Eighth meeting on the EADC-ADNI Harmonization of Protocols for Hippocampal Segmentation
AIC, Boston, Wednesday, July 17, 2013

Presenters and coordinators:
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In person participants:
Charles DeCarli, Stefan Teipel, Michel Grothe, Domink Wolf, Kristian Fredricksen, Nicola Cherubini, Derek Hill, Joyce Suhy, Diane Stephenson, Hiroshi Matsuda, Chahin Pachai, Melissa Murray, Liana G Apostolova, Heather Snyder

List of in person participants may not be exhaustive

Remote participants:
Martina Bocchetta, Josefina Maranzano, Ronald Pierson, Paul Edison, Jonathan Harlap, Lu Zhang, Dirk Smeets, Paul Yushkevich, Mark Fraser, Katherine Gray

GBF reports the background and previous steps of the project (operationalization and quantification, Delphi consensual definition, tracing of benchmark labels, setting of the certification platform, tracers qualification)
MB reports the last updates re tracers qualification, with their performance at Jaccard and Dice indices, and describes in detail the 2 Validation phases. The design of Validation Phase 1 (aimed to compare inter-rater ICCs with local and harmonized segmentations among all tracers) and Phase 2 (aimed at evaluate the variance due to tracer, side, subject, field strength, manufacturer) are described.
Validation phase 1 showed higher ICC values and narrower confidence intervals for the Harmonized Protocol (HP) segmentation, more marked for the Absolute method (consistency: >0.96; Absolute: >0.88). The differences versus ICCs at local protocols were significant at t-test for both the absolute and consistency methods. Validation phase 2 allowed to compute also intra-rater ICCs (> 0.94 also with the consistency method). For 3 tracers, ICCs were >0.94 and consistency and absolute method ICCs were overlapping, denoting almost perfect correspondence of values in the two segmentations.
A first ANOVA showed that the variability due to tracers is significantly smaller than the variability due to disease severity, however only very preliminary results could be presented.
As a next phase, the protocol will be validated versus pathology thanks to samples from Mayo Clinic and UCLA.
Henry Duvernoy and Charles Duyckaerts have been involved as advisors and coworkers, and interactions are being held with the hippocampal subfields harmonization consortium.
An expansion of the HP project has been described, aimed at producing additional labels accounting for wider individual variability of hippo morphology. This is a PPP including the AA and private funders, generating hippocampal labels from ADNI images of 135 different subjects well balanced for confounders.

RELEASE OF DELIVERABLES:
Being the project almost completed with good validation results, deliverables are being released. At www.hippocampal-protocol.net the deliverables available so far can be downloaded directly from the home page. We are delivering now:
The user manual
100 labels for the training of automated algorithms

the web-platform for training and certification of new tracers

We will deliver at a later time:

Hippo contours, 3D objects from contours, image files in transformed space, in both MINC and NIFTI formats. Also, we will release contours + 3D objects + images in native space, and the transformation file from transformed space to native space. All of that will be in MINC and NIFTI.

The presented slides are available at:
http://www.hippocampal-protocol.net/SOPs/LINK_PAGE/slide-showBoston2013.pps

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Q=Question A=Answer

Q: the presented hippo volumes were corrected by TIV but TIV is a relevant source of variance and heterogeneity when using different method, how can we consider these values as “harmonized” or “standard”?
A: volumes were corrected by TIV here (for the “expansion” project) only to provide an example of the measure obtained by the HP, and to show that the obtained volumes properly reflect disease severity. However, this was not the main output of the project: all the relevant analyses that were the target of the project (reliability, analysis of variance, etc) were carried out on the raw volumes, indeed because a standardized/certified way to compute TIV is not available. This should be solved by an independent project, the project that we are completing now only solved the hippocampal segmentation problem and not the TIV problem.

Q: what did tracers say about the harmonized protocol?
A: let the tracers present at the meeting answer. Tracers: main problems were not with the protocol, but with the segmentation tool (MultiTracer) that was not very easy to use

Q: others also complained about the segmentation tool
A: we were bond to this tool for this project, but what has been defined is a segmentation protocol, the tool does not necessarily need to be the same. However, the effect of different segmentation tools should be evaluated and is relevant for the standard measurement of the hippo volume.

Q: when will the training/certification platform be available for free use?
A: from now, this is the official release of this HP manual platform and of part of the other deliverables described before.