs of scientists and researchers not only in the region but also throughout the world to publish their own findings. Our mission has been to serve the needs of scientists and community by working with capable researchers and professionals from across the world to produce the most accurate and up to date scientific and technical resources.

IJRR at the time (2003), has been one of the specialized scientific journals in Iran. The executive committee of the journal has been anxious about the quality and quantity of papers received by the IJRR office. The reason was unexplored potential of research activities in Iran and in the region. Therefore, we were worried that there might not be sufficient numbers of articles submitted to the journal for publication. Soon, we have realized potential peoples and centers working in this area, not only in Iran but in other countries who contributed sincerely to the journal. We have realized that the existence of such a unique journal is a must both for Iranian and the researchers in other countries. In 2013, after 10 years of publication in the various fields of radiation sciences, we realized the need for broader readerships and contributors throughout the world. Therefore, we have decided to advance our scientific activities towards publishing the journal with a title change. Official permissions were given to Dr. Mozdarani as concessionaire to publish the journal with the title of *"The International Journal of Radiation Research"*.

After the name change, authors from other countries realized that this is not a local or regional journal. Through the continued efforts we could index the journal with the host of reputable indexing agencies; so that, IJRR has now gained an international reputation and a strong emphasis on high academic standards. In addition to authors from Iran who contributed to IJRR, we received submissions from contributing authors from across the globe. Figure 1 shows the number of published papers per volume (four number per annum). As seen, the number of published articles increased specially after the title change and the contribution from other countries were much more than local contributors. Figure 2 shows the contribution of researchers from all over the world to IJRR since its first published issue. It is evident from figure 2A that the number of published papers and worldwide contribution has increased during the years and dramatically after the name change of the journal, perhaps because the researcher realized that this is not simply a local or a regional scientific journal and belongs to the researchers all over the world. We have had contributions from different countries belonging to all continents, although the number of contributions from Asian and Middle East countries were dominant (figure 2B).

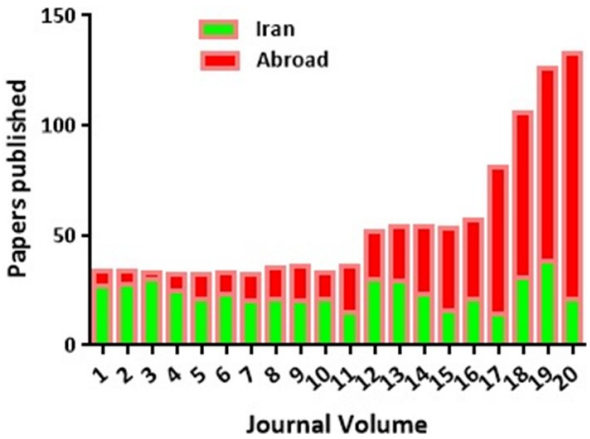

Figure 1. Number of papers published per volume and contributions from host country and abroad.

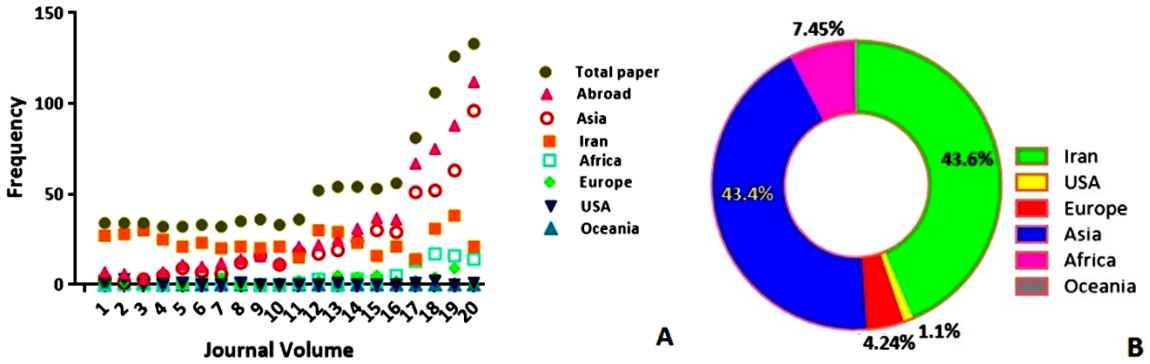

Figure 2. Contributions from various countries in different continents. **(A)**; contributions per journal volume. **(B)**; percentage of papers contributed from different continents.

In spite of some occasional barriers and obstructions from those who still believe that science is only for those who can afford paying huge amounts for access, we will persistently continue our global activities of publishing quality papers regardless of authors` geographical origin, gender, academic title, age, race or religion. Moreover, the journal is published by a non-profit private sector without governmental or political influences. Hence, hundreds of submissions by authors and researchers from six continents is an acknowledgement of our role and influence in the modern publishing processes. Therefore, we are thankful to all of our honorable contributors for their quality recognition. Indeed, they are motivating and nurturing the prominence of our work.

However, in a scientific time course, 20 years was also ample time when we have been able to promote the journal to a greater height. The *International Journal of Radiation Research* is now indexed in international data bases such as ISI, Scopus, Index Copernicus, EM base, Index Medicus for Eastern Mediterranean Region (IMEMR) and national data bases such as ISC (Islamic World Science Citation Center), SID (Scientific Information Database), Magiran, etc., therefore, there should be no hesitation for researchers to put their valuable works in the journal and work for the journal to become more visible internationally. We would like the IJRR become a venue for original, rigorous and complete exposition of experiments that add to our understanding at the radiological science and a worldwide representative of all the scientists interested in this field. As before, young scientists are requested to contribute by submitting interesting observations, raising controversies and publish constructive criticisms on published articles as well as submitting original articles in the cutting-edge areas of the radiation science. The Editorial board solicits quality manuscripts which will be subjected to vigorous peer review. We will maintain high standards of scientific quality and integrity for the journal and will expand the focus of the journal into new areas of radiation research and will try to make the journal to become more visible internationally. We will also monitor the quality of reviews for reviewer's responsiveness, scientific value and constructive comments. *We strongly believe that all research paper worth to be published and presented to other researchers; because, behind a research paper there is thoughts and idea of several scientists that are aware of their scientific problems. Moreover, lots of time and expenses has been consumed to do the research and produce a paper.* In this way we try to provide useful information to authors whose manuscripts needs modifications to improve the presentation of the manuscripts to an acceptable format and also for those manuscripts have been rejected. Unlike other editors, I personally value only the scientific quality of a manuscript, so I do not make authors to write their manuscripts as I desire, nor I reject their manuscripts without reading and without giving insights to improve their manuscript for future submissions. In this way with the help of our valuable reviewers throughout the world we somehow try to teach the young investigators research methodology and presentation of their research findings. During the last 20 years we have benefited from our honorable reviewers throughout the world. Scientists from over 30 countries helped us to select manuscript for publication or rejection. Although unlike other journals that their editors are proud of their high rejection rates, we feel unhappy if a manuscript is rejected for poor presentation. The editorial board and the publisher of IJRR will work to expedite the publication of timely research and proceedings of national and international symposium and conferences. We will try to do our bests in order to gain the recognition and respect of oncologists, radiobiologists, medical physicists, and other scientists working in diverse field of radiation research.

The ***International Journal of Radiation Research (IJRR),*** *a* fully open access multidisciplinary journal, is devoted to the advancement and dissemination of fundamental knowledge concerning the radiation oncology, basic and clinical radiation biology, medical physics, nuclear medicine, tumor imaging, radio-sensitizers, radio-protectors, biological dosimetry, risk assessment, environmental sciences,

epidemiology, new modalities in cancer treatment and health hazards of non-ionizing radiation. IJRR along with very high quality journals published in this field will try to bring all these various disciplines together and present a platform for the exchange of detailed scientific information concerning the latest developments in the fields. Our mission is to serve the needs of scientists and community by working with capable researchers and professionals from across the world to produce the most accurate and up to date scientific and technical resources.

I cordially request all the scientists and researchers in the field of radiation science to visit the journal's website at www.ijrr.com. This journal's website has reached nearly 20,000,000 unique visits. Apart from free access to abstracts and full text articles in PDF format, each article has its individual statistics of utility. You can see how often the website has been visited, how often articles in the journal have been visited and how often the PDF article has been downloaded. Figure 3 clearly show that a large number of interested scientists and students visited and downloaded published articles in IJRR during the last 20 years. The trends of download show that the quality of published manuscript has improved over the time and higher numbers of articles have been downloaded in as shorter time after publication. The number of downloaded full texts, over 2,000,000 during the last 20 years, i.e., download of over 2000 full text per published paper (figure 3B) indicated the contribution of IJRR to the radiation research community. The impact factor and citations are two important indices for any journal and an individual article's utility. Impact factor of IJRR has decreased for few years because of the title change, but is improving now. To date IJRR has published enough number of papers in different fields of radiation research to be cited by authors in their forthcoming articles. However, I hope in the future, the number of times an article has been visited or a full text PDF paper has been downloaded, will also be used to understand the interest in a particular article by readers who do not publish articles. The number of abstract visits of the papers published during last 20 years was near eight million times and the number of downloaded full text articles exceeded two million time (figure 3b). These statistics as well as being indexed by main indexing agencies indicate the level of articles published in IJRR and the scientific importance of this journal. I am sure with all your help this journal will be able to immortalize itself.

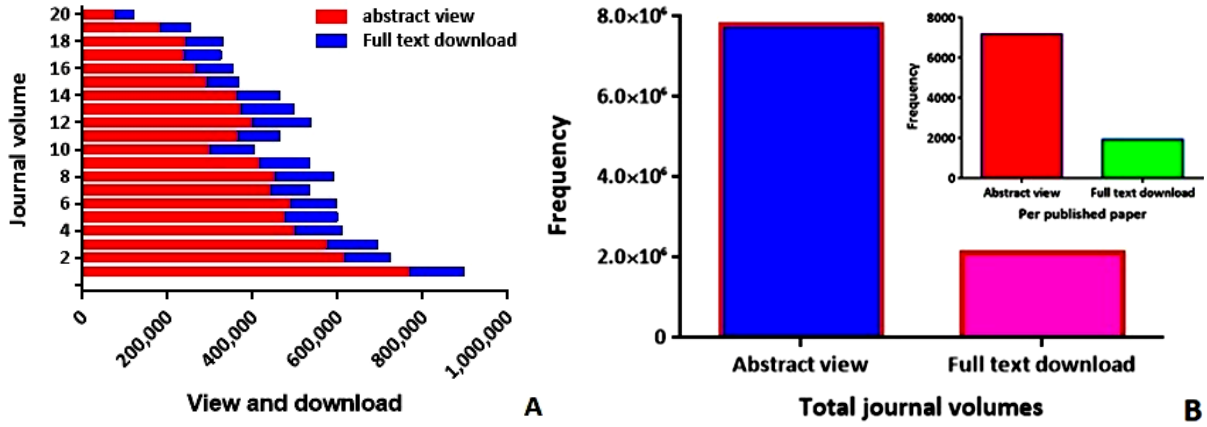

Figure 3. (A); Frequency of papers visited and downloaded per published volume of IJRR. **(B)**; Total frequency of abstract view and paper download from 20 volumes of IJRR during the last 20 years. Insert histogram in figure 3B indicated the frequency of abstract visit and full text download per published paper.

Finally, I would like to thank to our honorable editorial board members for their continued help and suggestions, all honorable reviewers for their sincere help and careful voluntary review of the articles and my colleagues at the editorial and publication office. I express my special thanks and gratitude's to authorities at the Novin Medical Radiation Institute for their financial support to keep the journal alive. I would also like to express my sincere thanks and gratitude to the devoted colleagues at the editorial office, Ms. Miranda Firouzbakhsh and Mr. Sohail Mozdarani for their tired-less day and night efforts at the editorial office to manage the articles from the first day of receipt until publication; and Mr. Vahid Emdadi for page-setting of articles. The contribution of all scientists to IJRR is greatly acknowledged.