

Introduction

This is a report summarizing the results obtained using the GraphICA[®] software to analyze this patient's resting state fMRI data. The data were analyzed for eleven resting state networks as follows: Auditory Network, Default Mode Network, Executive Control Network Left, Executive Control Network Right, Hippocampal Network, Language Network, Salience network, Sensorimotor Network, Visual Lateral Network, Visual Medial Network and the Visual Occipital Network.

The resting state networks from this patient were compared statistically to a normative database of 1243 cases with 433 females and 810 males.

Please see Appendix I for a more complete description of these networks and their function.

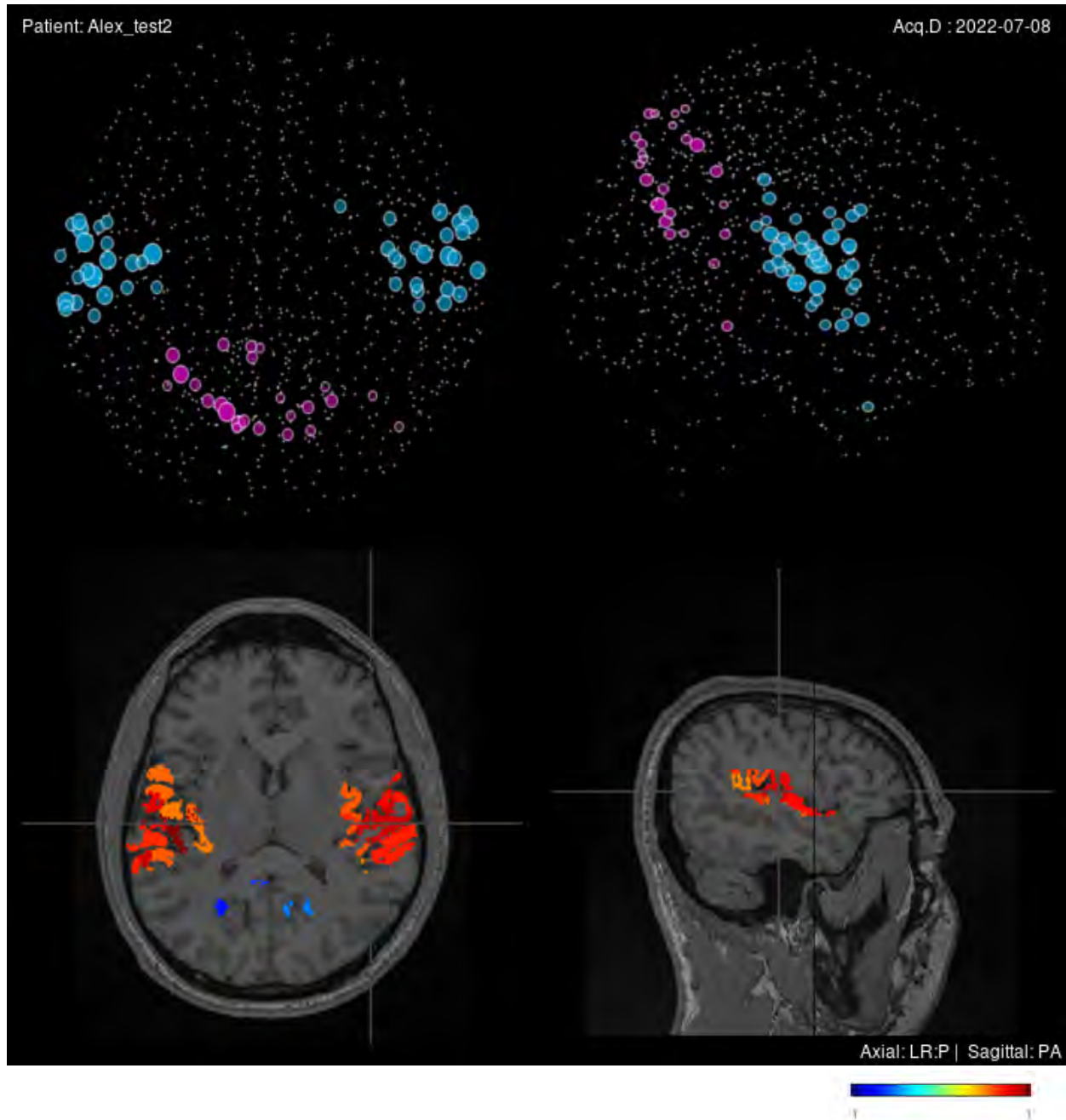
This report was created on July 28, 2022.

Patient Info:

Exam ID: 0000000

Name: Alex_test2

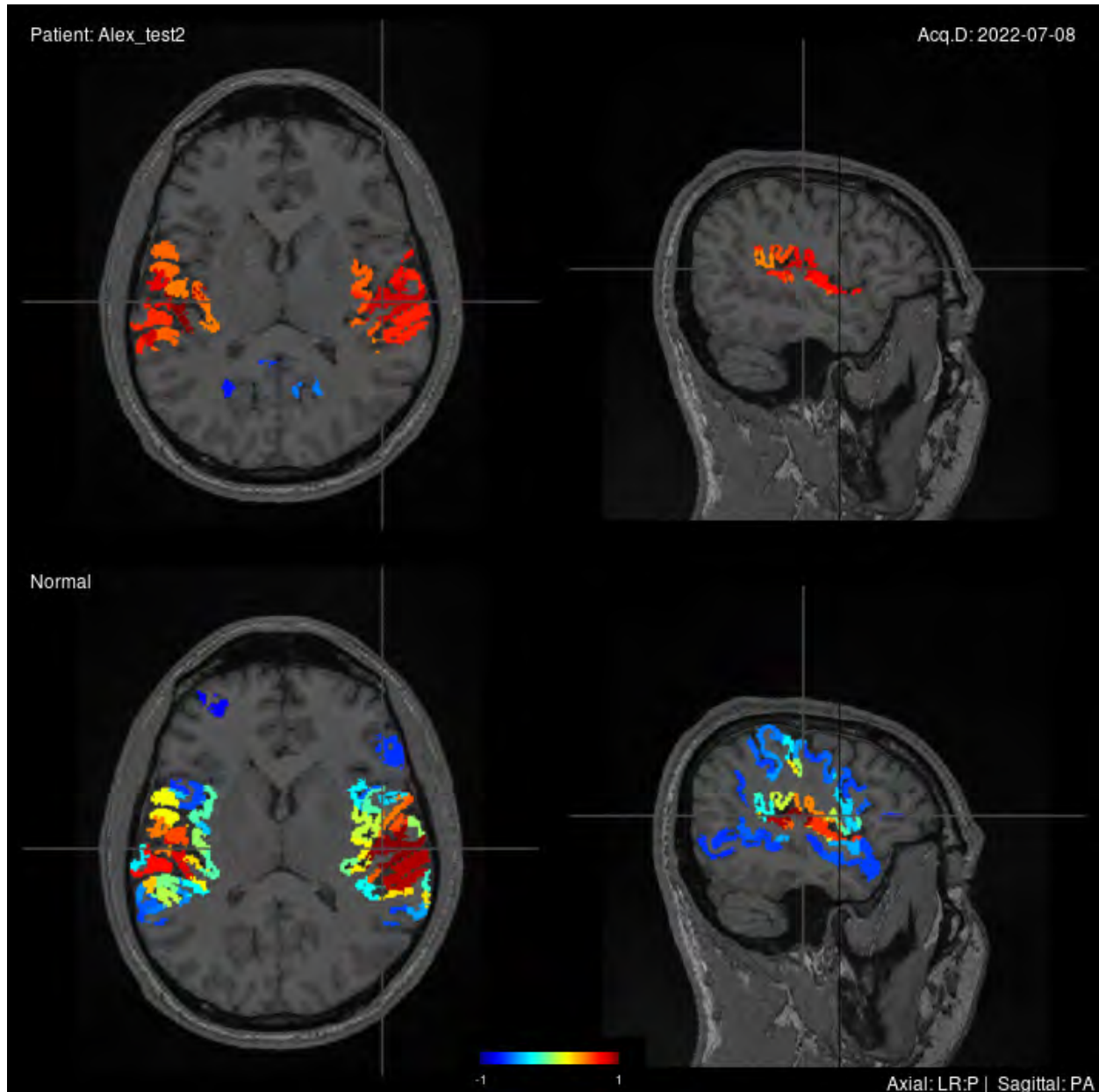
DOB: 19900101

Resting State fMRI of Auditory Network (Auditory).

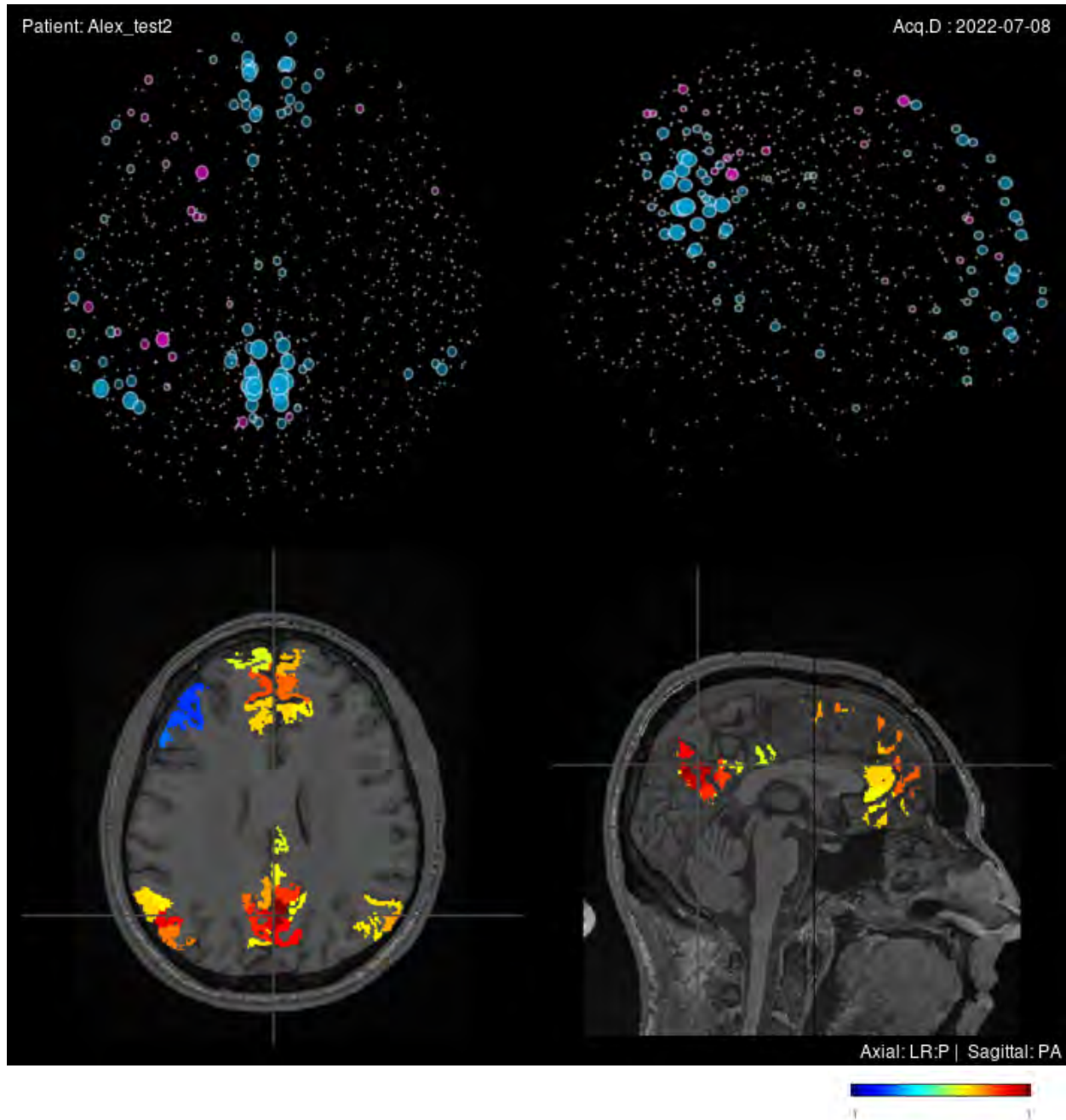
The coloured regions depict a brain network where there are synchronized functional connections among the neurons. Within the dark red or the dark blue regions, neural activity is strongly correlated. In addition, activity in the dark red regions is negatively correlated with activity in the dark blue regions, meaning that when the red regions are active, the blue regions are not active and vice versa. The other colours represent regions that are more weakly correlated but still part of the network.

The Auditory Network (Auditory) is not significantly different with respect to normal.

Resting State fMRI of Auditory Network (Auditory): Patient: Alex_test2 and Normals.



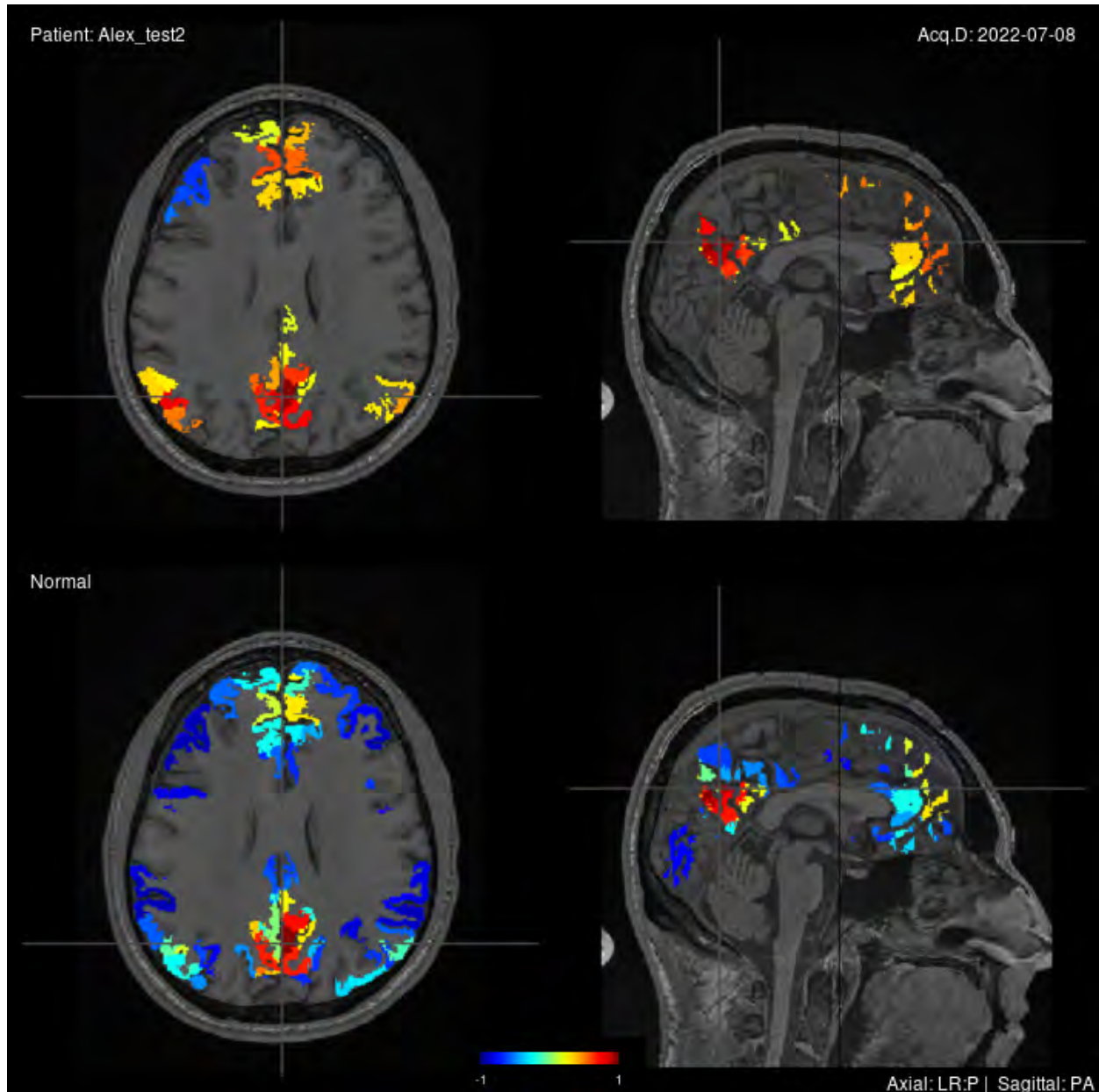
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Resting State fMRI of Default Mode Network (DMN).

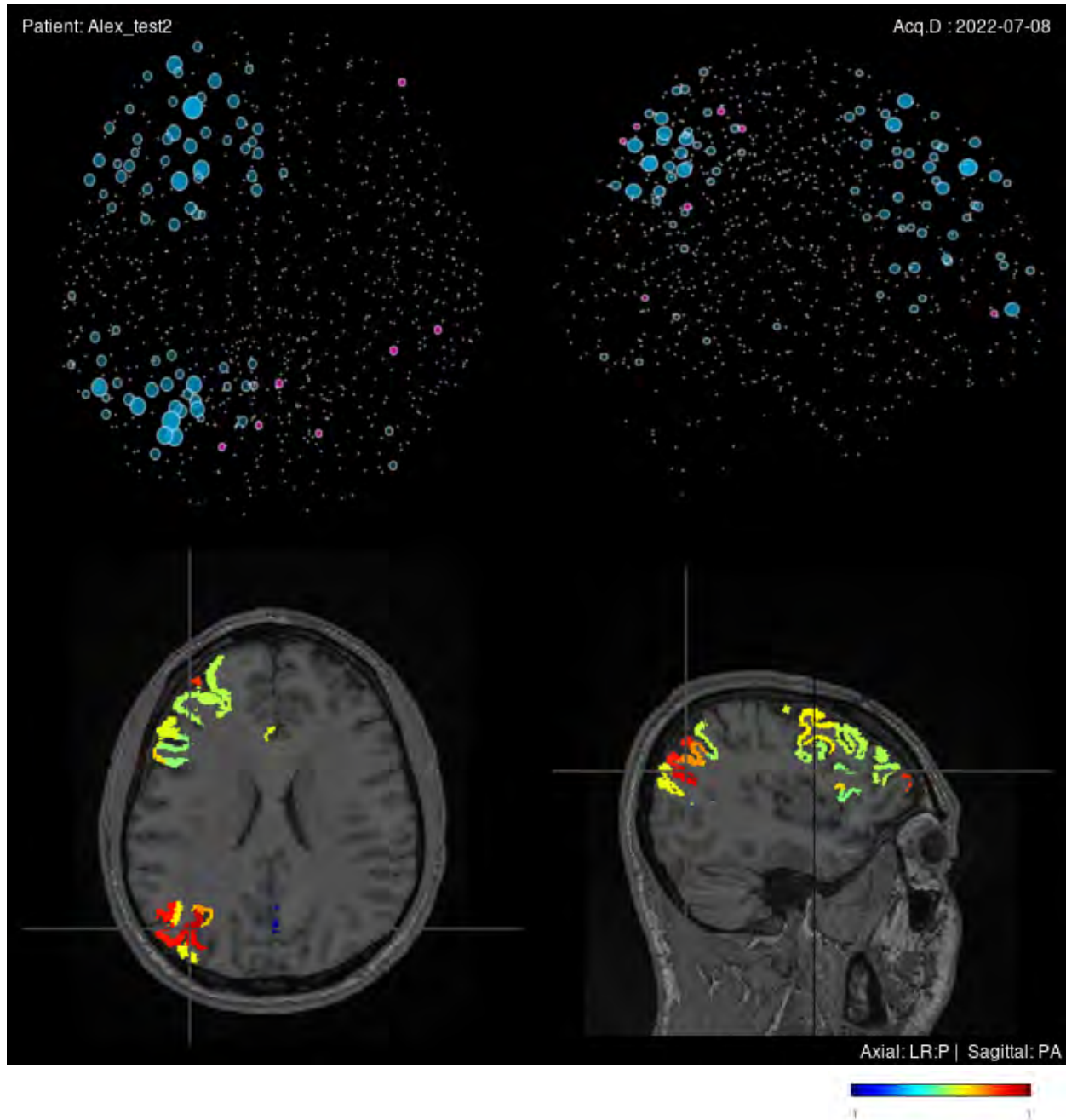
The coloured regions depict a brain network where there are synchronized functional connections among the neurons. Within the dark red or the dark blue regions, neural activity is strongly correlated. In addition, activity in the dark red regions is negatively correlated with activity in the dark blue regions, meaning that when the red regions are active, the blue regions are not active and vice versa. The other colours represent regions that are more weakly correlated but still part of the network.

The Default Mode Network (DMN) is not significantly different with respect to normal.

Resting State fMRI of Default Mode Network (DMN): Patient: Alex_test2 and Normals.



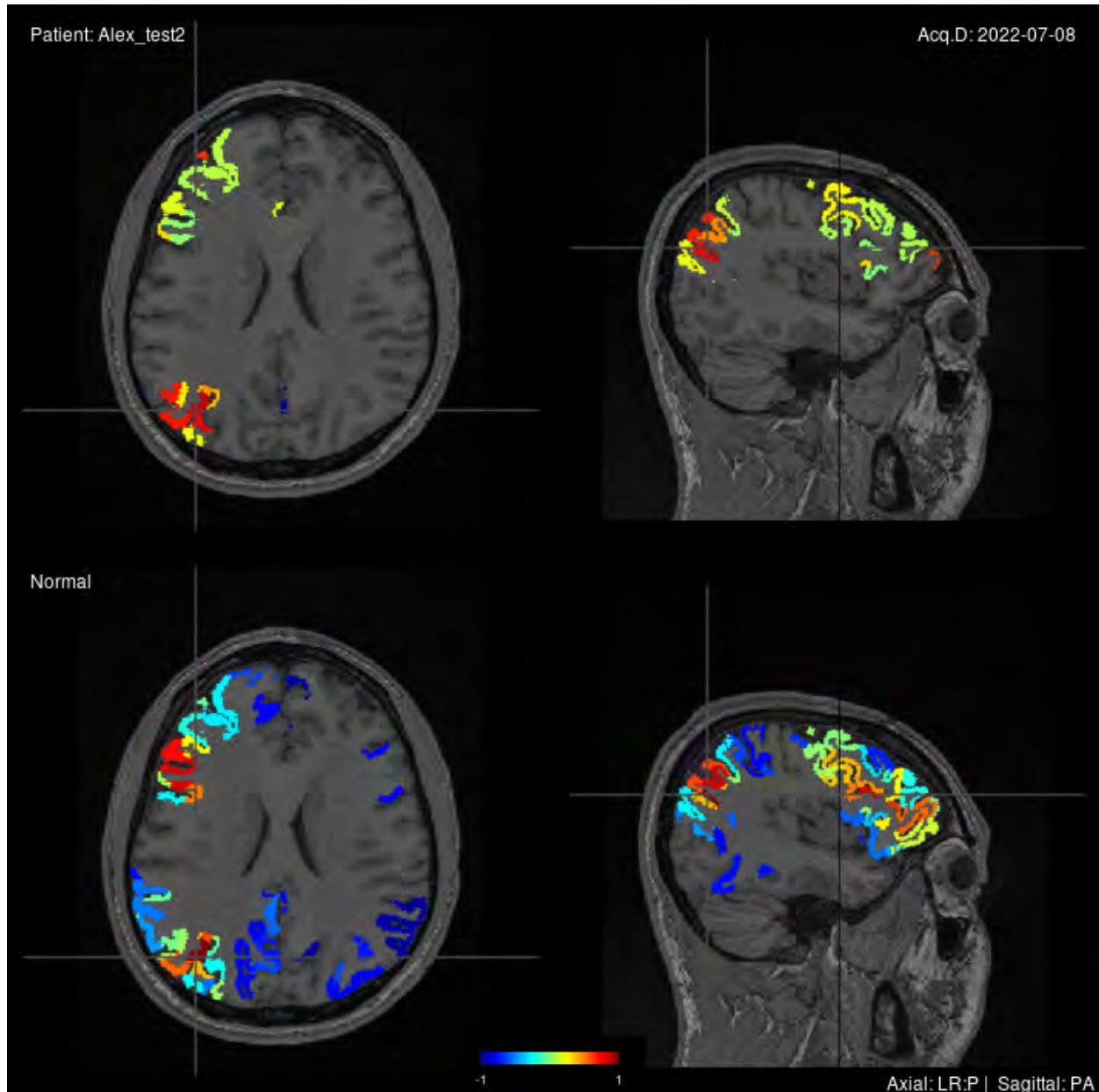
The coloured regions depict a brain network where there are synchronized functional connections among the neurons. Within the dark red or the dark blue regions, neural activity is strongly correlated. In addition, activity in the dark red regions is negatively correlated with activity in the dark blue regions, meaning that when the red regions are active, the blue regions are not active and vice versa. The other colours represent regions that are more weakly correlated but still part of the network.

Resting State fMRI of Executive Control Network Left (ECN_L).

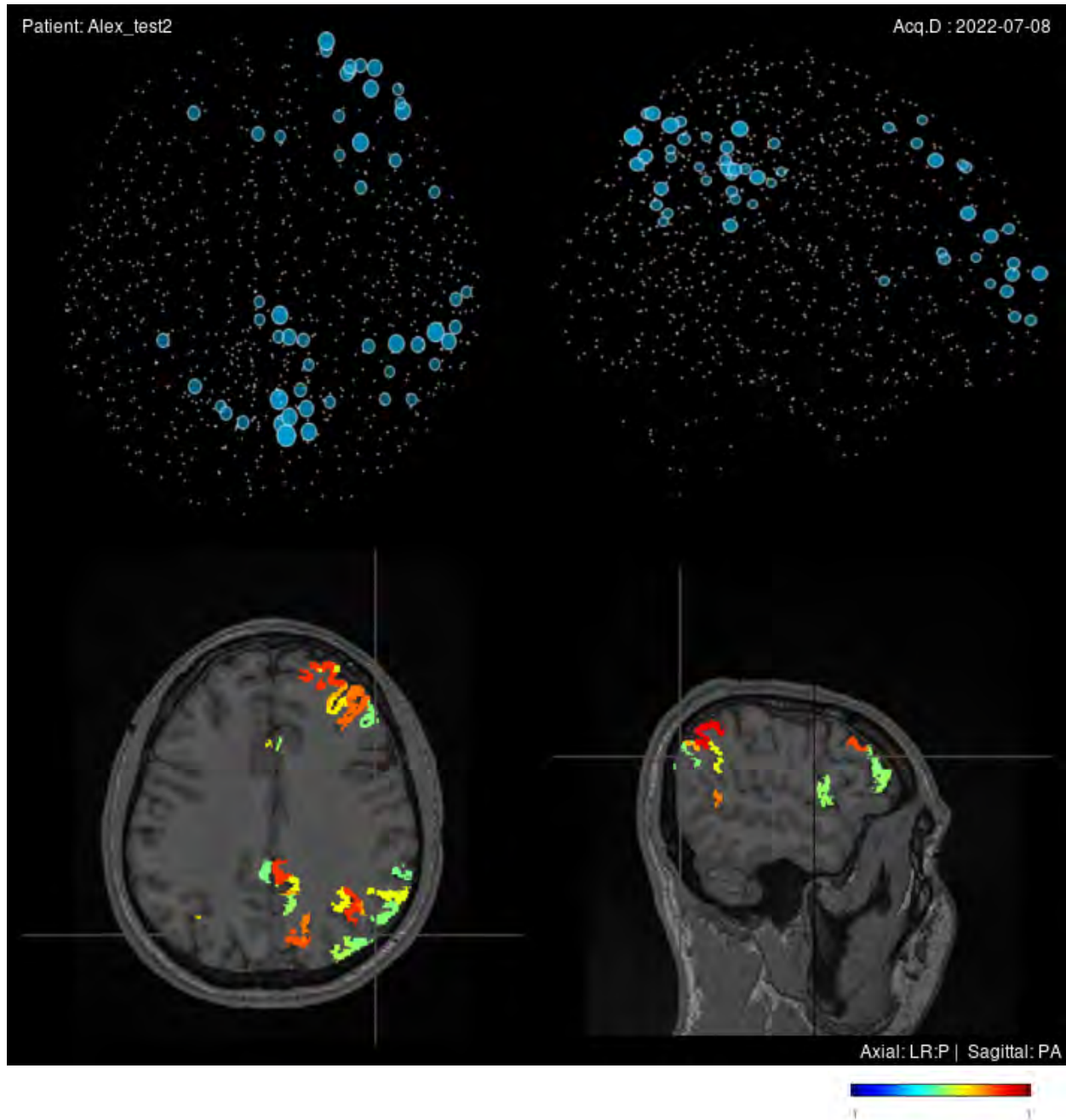
The coloured regions depict a brain network where there are synchronized functional connections among the neurons. Within the dark red or the dark blue regions, neural activity is strongly correlated. In addition, activity in the dark red regions is negatively correlated with activity in the dark blue regions, meaning that when the red regions are active, the blue regions are not active and vice versa. The other colours represent regions that are more weakly correlated but still part of the network.

The Executive Control Network Left (ECN_L) is not significantly different with respect to normal.

Resting State fMRI of Executive Control Network Left (ECN_L): Patient: Alex_test2 and Normals.



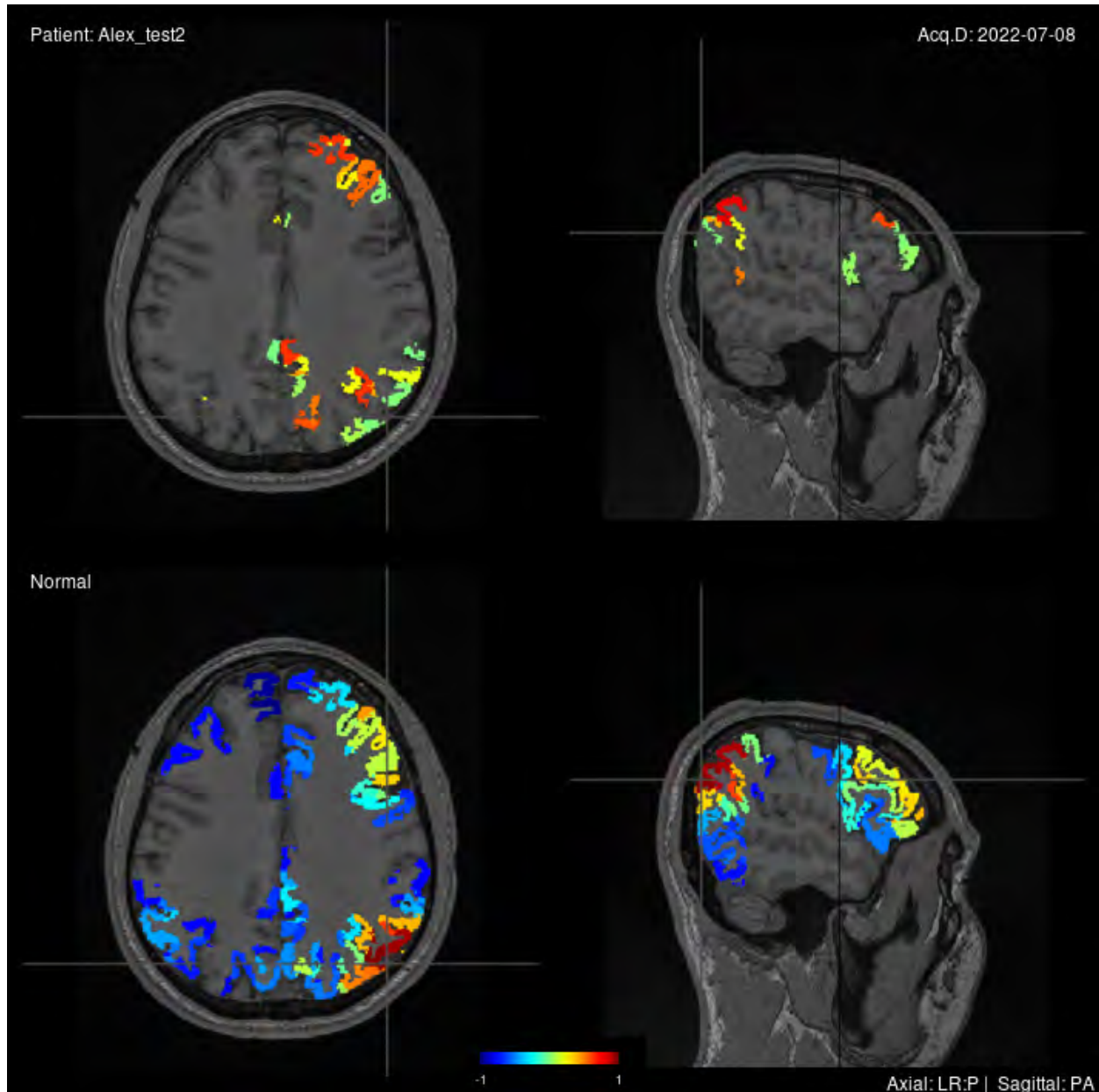
The coloured regions depict a brain network where there are synchronized functional connections among the neurons. Within the dark red or the dark blue regions, neural activity is strongly correlated. In addition, activity in the dark red regions is negatively correlated with activity in the dark blue regions, meaning that when the red regions are active, the blue regions are not active and vice versa. The other colours represent regions that are more weakly correlated but still part of the network.

Resting State fMRI of Executive Control Network Right (ECN_R).

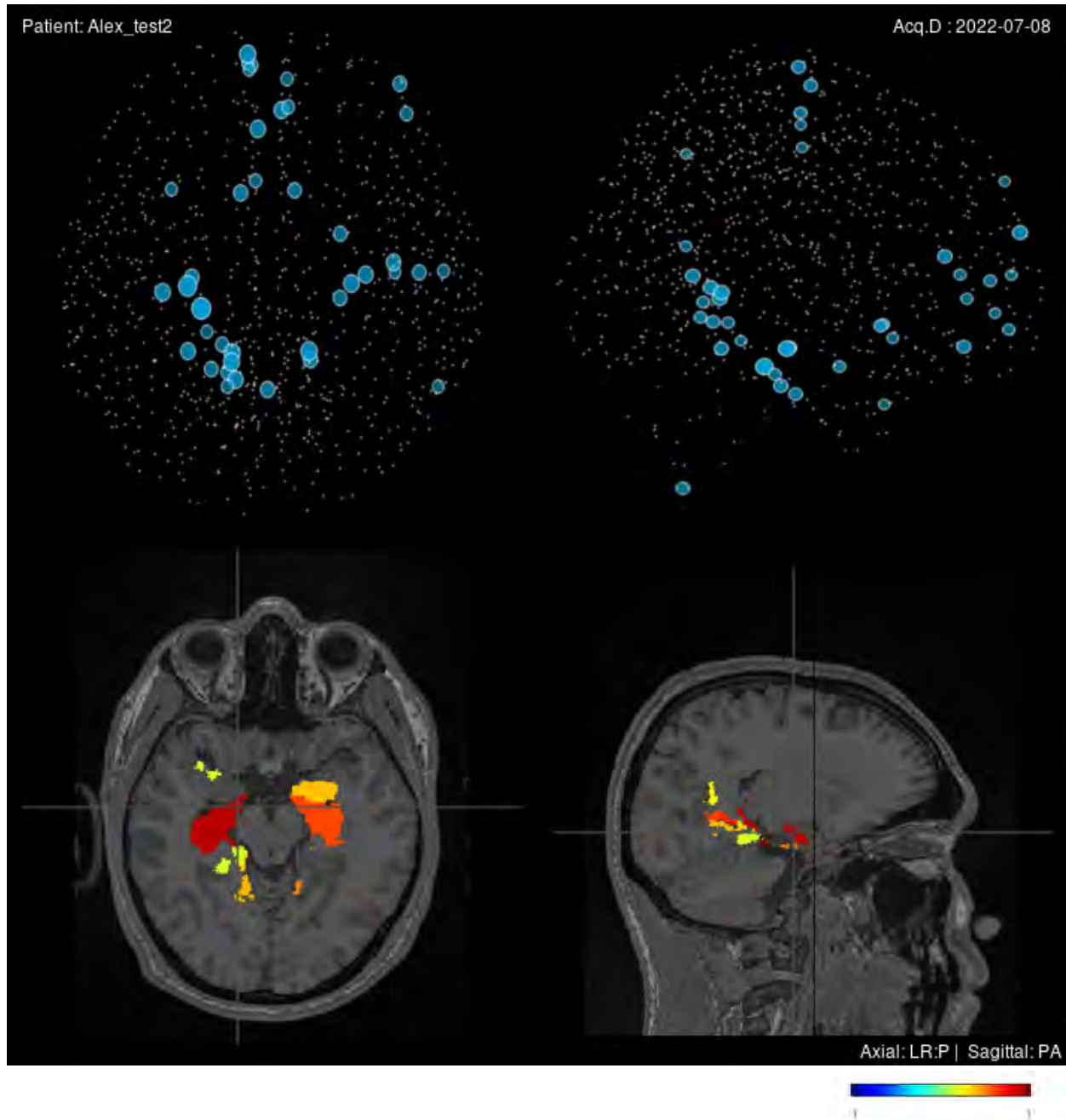
The coloured regions depict a brain network where there are synchronized functional connections among the neurons. Within the dark red or the dark blue regions, neural activity is strongly correlated. In addition, activity in the dark red regions is negatively correlated with activity in the dark blue regions, meaning that when the red regions are active, the blue regions are not active and vice versa. The other colours represent regions that are more weakly correlated but still part of the network.

The Executive Control Network Right (ECN_R) is not significantly different with respect to normal.

Resting State fMRI of Executive Control Network Right (ECN_R): Patient: Alex_test2 and Normals.



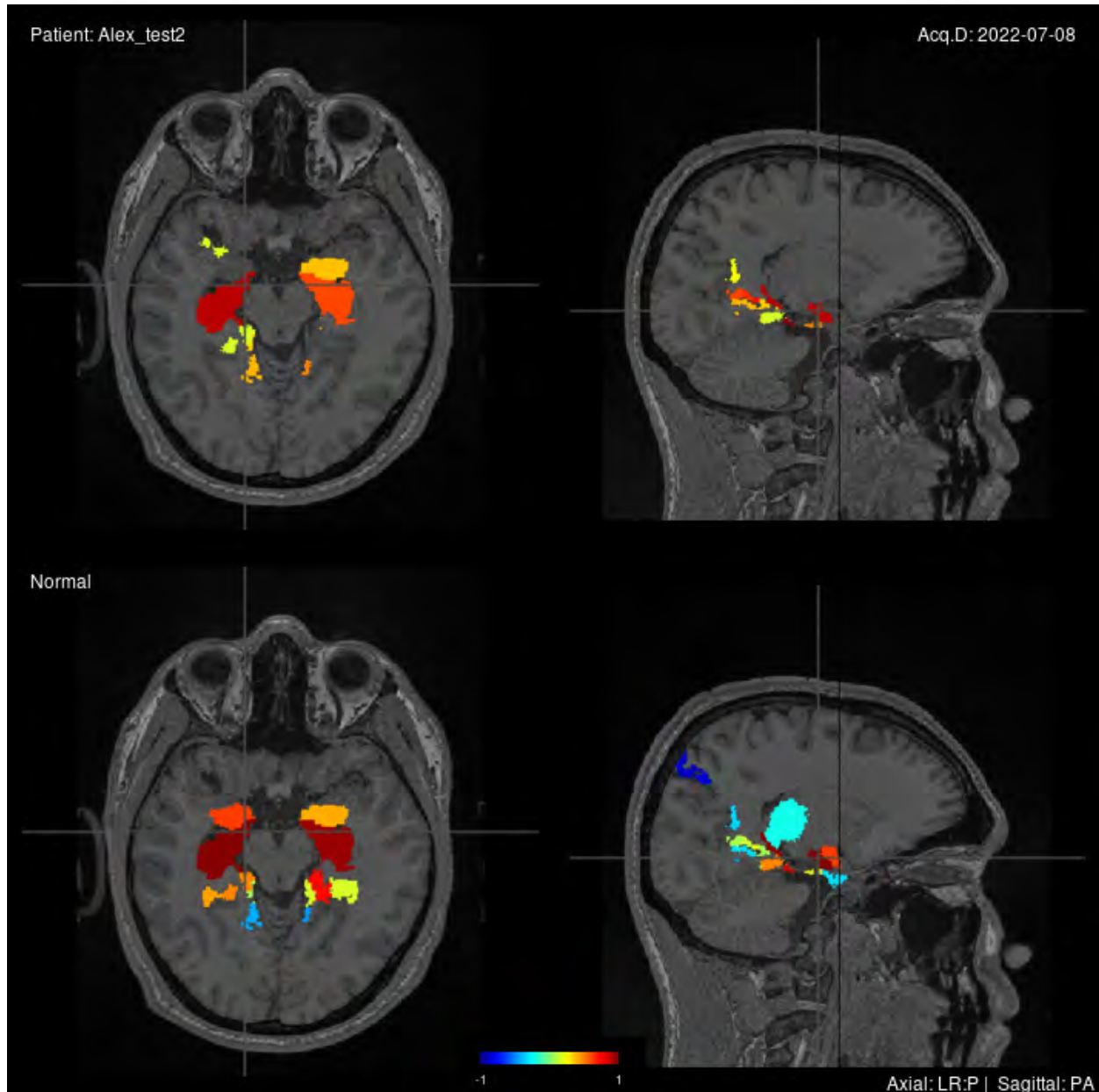
The coloured regions depict a brain network where there are synchronized functional connections among the neurons. Within the dark red or the dark blue regions, neural activity is strongly correlated. In addition, activity in the dark red regions is negatively correlated with activity in the dark blue regions, meaning that when the red regions are active, the blue regions are not active and vice versa. The other colours represent regions that are more weakly correlated but still part of the network.

Resting State fMRI of Hippocampal Network (Hippocampal).

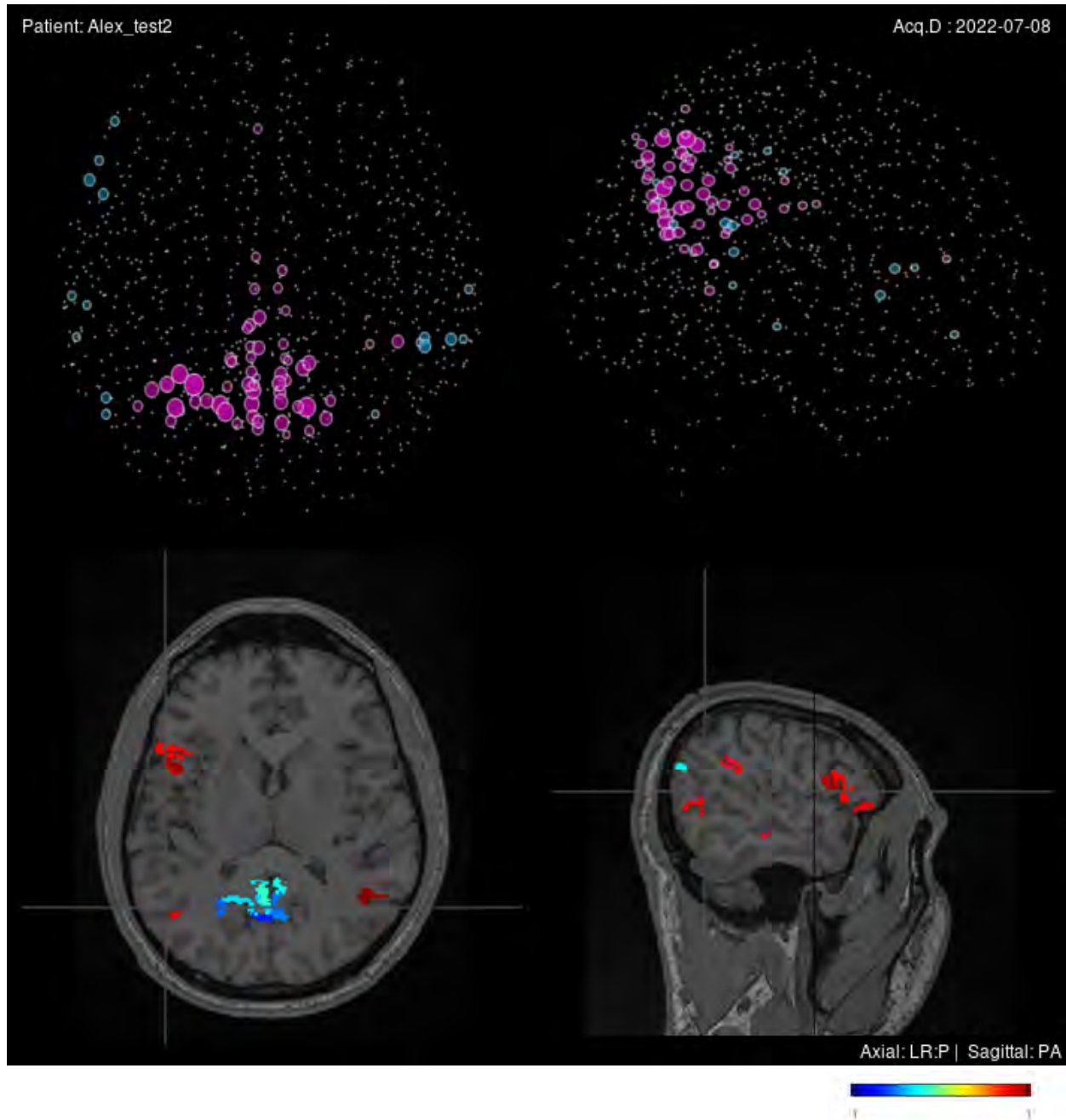
The coloured regions depict a brain network where there are synchronized functional connections among the neurons. Within the dark red or the dark blue regions, neural activity is strongly correlated. In addition, activity in the dark red regions is negatively correlated with activity in the dark blue regions, meaning that when the red regions are active, the blue regions are not active and vice versa. The other colours represent regions that are more weakly correlated but still part of the network.

The Hippocampal Network (Hippocampal) is not significantly different with respect to normal.

Resting State fMRI of Hippocampal Network (Hippocampal): Patient: Alex_test2 and Normals.



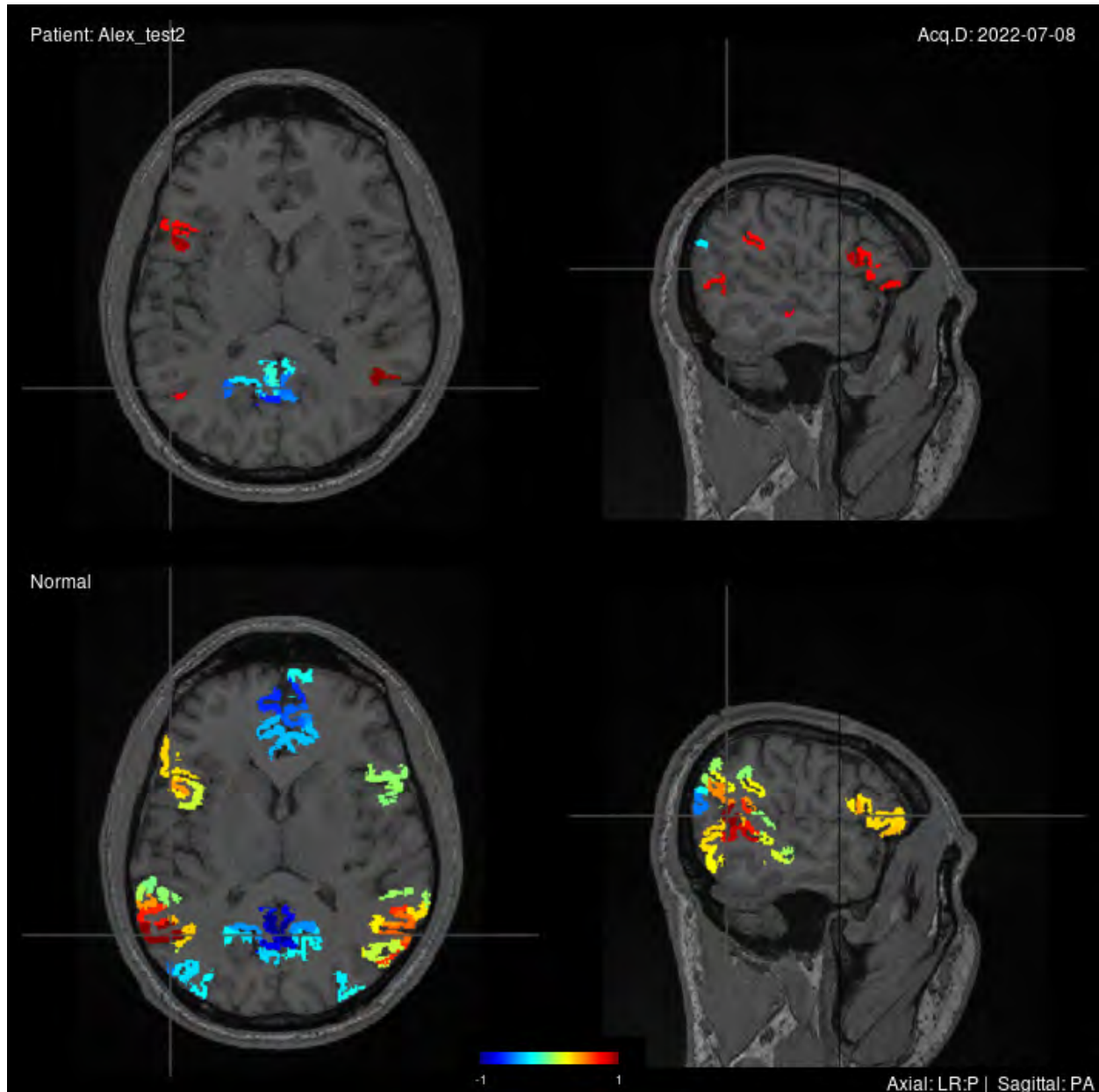
The coloured regions depict a brain network where there are synchronized functional connections among the neurons. Within the dark red or the dark blue regions, neural activity is strongly correlated. In addition, activity in the dark red regions is negatively correlated with activity in the dark blue regions, meaning that when the red regions are active, the blue regions are not active and vice versa. The other colours represent regions that are more weakly correlated but still part of the network.

Resting State fMRI of Language Network (Language).

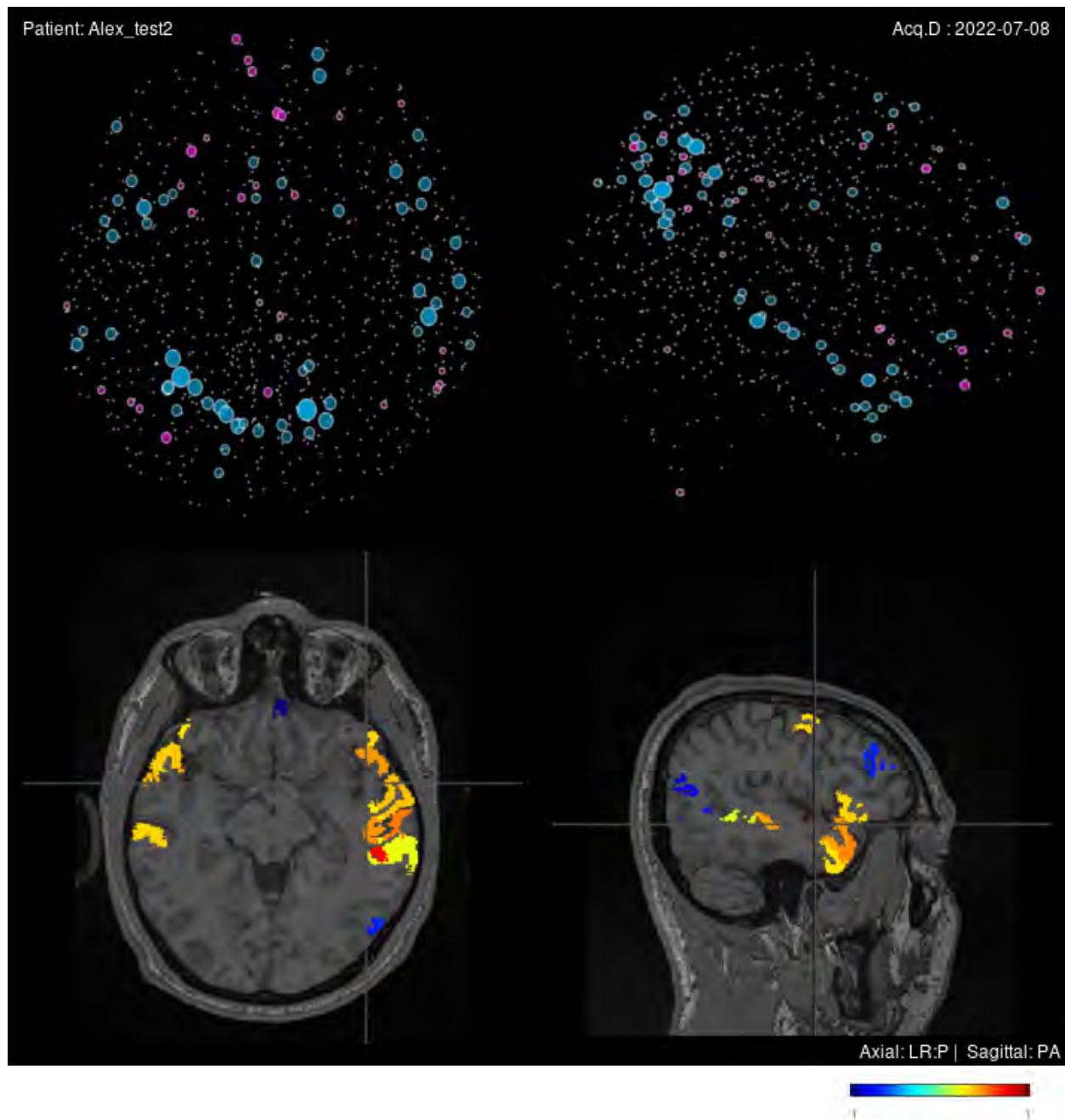
The coloured regions depict a brain network where there are synchronized functional connections among the neurons. Within the dark red or the dark blue regions, neural activity is strongly correlated. In addition, activity in the dark red regions is negatively correlated with activity in the dark blue regions, meaning that when the red regions are active, the blue regions are not active and vice versa. The other colours represent regions that are more weakly correlated but still part of the network.

The Language Network (Language) is not significantly different with respect to normal.

Resting State fMRI of Language Network (Language): Patient: Alex_test2 and Normals.



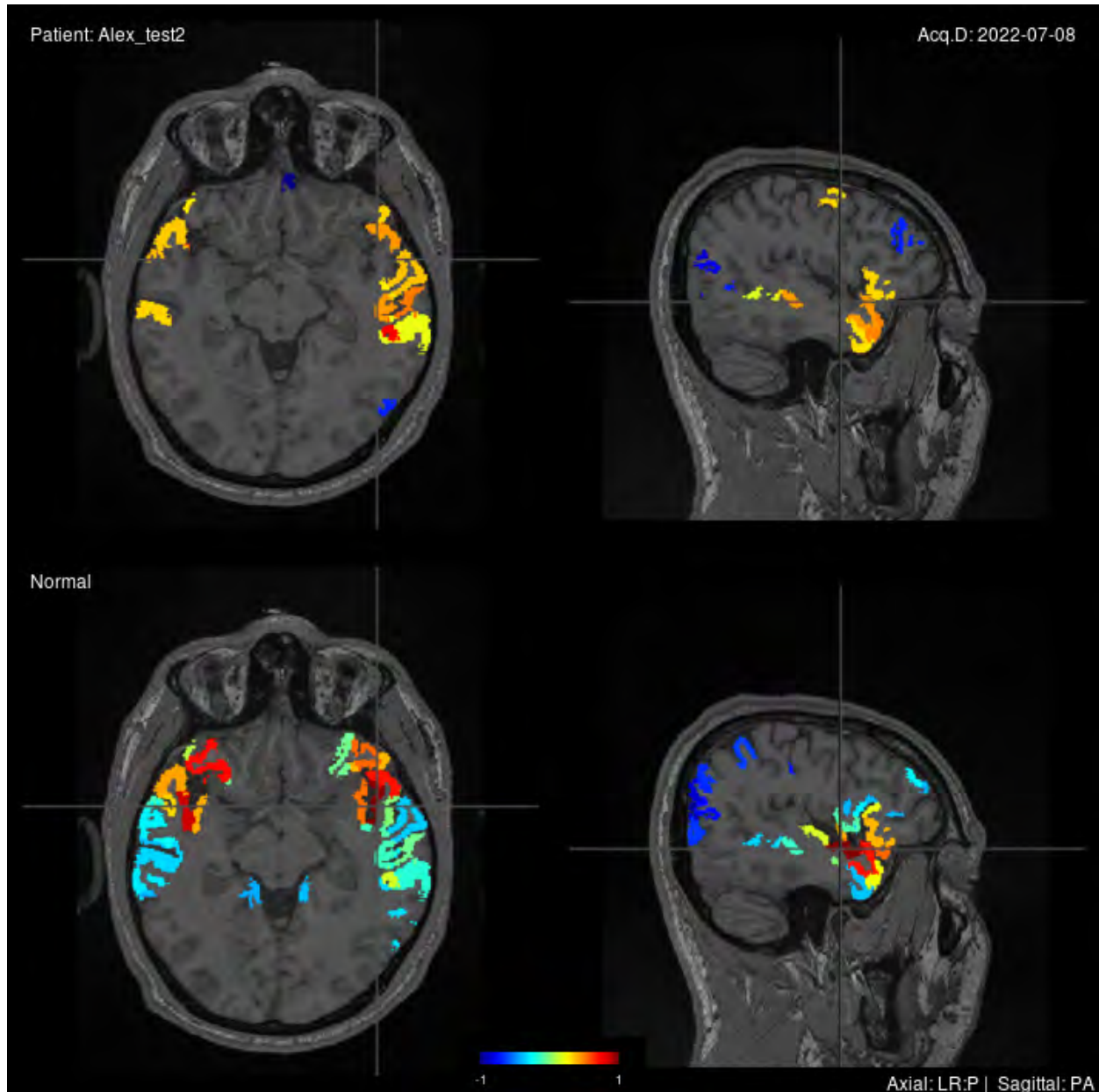
The coloured regions depict a brain network where there are synchronized functional connections among the neurons. Within the dark red or the dark blue regions, neural activity is strongly correlated. In addition, activity in the dark red regions is negatively correlated with activity in the dark blue regions, meaning that when the red regions are active, the blue regions are not active and vice versa. The other colours represent regions that are more weakly correlated but still part of the network.

Resting State fMRI of Saliience Network (Saliience).

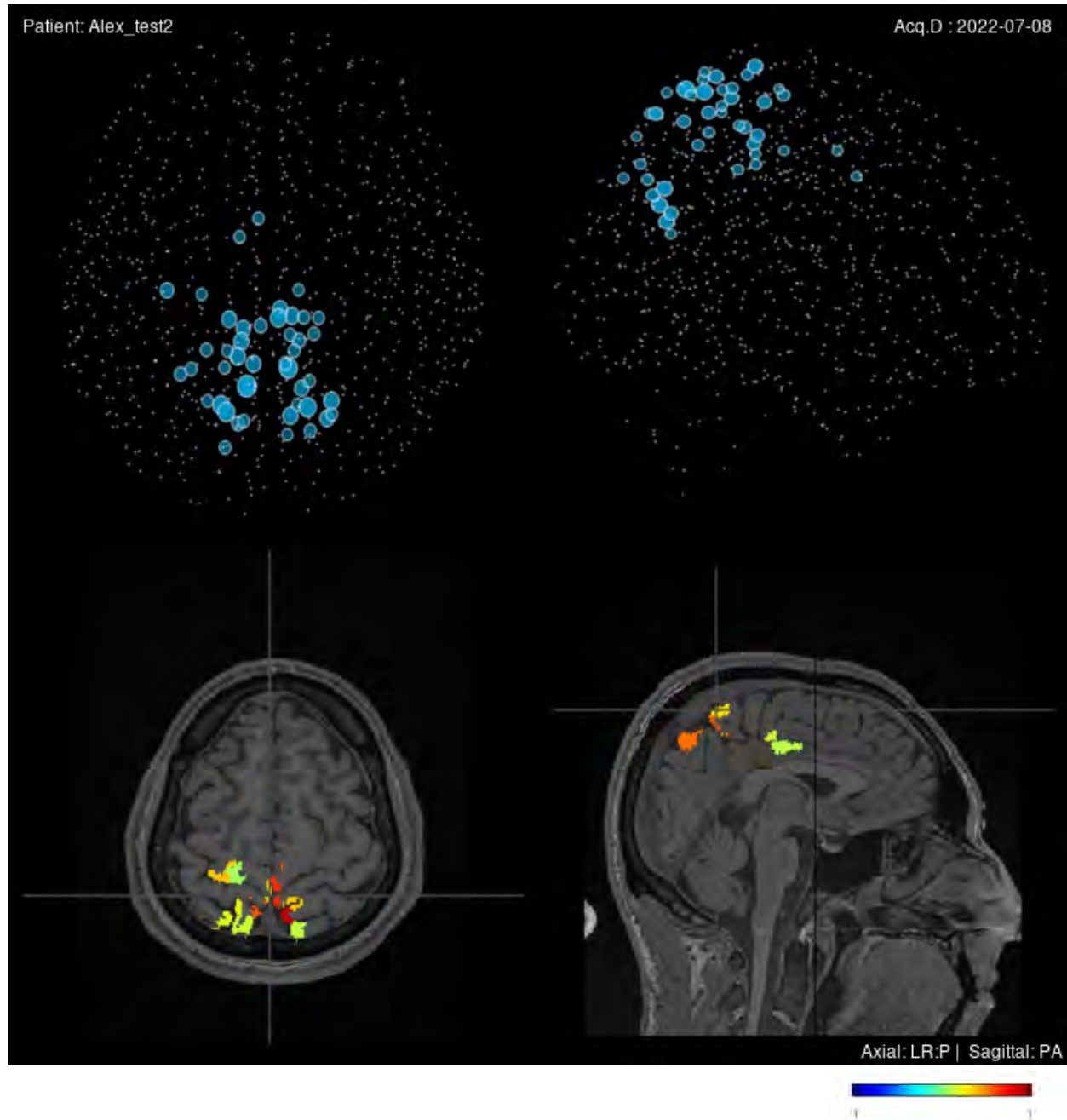
The coloured regions depict a brain network where there are synchronized functional connections among the neurons. Within the dark red or the dark blue regions, neural activity is strongly correlated. In addition, activity in the dark red regions is negatively correlated with activity in the dark blue regions, meaning that when the red regions are active, the blue regions are not active and vice versa. The other colours represent regions that are more weakly correlated but still part of the network.

The Saliience Network (Saliience) is significantly different with respect to normal with with p.value = 0.011.

Resting State fMRI of Saliency Network (Saliency): Patient: Alex_test2 and Normals.



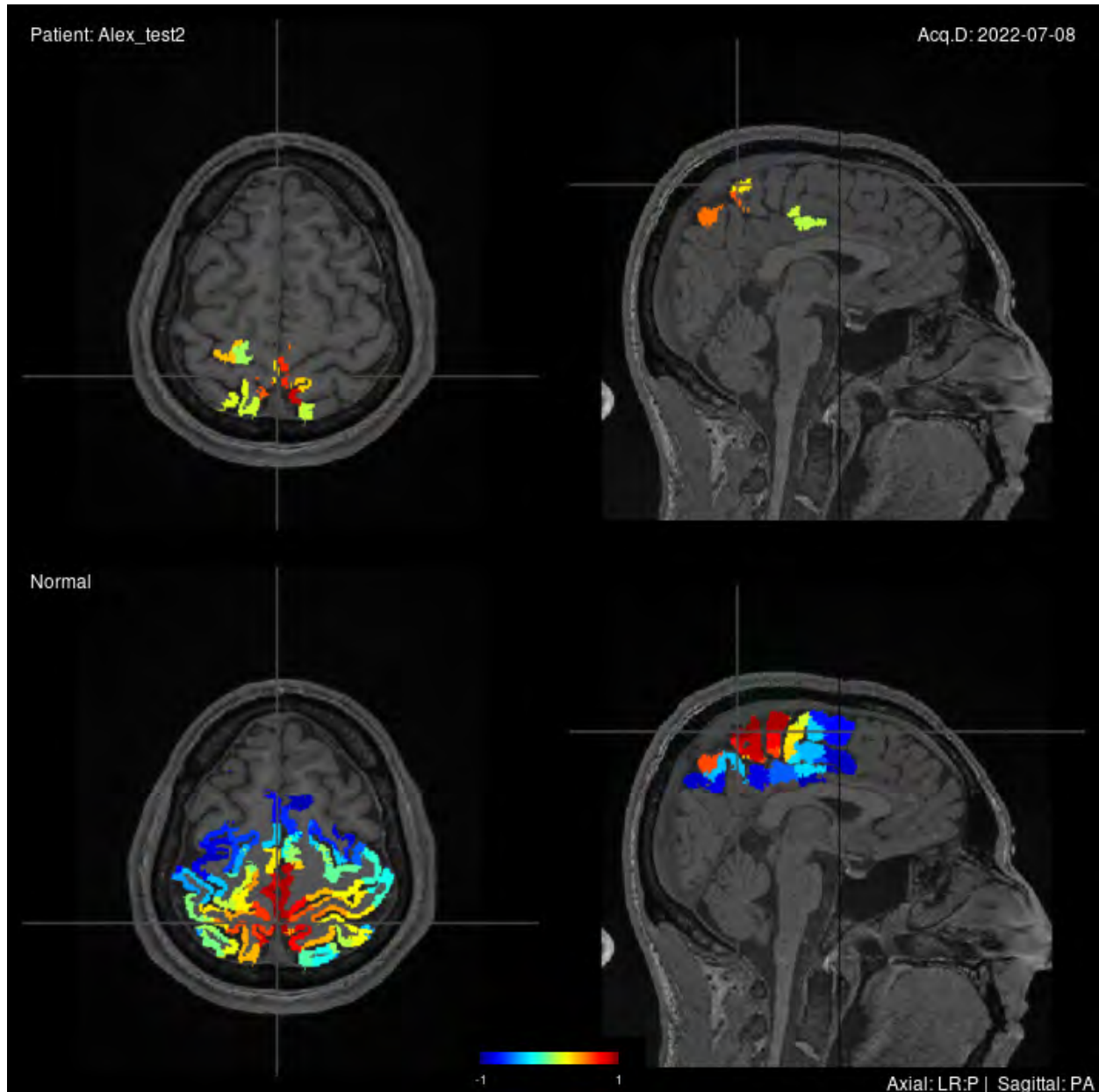
The coloured regions depict a brain network where there are synchronized functional connections among the neurons. Within the dark red or the dark blue regions, neural activity is strongly correlated. In addition, activity in the dark red regions is negatively correlated with activity in the dark blue regions, meaning that when the red regions are active, the blue regions are not active and vice versa. The other colours represent regions that are more weakly correlated but still part of the network.

Resting State fMRI of Sensorimotor Network (SN).

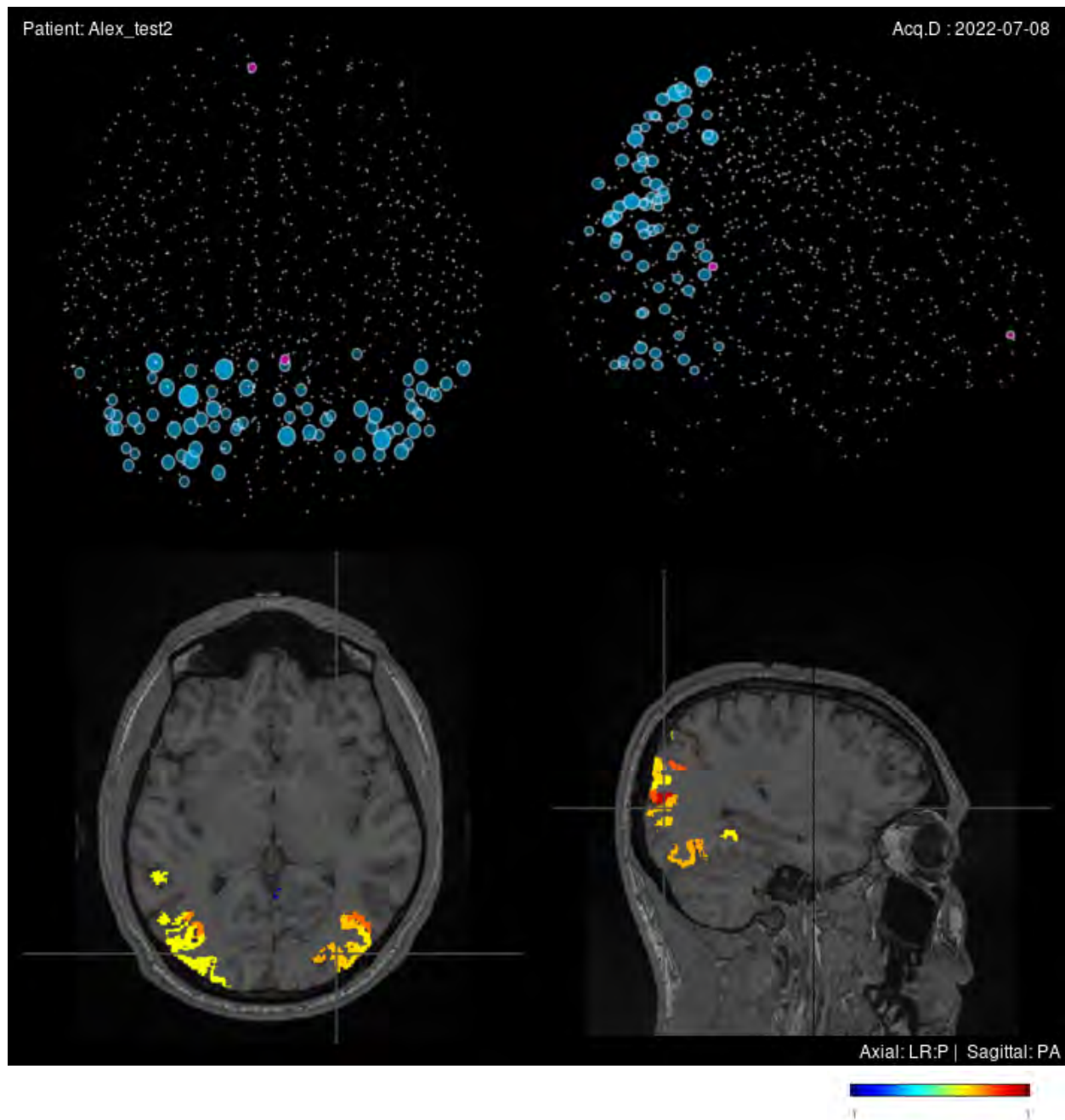
The coloured regions depict a brain network where there are synchronized functional connections among the neurons. Within the dark red or the dark blue regions, neural activity is strongly correlated. In addition, activity in the dark red regions is negatively correlated with activity in the dark blue regions, meaning that when the red regions are active, the blue regions are not active and vice versa. The other colours represent regions that are more weakly correlated but still part of the network.

The Sensorimotor Network (SN) is significantly different with respect to normal with with p.value = 0.011.

Resting State fMRI of Sensorimotor Network (SN): Patient: Alex_test2 and Normals.



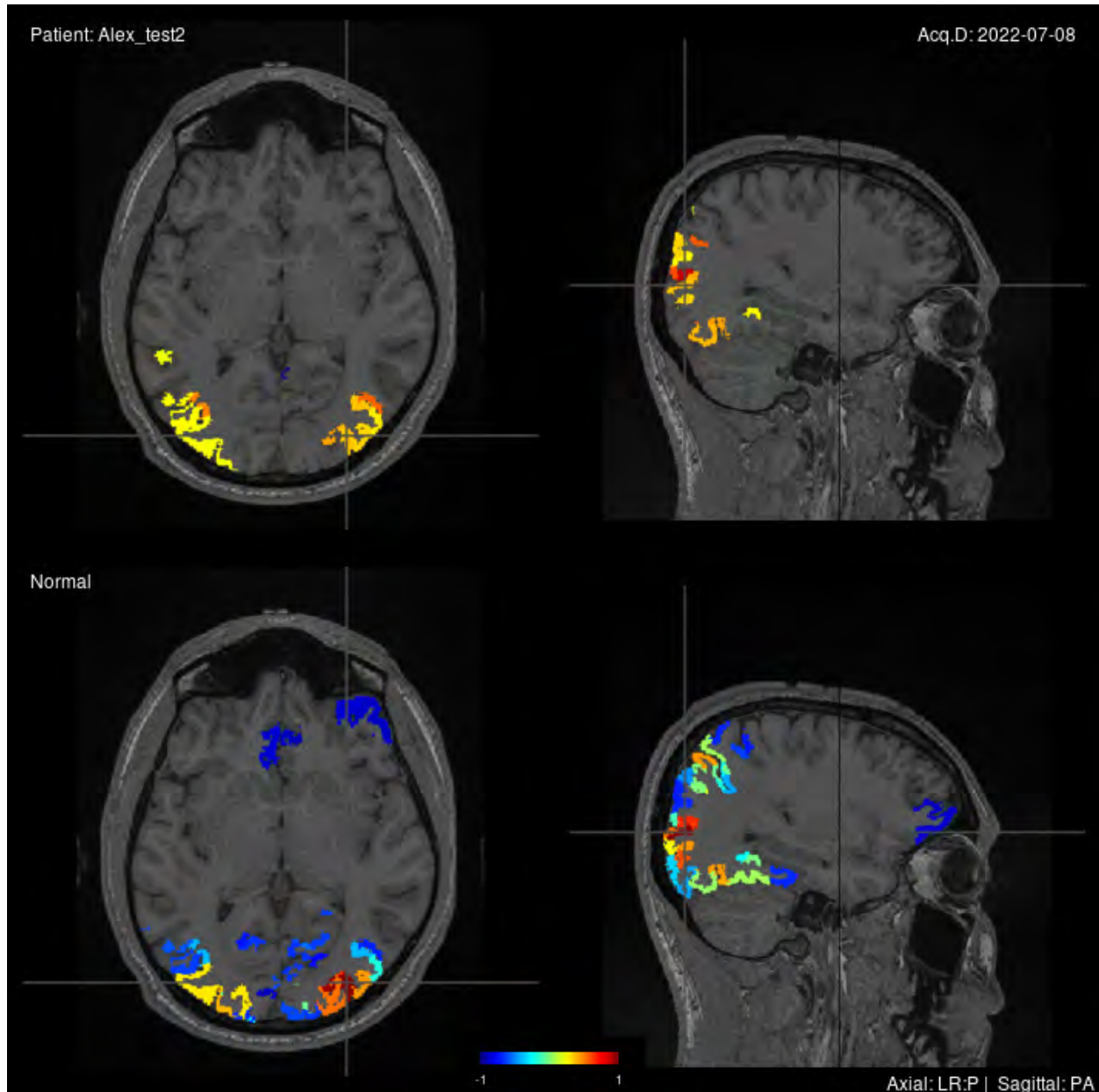
The coloured regions depict a brain network where there are synchronized functional connections among the neurons. Within the dark red or the dark blue regions, neural activity is strongly correlated. In addition, activity in the dark red regions is negatively correlated with activity in the dark blue regions, meaning that when the red regions are active, the blue regions are not active and vice versa. The other colours represent regions that are more weakly correlated but still part of the network.

Resting State fMRI of Visual Lateral Network (Visual_lateral).

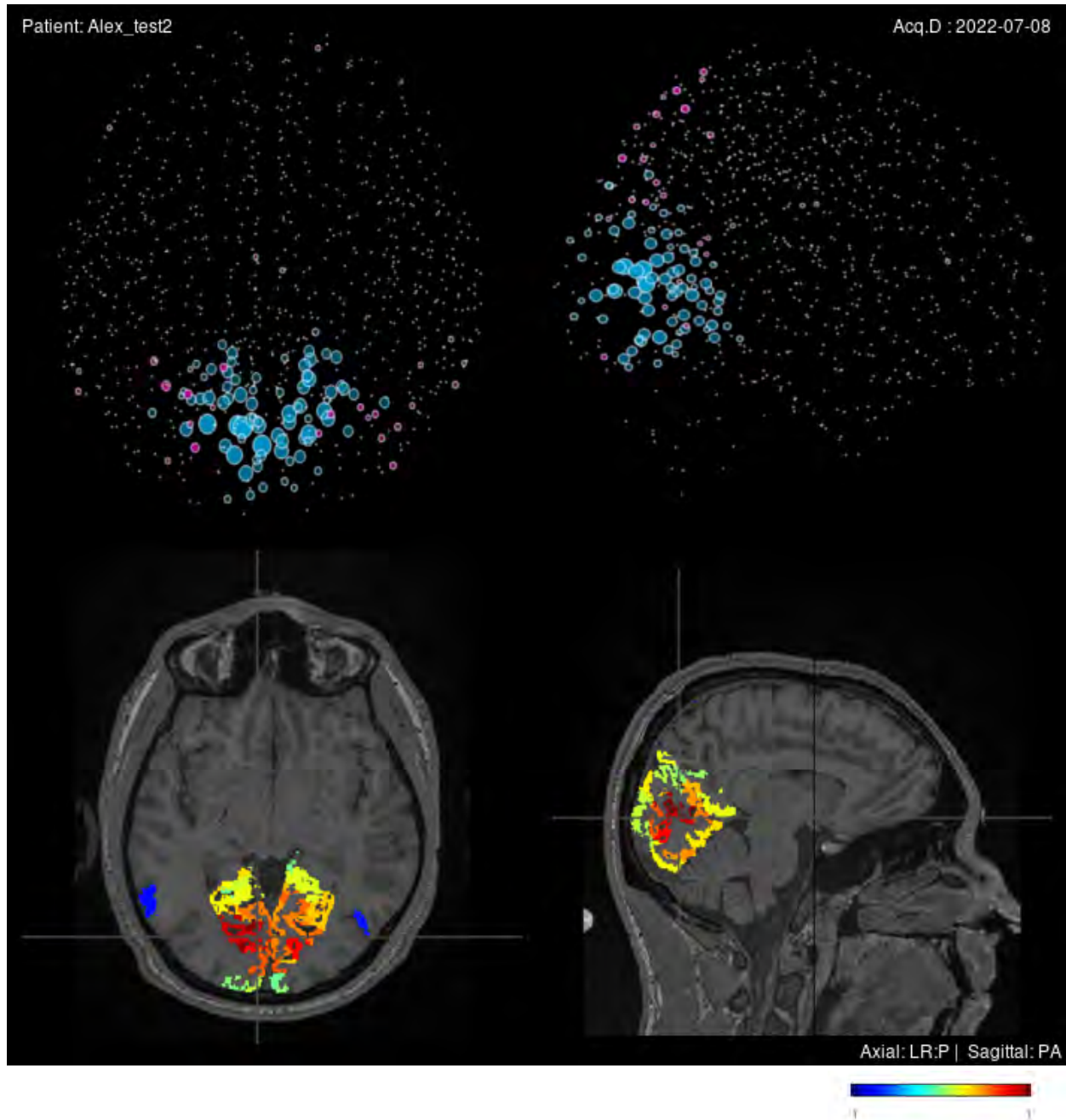
The coloured regions depict a brain network where there are synchronized functional connections among the neurons. Within the dark red or the dark blue regions, neural activity is strongly correlated. In addition, activity in the dark red regions is negatively correlated with activity in the dark blue regions, meaning that when the red regions are active, the blue regions are not active and vice versa. The other colours represent regions that are more weakly correlated but still part of the network.

The Visual Lateral Network (Visual_lateral) is not significantly different with respect to normal.

Resting State fMRI of Visual Lateral Network (Visual_lateral): Patient: Alex_test2 and Normals.



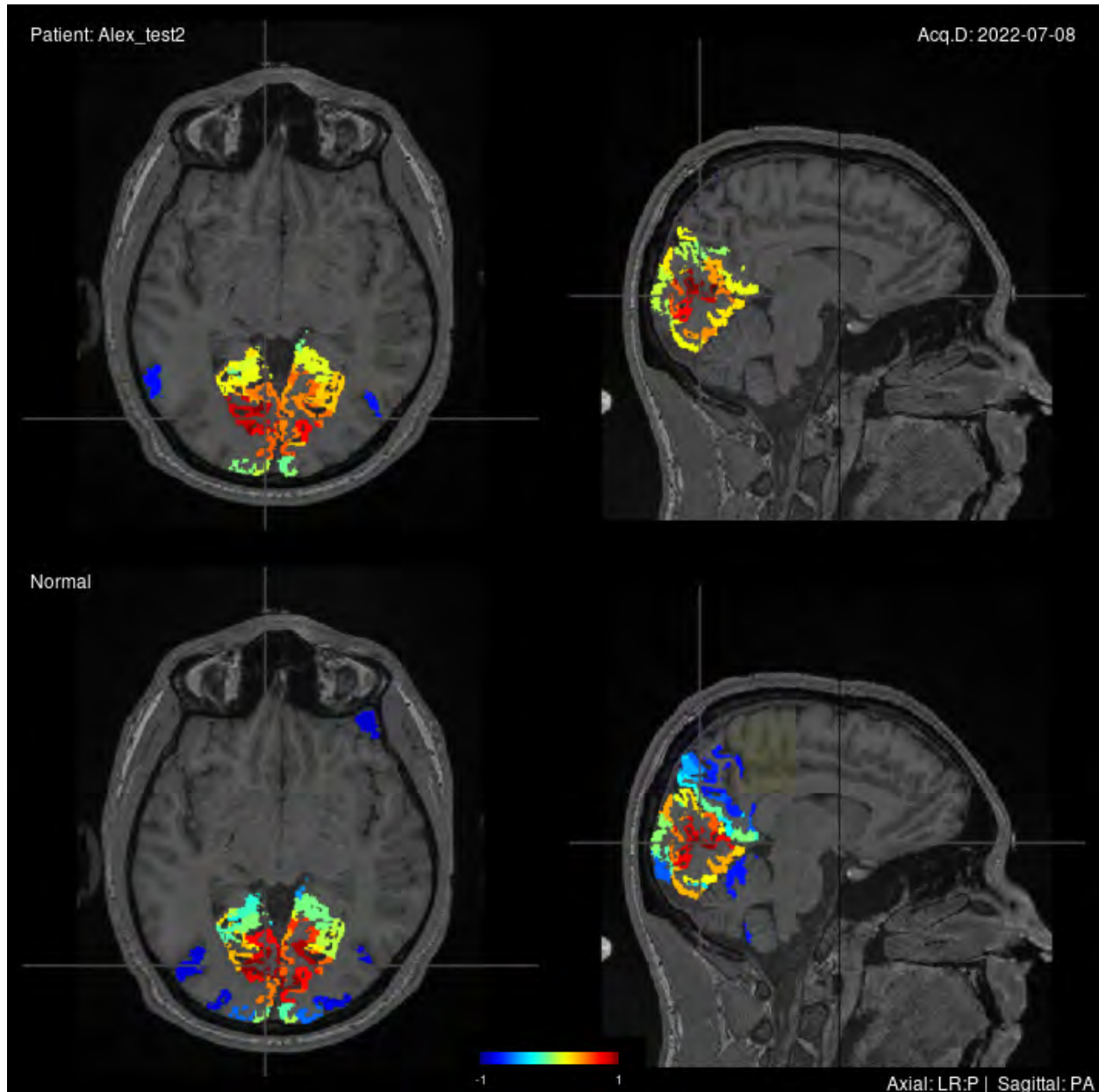
The coloured regions depict a brain network where there are synchronized functional connections among the neurons. Within the dark red or the dark blue regions, neural activity is strongly correlated. In addition, activity in the dark red regions is negatively correlated with activity in the dark blue regions, meaning that when the red regions are active, the blue regions are not active and vice versa. The other colours represent regions that are more weakly correlated but still part of the network.

Resting State fMRI of Visual Medial Network (Visual_medial).

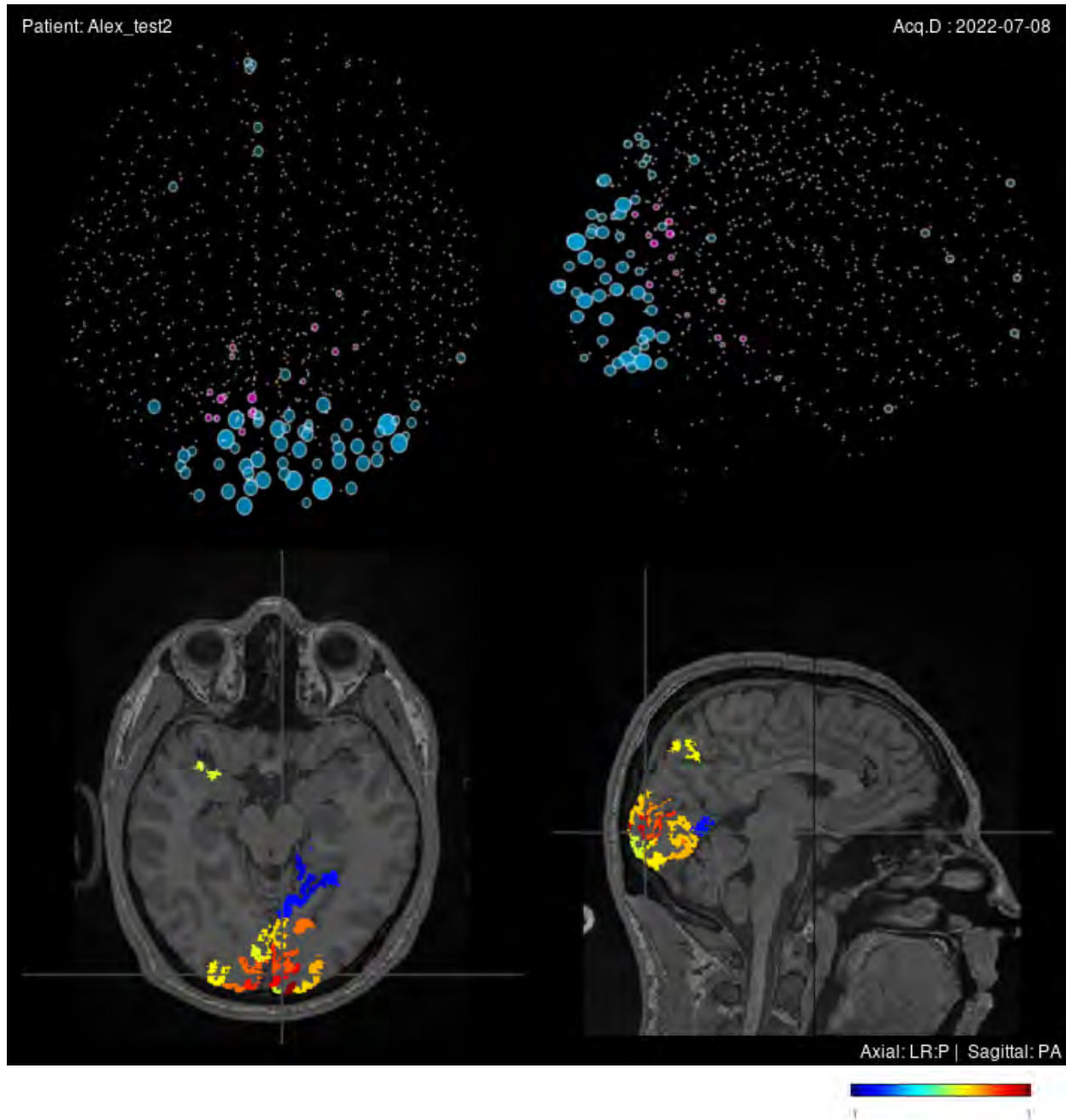
The coloured regions depict a brain network where there are synchronized functional connections among the neurons. Within the dark red or the dark blue regions, neural activity is strongly correlated. In addition, activity in the dark red regions is negatively correlated with activity in the dark blue regions, meaning that when the red regions are active, the blue regions are not active and vice versa. The other colours represent regions that are more weakly correlated but still part of the network.

The Visual Medial Network (Visual_medial) is not significantly different with respect to normal.

Resting State fMRI of Visual Medial Network (Visual_medial): Patient: Alex_test2 and Normals.



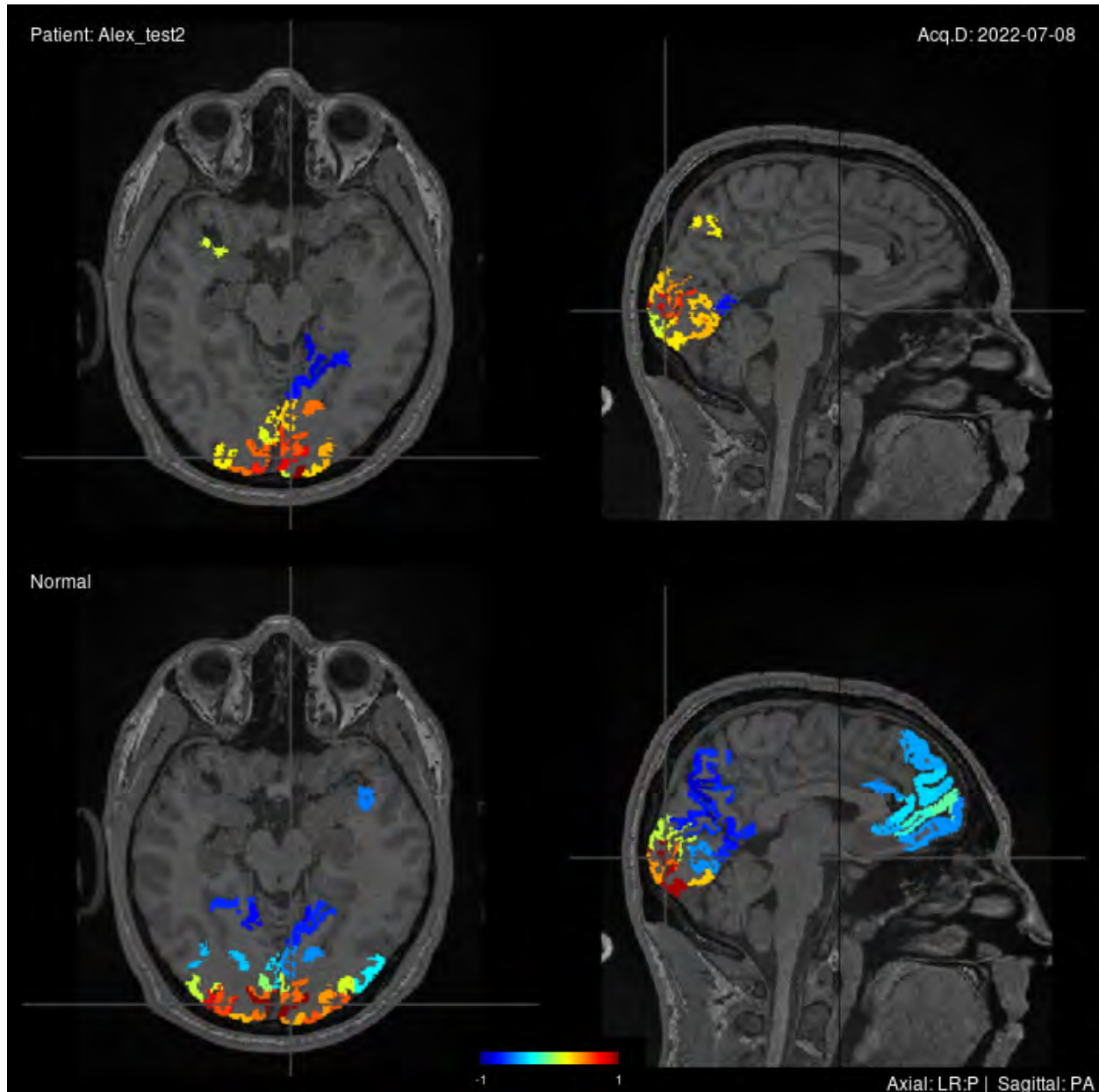
The coloured regions depict a brain network where there are synchronized functional connections among the neurons. Within the dark red or the dark blue regions, neural activity is strongly correlated. In addition, activity in the dark red regions is negatively correlated with activity in the dark blue regions, meaning that when the red regions are active, the blue regions are not active and vice versa. The other colours represent regions that are more weakly correlated but still part of the network.

Resting State fMRI of Visual Occipital Network (Visual_occipital).

The coloured regions depict a brain network where there are synchronized functional connections among the neurons. Within the dark red or the dark blue regions, neural activity is strongly correlated. In addition, activity in the dark red regions is negatively correlated with activity in the dark blue regions, meaning that when the red regions are active, the blue regions are not active and vice versa. The other colours represent regions that are more weakly correlated but still part of the network.

The Visual Occipital Network (Visual_occipital) is not significantly different with respect to normal.

Resting State fMRI of Visual Occipital Network (Visual_occipital): Patient: Alex_test2 and Normals.



The coloured regions depict a brain network where there are synchronized functional connections among the neurons. Within the dark red or the dark blue regions, neural activity is strongly correlated. In addition, activity in the dark red regions is negatively correlated with activity in the dark blue regions, meaning that when the red regions are active, the blue regions are not active and vice versa. The other colours represent regions that are more weakly correlated but still part of the network.

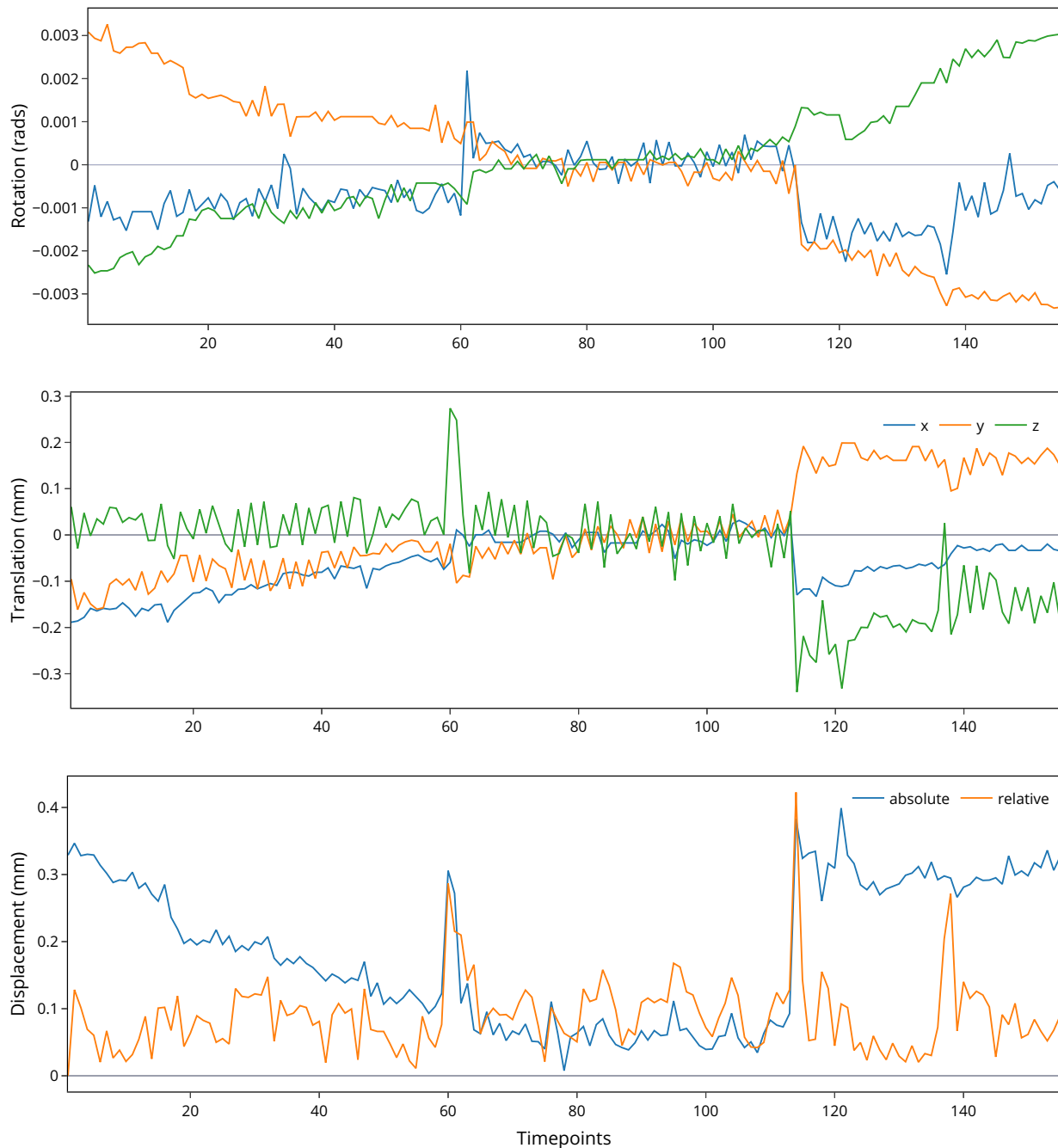
Summary Parameters:

Network	Found	Ref.Found	Missing	Ref.Missing	Extra	Ref.Extra	Cor	Ref.Cor	Left.L	Ref.Left.L
Auditory	69	94 - 101	184	156 - 160	15	16 - 21	0.69	0.69 - 0.72	55	45 - 46
DMN	96	107 - 115	234	221 - 227	12	15 - 20	0.7	0.68 - 0.7	64	49 - 51
ECN L	88	103 - 112	148	137 - 142	14	22 - 30	0.62	0.68 - 0.7	94	87 - 89
ECN R	52	96 - 106	194	158 - 162	6	18 - 24	0.52	0.64 - 0.66	16	15 - 16
Hippocampal	39	50 - 55	46	44 - 45	20	30 - 35	0.46	0.44 - 0.48	55	49 - 51
Language	74	91 - 97	150	154 - 158	6	30 - 34	0.6	0.46 - 0.48	62	54 - 56
Salience	83	88 - 96	177	160 - 164	37	28 - 33	0.29	0.5 - 0.52	53	48 - 50
Sensorimotor	44	97 - 108	183	133 - 138	8	16 - 23	0.38	0.64 - 0.67	50	52 - 54
Visual lateral	74	96 - 104	163	148 - 153	4	15 - 21	0.59	0.67 - 0.69	52	44 - 46
Visual medial	105	105 - 116	115	113 - 118	18	20 - 29	0.87	0.81 - 0.83	53	51 - 52
Visual occipital	77	71 - 79	116	125 - 129	12	18 - 24	0.65	0.62 - 0.65	47	51 - 53

Network	pvalues
Auditory	0.285
DMN	0.309
ECN L	0.23
ECN R	0.078
Hippocampal	0.346
Language	0.785
Salience	0.011
Sensorimotor	0.011
Visual lateral	0.146
Visual medial	0.674
Visual occipital	0.443

Displacement (mm)					
Absolute	Ref.A	Relative	Ref.R	QI	Ref.QI
0.4	0.95	0.42	0.72	10.6	16.4

Motion Parameters



Motion parameters are condensed into a single vector referred to as root mean squared displacement (in mm), which summarizes cumulative motion in terms of absolute and relative measures. Absolute displacement (blue) describes motion in a given volume with respect to a reference time point (i.e., middle volume in time-series), providing information on gradual shifts in head position over time. Relative displacement (orange) at a given volume describes motion with respect to the subsequent time point, useful for identifying abrupt changes in head position. Quality Index is calculated by: $2000 * (\text{Max Absolute} + \text{Max Relative}) / \text{Timepoints}$.

APPENDIX I

RESTING STATE BRAIN NETWORKS:

The **Auditory Network (Auditory)** is symmetrically represented in both brain hemispheres (a left-right symmetrical network). It consists of regions involved in hearing. It encompasses the primary auditory cortex responsible for the sensation of basic characteristics of sound such as pitch and rhythm, and the secondary auditory cortex, important for speech perception.

The **Default Mode Network (DMN)** is a left-right symmetrical network. It consists of regions most commonly active when a person is not focused on the outside world and the brain is at wakeful rest, such as during daydreaming, mind-wandering and envisioning past or future events. The network activates “by default” when a person is not involved in a task. The DMN has been shown to be negatively correlated with other networks in the brain, such that when the DMN is active, the other networks are inactive, and vice versa.

The **Executive Control Network Left (ECN_L)** is a network of regions including the left frontal-parietal brain areas, which are generally involved in tasks that rely on paying attention, as well as control processes and working memory. The ECNL is primarily involved in cognitive and language paradigms.

The **Executive Control Network Right (ECN_R)** is a network of regions including the right hemisphere frontal-parietal areas, which are generally involved in tasks relying on executive functions, such as control processes and working memory. The ECNR relates to perceptual, somesthetic (touch and position) and nociceptive (pain) processing.

The **Hippocampal Network (Hippocampal)** is left-right symmetrical network that encompasses the hippocampus and amygdala, parts of the limbic system. It plays important roles in the consolidation of information from short-term memory to long-term memory, and in spatial memory that enables navigation.

The **Language Network (Language)** consists of regions encompassing the Broca and Wernicke areas and is responsible for speech and language comprehension.

The **Salience Network (Salience)** is a left-right symmetrical network encompassing the anterior insula and dorsal anterior cingulate cortex. It is involved in detecting and filtering emotionally important and relevant stimuli as well as alerting.

The **Sensorimotor Network (SN)** is a left-right symmetrical network encompassing the somatosensory (post-central gyrus) and motor (pre-central gyrus) areas that are activated during motor tasks.

The **Visual Lateral Network (Visual_lateral)** is left-right symmetrical network encompassing the middle temporal visual association area and is most important in processing complex(emotional) stimuli. It also is involved in spatial navigation.

The **Visual Medial Network (Visual_medial)** is left-right symmetrical network encompassing medial regions important in simple visual stimuli (e.g. a flickering checkerboard).

The **Visual Occipital Network (Visual_occipital)** is a left-right symmetrical network of occipital regions that is important in processing higher-order visual stimuli (e.g. orthography).