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

Wednesday, August 31, 2011

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
Clifford R. Jack	(CJ)	– Mayo Clinic, Rochester, MN, USA
Simon Duchesne	(SD)	– Laval University, Québec City, Canada
Lennart Thurfjell	(LT)	– GE
Gunnar Krueger	(GK)	– Siemens

Dr Frisoni describes the Project Management Team (PMT), which is composed by Giovanni Frisoni himself and Clifford Jack as the Principal Investigators, Marina Boccardi and Martina Bocchetta as the Project Coordinators, Simon Duchesne as the head of the Statistical Working Group and Lennart Thurfjell and Gunnar Krueger as the Industry Advisors. He explains that this is the first periodical teleconference with the aim of monitoring the development of the project. He encourages the participants to make suggestions to improve the design of the project, especially for the future application regarding the automatic segmentation algorithms.
Then he describes the overall project, the preliminary phase and the work done so far.

Dr. Boccardi shows the Validation Phase and the details of each branch. Dr. Duchesne show the web-portal for the tracer Qualification and describes its working. He also describes how to compare a new tracing to the benchmark tracings made by 5 Master Tracers. This can be automatically computed by a pipeline enclosed into the system. The idea is that a Naïve Tracer who wants to qualify for the Harmonized Protocol has to trace the hippocampus as near as possible to the average of the 5 Master contours, point by point, slice by slice for all the benchmark images. The comparison, and the consequent result, will take into account the range of variability among the 5 Master Tracers: if there is a minimal variability at a given point, even a small error will compromise the qualification; if there is a wider variability, the criterion will be less restrictive. Dr Duchesne explains that a Naïve Tracer will find different types of feedback: by volumes, by metrics and by images. He underlines the importance to use a unique software (MultiTracer) for the whole project. He finally shows the section where tracer profiles can be tracked: how many times they attempt the qualification, types of images downloaded, results and failures.
Dr Boccardi concludes with a brief summary of the preliminary results of the first two Delphi rounds carried out so far. Dr. Frisoni underlines that the deadline for the whole project is shifted to August 2013 due to financial issues. However considering the urgent need for the Harmonized Protocol, we would carry out with the previous GANTT chart and the deadline of August 2012.

The presented slides are available at www.hippocampal-protocol.net.

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Questions/comments from the participants:

Q=question

A=answer

C=comment

Q (SD): Regarding the first part of Validation Phase are the local protocols the same 12 that were selected from the AD literature for the project?
A (GBF): The Naïve tracers could use whatever protocol they prefer, they were not obliged to use one of the 12 investigated protocols.

Q (LT): Which is the purpose of tracing following the local protocols?
A (GBF): We want to show the improvement regarding the variability with the Harmonized Protocol. The sample of images traced first following local protocols and then following the Harmonized Protocol is the same.

Q (CJ): The aim is to document the increased reliability. There will be a lower variance for the Harmonized Protocol among tracers and within tracers. The inter-rater will obviously decrease, because tracers following different protocols will obtain different volumes. Why will the intra-rater ICC decrease? The Naïve Tracers are well trained and confident with their local protocols, so they should have a high intra-rater ICC even with the local ones.
A (GBF): We demonstrated in our laboratory that also the intra-rater increases, due to the accurate tracing procedure that has been defined.

A discussion arises regarding the necessity to trace both at 1.5 Tesla and 3 Tesla. All the 20 Naïve Tracers have already started or completed the tracings, so the suggestion is to investigate whether or not there are different results between 1.5T and 3T and eventually, if the results are similar, skip out the 120 3T scans during the last "5 best Naïve Tracers" phase.

Q (LT): Will each Master Tracer have to segment the same 40 benchmark hippocampi?
A (GBF): Yes.

Q (LT): Why did you use the Scheltens' scale for the selection of images and not diagnosis (control, MCI and AD)?
A (GBF): The aim is to capture the range of atrophy. We are interested to cover all the degree of atrophy, not properties of the patients.
C (LT): He suggests to show demographic issues (age, sex, disease, ApoE) of the selected subjects during the next meeting.

C (SD): It's important to apply for ADNI permission to redistribute ADNI data, especially for future tracers, who wants to qualify outside the project itself.
A (GBF): The solution could be a compromise with ADNI: we could ask each new tracers to first register with ADNI.

Q (SD): Will the Master Tracers segment benchmark images both at 1.5T and 3T?
A (MB): Yes.

C (LT-CJ): They remind a problem found with the quality of SIEMENS-Allegra scans at 3T and they suggest to check and show the scanner type for the selected benchmark images during the next TC.

Q (LT): What about the normalization?
A (SD): It's an important issue, but this is not part of this project. We chose a minimal transformation for the pre-processing.

Q (GK): Which contrast are you working on? Is it only the T1 MPRAGE contrast or are you also using T2 contrast?

A (GBF): Only MPRAGE.

Q (GK): How do you deal with partial volume effects? Even the best manual tracer won't be able to cope with this, but for a precise analysis the error from partial volume effects may become significant. Or am I wrong?

A (MB): We include about half the thickness of the boundary that we can identify as partial volume. We proposed this issue to the Delphi panel, but only a couple of participants answered. They defined as partial volume to be excluded a single line of pixels. In this project, we do not visualize "pixels" as MultiTracer allows subvoxel visualization, segmentation and computation, but the amount that we exclude can be considered as similar to a single line of pixels in the region where we detect partial volume effects, coronally. It is possible that the orientation along the long axis of the hippocampus, voted by most panelists so far, will reduce the presence of partial volume effects in the coronal visualization.

The PTM will meet monthly, each last Wednesday, from 4 pm to 5 pm CET.
The next TC has been scheduled on September 28, 2011.