

Supplements

Supplementary material of the article *External Evaluation of a Deep Learning-based Approach For Automated Brain Volumetry in Patients with Huntington's Disease* published in *Scientific Reports*.

Author names:

Robert Haase¹, Nils Christian Lehnen¹, Frederic Carsten Schmeel¹, Katerina Deike¹, Theodor Rüber², Alexander Radbruch¹, Daniel Paech^{1*}

Affiliations:

¹Department of Neuroradiology, University Hospital Bonn, Venusberg-Campus 1, 53127, Bonn, Germany

²Department of Epileptology, University Hospital Bonn, Venusberg-Campus 1, 53127, Bonn, Germany

***Corresponding author:**

PD Dr. Daniel Paech, M.D., Ph.D., Department of Neuroradiology, University Hospital Bonn, Venusberg-Campus 1, 53127, Bonn, Germany, E-mail: daniel.paech@ukbonn.de, Phone: +49 228–287 31092

Supplementary Tab. S1 Mean volume, Standard deviation (SD), Results of Two-sample t-tests, Statistical significance, and Number of cases marked as potentially pathologic by the software.

Variable	Mean $\pm$ SD (Huntington), volume in ml	Mean $\pm$ SD (Control), volume in ml	Two- sample t- test, p- value	Adjusted p-value (Holm) ^a	Statistical Significance ^b	Marked cases (out of 11), Huntington/ Control group ^c
FH/CC	1.83 $\pm$ 0.27	3.18 $\pm$ 0.54	<.0001	<.0001	****	10/ 0
CC/IT	0.17 $\pm$ 0.03	0.09 $\pm$ 0.02	<.0001	<.0001	****	11/ 0
whole brain	1073 $\pm$ 101	1266 $\pm$ 118	.0005	.008	**	7/ 0
whole white matter	463 $\pm$ 74	558 $\pm$ 72	.006	.045	*	4/ 0
whole gray matter	609 $\pm$ 53	708 $\pm$ 50	.0002	.004	**	7/ 0
cerebral cortex	411 $\pm$ 42	488 $\pm$ 39	.0002	.004	**	7/ 0
cerebellar cortex	103 $\pm$ 12	110 $\pm$ 7	.11	.32	ns	1/ 0
frontal lobe	77.9 $\pm$ 9.6	90.0 $\pm$ 7.0	.003	.03	*	4/ 0
parietal lobe	41.4 $\pm$ 4.2	48.9 $\pm$ 4.3	.0008 ^d	.01	*	5/ 0
precuneus	9.3 $\pm$ 0.8	11.7 $\pm$ 1.3	<.0001	.002	**	3/ 0
occipital lobe	27.9 $\pm$ 3.0	35.0 $\pm$ 4.3	.0003	.005	**	6/ 0
temporal lobe	58.2 $\pm$ 6.6	70.4 $\pm$ 5.7	.0001 ^d	.002	**	3/ 0
hippocampus	3.2 $\pm$ 0.3	3.8 $\pm$ 0.4	.001	.015	*	1/ 0
parahippocampal gyrus	2.7 $\pm$ 0.6	3.4 $\pm$ 0.4	.001 ^d	.01	*	3/ 0
entorhinal cortex	2.0 $\pm$ 0.4	2.5 $\pm$ 0.3	.002	.02	*	2/ 0
caudate nucleus	1.4 $\pm$ 0.4	3.2 $\pm$ 0.4	<.0001	<.0001	****	11/ 0
putamen	2.5 $\pm$ 0.6	4.4 $\pm$ 0.4	<.0001	<.0001	****	11/ 0
globus pallidus	1.0 $\pm$ 0.2	1.4 $\pm$ 0.2	<.0001	<.0001	****	11/ 0
thalamus	7.2 $\pm$ 0.8	8.3 $\pm$ 0.7	.003	.03	*	5/ 1
brainstem	25.3 $\pm$ 3.3	27.8 $\pm$ 2.8	.06	.32	ns	3/ 0
mesencephalon	7.3 $\pm$ 1.0	8.0 $\pm$ 0.8	.07	.32	ns	3/ 0
pons	13.7 $\pm$ 1.9	14.9 $\pm$ 1.7	.14	.32	ns	2/ 0
lateral ventricle	20.6 $\pm$ 8.7	13.8 $\pm$ 9.6	.05 ^d	.28	ns	5/ 2
third ventricle	1.8 $\pm$ 0.5	1.0 $\pm$ 0.4	.0008	.01	*	11/ 1
fourth ventricle	1.4 $\pm$ 0.5	1.4 $\pm$ 0.4	.88	.88	ns	1/ 1

^aApplication of the Holm correction

^bUsed convention for symbols indicating statistical significance: ns: $p > .05$; *: $p \leq .05$; **: $p \leq .01$; ***: $p \leq .001$; ****: $p \leq .0001$

^cFH/CC and CC/IT: Number of cases with a pathological ratio assuming a ratio of 0.09-0.12 for CC/IT and of 2.2-2.6 for FH/CC as normal. Other: Number of cases marked by the software as potentially pathologic with a difference of the volume from the internal reference collective of the software by more than two standard deviations.

^dWilcoxon rank-sum tests were performed to compare the volumes of structures with significant results in the Shapiro-Wilk test.

Supplementary Tab. S2 Median and Interquartile range (IQR) of percentiles of the volumetrized structures, Results of Wilcoxon rank sum-test, and Statistical Significance

Variable	Median, (Huntington), IQR percentile	Median, (Control), IQR percentile	Wilcoxon rank-sum test, p-value	Adjusted p-value (Holm) ^a	Statistical Significance ^b
whole brain	0.7, 4.8	77.1, 17.6	<.0001	.002	**
whole gray matter	0.5, 4.4	37.8, 29.9	.001	.01	*
whole white matter	4.5, 12.6	89.5, 36.7	.001	.01	*
cerebral cortex	1.0, 4.9	39.1, 38.6	.001	.01	*
cerebellar cortex	61.1, 40.1	73.4, 28.7	.44	1	ns
frontal lobe	9.3, 31.0	59.0, 42.6	.02	.12	ns
parietal lobe	2.3, 6.8	31.2, 24.6	.002	.02	*
precuneus	4.8, 12.4	50.8, 27.6	.0004	.005	**
occipital lobe	0.9, 2.2	33.5, 24.1	.0001	.003	**
temporal lobe	3.2, 10.6	49.1, 29.9	.002	.01	*
hippocampus	8.2, 8.2	45.3, 31.9	<.0001	.0008	***
parahippocampal gyrus	4.8, 22.6	62.4, 34.1	.0002	.003	**
entorhinal cortex	8.9, 11.8	65.1, 37.8	.0002	.003	**
caudate nucleus	0, 0.1	32.7, 42.4	<.0001	.001	**
putamen	0, 0	26.5, 32.8	<.0001	.0008	***
globus pallidus	0, 0.1	25.9, 37.7	<.0001	.001	**
thalamus	1.6, 8.7	38.7, 29.1	.0004	.005	**
brainstem	22.9, 70.2	59.2, 30.2	.27	1	ns
mesencephalon	40.2, 49.2	59.6, 21.6	.09	.44	ns
pons	40.2, 63.9	49.9, 38.9	.37	1	ns
lateral ventricle	95.3, 7.6	52.8, 42.8	.004	.03	*
third ventricle	99.9, 0.2	73.3, 36.9	.0002	.003	**
fourth ventricle	50.8, 52.6	50.8, 44.6	.79	1	ns

^aApplication of the Holm correction. The unequal distribution of percentile volumes between groups should be noted. Due to ties, exact p-values cannot be calculated for some volumes. Therefore, an exact comparison is not reasonable.

^bUsed convention for symbols indicating statistical significance: ns: $p > .05$; *: $p \leq .05$; **: $p \leq .01$; ***: $p \leq .001$; ****: $p \leq .0001$.

Supplementary Fig. S1 Box-and-whisker plots of the percentiles of all structures automatically volumetrized in the Huntington and control group. Used convention for symbols indicating statistical significance: ns: $p > .05$; *: $p \leq .05$; **: $p \leq .01$; ***: $p \leq .001$; ****: $p \leq .0001$

