

**First Mediterranean Thematic Workshop on Advanced Molecular Brain  
Imaging with Compact High Performance MRI-Compatible PET and SPECT  
Imagers –Potential for a Paradigm Shift**

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## **Incorporating anatomical information in PET image reconstruction**

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**Abstract.** Over the last decade multimodality devices have revolutionized the domain of medical imaging. The first example is PET/CT which has already become a gold standard in oncology imaging. The next chapter in multimodality imaging and associated integration concerns the development of PET/MRI devices, offering clear advantages for brain imaging relative to PET/CT. Despite the obvious advantages, from the medical point of view, in combining anatomical and functional information within a multimodality imaging platform there are also a number of software challenges. The most important one is the availability of anatomical information and its integration within the PET image reconstruction process. Such integration targets an improvement in overall PET image quality in terms of both quantitative and qualitative accuracy. These include the use of anatomical images for the correction of different errors associated with the PET physics detection process such as attenuation, scatter and finite spatial resolution. These issues are particularly challenging considering for example the absence or differences in tissue attenuation characteristics obtained through anatomical imaging. On the other hand in order to be able to incorporate such information in PET image reconstruction one requires to ensure that both acquired datasets are within the same spatial framework, including accounting for mismatches as a result of physiological motion such as patient respiration. Current and future solutions in the field of anatomically driven PET image reconstruction will be covered.

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**Session Classification:** Reconstruction