

## Special focus issue: 'innovations in diagnostic and interventional oncology'

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“The actual aim of cancer imaging is not only to detect the smallest possible number of tumor cells, ideally before the angiogenic switch but also to predict tumor response after modern targeted therapies, including antiangiogenic drugs and biologic agents.”

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It is well known that many imaging techniques are routinely employed for tumor diagnosis, staging and assessment of tumor response. Alongside this, interventional and surgical oncology has expanded the horizons of imaging, determining an increasingly pivotal role in the management of cancer patients through a personalized treatment plan.

The actual aim of cancer imaging is not only to detect the smallest possible number of tumor cells, ideally before the angiogenic switch but also to predict tumor response after modern targeted therapies, including antiangiogenic drugs and biologic agents. Its importance is further exacerbated by the multidisciplinary approach, involving radiologists, oncologists, surgeons and pathologists. The new modern approach of image-based diagnosis and imaging-based treatment is becoming a decisive step in the fight against cancer.

Great importance has been given to interventional procedures in the last few years, with a large number of new treatments available for many cancers. The priority remains to treat patients with the most appropriate, least invasive treatments available for cancer type.

As the articles in this issue show, the advancement in imaging techniques for tumor diagnosis and assessment after therapy allows a more complete evaluation in patient. Tumor tissue characterization after therapy, for example, has become an essential factor both for patient's survival and for surgical and oncological management. In addition, we have to consider the vast possibilities offered by modern interventional treatments that improve compliance and allow better results without collateral effects, which is actually fundamental in the management of many neoplasms.

This special focus issue consists of original articles, reviews and special reports presenting up-to-date information on the use of the imaging techniques in different cancer's management, discussing the advantages and limitations in particular cases.

A correct imaging diagnosis before surgery represents the starting point in the cancer evaluation. Pesapane *et al.* report the importance of imaging in diagnosis and management of a rare case of a benign retroperitoneal tumor, underlining the importance of preoperative diagnosis of benignity through integrated imaging examinations, allowing a conservative management approach [1].

A pilot study concerning the new advanced imaging technique applied in cancer differentiation is an important contribution by Patella *et al.* Through the multiparametric analysis performed by MRI, the authors suggest a possible imaging differentiation of parotid tumors with consequent important implication in clinical management [2].

Imaging also plays a crucial role in treatment evaluations of the response in cancers. The evaluation of tumor response based solely on tumor size changing is the standard form for assessing the response of anticancer therapy. However, it is not completely true in tumors with high biologic rate of aggressiveness and in those treated with local procedures. As Reginelli *et al.* explained in their original research article, the combination between tumor

size measurements and tumor density changes can be used as indicators of tumor response in patients treated with regorafenib [3].

Continuing the focus on tumor response evaluation, the efficacy of renal tumors radiofrequency ablation is the topic of the original research of Russo *et al.* They show the typical aspects of an effective radiofrequency ablation treatment and compare them with imaging findings that may predict the presence of residual tumoral tissue, which in many cases is not easily detectable [4].

Image-guided interventional procedures represent essential techniques in the modern multimodal management of malignancies. The topic of new endovascular treatment based on the use of microspheres to release chemotherapeutic agents is presented in an original review by Melchiorre *et al.*, with special attention on the role of DEB-TACE in the hepatocellular carcinoma treatment. They debate on the superiority of DEB-TACE over conventional techniques in terms of efficacy explaining the improvement of new technologies applied in liver cancer therapy [5].

Image-guided therapies in bone lesions are another crescent field of interest in the modern approach for primitive cancers and for metastasis. Barile *et al.* critically evaluate the applications of a number of minimally invasive techniques in oncologic bone diseases considering the pain management and the disease control. As discussed by the authors, the new ablation techniques contribute to the achievement of significant rates of effectiveness and safety [6].

Where most articles in the issue focus on primitive malignancies, a review from Ierardi *et al.* shows the importance to treat symptomatic large veins obstruction secondary to malignant involvement. The authors provide an insightful discussion on the current state of the endovascular treatments for vascular compression syndromes in cancer patients explaining the technical difficulties, safety and feasibility [7].

Continuing the focus on interventional radiology challenges, Petrillo *et al.* systematically review the interaction between hypoxia and neoangiogenesis after transarterial locoregional therapies. They focus their attention on the treatment of hepatocellular carcinoma and suggest future therapies directed toward specific factors related to angiogenesis, in order to reduce local tumor recurrence and metastasis [8].

Finally remaining on the topic of hepatocellular carcinoma, Reginelli *et al.*, critically review the most significant predictors of microvascular invasion correlating with imaging techniques. They underline the importance to detect these predictors useful for preoperative evaluation and both for prognosis. Using an interesting mathematical model, they analyze factors with the most impact on microvascular invasion detection producing remarkable results helpful for management [9].

Actually, the inclusion of imaging in the management of patients with cancer is associated with improvements in survival. The greatest improvements have been demonstrated for the application of imaging for detection and response evaluation and for image-guided therapy. New developments in imaging techniques suggest the greatest opportunities for improvements in survival through a prompt imaging detection of cancer and through a new imaging-guided procedures with minimally-invasive approach. The use of modern imaging techniques has also demonstrated benefits in the healthcare expenditure; so, the future direction is to improve patients' survival through the applications of modern technology for healthcare, which will continue to drive and be driven by radiology.

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