

with MI in the image domain yielding a mean of 5 px (SD 3, outlier percentage 16 %).

**Conclusion:** We have obtained stable and reliable automatic registration using a wavelet approach. We expect further improvement of automatic-registration performance by employing alternative mother wavelets and/or thresholding in the wavelet domain. Rotation-invariant registration is currently implemented to improve performance.

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### **Requirements for the use of an atlas-based automatic segmentation for delineation of Organs at risk (OAR) in conformal radiotherapy (CRT): quality assurance (QA) and preliminary results for 22 adult patients with primary brain tumors.**

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**Introduction:** In collaboration with the Dosisoft company, within the European project "MAESTRO", the assessment in clinical context of an anatomical atlas developed for the brain by INRIA (Institut National de Recherche en Informatique et en Automatique) was initiated. The principle of an atlas-based automatic segmentation (ABAS) is of great interest for OAR delineation in CRT: it provides an automatic segmentation of these OAR from registered multimodality images. Thus, numerous and complex processes are involved before the medical use for CRT. To ensure the reliability of the final result, the whole process must be assessed independently. We describe preliminary results for adult patients with brain tumors using the ABAS technique.

**Description:** Four steps are identified as crucial. Quality control of : (1) imaging devices: Computed Tomography (CT) scan, T1-weighted MRI with Gadolinium-contrast injection (2) data transfer integrity: image geometry, grayscale values, etc... (3) virtual simulation software: RT related parameters (4) brain multimodality image registration (CT, MRI). For steps (1) to (3), controls can be performed following the most relevant items of existing protocols (AAPM reports n°28, 62 and 83). In this work, we focus on the step (4) which is the initial stage of the ABAS technique. The controls of step (4) are performed on a suitable phantom. After that, the ABAS is assessed by expert clinicians on adult patients referred for CRT of their primary brain tumors.

**Results:** Results concerning the QA of brain image registration will be presented. Thus, the use of the ABAS will be presented for a series of 22 consecutive patients treated in the last 3 months: 11 high grade gliomas, 7 unfavourable low grade gliomas, 4 meningiomas, (either resected or biopsied). The feasibility was excellent: all the labelled structures were segmented within the T1 MRI images, the average time to perform the automatic segmentation of brain structures was 10 minutes (6 to 13 min). The evaluation of the quality of this automatic delineation is ongoing, based on the comparison of OAR volumes obtained by manual and automatic delineation.

**Conclusion:** the use of an ABAS needs to be accurately controlled following strict QA procedures. Preliminary results are encouraging for a large spectrum of adult primary brain tumors. Next step will consist in a detailed quantitative assessment of the accuracy of this automatic delineation.