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From Innovation to Action
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ESTRO 2023 Biology Track - Introduction

The best opportunity to update, interact and have a drink together with the radiobiology community

A very exciting radiobiology track programme was put together for ESTRO2023!
Sessions started on Friday with the pre-meeting course, which was focused on combination therapies that involved the use of radiation therapy with other therapies.

The early risers had the opportunity to follow two outstanding teaching lectures on Saturday and Sunday mornings.

The first was presented by Joanna Birch, who addressed the topic of radiation-induced cell migration and metastasis. The issue has been reported in preclinical studies for more than 70 years, but it remains controversial because clinical evidence is sparse. In mice, irradiation of xenografted tumours increased the frequency of the development of pulmonary metastasis. In preclinical studies, after irradiation, we observe increased genome instability, secretion of cytokines such as tumour growth factor-beta, epithelial to mesenchymal transition, modulation of the signalling by Ras-homologous guanosine triphosphate-ases (RhoGTPases), and alteration of the extracellular matrix. Surviving radio-resistant cells show a more aggressive phenotype and are prone to local invasion, extravasation and distant metastasis. Local invasion and distant metastasis are the leading causes of morbidity and death in cancer patients. Preclinical studies on pancreatic cancer have shown that radiotherapy changes the molecular drivers of motility and invasion and that the mechanism involves the RhoGTPase signalling network. RhoGTPases are critical components of signalling pathways that regulate the cytoskeleton to coordinate cell migration, and RhoA-binding coiled coil-containing kinase (ROCK) and myotonic dystrophy kinase-related Cdc42-binding kinase (MRCK) are associated effector proteins. In-vivo studies on glioblastoma mouse models have demonstrated that radiotherapy promotes cancer invasion. The small molecule inhibitor BDP-9066 targets the MRCK pathway. The combination of BDP-9066 with radiotherapy prolonged survival in a mouse model of glioblastoma. Thus, combining anti-invasive therapies with radiotherapy offers potential benefits because it can control local spread. Understanding the drivers of invasion and metastasis after radiotherapy may help to improve the design of novel anti-invasive treatments in the future.

In the second teaching lecture, Ejung Moon focused on ferroptosis, which is a recently described form of cell death. Three conditions are required to induce ferroptosis: the presence of redox-active iron and lipid peroxides, and a defective/ insufficient antioxidant response. Ferroptosis sensitises invasive and drug-resistant cancer cells. Morphologically, it shows a decrease in mitochondrial volume, and it has been demonstrated that the process depends on calcium flux, mitochondria, autophagy, ferritinophagy, and lipophagy. In a clinical setting, several ferroptosis inducers are available, such as sulphasalazine, sorafenib, olaparib, artesunate and irradiation, which interact with an antioxidant response, and doxorubicin, which accumulates iron in the system. The combination of radiotherapy with ferroptosis inducers increases the response; radiation promotes ferroptosis in cancer and this process is independent of DNA damage. In mice models, the administration of a ferroptosis inhibitor reduces the amount of radiation-induced lung fibrosis. Thus, ferroptosis can widen the therapeutic window. Ferroptosis seems also to be involved in the immune response and the FLASH effect.

The symposiums ranged over four hot topics: lipids and metabolomics, radio-immunotherapy combinations, senescence, and individualised radiotherapy dose. Speakers provided up-to-date insights and presented their outstanding research. The discussions that followed the presentations were very lively and I'm pretty sure they continued during the coffee breaks.

Abstracts that had been selected as proffered papers were divided into four main topics: microenvironment and immuno-, tumour and normal-tissue radiobiology. Most of the studies were focused on innovative study models, new therapeutic targets and biomarkers. There was considerable space for debate and interaction.

On Sunday afternoon, the radiobiology community had the opportunity to get together at the not-to-be-missed “meet and greet”. Long drinks for everybody and the opportunity to meet others, get acquainted, continue to discuss the meeting sessions, forge partnerships, or simply chat informally with old and new friends.

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