BioMed Research International

Special Issue on
Respiratory Motion Management in Image-Guided Radiation Therapy

Call for Papers

Respiratory motion causes thoracic and abdominal tissue to move and deform, reducing both imaging quality in tumor assessment and targeting accuracy in therapeutic treatment. Recent advancements in respiratory-correlated four-dimensional (4D) imaging allow us to visualize a moving tumor with reduced artifacts and to target a moving tumor with improved precision. However, patient breathing irregularity is common and inevitable. It often causes large motion artifacts in retrospective 4D imaging, degrades the correlation in tumor motion surrogating, and leads to large uncertainties in tumor localization. As a result, a large safety margin is required to define treatment target volume, resulting in higher normal tissue injury. To move this field forward, it is a key to overcome the breathing irregularity obstacle in retrospective 4D imaging or to establish real-time prospective 4D imaging for image-based treatment planning and image-guided treatment delivery.

We invite investigators to contribute original research articles, which stimulate the continuing efforts in developing new approaches or improving the current methods for respiratory motion management. We are particularly interested in studies that demonstrate proof-of-principle for a new concept, feasibility of a new method, and fresh results from a different perspective. All 4D imaging modalities are of interest, including 4D computed tomography (4D CT), 4D magnet resonance imaging (4D MRI), 4D positron emission tomography (4D PET), 4D ultrasonic (4D US), and 4D optical surface imaging (4D OSI). Potential topics include, but are not limited to:

- Development, validation, and application of novel 4D imaging techniques of motion management
- Characterization and reduction of motion artifacts of 4D imaging
- Characterization and modeling of respiratory motion and ventilation using 4D imaging
- Clinical feasibility and applications of hybrid MR-Linac or MR-Cobalt treatment machines
- Development of automatic 4D image processing and 4D imaging data management
- Quantitative imaging for assessment of tumor activity and volume in the thorax and upper abdomen
- Incorporation of 4D imaging information into 4D treatment planning and delivery
- Investigation of novel internal and external tumor motion surrogates for motion tracking
- Clinical applications of real-time image-guided procedures using other treatment modalities

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