

Hippocampal and Limbic Terminology

Richard A. Bronen¹

MR imaging of the hippocampus and associated limbic structures is important in the evaluation of epilepsy, Alzheimer disease, and schizophrenia. The MR imaging of this region has already been described in detail (1–3). Because of the complex anatomy, terminology is often redundant and confusing. Nomenclature by anatomists was first based on appearance of structures as viewed through the lateral ventricle. These terms were then sometimes applied inappropriately to structures seen on sectional slices. More recently, histologic investigations have helped elucidate the origin and relationships of macroscopic structures. The following tables (Tables 1 and 2; see pages 944 and 945) were compiled to help clarify terminology and by doing so, further understanding of the hippocampus and limbic system. The terminology in these tables is based principally on work by Duvernoy (4–8).

References

1. Naidich TP, Daniels DL, Haughton VM, et al. Hippocampal formation and related structures of the limbic lobe: anatomic-MR correlation. I. Surface features and coronal sections. *Radiology* 1987;162:747–754
2. Naidich TP, Daniels DL, Haughton VM, et al. Hippocampal formation and related structures of the limbic lobe: Anatomic-MR correlation. II. Sagittal sections. *Radiology* 1987;162:755–761
3. Bronen A, Cheung G. MRI of normal hippocampus. *Magn Reson Imaging* 1991;9:497–500
4. Duvernoy HM. *The human hippocampus: an atlas of applied anatomy*. Munchen: JF Bergmann Verlag, 1988
5. Nieuwenhuys R, Voogd J, van Huijzen C. *The human central nervous system: a synopsis and atlas*. 2nd revised ed. New York: Springer-Verlag, 1981
6. Carpenter MB, Sutin J. *Human neuroanatomy*. 8th ed. Baltimore: Williams & Wilkins, 1983:612–642
7. Williams PL, Warwick R. *Gray's anatomy: 36th edition*. New York: Churchill Livingstone, 1980:990–1002
8. Riley HA. *An atlas of the basal ganglia, brain stem and spinal cord based on myelin-stained material*. Baltimore: Williams & Wilkins, 1943

¹ Department of Diagnostic Radiology, Yale University School of Medicine, 333 Cedar Street, New Haven, CT 06510.

Index terms: Hippocampus; Seizures; Nomenclature

TABLE 1: Hippocampal terminology

Described Entity	Best Term	Synonym	Synonym	Other Terms
Hippocampus^a	Hippocampus	Hippocampal formation ^b		Ram's horn Ammon's horn Cornu ammonis Pes hippocampus Pes hippocampus major
Cornu ammonis Lorente de No's CA1	Cornu ammonis CA1	Ammon's horn Sommer sector	Hippocampus proper Vulnerable sector	Hippocampus Rose's H1 Vogt's H1 Gyri of Andreas Retzius ^c Retrosplenial gyrus ^c Subcallosal eminence ^c
Lorente de No's CA2	CA2			Rose's H2 Vogt's H2
Lorente de No's CA3	CA3	Resistant sector	Spielmeyer sector	Rose's H3 Vogt's H2
Lorente de No's CA4	CA4	Hilus of fascia dentata	Endfolium	Rose's H4, H5 Vogt's H4 Endblade Bratz sector
Dentate gyrus Visible dentate gyrus In uncus In head and body In tail Area dentata 1. CA4 2. Dentate gyrus	Dentate gyrus Band of Giacomini Margo denticulatus Fasciola cinerea	Gyrus dentatus	Fascia dentata	
Fornix Hippocampal segment Fimbria Alveus Crus of fornix Commissure of fornix Body of fornix Column of fornix Precommissural fornix Retrocommissural fornix		Hippocampal commissure Postcommissural fornix	Psalterium	Lyre of David
Sulci Hippocampal fissure Dentatofimbrial fissure		Hippocampal sulcus Fimbrio dentate sulcus		
Hippocampal tail Retrosplenial gyrus Subsplenial gyrus Fasciolar gyrus Fasciola cinerea	Gyri of Andreas Retzius ^c Terminal segment of tail, inferior to splenium, bridge from cornu ammonis to indusium griseum ^d As fimbria separates and forms fornix crus, the fimbriodentate sulcus widens to form this structure which is CA3 covered by alveus Visible portion of dentate gyrus	Subcallosal eminence ^c	Bulge of CA1 in the tail	(Some use this term to refer to entire tail) (Some use this interchangeably with fasciolar cinera/dentate gyrus)

^a Originally based on its intraventricular appearance.^b "Hippocampal formation" usually refers to the functional unit consisting of the cornu ammonis, dentate gyrus, associated white matter tracts, and the subiculum (\pm entorhinal cortex); thus, synonymous with Broca's intralimbic gyrus.^c Names in the hippocampal tail only.^d It is controversial as to whether the indusium griseum is a continuation of the cornu ammonis (as thought by Duvernoy) or the dentate gyrus.

TABLE 2: Limbic terminology

Described Entity	Best Term	Synonym	Synonym	Other Terms
Limbic system	Limbic system			
I. Limbic lobe	Limbic lobe			Rhinencephalon
A. Limbic gyrus				
1. Subcallosal area	Subcallosal area	Paraolfactory area		
2. Cingulate gyrus	Cingulate gyrus			
3. Isthmus of the cingulate gyrus	Isthmus of the cingulate gyrus			
4. Parahippocampal gyrus	Parahippocampal gyrus			Hippocampal gyrus
a. Anterior portion including uncus	Entorhinal cortex or area	Brodman's area 28		
Anterior folded parahippocampal gyrus	Uncus			
b. Subiculum ^a	Subiculum			
B. Broca's "Intralimbic gyrus" ^b				
1. Anterior segment	Paraterminal gyrus	Prehippocampal rudiment	Precommissural hippocampus ^c	
2. Superior segment	Supracallosal gyrus	Indusium griseum	Supracommissural hippocampus ^c	
Indusium griseum gray matter				
Lateral longitudinal stria white matter				
Medial longitudinal stria white matter				
3. Inferior segment	Hippocampus	Hippocampal formation	Retocommissural hippocampus ^c	
Anterior hippocampal digitations	Hippocampal head	Pes hippocampus	Digitationes hippocampi	
Middle region	Hippocampal body			
Posterior region	Hippocampal tail		Subsplenial gyrus	
II. Subcortical structures:				
Amygdala				
Thalamus				
Habenula				
Hypothalamus				
Midbrain				
Mamillary body				
Septal area	Septal area	Paraterminal body		
Subcallosal area	Subcallosal area	Paraolfactory area		
Paraterminal gyrus	Paraterminal gyrus	Subcallosal gyrus		

^a Some include subiculum as part of hippocampal formation.

^b To avoid confusion with the uncus, this is designated *Broca's intralimbic gyrus*. The term "intralimbic gyrus" is more widely used to denote a portion of the posterior uncus.

^c In relationship to the corpus callosum.