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Molecular imaging as biomarker of tumor heterogeneity

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The development of the new biological drugs in the treatment of cancer has recently renewed the concept of "tumor heterogeneity". The effects of the new targeted therapy, such as angiogenesis inhibitors and antivascular therapies, are more complex, compared to the well known cytotoxic drugs. The intra- and inter-tumor heterogeneity, heterogeneity between metastatic disease, and also heterogeneity that happens over time, profoundly influence the treatment outcome of patients. At present, tailored medicine heavily relies on the pathological characterization of tumor by biopsies but we should have multiple biopsies of the same tumor in the same patients, to study the dedifferentiation of a metastatic disease under treatment. Considering the invasive limitations and the issue of expression heterogeneity, molecular imaging, represent one of the most important and attractive challenge of Radiology. It allows non-invasive whole body characterization of *in vivo* tumor tissues by using multimodality imaging techniques (such as FDG-PET, non FDG-PET, DWI-MRI, Ultrasound targeted contrast Agents and Optical Imaging). All together, these techniques, offer a morphological and quantitative/functional imaging characterization, in a real time manner. They can be safely performed and repeated multiple times, providing information about heterogeneity in the primitive or metastatic disease. On the other hand, the future of molecular imaging is limited in terms of sensitivity, specificity and clinical translatability. The sensitivity is dependent on the molecular probes that are used and the specificity is dependent on the imaging signal obtained. Indeed, still few multimodality imaging techniques are applied in the clinical trials. In this view, we expect that the improvement of the technology behind molecular imaging, with a more availability and knowledge of the application of these techniques in the clinical settings, will definitely improve the diagnosis and the monitoring treatment in clinical cancer practice.

Biography

Gabriella Baio studied Medicine and Surgery at University of Pisa and she obtained Radiology specialization at University of Genoa in 2007. Since 2008, she works as Radiologist at IRCCS Azienda Ospedaliera Universitaria San Martino-IST-National Cancer Institute, in Genoa. Dott. Baio research activities, cover clinical and preclinical molecular imaging by Magnetic Resonance and Optical Imaging applied to oncology, vascular and neuroscience. Her current research consist in the characterization of breast cancer in animal model, in order to validate new contrast agents as potential biomarkers for early diagnosis and drug delivery. She is invited speaker to national and international conferences and an active member of the European Society of Molecular Imaging (ESMI). She has been abstract reviewer for the World Molecular Imaging Congress (WMIC) 2011 and 2012.

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