

Harmonization of protocols for the manual tracing of the hippocampus - an EADC-ADNI joint effort

AUTHOR-CERTIFIED PROTOCOL FEATURES AND TRACINGS

Pantel J, O'Leary DS, Cretsinger K, et al. *A new method for the in vivo volumetric measurement of the human hippocampus with high neuroanatomical accuracy.* Hippocampus 2000; 10:752-8.

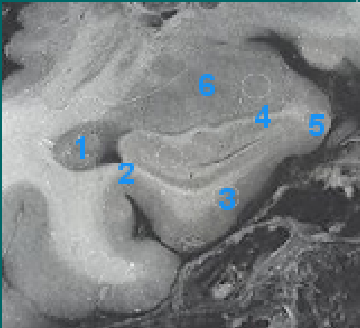
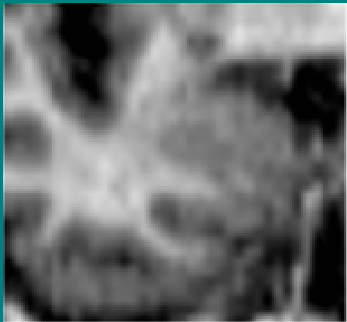
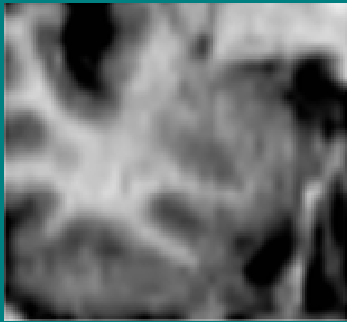


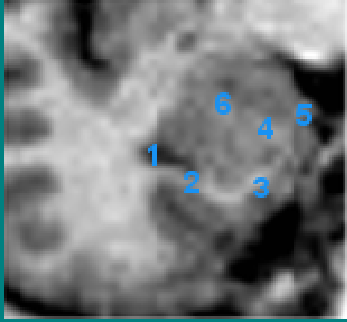
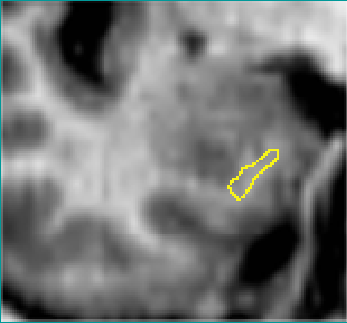
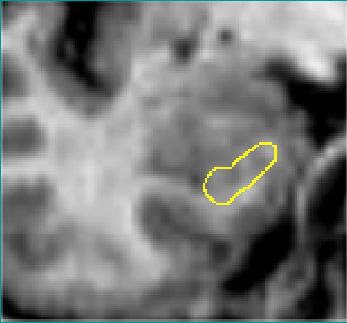

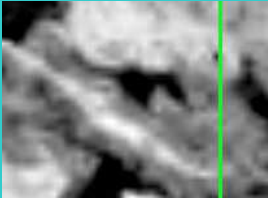
In the following section you can find:

- 1) An excerpt of the Survey of anatomical landmarks according to Pantel et al.'s criteria.
- 2) The hippocampal tracing on consecutive coronal slices of a 1.5T ADNI control subject (**2A**) and AD patient (**2B**).

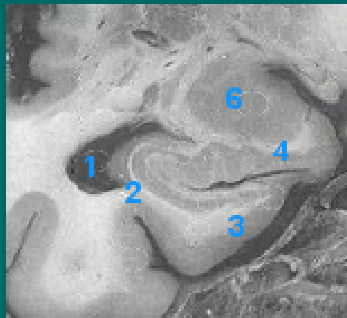
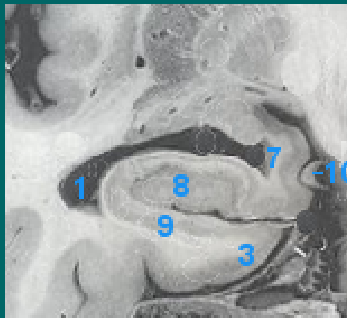

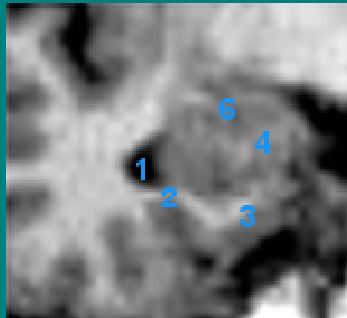

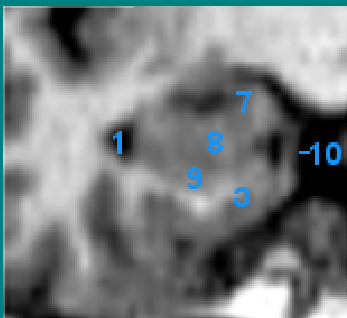
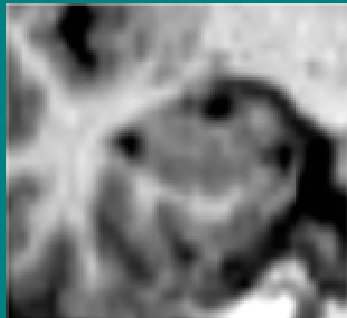
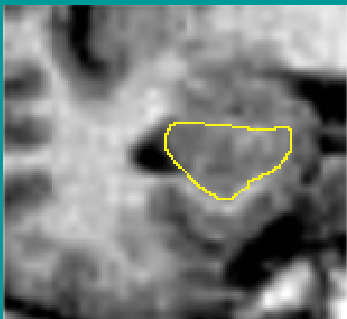
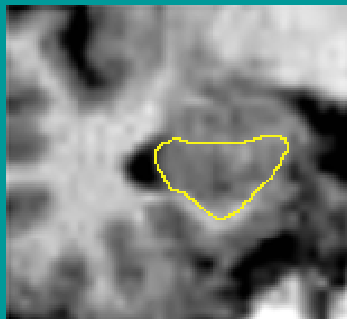
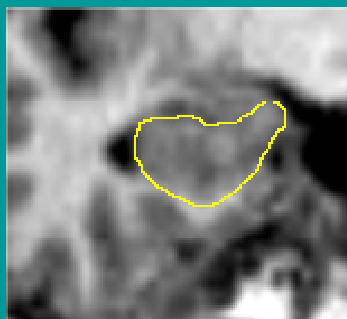
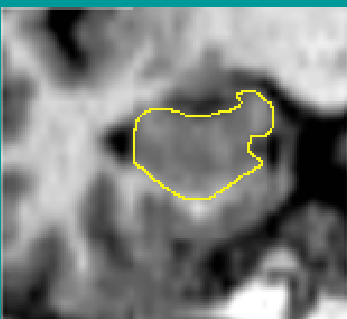
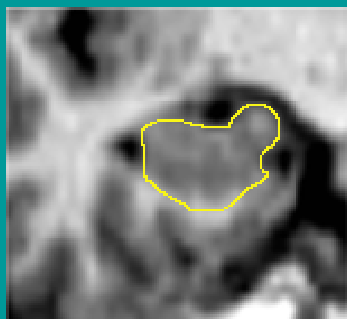
1) Excerpt of the Survey of anatomical landmarks according to Pantel et al.'s criteria.

Plane				
AC-PC line				
Start tracing				
Areas explicitly included	Areas explicitly excluded	Most anterior slice	Most posterior slice	
CA regions, dentate gyrus, subiculum, ambient gyrus, alveus, fimbria*		level at which the head of hippocampus first appears below the amygdala as a transversely oriented oval structure	slice where an ovoid mass of gray matter started to appear inferomedially to the trigone of lateral ventricle	
BOUNDARIES				
	Lateral border	Inferior border	Medial border	Superior border
HEAD	temporal horn of the lateral ventricle/adjacent WM of temporal stem	WM of the parahippocampal gyrus (PG)	a line following the same inclination of WM of PG defines the medial border of hippocampal head	temporal horn of the lateral ventricle/alveus
BODY	temporal horn of the lateral ventricle/adjacent WM of temporal stem	white matter of the PG	CSF of ambient cistern/ crus cerebri	fimbria
TAIL	atrium of the lateral ventricles/crux of fornix	white matter of the PG	CSF of quadrigeminal cistern	pulvinar of the thalamus


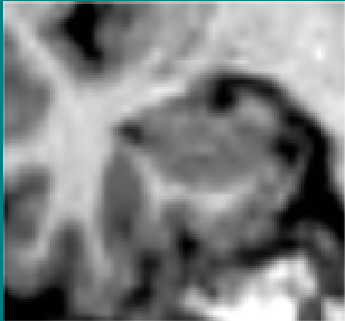
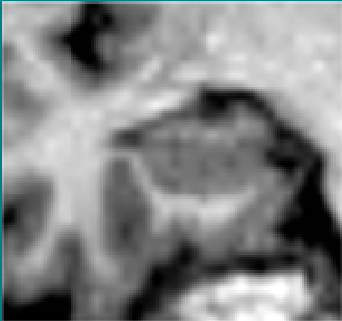
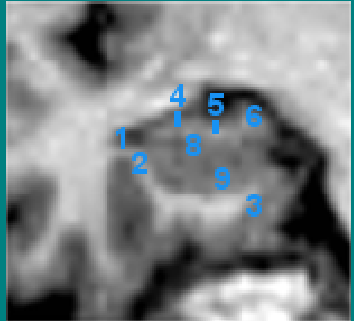



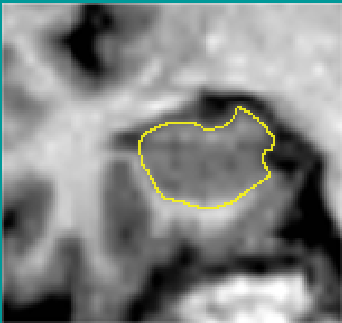
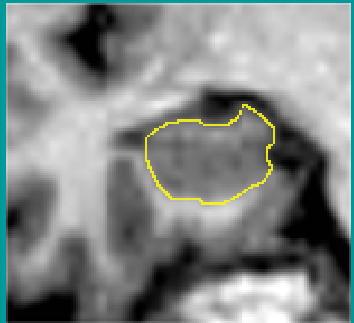

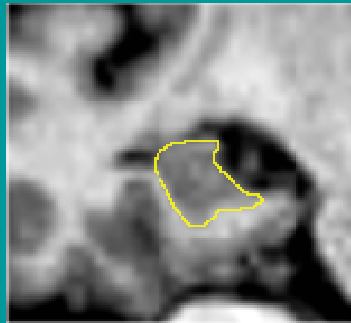
*Inclusion of the ambient gyrus/alveus/fimbria depending on MRI resolutions

2A)CTRL	1	2	3	4	5
Anatomical section					
Native MRI					
Tracing					
Notes	<p>In the Pantel protocol T2 – weighted images are used as reference</p> <p>We used only T1 MR images</p>		<p>Most anterior slice: level at which the head of hippocampus first appears below the amygdala as a transversely oriented oval structure</p>  <p>Sagittal view</p>	<p>Your protocol excludes part of the Ambient Gyrus (AG) but, during the TC, you suggested that, due to the low resolution of these MR images, AG cannot be excluded. Thus, you suggested to draw a line following the same inclination of the WM of PG and to stop tracing at the end of the WM of PG.</p>	<p>1=Temporal horn of lateral ventricle 2= WM in temporal lobe 3= Parahippocampal gyrus 4= Alveus (not included in the tracing) 5=Ambient gyrus 6=Amygdala</p>

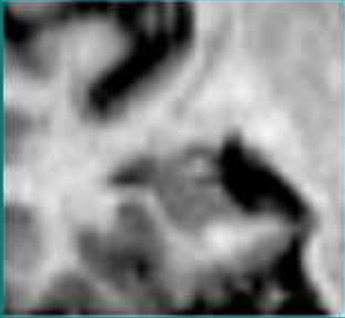


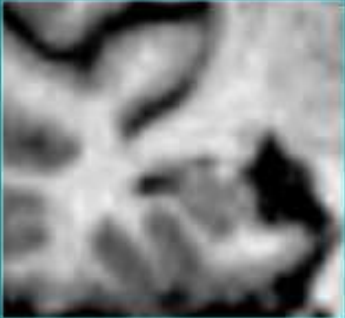

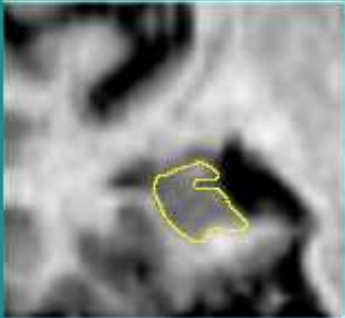
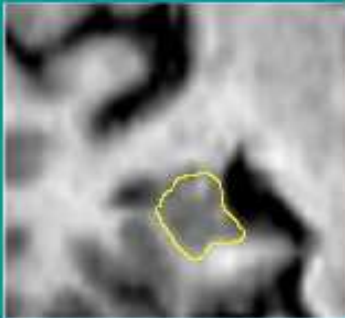
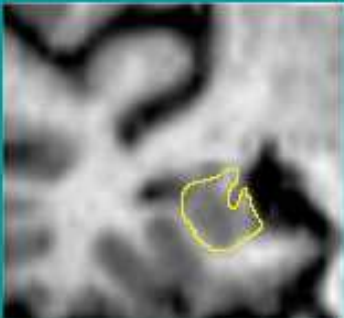
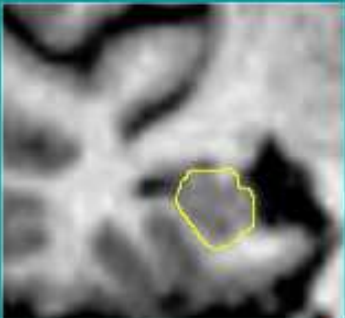
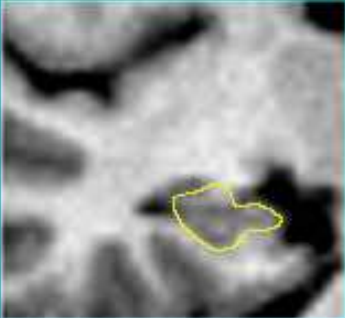
2A)CTRL

	6	7	8	9	10
Anatomical section					
Native MRI					
Tracing					
Notes		<p>1=Temporal horn of lateral ventricle 2= WM in temporal lobe 3= Parahippocampal gyrus 4= Alveus (not included in the tracing) 6=Amygdala</p>	<p>According to your protocol, fimbria and alveus are excluded. However, during the TC you suggested that, due to the low resolution of these MR images, it would be safer to include both these structures.</p>	<p>1=Temporal horn of lateral ventricle 3= Parahippocampal gyrus 7=Vertical digitation 8=gyrus dentatus 9=subiculum 10=posterior cerebral artery</p>	

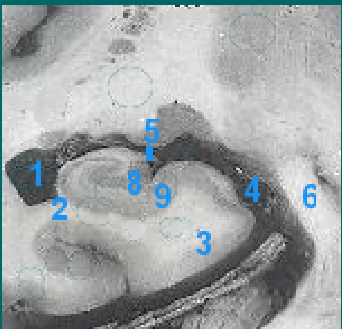

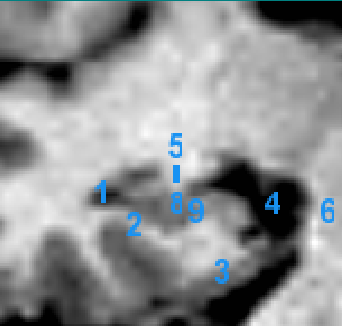
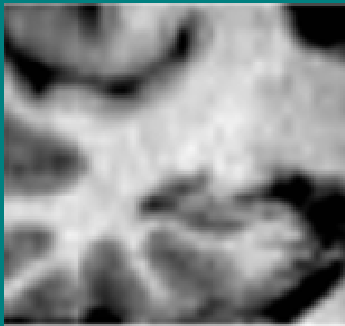
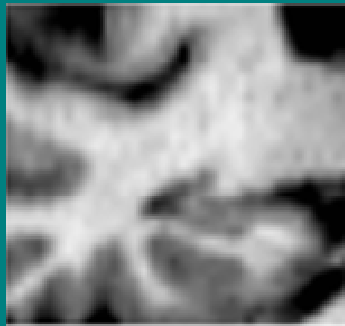
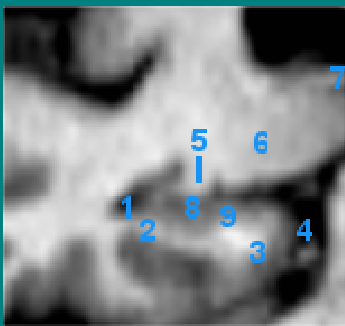
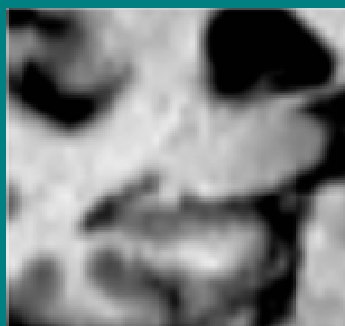
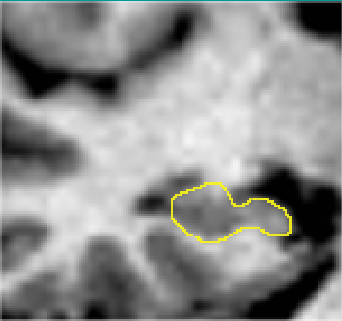
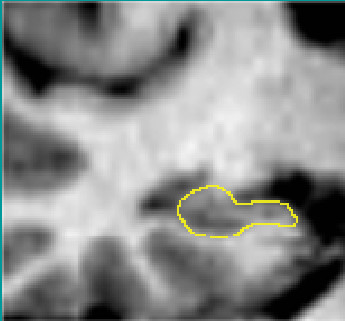
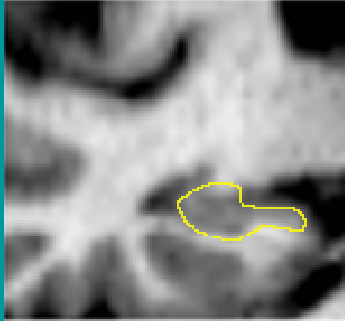

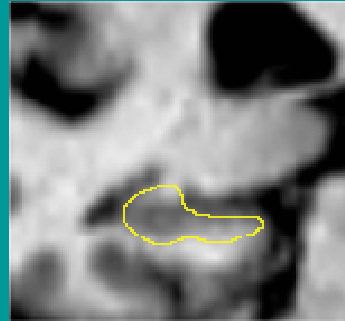
2A)CTRL

	11	12	13	14	15
Anatomical section					
Native MRI					
Tracing					
Notes			1=Temporal horn of lateral ventricle 2= WM in temporal lobe 3= Parahippocampal gyrus 4= Alveus (not included) 5= Fimbria (not included) 6= Uncal Apex 8= Gyrus dentatus 9= Subiculum		


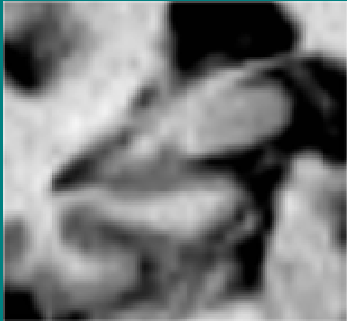



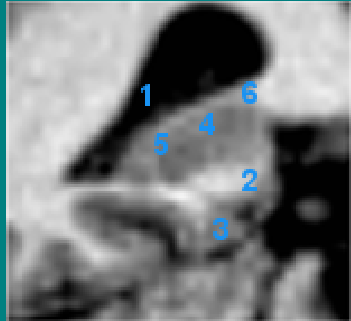
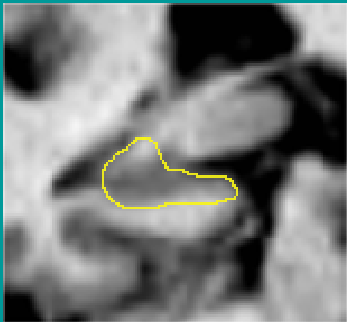




2A)CTRL

	16	17	18	19	20
Anatomical section					
Native MRI					
Tracing					
Notes					



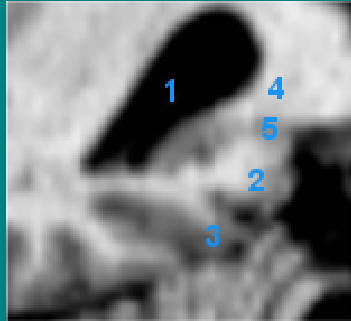




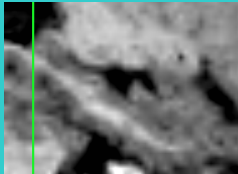
2A)CTRL

	21	22	23	24	25
Anatomical section					
Native MRI					
Tracing					
Notes	1=Temporal horn of lateral ventricle 2= WM in temporal lobe 3= Parahippocampal gyrus 4= Ambient cistern 5= Fimbria (not included) 6= Crus cerebri 8= Gyrus dentatus 9= Subiculum			1=Temporal horn of lateral ventricle 2= WM in temporal lobe 3= Parahippocampal gyrus 4= Ambient cistern 5= Fimbria (not included) 6= Pulvinar 7= Crus of fornix 8= Gyrus dentatus 9= Subiculum	



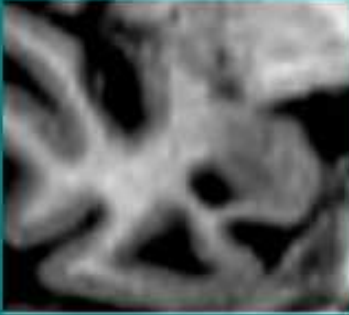
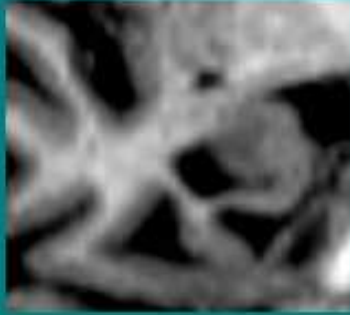

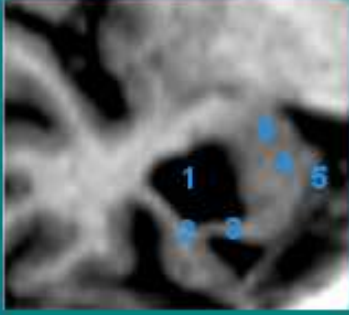
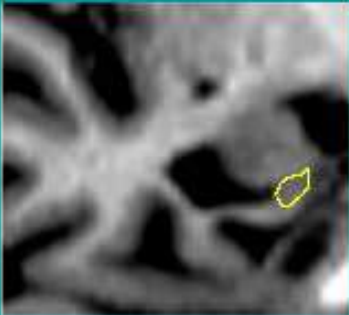
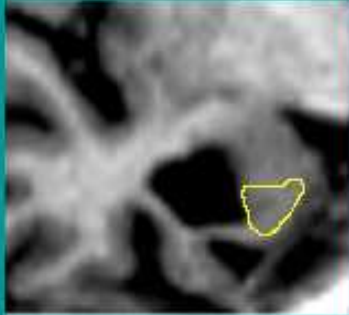
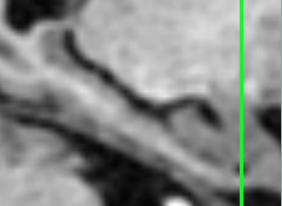
2A)CTRL

	26	27	28	29	30
Anatomical section					
Native MRI					
Tracing					
Notes					<p>1=Temporal horn of lateral ventricle 2= Isthmus 3= Parahippocampal gyrus 4= Gyrus dentatus 5= Cornu Ammonis 6= Crus of fornix</p>

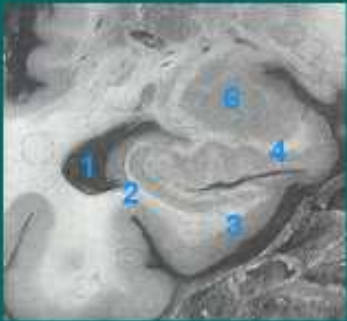

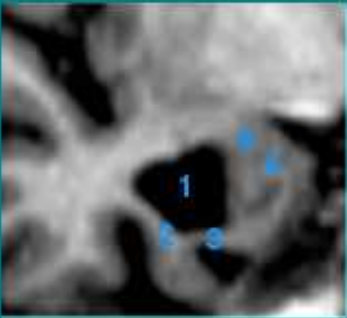
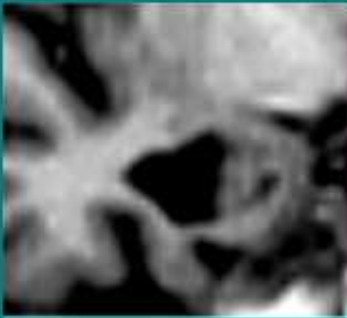
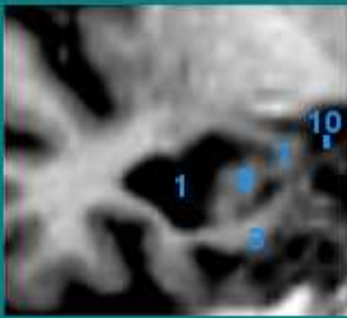


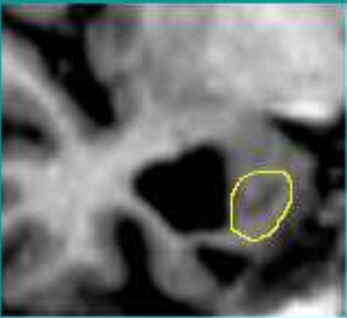
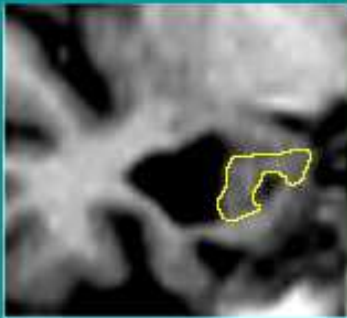
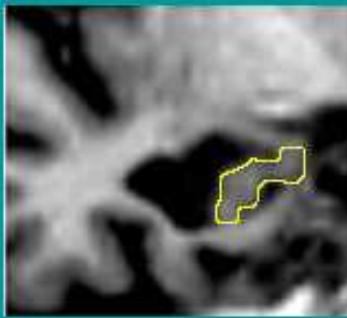
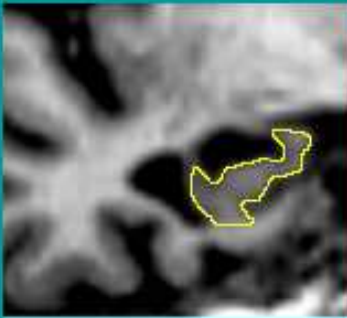
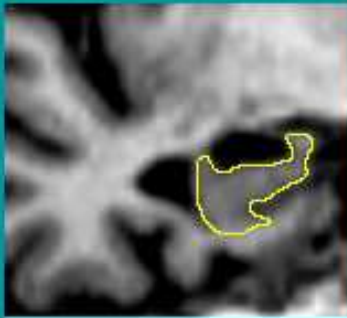
2A)CTRL

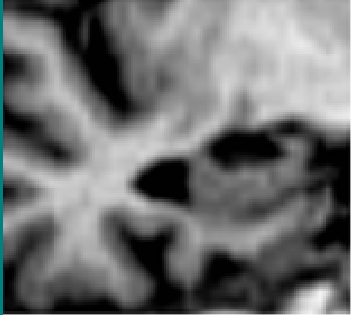
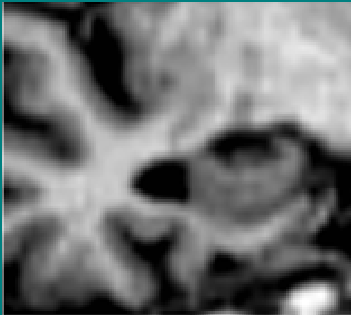
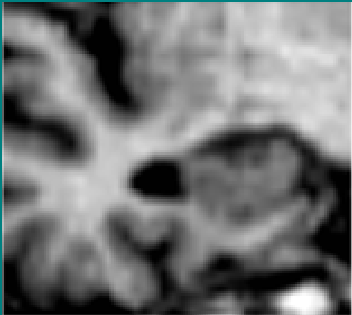
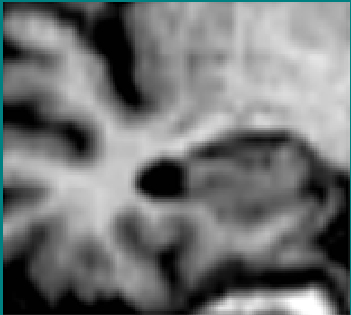
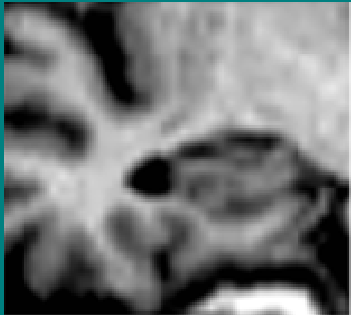

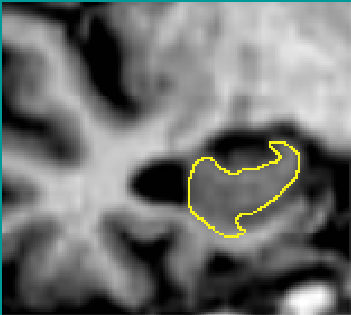
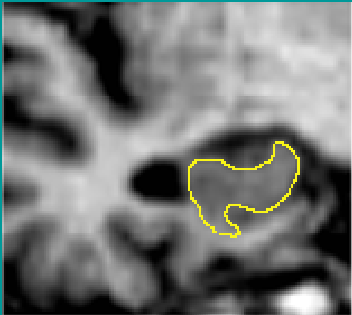
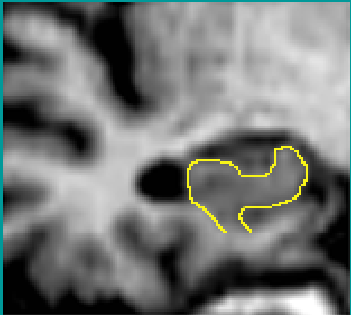

	31	32	33		
Anatomical section					
Native MRI					
Tracing					
Notes		<p>Most posterior slice: slice where an ovoid mass of gray matter started to appear inferomedially to the trigone of lateral ventricle</p>  <p>Sagittal view</p>	<p>1=Temporal horn of lateral ventricle 2= Isthmus 3= Parahippocampal gyrus 4= Splenium 5= Cornu Ammonis</p>		


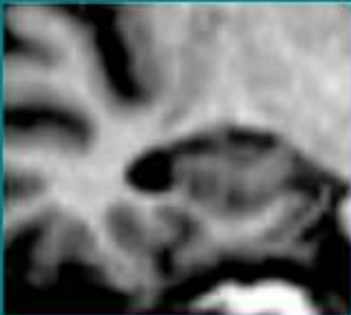
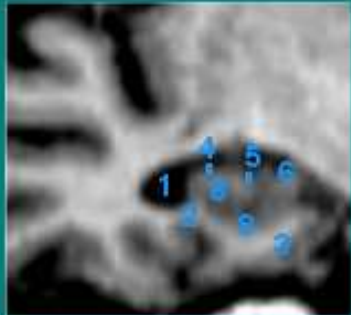
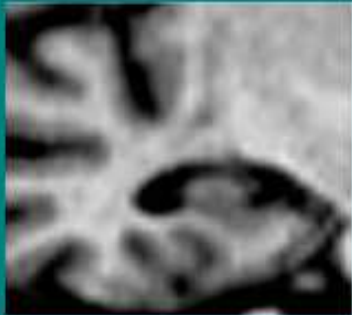
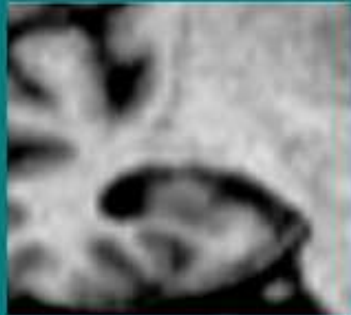
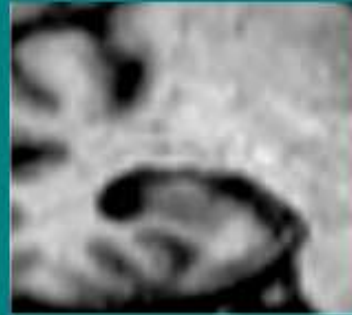


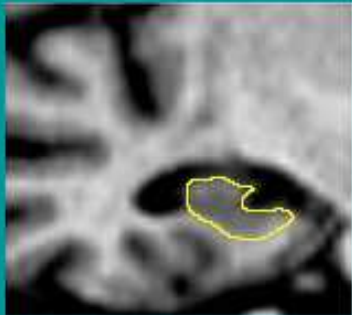
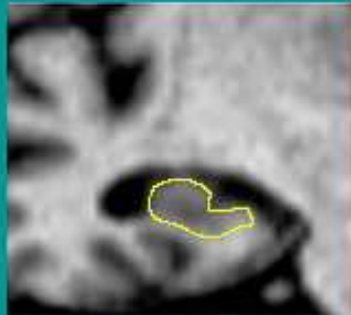
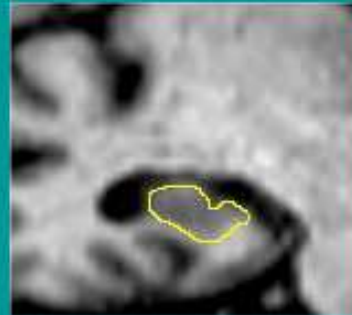
2B) AD

	1	2	3	4	5
Anatomical section					
Native MRI					
Tracing					
Notes				<p>Most anterior slice: level at which the head of hippocampus first appears below the amygdala as a transversely oriented oval structure</p>  <p>Sagittal view</p> <p>1=Temporal horn of lateral ventricle 2= WM in temporal lobe 3= Parahippocampal gyrus 4= Alveus (not included in the tracing) 5=Ambient gyrus 6=Amygdala</p>	




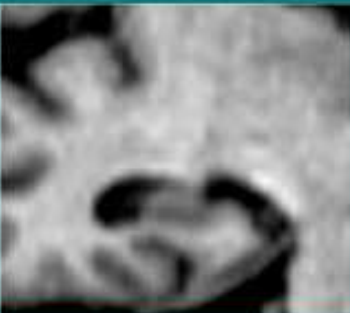
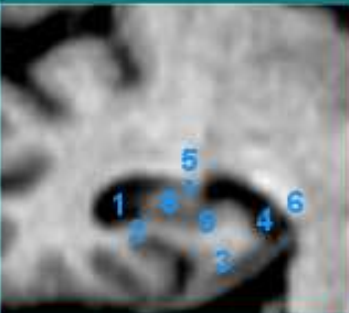
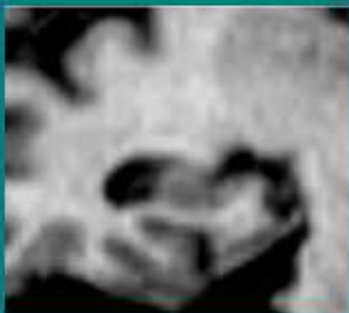

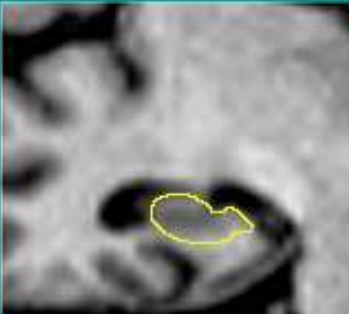
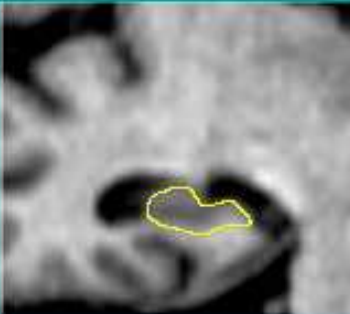
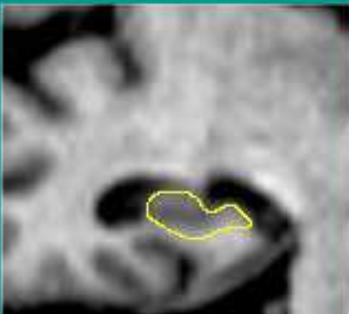
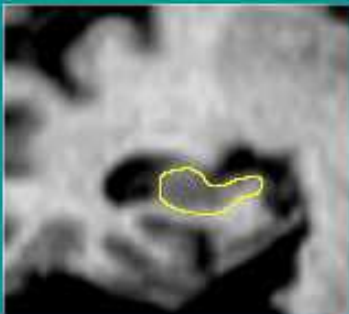
2B) AD


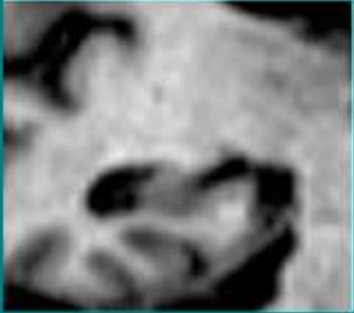
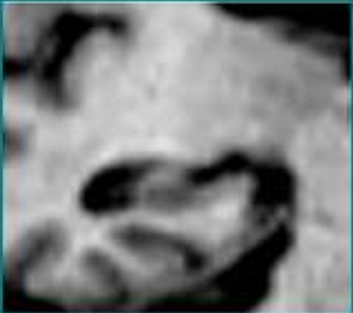


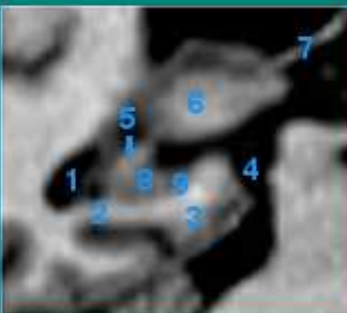
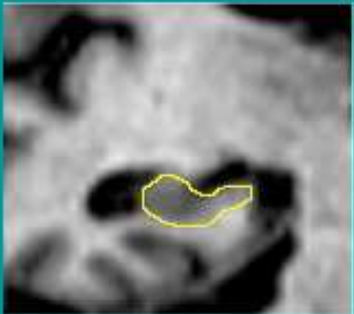
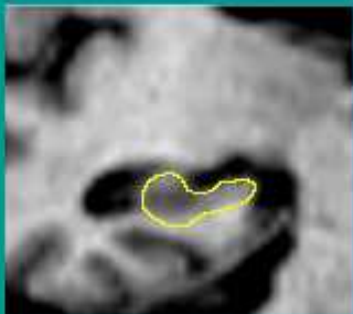
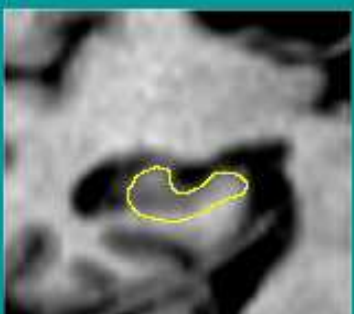
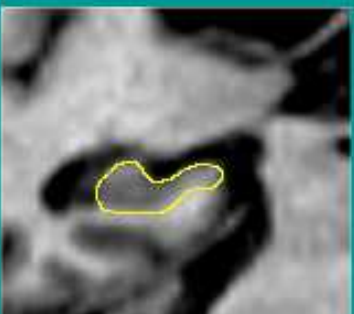
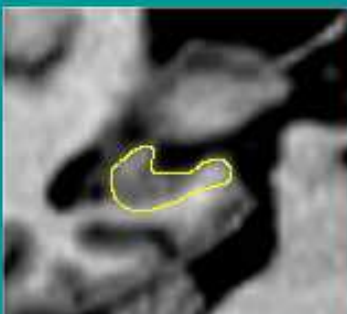
	6	7	8	9	10
Anatomical section					
Native MRI					
Tracing					
Notes	<p>1=Temporal horn of lateral ventricle 2= WM in temporal lobe 3= Parahippocampal gyrus 4= Alveus (not included in the tracing) 6=Amygdala</p>		<p>1=Temporal horn of lateral ventricle 3= Parahippocampal gyrus 7=Vertical digitation 8=gyrus dentatus 9=subiculum 10=posterior cerebral artery</p>		





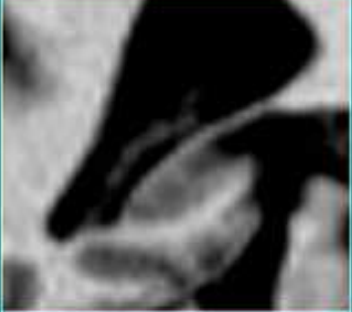
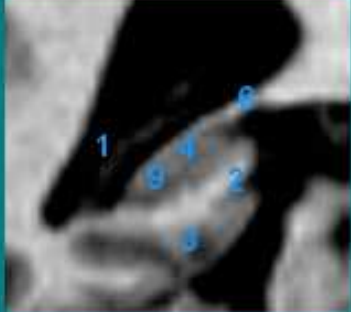
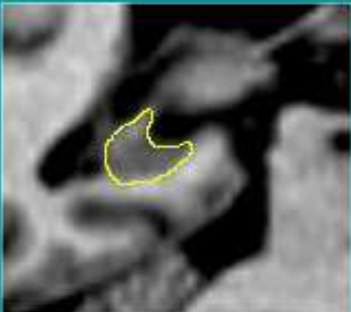
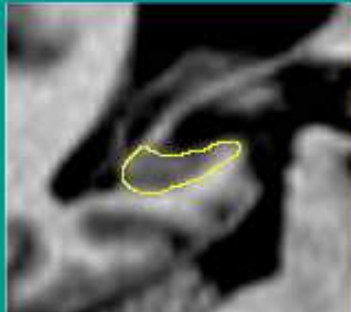
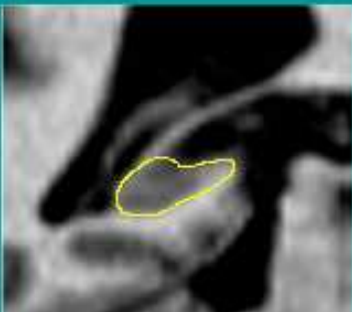
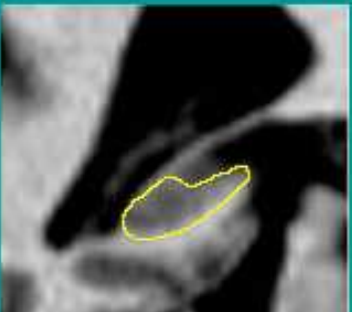
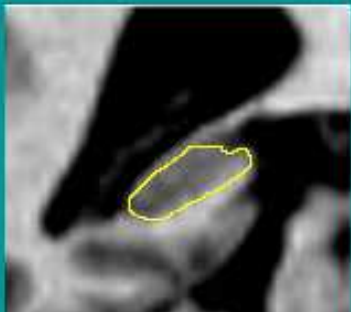
2B) AD	11	12	13	14	15
Anatomical section					
Native MRI					
Tracing					
Notes					

2B) AD	16	17	18	19	20
Anatomical section					
Native MRI					
Tracing					
Notes		1=Temporal horn of lateral ventricle 2= WM in temporal lobe 3= Parahippocampal gyrus 4= Alveus (not included) 5= Fimbria (not included) 6= Uncal Apex 8= Gyrus dentatus 9= Subiculum			


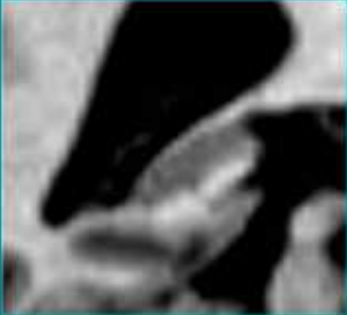

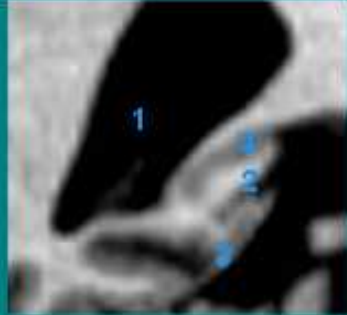

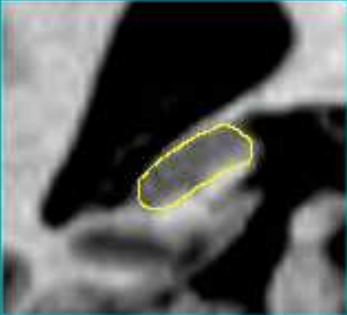
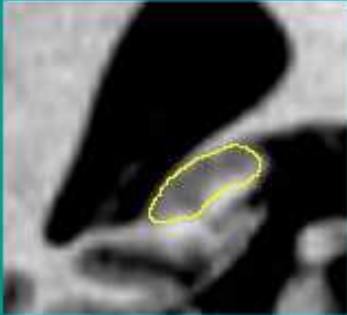
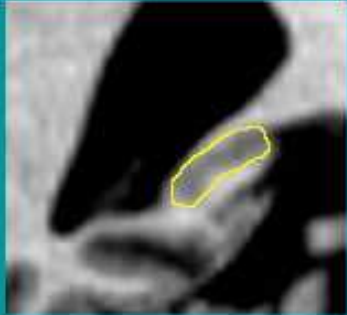
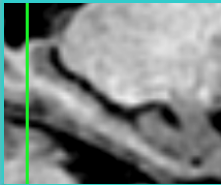
2B) AD

	21	22	23	24	25
Anatomical section					
Native MRI					
Tracing					
Notes				<p>1=Temporal horn of lateral ventricle 2= WM in temporal lobe 3= Parahippocampal gyrus 4= Ambient cistern 5= Fimbria (not included) 6= Crus cerebri 8= Gyrus dentatus 9= Subiculum</p>	

2B) AD	26	27	28	29	30
Anatomical section					
Native MRI					
Tracing					
Notes					<p>1=Temporal horn of lateral ventricle 2= WM in temporal lobe 3= Parahippocampal gyrus 4= Ambient cistern 5= Fimbria (not included) 6= Pulvinar 7= Crus of fornix 8= Gyrus dentatus 9= Subiculum</p>

2B) AD	31	32	33	34	35
Anatomical section					
Native MRI					
Tracing					
Notes					<p>1=Temporal horn of lateral ventricle 2= Isthmus 3= Parahippocampal gyrus 4= Gyrus dentatus 5= Cornu Ammonis 6= Crus of fornix</p>

2B) AD

	36	37	38	39	
Anatomical section					
Native MRI					
Tracing					
Notes			<p>Most posterior slice: slice where an ovoid mass of gray matter started to appear inferomedially to the trigone of lateral ventricle</p>  <p>Sagittal view</p>	<p>1=Temporal horn of lateral ventricle 2= Isthmus 3= Parahippocampal gyrus 4= Splenium 5= Cornu Ammonis</p>	