

Supplementary Material

Reduction in Constitutively Activated Auditory Brainstem Microglia in Aging and Alzheimer's Disease

Supplementary Table 1. MRI volumes of bilateral or midline (shown in blue) brainstem and diencephalic nuclei in 63 healthy control subjects and 8 subjects with Alzheimer's Disease. Volumes are based on probabilistic masks from BrainstemNavigator (<https://www.nitrc.org/projects/brainstemnavig>) thresholded at 50%. See manuscript for details of subject characteristics. Regional volumes were compared between AD subjects and controls using ANCOVA controlling for age and total intracranial volume (TICV). In control subjects, who ranged in age from 23-85, the correlation between regional volume (divided by TICV) and subject age was assessed using Spearman test. Results significant at an uncorrected $p < 0.05$ are presented.

REGION	Control mean volume in ml (SD)	AD mean volume in ml (SD)	AD versus Control p	Age correlation in controls Spearman rho, p
Caudal-rostral linear raphe	124.3 (15.7)	130.4 (21.0)		
Cuneiform nucleus	72.0 (9.2)	69.4 (14.2)		
Dorsal raphe	111.4 (16.4)	113.3 (21.9)	#	
Inferior colliculus	71.9 (10.2)	72.4 (13.8)	#	
Inferior medullary reticular formation	347.4 (43.2)	346.5 (76.2)		
Inferior olivary nucleus	335.1 (40.7)	344.4 (90.6)		
Isthmic reticular formation	104.8 (15.6)	101.9 (20.2)		
Locus coeruleus	7.9 (1.7)	8.3 (2.6)	#	
Laterodorsal tegmental nucleus - central gray of rhomboencephalon	174.9 (18.8)	177.5 (27.8)		-0.395, p=0.001
Lateral parabrachial nucleus	112.3 (13.6)	108.8 (22.5)		
Microcellular tegmental nucleus - parabrachial nucleus	49.6 (7.4)	49.0 (9.9)		
Median raphe	3.9 (1.2)	4.1 (1.2)		
Medial parabrachial nucleus	98.3 (12.2)	98.1 (18.1)		-0.335, p=0.007
Mesencephalic reticular formation	602.6 (56.8)	586.8 (102.3)	0.006	-0.373, p=0.003
Periaqueductal gray	281.5 (33.8)	299.8 (51.7)		
Parvicellular reticular nucleus Alpha part	24.0 (4.3)	25.8 (5.3)		
Paramedian nucleus	41.9 (7.0)	42.9 (8.2)		
Pontine reticular nucleus, oral and caudal parts (pontis oralis and caudalis)	282.3 (31.0)	281.6 (50.6)		
Pedunculotegmental nucleus (also called Pedunculopontine nucleus)	37.1 (6.0)	34.9 (8.4)		
Raphe magnus	5.6 (1.8)	5.9 (1.8)	#	
Red nucleus	468.0 (53.6)	456.9 (87.8)	0.046	-0.249, p=0.049
Raphe obscurus	22.9 (4.0)	24.9 (5.6)	#	
Raphe pallidus	102.8 (14.7)	112.3 (25.3)		
Superior colliculus	81.0 (12.9)	84.8 (16.2)		
Superior medullary reticular formation	82.8 (11.7)	85.5 (21.1)		
Substantia nigra	916.5 (85.9)	922.9 (164.5)		-0.348, p=0.005
Substantia nigra subregion 1, compatible with reticulata	481.8 (45.9)	482.5 (89.0)		
Substantia nigra subregion 2, compatible with compacta	257.5 (25.6)	262.6 (44.6)		-0.376, p=0.002
Superior olivary complex	28.0 (4.5)	27.1 (8.3)		
Subcoeruleus	55.4 (7.7)	56.9 (10.5)	#	-0.471, p<.0001*

Vestibular nuclei complex	280.8 (28.5)	279.5 (58.8)		
Viscero-sensory-motor nuclei complex	146.3 (16.2)	149.3 (34.6)		
Ventral tegmental area - parabrachial pigmented nucleus complex	560.9 (53.1)	567.8 (98.5)		-0.321, p=0.010
Lateral geniculate nucleus	173.0 (18.5)	175.5 (36.7)		
Medial geniculate nucleus	65.4 (9.8)	62.1 (17.7)	0.042	-0.353, p=.005
Subthalamic nucleus	317.1 (27.3)	315.4 (55.6)		

* The correlation between age and subcoereleus volume remained significant after correction for multiple comparisons.

ANCOVA was not valid in 7 regions so regional volume divided by TICV was compared between AD subjects and controls using non-parametric test (Mann-Whitney). No group differences were found at $p < 0.05$.