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EDITORIAL

No time to die – BiGART is back. The 20th Acta Oncologica Symposium – BIGART 2021

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The first Acta Oncologica Symposium in the series of meetings, now known as BiGART, was held in 2006. Since then, we have had a symposium almost every second year with an audience of Scandinavian and international participants engaged in clinical and translational radiation oncology [1–7]. By tradition, ACTA ONCOLOGICA supports the activity and special issues of the journal with BiGART papers were published following each of the symposia. BiGART 2021, the eight BiGART meeting symposium in a row, was a one-day combo, hybrid symposium held the 6th October with 100 attendees in Middelfart. Denmark, 70 in Oslo, Norway and 80 online globally. The present special issue of ACTA ONCOLOGICA features more than 20 papers presented at the BiGART2021 Symposium.

BiGART stands for Biology-Guided Adaptive Radiotherapy and it is unique for the way it bridges clinical and translational research in radiation oncology. Clinical trials, physics and biology research are equally important players that must interact and integrate—and that is just what is in the spirit of BiGART.

With the rapid evolvement of advanced technologies within radiation therapy, the industry has become a driver in development of radiation oncology. Proton therapy is not a new radiation modality, but development of delivery systems based on spot-scanned protons combined with improved IT platforms have increased the usability of proton therapy both in classical indications such as brain, and in novel indications (e.g. head and neck). Huge health care investments have been channeled to this area and the number of proton therapy facilities has increased considerably over the recent decade. In the Scandinavian countries four proton centers are already operational or underway in a population of 26 mio inhabitants. This emphasizes the need to establish further evidence for clinical superiority of protons in new indications, the unresolved riddle of the radiobiological effectiveness of protons and the uncertainty related to assessment of proton stopping power [8–11].

During the most recent years, the integrated MRI-linac has been introduced and MRI-linacs are now being installed in oncology centers around Europe and North America. In the Nordic countries four of these have been commissioned and are now in clinical operation. Improved soft-tissue resolution combined with a modern IT platform allow accurate patient set-up and online treatment plan adaptation to compensate for day-to-day anatomical changes. On the backside, the MRI-linac demands specific and resource demanding work-flow with long treatment times with physicians and physicists on the spot during the treatment sessions and it is not straight forward to define what are the clinical indications for the MRI-linac [12,13]. Other emerging technologies are also being explored, such as a new center for accelerator-based Boron Neutron Capture Therapy (BNCT) in Helsinki [14], and all in all, the Nordic countries have globally become the region with the most high technological radiation facilities per capita, and consequential research activity [15–18]. This leaves immense possibilities for therapeutic improvements, and a strong obligation to scientifically explore and disseminate the potentials of such technology. The BiGART meeting are one of the ways to solve the latter issue.

Artificial intelligence (AI) is a magic evolution with huge potential for improvements in society and in medicine. It acts intelligent without being so, and it may help us doing things smarter. In radiation oncology, AI is used for automatized contouring of targets and organs at risk and for automatized treatment planning [19–21]. It may lead to improved quality of radiotherapy plans and may at the same time be a resource sparing technology. Providers of radiotherapy software are already releasing the first versions of AI-based contouring and treatment planning, but the technology is still immature, and validation is incomplete.

With a history that goes back more than a century, radiation therapy is still expanding and on a great move ahead. New technologies shall assist us on our way, but should not be the only driving force. Clinical and translational research are crucial in implementation of new technologies, but the value of such achievements are of limited use, unless applied in a therapeutic situation with an appropriate indication for radiotherapy. A continuous exploration into the proper indications for radiotherapy within the multidisciplinary oncological armamentarium is therefore the prime requirement for a successful cancer treatment [22]. Knowledge about the

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biological condition of the tumor and its host (the patient) is the fundament on which all radiation oncological activities are based, and we must constantly strive to utilize such knowledge better taking the individual patient and tumor characteristics into consideration [23–25]. Therefore, the well-established radiobiological values underlaying successful radiotherapy must not be discharged in our eagerness for short-lived gains. This is especially true for hypofractionation. The human body and its biological properties are unchanged, and thus, it is unlikely that hypofractionation, which was discharged as harmful a few years ago, now suddenly should result in a radiobiological benefit. Rather are we in a situation where the improved technology allows us to get away with a biologically inferior treatment without doing too much immediate harm. But to claim that to be 'progress' is probably to go too far.

Nevertheless, the tumors we treat today may partly be different. Head and neck cancer, and other squamous cell carcinomas, which constitute a large group of the cancers given primary curative radiotherapy, are increasingly associated with HPV infection which to some extend have changed their radiobiological properties toward higher radiosensitivity, and similar are many of the numerous breast cancer patients given adjuvant radiotherapy, probably in a state where they need no irradiation at all. Thus, the indication for radiotherapy must constantly be challenged taking the risk of treatment related morbidity into consideration [26], and so must the interaction with other cancer treatment modalities, not least the increasingly use of immunotherapy. Whereas irradiation 30 years ago was considered to cause a harmful weakening of the immune response, is it today found to be a helpful support in strengthen the body's defense against malignant progression [27,28]. The near future is likely to see trials using such strategy in overcoming the spread of aggressive tumors. The future will probably also see the use of new and powerful technology, allowing for hitherto unseen biological mechanisms such as FLASH and GRID therapy – fascinating concepts yet to be fully understood and tested [29,30].

All this underlies the constant and persistent need for an interactive biological, technical and clinical approach toward a better use of irradiation in cancer treatment - BiGART is providing such a platform, and we look forward to welcome you to our next symposium which is planned for 2023.

Disclosure statement

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