XI PMT meeting on the EADC-ADNI Harmonization of Protocols for Hippocampal Segmentation

Tuesday, July 3, 2012

Participants:

Giovanni B. Frisoni	(GBF)	– IRCCS S. Giovanni di Dio - Fatebenefratelli, BS, Italy
Marina Boccardi	(MB)	– IRCCS S. Giovanni di Dio - Fatebenefratelli, BS, Italy
Martina Bocchetta	(MBocch)	– IRCCS S. Giovanni di Dio - Fatebenefratelli, BS, Italy
Simon Duchesne	(SD)	– Laval University, Québec City, Canada

BENCHMARK SEGMENTATION UPDATE

After the first round of benchmark segmentations by Master tracers, the mean overlapping values are 0.71 for 1.5T and 0.75 for 3T images. The gold standard is around 0.85/0.90, but this refers to Dice's values computed comparing only 2 segmentations, not among 5. Simon will compute the average for all 2-way possible comparisons and verify whether or not it can be comparable to what reported in the literature.

We checked and reported causes for overlapping discrepancies at 1.5T and at 3T images, then we improved Harmonized Protocol in many points and asked Masters to correct their segmentations if they agree or to discuss the issue if they disagree with the corrections.

THRESHOLD FOR BENCHMARK HIPPOCAMPAL MAPS

SD described the possibility to have different threshold criteria in different slices (i.e. a general average among Master segmentations and different thresholds in specific points, in particular the most rostral and caudal areas), due to different issues and admissible variability in segmentation. The idea is to have *a posteriori* threshold for naïve tracers. It's not possible to have an interpolation for the benchmark maps (too much blurred and thus error), but only slice-by-slice threshold.
Moreover, the criterion that the whole range of variability observed among Masters should be acceptable for naïve as well was reasonable for all.

The Harmonized Protocol prescribes to properly excluded the internal CSF pools. The attempt to exclude internal pools connecting them somehow to external CSF leads to increased variability, since every tracer finds a different connection. Thus we ask Master tracers to segment CSF separately, using an additional label, and the volume of these CSF areas will be subtracted from the proper hippocampal volume. Nicolas Robitaille will check whether it's possible to merge the 2 areas (hippocampus and CSF pools) to obtain overlapping values accounting for CSF exclusion.

VALIDATION versus PATHOLOGY

We are waiting for further details about Mayo's and Liana's neuropathological verified samples, but the shared proposal is to ask to a single tracer from Mayo (maybe Gregory Preboske) to segment the three samples, because only Mayo has privacy restrictions in sharing the data with other centres.

"STUDY ON THE VALIDATION OF VSRAD"

Dr. Masami Nishikawa has submitted to the Steering Committee his project about the validation of VSRAD algorithm. This project aims to compare Adaboost, VSRAD and manual segmentations of

the hippocampus following the Harmonized Protocol on a sample of 22 AD, 19 MCI, 18 controls, plus 3 healthy volunteers that served as human phantoms for the pilot E-ADNI project (Frisoni et al., 2008) and that were scanned by the 7 different machines. Dr Masami would learn how to trace the hippocampus following the Harmonized Protocol and his work may be included as a new branch in the Validation Phase of the Harmonized Project (he would need to qualify as any naïve tracer). Simon says that he should not be able to use the images that he segmented for other validation purposes in his country. Also, the E-ADNI images that he would segment may be used to compose the training set for the certification platform that will be released by the Harmonized Protocol project. In this case images would need to be checked for correctness, even if he was able to qualify.

"NAÏVE TRACERS PRACTISE"

SD suggested to ask Naïve tracers to start in practicing and learning the Harmonized Protocol criteria. Many solutions raised regarding what images can be used for this purpose:

1- use the same ADNI sample of images on which they have already segmented following their local protocols and that will be used for the Validation of the Harmonized Protocol (if the segmentations will be good, they can be used for the second step of the Validation Phase and part of the work will be already done)
2- use their own local samples
3- use a template: Simon says that templates may be too blurred
4- use Liana's 7T sample
5- use Simon's 3T sample

We will talk to Liana in Vancouver as to the use of her 7T images, and wait to hear from Simon more details about the 3T images that he was suggesting for this purpose.