
**Objective:** An increasing number of human in vivo magnetic resonance imaging (MRI) studies have focused on examining the structure and function of the subfields of the hippocampal formation (the dentate gyrus, CA fields 1 – 3, and the subiculum) and subregions of the parahippocampal gyrus (entorhinal, perirhinal, and parahippocampal cortices). The ability to interpret the results of such studies and to relate them to each other would be improved if a common standard existed for labeling hippocampal subfields and parahippocampal subregions. Currently, research groups label different subsets of structures and use different rules, landmarks, and cues to define their anatomical extents. This paper characterizes, both qualitatively and quantitatively, the variability in the existing manual segmentation protocols for labeling hippocampal and parahippocampal substructures in MRI, with the goal of guiding subsequent work on developing a harmonized substructure segmentation protocol.

**Method:** MRI scans of a single healthy adult human subject were acquired both at 3 T and 7 T. Representatives from 21 research groups applied their respective manual segmentation protocols to the MRI modalities of their choice. The resulting set of 21 segmentations was analyzed in a common anatomical space to quantify similarity and identify areas of agreement.

**Results:** The differences between the 21 protocols include the region within which segmentation is performed, the set of anatomical labels used, and the extents of specific anatomical labels. The greatest overall disagreement among the protocols is at the CA1/subiculum boundary, and disagreement across all structures is greatest in the anterior portion of the hippocampal formation relative to the body and tail.

**Conclusions:** The combined examination of the 21 protocols in the same dataset suggests possible strategies towards developing a harmonized subfield segmentation protocol and facilitates comparison between published studies.

**General information**

State: Published

Organisations: Department of Applied Mathematics and Computer Science, Image Analysis & Computer Graphics, University of Pennsylvania, McGill University, Massachusetts General Hospital, Wayne State University, Stanford University School of Medicine, IRCCS Centro S. Giovanni di Dio Fatebenefratelli, University of Brescia, University of California, Stanford University, Harvard Medical School


Pages: 526-541

Publication date: 2015

Peer-reviewed: Yes

**Publication information**

Journal: NeuroImage

Volume: 111

ISSN (Print): 1053-8119

Ratings:

BFI (2018): BFI-level 2

Web of Science (2018): Indexed yes

BFI (2017): BFI-level 2

Scopus rating (2017): CiteScore 6.15 SJR 3.679 SNIP 1.806

Web of Science (2017): Impact factor 5.426

Web of Science (2017): Indexed yes

BFI (2016): BFI-level 2

Scopus rating (2016): CiteScore 6.31 SJR 3.967 SNIP 1.759

Web of Science (2016): Impact factor 5.835

Web of Science (2016): Indexed yes

BFI (2015): BFI-level 2

Scopus rating (2015): CiteScore 6.71 SJR 4.583 SNIP 1.852

Web of Science (2015): Impact factor 5.463

Web of Science (2015): Indexed yes

BFI (2014): BFI-level 2

Scopus rating (2014): CiteScore 6.9 SJR 4.323 SNIP 2.03


Web of Science (2014): Indexed yes

BFI (2013): BFI-level 2

Scopus rating (2013): CiteScore 7.06 SJR 4.489 SNIP 2.028