STRUCTURAL AND FUNCTIONAL IMAGING BIOMARKERS TO ASSESS CANCER TREATMENT RESPONSE

Brandon Whitcher

Mango Solutions, London UK

ABSTRACT

The development of anti-cancer therapies demands new biomarkers in order to assess efficacy. Established measurements that rely on changes in tumor size from a structural acquisition may not be the most appropriate. There is also the desire to move away from manual techniques in favor or more automated analysis methods. The variety of MRI sequences and availability of PET radiotracers provides scientists with a rich collection of imaging biomarkers. A brief background on the broader collection of imaging approaches will be provided before the focus shifts to acquisition techniques that capture functional and/or structural properties of the tumor. It should be noted that the variety of image acquisition techniques are not mutually exclusive, but complementary, and care is required when selecting a set of imaging biomarkers. Criteria include but are not limited to the organ system, dosing schedule, downstream treatment effects, patient burden and cost. When anti-angiogenic or anti-vascular therapies must be assessed in-vivo measurements of tissue perfusion, using dynamic contrast-enhanced MRI, have been widely used. The application of diffusion-weighted MRI has also seen a dramatic rise in the last five years. Of course, this is not an exhaustive list. With the use of more advanced acquisition techniques comes the need for standardization and validation, especially when considering their implementation in a multi-center clinical trial. Efforts are ongoing in order to provide practitioners with advice on the design, application and analysis of advanced imaging biomarkers for therapeutic response in oncology.

Index Terms— Magnetic Resonance Imaging (MRI), clinical trials, oncology, dynamic contrast enhanced MRI (DCE-MRI), biomarkers