

Analysis of Traditional Scalp Acupuncture Point Locations as Local Cortical Region and Functional Network Node Targets in Non-Invasive Brain Network Neuromodulation

Section 8 - The Occipital Lobe

Douglas S. Wingate

Abstract

Background/Objective: Non-invasive neuromodulation techniques have increasingly been utilized and investigated as potential treatment approaches for neurological and psychiatric disorders. Increasing evidence supports the possibility of non-invasive neuromodulation affecting larger scale brain networks rather than just local stimulation targets. In this article, this concept and implications thereof are explored within the context of traditional acupuncture points located on the scalp and their cortical region correlates.

Method: This article addresses the conceptual framework of traditional acupuncture point locations on the scalp as potential local cortical region and/or neural network nodes of non-invasive neuromodulation modalities and may expand existing understanding of the influence of scalp acupuncture points based on these network connections. Studies that support this hypothesis are provided followed by an exploration of functionally and structurally connected brain parcellations elucidated by connectomic mapping and correlations with traditional acupuncture points. In this installment cortical regions of the occipital lobe are explored.

Main Results/Conclusion: Studies stimulating brain regions by various non-invasive methods including manual and laser scalp acupuncture, repetitive Transcranial Magnetic Stimulation (rTMS), and transcranial Direct Current Stimulation (tDCS) offer evidence of underlying neuromodulatory mechanisms and clinical therapeutic effect in cases of various neuropathologies. These effects have evidence to support that in addition to local cortical region responses; structural and functional brain network modulatory influence including influence upon deeper brain structures, have been demonstrated. In light of this evidence, it is proposed that applying a network perspective to non-invasive transcranial stimulation may lend a broader understanding of therapeutic potential in using these techniques.

Keywords: scalp acupuncture, connectome, neuromodulation, brain networks, brain hubs, occipital lobe, visual cortex, visual network

Medial Occipital Surface

9.01 Area V1 (Visual Area 1)

Location:

The primary visual cortex, located on the banks of the calcarine sulcus. It fills both banks of the sulcus and extends onto the tip of the occipital pole

Functions:

-Encodes an inverted, contralateral hemifield with greater cortical surface area devoted to visual stimuli detected by the fovea, indicating greater processing of input closer to the center of the visual field
 -Initial detection of motion, and signaling to the middle temporal area for the directional and spatial integration of global motion

Functional Connectivity:

Frontal lobe: 46, 9-46d, a24pr, a32pr, p9-46v, p24, p32pr
 Premotor region: 5mv, FEF, SCEF
 Temporal and opercular area: 43, A1, AVI, FOP4, FOP5, LBelt, PBelt, Pol2
 Temporal lobe: PHT
 Parietal lobe: 7AM, 7PL, IP0, IP1, IPS1, LIPd, LIPv, MIP, PF, PFop, PGp
 Medial parietal lobe: 23c, DVT, PCV, POS2, RSC
 Medial occipital lobe: ProS, V2, V3, V4
 Dorsal visual area: V3a, V3b, V6, V6a, V7
 Ventral visual stream: FFC, PIT, V8, VMV1, VMV2, VMV3, VVC
 Lateral occipital lobe: FST, LO1, LO2, LO3, PH, V3cd

White matter connections:

Structurally connected to the IFOF, MdLF, optic radiations (OR) and splenium of the corpus callosum. IFOF projections terminate at parcellations in the frontal pole including 11L, a10p, and p10p. Connections from the MdLF terminate in the superior temporal gyrus at STSda. There are consistent connections with FM to contralateral V1 through the splenium of the corpus callosum. Short association bundles are connected to V2, V3, and V3B

Traditional Acupoint Correlates:

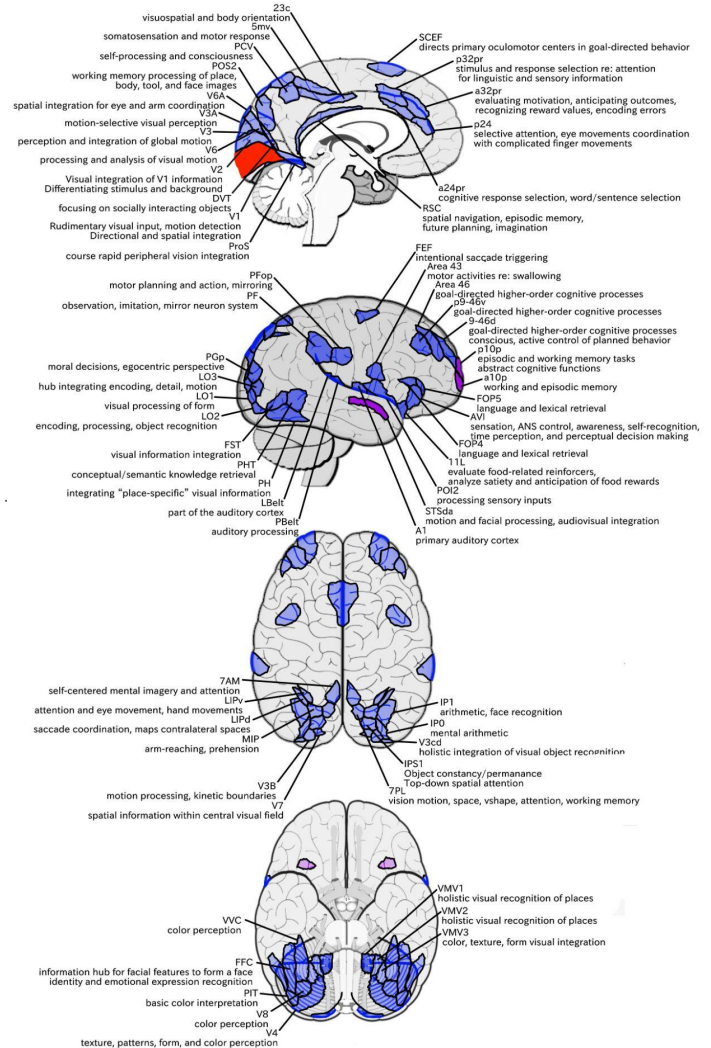
BL9, GV17, GV18

Functionally Connected Acupoints:

BL4 (9-46d, 46)	BL8 (IP0, IPS1, V3b, V7)
GB5 (43)	GB6 (A1)
GB10 (FST, PH, PHT)	GB11 (PH)
GB13 (p9-46v)	GB15 (p9-46v, 46)
GB16 (FEF)	GB18 (LIPd)
TW19 (PH, PHT)	GV18 (V2)
GV19 (V6a)	GV21 (SCEF)

Structurally Connected Acupoints:

BL8 (V3b)	BL9 (V1)
GB3 (STSda)	GB14 (a10p, p10p)
TW22 (STSda)	GV17 (V1)
GV18 (V1, V2)	



9.02 Area V2 (Visual Area 2)

Location:

"C" shaped region that wraps around V1. Its apex loops slightly around the occipital pole onto the lateral surface. Its upper limb is slightly shorter but makes up a large fraction of the cuneus. Its inferior limb makes up a large part of the lingula

Functions:

- Partitions the visual field into two discontinuous, inverted, contralateral quarterfield maps divided by the horizontal meridian
- Perceives visual stimuli at greater angles from the foveal point than V1, indicating perception of the visual field farther from the fovea than V1
- Compared to V1: implicated in more complex visual integration after receiving information from V1, most notably, the differentiation between stimulus and background

Functional Connectivity:

- Lateral frontal lobe: 9-46d, 46
- Sensorimotor strips: 1, 2, 3a, 3b, 4
- Premotor region: 5mv, 6a, FEF
- Medial frontal lobe: 24dd, 24dv, a24pr, p32pr, SCEF
- Insula and opercular region: 43, 52, A1, A4, FOP3, FOP4, LBelt, MBelt, OP2-3, OP4, PBelt, PFcm, Pol1, Pol2, PSL, RI, STV, TA2
- Temporal lobe: PHT
- Parietal lobe: 7PC, AIP, IP0, IPS1, LIPd, LIPv, MIP, PFop, PGp, TPOJ1, TPOJ2, TPOJ3, VIP
- Medial parietal lobe: 23c, DVT, PCV
- Medial occipital lobe: ProS, V1, V3, V4
- Dorsal visual area: V3a, V3b, V6, V6a, V7
- Ventral visual stream: FFC, PIT, V8, VMV1, VMV2, VMV3, VVC
- Lateral occipital lobe: FST, LO1, LO2, LO3, MST, MT, PH, V3cd, V4t

White matter connections:

Structurally connected to the IFOF, ILF, MdLF, and contralateral hemisphere. IFOF projections terminate at parcellations in the frontal pole including 8BL, 9a, 9p, 10d, 10pp, a10p. Connections from the MdLF terminate in the superior temporal gyrus at STSDa, TGd, and TE1a. There are consistent connections with the FM to the contralateral hemisphere through the splenium of the corpus callosum that connect to V1, V2, V3, V4, V6, DVT, and V3A. Short association bundles are connected to V1, V2, V3, V4, V6, V3A, and DVT

Traditional Acupoint Correlates:

GV18

Functionally Connected Acupoints:

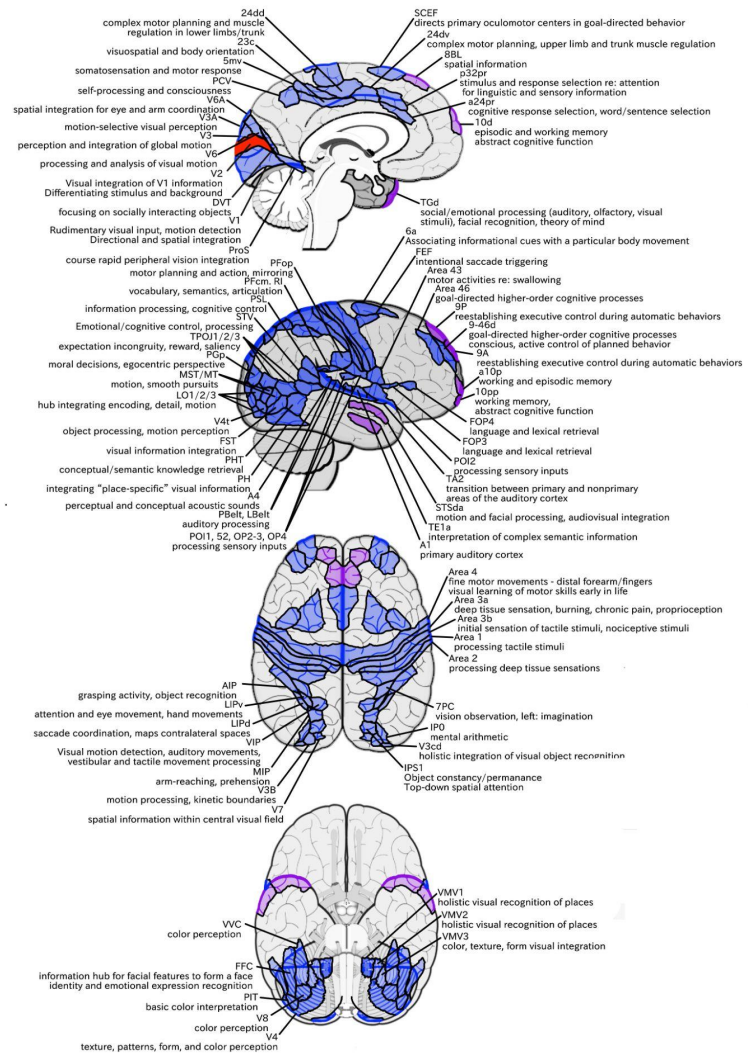
BL4 (9-46d, 46)
 BL9 (V1)
 GB9 (TPOJ1, TPOJ2)
 GB16 (FEF)
 TW19 (PH, PHT)
 GV20 (3a, 3b, 4)

BL6 (6a)
 GB5 (43, OP4)
 GB10 (FST, PH, PHT)
 GB17 (1, 3a, 3b, 4)
 GV17 (V1)
 GV21 (SCEF)

Structurally Connected Acupoints:

BL2 (10pp)
 GB14 (a10p)
 GV22 (8BL)

BL3 (8BL, 9p)
 GB19 (V4)
 GV23 (10d)



9.03 Area V3 (Visual Area 3)

Location:

"C" shaped region that wraps around V2. Its apex loops around the occipital pole onto the lateral surface. Its upper limb makes up a fraction of the cuneus. Its inferior limb makes up the lower half of the lingula

Functions:

- Similar to V2, area V3 receives visual input as two discontinuous, inverted, contralateral quarterfield maps divided by the horizontal meridian
- Perceives even wider degrees of the visual field than V2, indicating it perceives visual stimuli at an even further angle from the fovea
- Perception and integration of global motion by processing directionally specific, visual, local motion in its broad receptive fields and transmitting information to area V6, and the dorsal visual stream for further processing

Functional Connectivity:

- Lateral frontal lobe: 9-46d, 46
- Sensorimotor strips: area 1, 2, 3a, 3b, 4
- Premotor region: 5mv, 6a, FEF
- Medial frontal lobe: a24pr, p32pr, SCEF
- Insula and opercular region: 43, 52, A1, A4, FOP3, FOP4, LBelt, MBelt, OP2-3, OP4, PBelt, Pol1, PFcm, PSL, RI, STV, TA2
- Parietal lobe: IP0, IPS1, LIPd, LIPv, PFop, PGp, TPOJ1, TPOJ2, TPOJ3, VIP
- Medial parietal lobe: 23c, DVT
- Medial occipital lobe: ProS, V1, V2, V4
- Dorsal visual area: V3a, V3b, V6, V6a, V7
- Ventral visual stream: FFC, PIT, V8, VMV1, VMV2, VMV3, VVC
- Lateral occipital lobe: FST, LO1, LO2, LO3, MST, MT, PH, V3cd, V4t

White matter connections:

Structurally connected to the IFOF, ILF, MdLF, and FM. The IFOF projections originate from the superior portion of the parcellation before it curves inferiorly to the basal surface of the occipital lobe. Projections from the IFOF have typical anterior terminations that include 8BL, 9a, 9p, and 10d. Connections from the MdLF terminate at A5 of the superior temporal gyrus. ILF projections originate from the inferior portion of V3 along the basal surface of the occipital lobe and terminate at STGa and TGd. Contralateral connections with FM course through the splenium of the corpus callosum and terminate at V1 and V2. Short association bundles are connected to V1, V2, V3A, and V4

Traditional Acupoint Correlates:

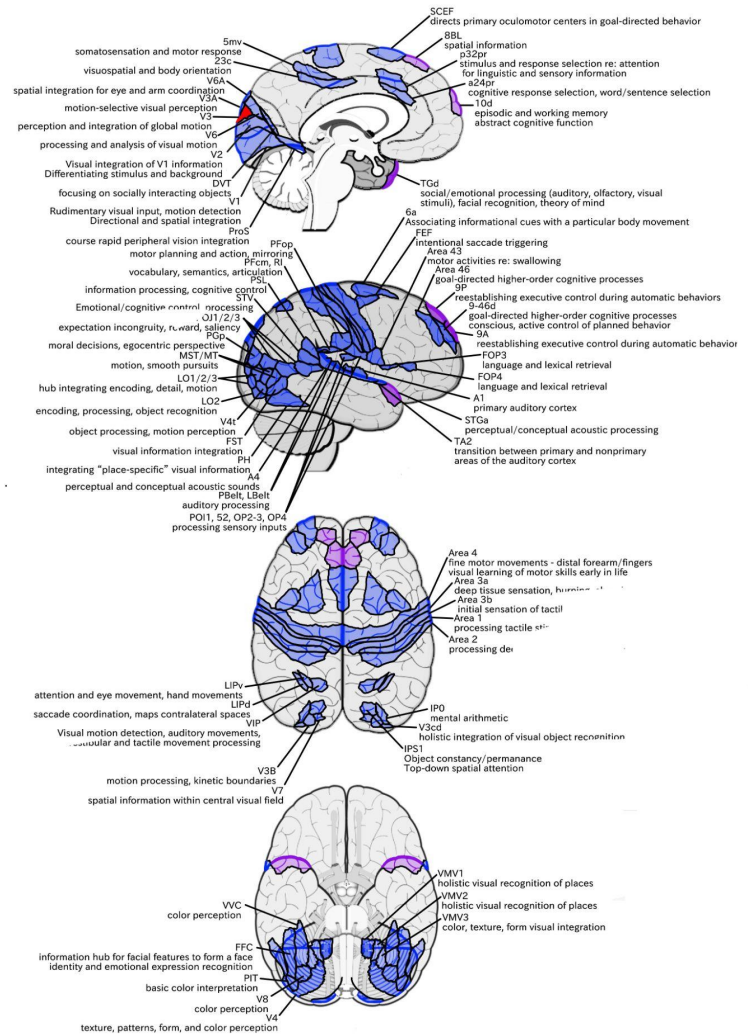
N/A (between GV18 and GV19)

Functionally Connected Acupoints:

BL4 (9-46d, 46)	BL6 (6a)	BL7 (2)	BL8 (IP0, IPS1, V3b, V7)
GB5 (43, OP4)	GB6 (52, A1, Pol1)	GB8 STV, TPOJ1)	GB9 (TPOJ1, TPOJ2)
GB10 (PH, FST)	GB11 (PH)	GB15 (46)	GB16 (FEF)
GB17 (1, 3a, 3b, 4)	GB18 (LIPd)	GB19 (V4)	TW19 (PH)
GV18 (V1, V2)	GV19 (V6a)	GV20 (3a, 3b, 4)	GV21 (SCEF)

Structurally Connected Acupoints:

BL3 (8BL, 9p)	BL9 (V1)	GB7 (A5)	GB19 (V4)
GV17 (V1)	GV18 (V1, V2)	GV22 (8BL)	GV23 (10d)
GV24 (10d)			



9.04 Area V4 (Visual Area 4)

Location:

"C" shaped region that wraps around V3. It is primarily located on the posterior aspect of the lateral occipital surface. Its inferior limb extends onto the medial basal surface of the occipital lobe

Functions:

- Encodes texture, patterns, form, and color perception, making it integral to object and pattern recognition
- Perception of contralateral, hemifield representations of the peripheral visual field

Functional Connectivity:

Lateral frontal lobe: 9-46d

Sensorimotor strips: area 1, 3a, 3b, 4

Premotor region: 6a, FEF

Medial frontal lobe: a24pr, p32pr, SCEF

Insula and opercular region: 43, 52, A1, A4, FOP3, LBelt, MBelt, OP4, PBelt, PFcm, PSL, RI, STV, TA2

Lateral parietal lobe: IP0, IPS1, LIPv, PFop, VIP, TPOJ1

Medial parietal lobe: 23c, DVT

Medial occipital lobe: ProS, V1, V3

Dorsal visual area: V3a, V3b, V7, V6, V6a

Ventral visual stream: FFC, PIT, V8, VMV1, VMV2, VMV3, VVC

Lateral occipital lobe: FST, LO1, LO2, LO3, MST, MT, PH, V3cd, V4t

White matter connections:

Structurally connected with the ILF, MdLF, and portions of the IFOF. ILF projections terminate at TF. IFOF projections are inconsistent and the parcellations at which this tract terminates are unable to be discerned. MdLF connections terminate at the superior temporal gyrus at A4 and A5. Short association bundles are connected to V3, V3a, V3b, V3CD, LO1, LO2, and V6a

Traditional Acupoint Correlates:

GB19

Functionally Connected Acupoints:

BL4 (9-46d)

BL8 (IP0, IPS1, V3b, V7)

GB5 (43, OP4)

GB8 (STV, TPOJ1)

GB10 (PH, FST)

GB16 (FEF)

TW19 (PH)

GV18 (V1)

GV20 (3a, 3b, 4)

BL6 (6a)

BL9 (V1)

GB6 (52, A1)

GB9 (TPOJ1)

GB11 (PH)

GB17 (1, 3a, 3b, 4)

GV17 (V1)

GV19 (V6a)

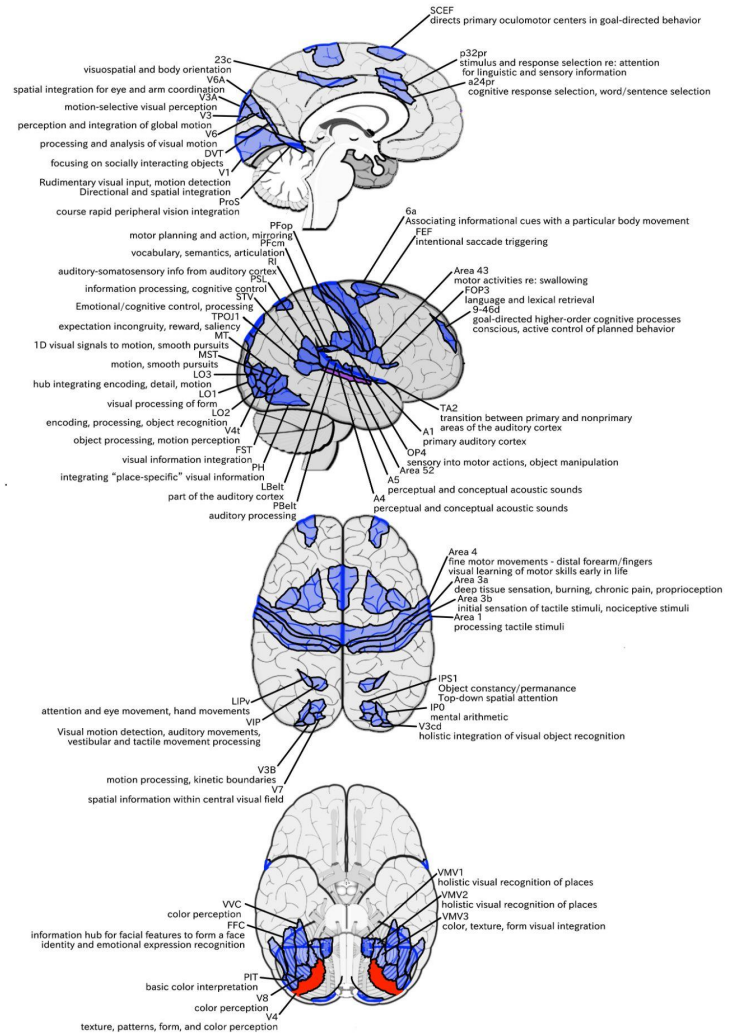
GV21 (SCEF)

Structurally Connected Acupoints:

BL8 (V3b)

GB7 (A5)

GV19 (V6a)



Basal Occipital Areas

9.05 Area V8 (Visual Area 8)

Location:

At the far posterior most portion of the fusiform gyrus

Functions:

-Perception and processing of color in the visual field

Functional Connectivity:

Premotor region: FEF

Insula and opercular region: 43, A4, PBelt

Parietal lobe: DVT, IPO, IPS1, LIPv, VIP

Medial occipital lobe: ProS, V1, V2, V3, V4

Dorsal visual area: V3a, V3b, V6, V6a, V7

Ventral visual stream: V8, VMV2, VMV3, VVC

Lateral occipital lobe: FST, LO1, LO3, PH, V3cd

White matter connections:

Structurally connected with the ILF and VOF. The ILF terminates at TGv but the connections with this tract are inconsistent across brains. The VOF tract courses mediodorsal from V8 to terminate at V3a, V3b, V3cd, and V7. Short association bundles are connected to V4, PIT, FFC, and V3

Traditional Acupoint Correlates:

N/A

Functionally Connected Acupoints:

BL8 (IP0, IPS1, V3b, V7)

GB5 (43)

GB11 (PH)

GB19 (V4)

GV17 (V1)

GV19 (V6a)

BL9 (V1)

GB10 (FST, PH)

GB16 (FEF)

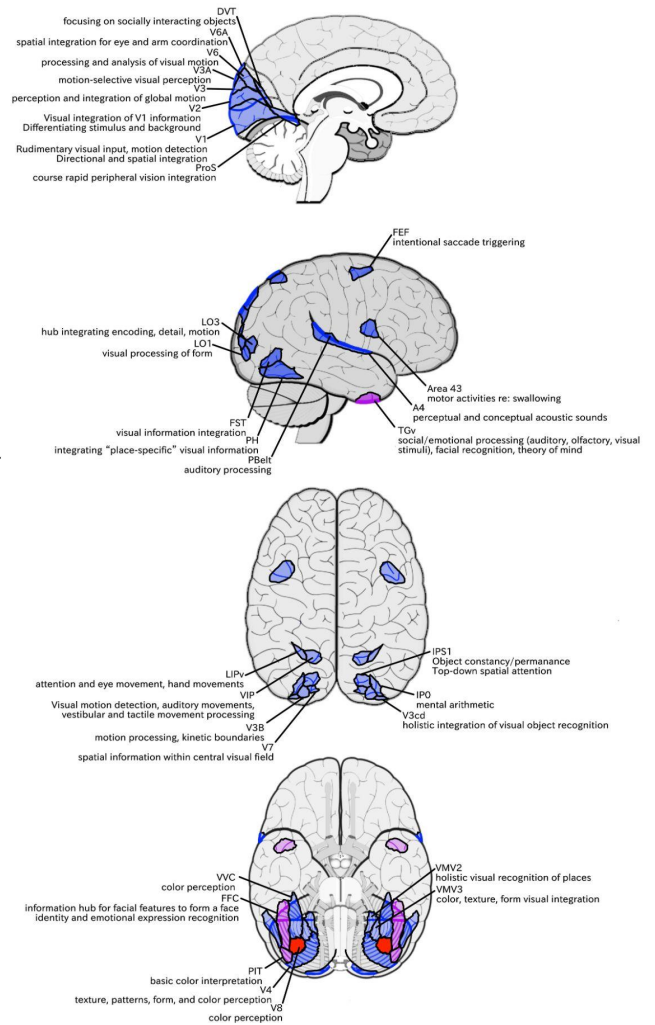
TW19 (PH)

GV18 (V1, V2)

Structurally Connected Acupoints:

BL8 (V3b)

GB19 (V4)



9.06 Area PIT (Posterior Infratemporal Cortex)

Location:

Posterior most portion of the occipitotemporal gyrus where it begins to blend into the occipital pole. It spills slightly onto the lateral surface

Functions:

-Analysis of the basic characteristics of color, such as hue, saturation, and brightness based on information provided by V8

Functional Connectivity:

Premotor region: FEF

Insula and opercular region: A4, PBelt

Parietal lobe: DVT, IPS1, LIPv, VIP

Medial occipital lobe: V1, V2, V3, V4

Dorsal visual area: V3a, V3b, V6, V6a, V7

Ventral visual stream: FFC, V8, VVC

Lateral occipital lobe: FST, LO1, LO2, LO3, MST, PH, V3cd

White matter connections:

Structurally connected to VOF and its surrounding parcellations. VOF connections project mediodorsally to terminate at V3, V2, and V3a. Short association bundles are connected to PH, V8, V4, and V1

Traditional Acupoint Correlates:

N/A

Functionally Connected Acupoints:

BL8 (IPS1, V3b, V7)

GB10 (FST, PH)

GB16 (FEF)

TW19 (PH)

GV18 (V1, V2)

BL9 (V1)

GB11 (PH)

GB19 (V4)

GV17 (V1)

GV19 (V6a)

Structurally Connected Acupoints:

BL9 (V1)

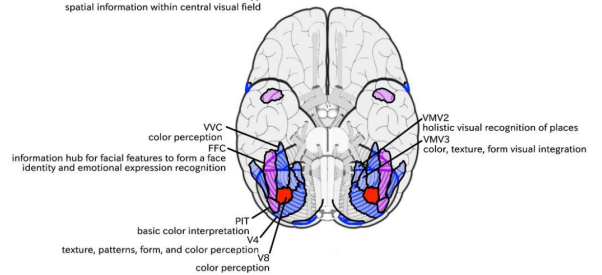
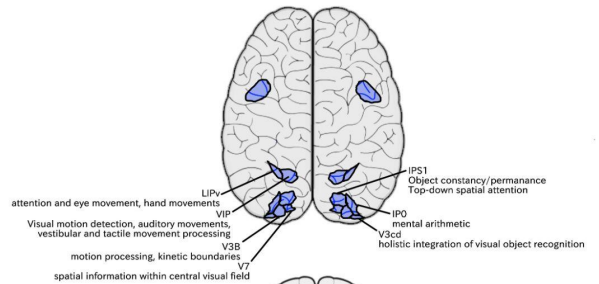
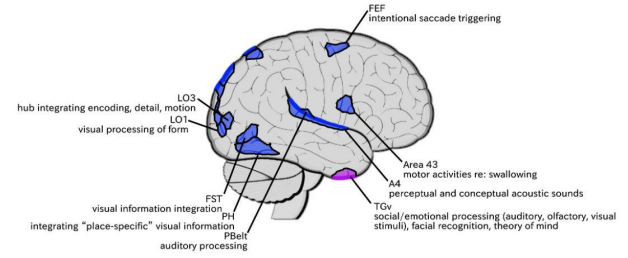
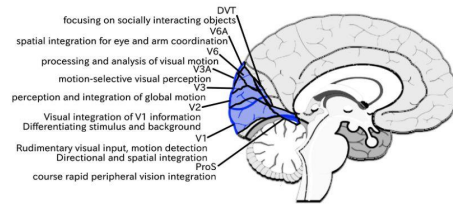
GB11 (PH)

GV17 (V1)

GB 10 (PH)

TW19 (PH)

GV18 (V1, V2)



9.07 Area FFC (Fusiform Face Complex)

Location:

In the posterior fusiform gyrus. It comprises the lateral half of the posterior portion of the gyrus and forms the medial bank of the adjacent portion of the occipitotemporal sulcus

Functions:

-An information hub receiving extensive input from the ventral stream about the static and dynamic details of invariant facial features and integrates them to produce the holistic form of a face

-Integral role in identity recognition and plays a minor role in emotional expression recognition due to its high activity for both neutral and expressive faces

Functional Connectivity:

Sensorimotor strips: 1, 2, 3a, 3b, 4

Premotor region: 6v, FEF

Medial frontal lobe: SCEF

Insula and opercular region: 43, A4, A5, LBelt, PBelt, PFcm, OP4, RI, STV

Temporal lobe: TE2p

Parietal lobe: 7PC, AIP, DVT, IP0, IPS1, LIPv, MIP, PFt, PGp, TPOJ1, TPOJ2, TPOJ3, VIP

Medial occipital lobe: V1, V2, V3, V4

Dorsal visual area: V3a, V3b, V6, V6a, V7

Ventral visual stream: PIT, V8, VMV1, VMV2, VMV3, VVC

Lateral occipital lobe: FST, LO1, LO2, LO3, MST, MT, PH, V3cd, V4t

White matter connections:

Structurally connected to the ILF. It also has many local U-fibers projecting from the parcellation. In some brains, fiber bundles connect with the SLF but this tract is inconsistent. The ILF projects toward the temporal pole and terminates at TGv. Short association bundles are connected to V4, PIT, LO3, FST, MST, MT, PH, and TPOJ2

Traditional Acupoint Correlates:

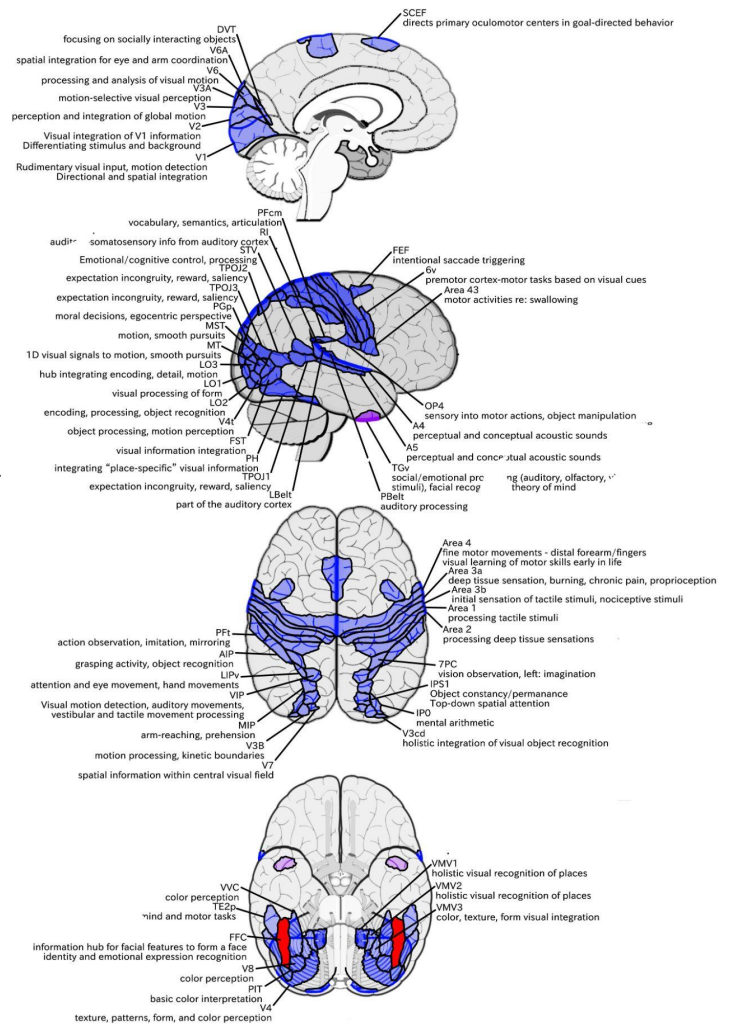
N/A

Functionally Connected Acupoints:

BL7 (2, 7PC)	BL8 (IP0, IPS1, V3b, V7)
BL9 (V1)	GB5 (43, OP4)
GB7 (A5)	GB8 (STV, TPOJ1)
GB9 (TPOJ1, TPOJ2)	GB10 (FST, PH)
GB11 (PH)	GB16 (FEF)
GB17 (1, 3a, 3b, 4)	GB18 (AIP)
GB19 (V4)	ST8 (6v)
TW19 (PH)	GV17 (V1)
GV18 (V1, V2)	GV19 (V6a)
GV20 (3a, 3b, 4)	GV21 (SCEF)

Structurally Connected Acupoints:

GB9 (TPOJ2)	GB10 (FST, PH)
GB11 (PH)	GB19 (V4)
TW19 (PH)	



9.08 Area VVC (Ventral Visual Complex)

Location:

In posterior fusiform gyrus where it makes up the medial half of this portion of the gyrus, as well as portions of the lateral bank of the collateral sulcus

Functions:

- Color perception in tandem with V4 and V8, and shows increased responsiveness to the detection of color in a monochromatic field, or the initial detection of color
- Integration of color, contrast, and textural information for the recognition of places and recognition of a spatial map

Functional Connectivity:

Premotor region: FEF

Insula and opercular region: A4, PBelt

Temporal lobe: TE2p

Parietal lobe: DVT, IP0, IPS1, LIPv, PGp, VIP

Medial occipital lobe: ProS, V1, V2, V3, V4

Dorsal visual area: V3a, V3b, V7, V6, V6a

Ventral visual stream: V8, VMV2, VMV3, VVC

Lateral occipital lobe: FST, LO1, LO2, LO3, MST, MT, PH, V3cd, V4t

White matter connections:

Structurally connected to the ILF and VOF. The ILF projects toward the temporal pole and terminates at TGv. The VOF lies orthogonal to the ILF and courses dorsomedially to end at V3b. Short association bundles are connected to FFC, PIT, V3B, V3cd, V8, VMV1, VMV2, and VMV3

Traditional Acupoint Correlates:

N/A

Functionally Connected Acupoints:

BL8 (IP0, IPS1, V3b, V7)

GB10 (FST, PH)

GB16 (FEF)

TW19 (PH)

GV18 (V1, V2)

BL9 (V1)

GB11 (PH)

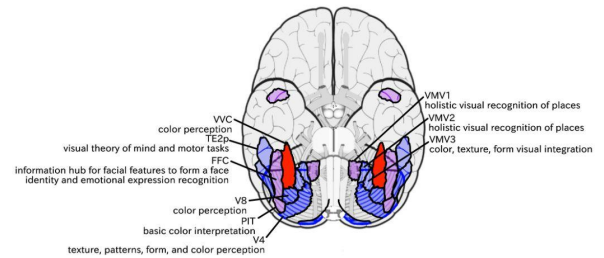
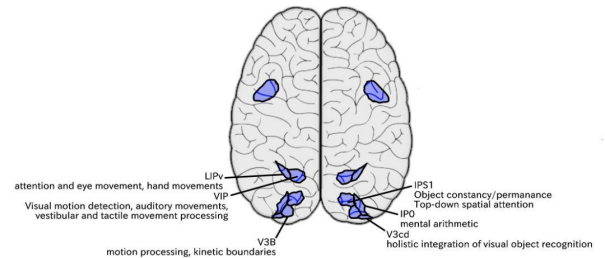
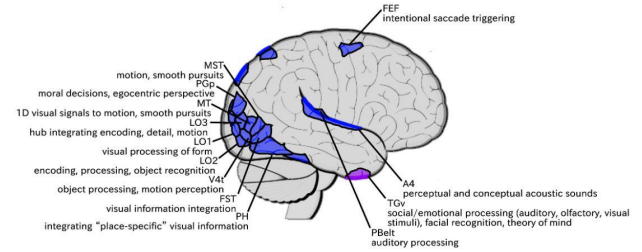
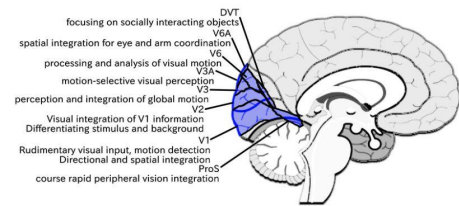
GB19 (V4)

GV17 (V1)

GV19 (V6a)

Structurally Connected Acupoints:

BL8 (V3b)



9.09 Area VMV1 (Ventromedial Visual Area 1)

Location:

On the anteromedial lingula at the point where this gyrus blends anteriorly into the parahippocampal gyrus. It is located on the lower half of this portion of the gyrus

Functions:

-Integration of color, texture, and form information for the holistic recognition of places

Functional Connectivity:

Premotor region: FEF

Temporal lobe: PHA1

Parietal lobe: DVT, IPS1, LIPv, VIP

Medial occipital lobe: V1, V2, V3, V4

Dorsal visual area: V3a, V3b, V6, V6a, V7

Ventral visual stream: FFC, V8, VMV2, VMV3, VVC

Lateral occipital lobe: FST, LO1, LO2, LO3, PH, V3cd, V4t

White matter connections:

Structurally connected with the ILF and VOF. The ILF projects to the temporal pole and terminates at TGd. The VOF lies orthogonal to the ILF and courses dorsomedially to V3a. Short association bundles are connected to V1, V3a, V3, V6, V8, and VMV3

Traditional Acupoint Correlates:

N/A

Functionally Connected Acupoints:

BL8 (IPS1, V3b, V7)

GB10 (FST, PH)

GB16 (FEF)

TW19 (PH)

GV18 (V1, V2)

BL9 (V1)

GB11 (PH)

GB19 (V4)

GV17 (V1)

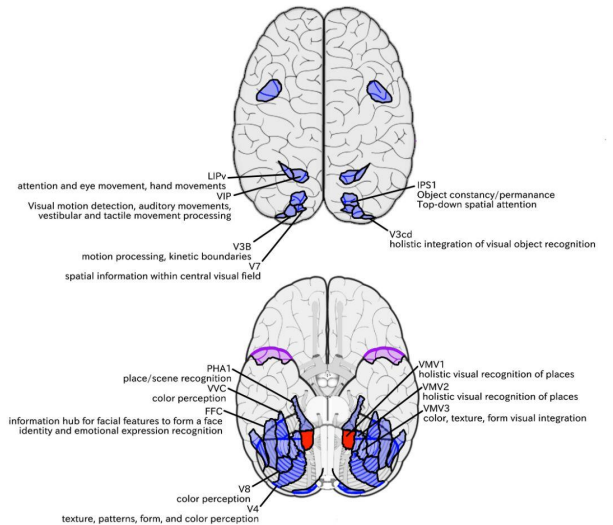
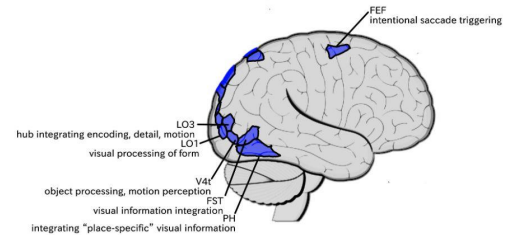
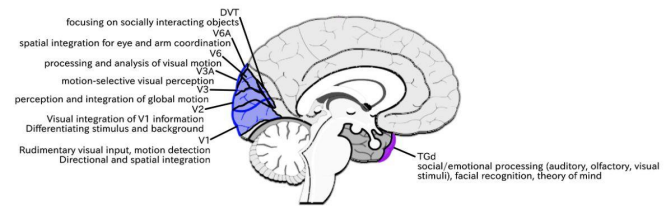
GV19 (V6a)

Structurally Connected Acupoints:

BL9 (V1)

GV17 (V1)

GV18 (V1)



9.10 Area VMV2 (Ventromedial Visual Area 2)

Location:

On the posterior superior bank of the collateral sulcus just as the lingula is blending with the parahippocampal gyrus anteriorly

Functions:

-Integration of color, texture, and form information for the holistic recognition of places

Functional Connectivity:

Premotor region: FEF

Temporal lobe: PHA3

Parietal lobe: DVT, IP0, IPS1, LIPv, PGp, VIP

Medial occipital lobe: ProS, V1, V2, V3, V4

Dorsal visual area: V3a, V3b, V6, V6a, V7

Ventral visual stream: FFC, V8, VMV1, VMV3, VVC

Lateral occipital lobe: FST, LO1, LO2, LO3, PH, V3cd, V4t

White matter connections:

Structurally connected with the ILF, IFOF, and VOF. The ILF courses through the temporal lobe to end at TGv. There are consistent tracts that run with the inferior portion of the IFOF and project to the pole of the frontal lobe. The VOF lies orthogonal to the ILF and ends at V3a. Short association bundles are connected to V1, V2, V3, V3a, V6a, FFC, and VVC

Traditional Acupoint Correlates:

N/A

Functionally Connected Acupoints:

BL8 (IP0, IPS1, V3b, V7)

GB10 (FST, PH)

GB16 (FEF)

TW19 (PH)

GV18 (V1, V2)

BL9 (V1)

GB11 (PH)

GB19 (V4)

GV17 (V1)

GV19 (V6a)

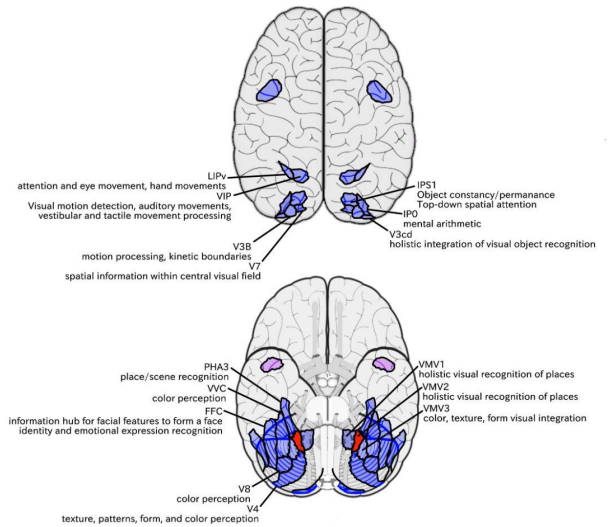
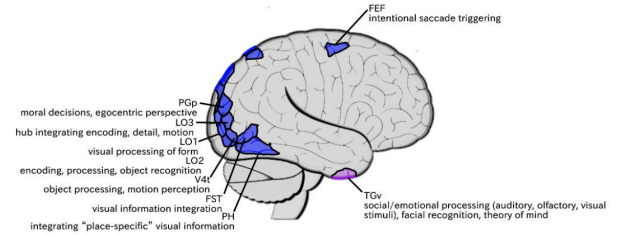
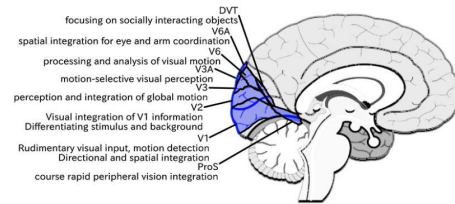
Structurally Connected Acupoints:

BL9 (V1)

GV17 (V1)

GV18 (V1, V2)

GV19 (V6a)



9.11 Area VMV3 (Ventromedial Visual Area 3)

Location:

On the posterior most portion of the lateral bank of the collateral sulcus

Functions:

-Integration of color, texture, and form information for higher level object recognition

Functional Connectivity:

Premotor region: FEF

Temporal lobe: PHA3

Parietal lobe: DVT, IPO, IPS1, LIPv, PGp, VIP

Medial occipital lobe: V1, V2, V3, V4

Dorsal visual area: V3a, V3b, V6, V6a, V7

Ventral visual stream: FFC, PIT, V8, VMV2, VMV3, VVC

Lateral occipital lobe: FST, LO1, LO2, LO3, MT, MST, PH, V3cd, V4t

White matter connections:

Structurally connected with the ILF and VOF. The ILF courses through the temporal lobe to terminate at PeEc. The VOF lies orthogonal to the ILF and projects dorsomedially to end at V3a and V3b. Short association bundles are connected to V4, V3, VMV1, VMV2, PIT, V8, and PH

Traditional Acupoint Correlates:

N/A

Functionally Connected Acupoints:

BL8 (IP0, IPS1, V3b, V7)

GB10 (FST, PH)

GB16 (FEF)

TW19 (PH)

GV18 (V1, V2)

BL9 (V1)

GB11 (PH)

GB19 (V4)

GV17 (V1)

GV19 (V6a)

Structurally Connected Acupoints:

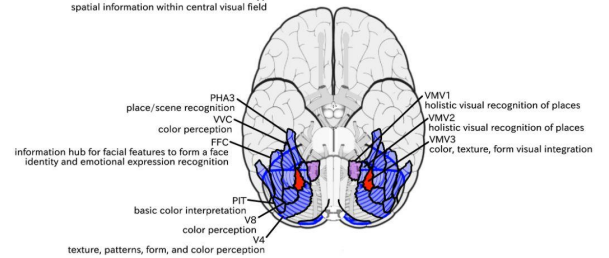
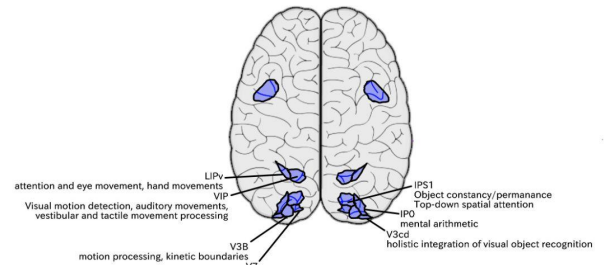
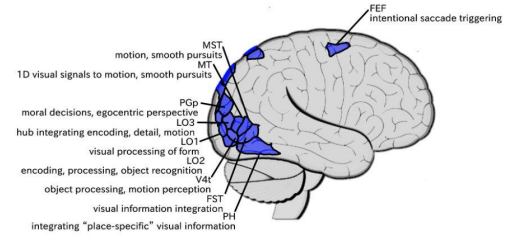
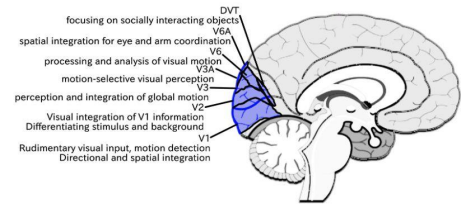
BL8 (V3b)

GB11 (PH)

TW19 (PH)

GB10 (PH)

GB19 (V4)



Superior Surface Areas

9.12 Area V6 (Visual Area 6)

Location:

Vertically oriented area into the anterosuperior portion of the cuneus, just posterior to the superior parieto-occipital sulcus

Functions:

- Processing and analysis of visual motion
- Motion blindness and other motion-related visual disturbances in lesion studies

Functional Connectivity:

- Lateral frontal lobe: 9-46d, 46
- Sensorimotor strips: area 1, 2, 3a, 3b, 4
- Premotor region: 5mv, FEF
- Medial frontal lobe: a24pr, p32pr, SCEF
- Insula opercular regions: 43, 52, A4, FOP1, FOP3, FOP4, MBelt, MI, OP2-3, OP4, PBelt, PFcm, Pol1, Pol2, RI, STV, TA2
- Parietal lobe: 7AL, 7AM, 7PC, IP0, IPS1, LIPV, PGp, PFop, TPOJ2, TPOJ3, VIP
- Medial parietal lobe: 23c, PCV, DVT
- Medial occipital lobe: ProS, V1, V2, V3, V4
- Dorsal visual area: V3a, V3b, V6a, V7
- Ventral visual stream: FFC, V8, VMV1, VMV2, VMV3, VVC
- Lateral occipital lobe: FST, LO1, LO2, LO3, MT, MST, PH, V3cd, V4t

White matter connections:

Structurally connected to the IFOF, MdLF, and FM. IFOF projections terminate at parcellelations in the frontal lobe including 8BL, 9a, 9m, 9p. The MdLF runs parallel to the IFOF then courses laterally to the superior temporal gyrus, as the IFOF courses medially between the lateral ventricle and insula. The MdLF projections terminate at MBelt, A5, and PI. FM connections travel through the splenium of the corpus callosum to terminate at V6, V2, and V1. Short association bundles are connected to V7, V3, V3b, and V3a. Right hemisphere has consistent ILF projections

Traditional Acupoint Correlates:

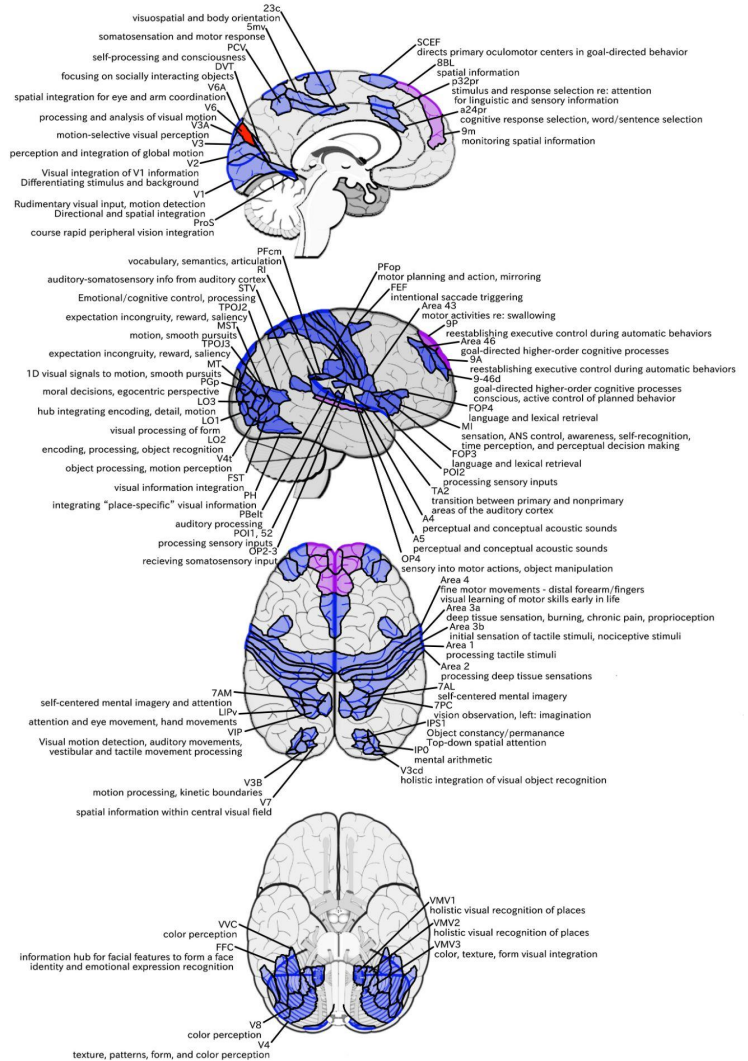
N/A

Functionally Connected Acupoints:

- | | |
|---------------------|-------------------|
| BL4 (9-46d, 46) | BL7 (2, 7AL, 7PC) |
| BL9 (V1) | GB5 (43, OP4) |
| GB8 (STV) | GB9 (TPOJ2) |
| GB11 (PH) | GB15 (46) |
| GB17 (1, 3a, 3b, 4) | GB19 (V4) |
| GV17 (V1) | GV18 (V1, V2) |
| GV20 (3a, 3b, 4) | GV21 (SCEF) |

Structurally Connected Acupoints:

- | | |
|---------------|---------------|
| BL3 (8BL, 9p) | BL8 (V3b, V7) |
| GB7 (A5) | GV17 (V1) |
| GV22 (8BL) | GV23 (9m) |



9.13 Area V6a (Visual Area 6a)

Location:

A small area that straddles the angle of the interhemispheric cleft of the superior occipital lobe, lying just posterior to the superior most limit of the parieto-occipital sulcus

Functions:

-Responds to peripheral visual stimuli and has been implicated in the integration and evaluation of spatial information to coordinate eye and arm movements, indicating its importance for reaching and hand-eye coordination

Functional Connectivity:

Sensorimotor strips: 1, 2, 3a, 3b, 4

Premotor region: 5mv. FEF

Medial frontal lobe: a24pr, p32pr, SCEF

Insula opercular regions: 43, A4, PBelt, OP4, RI

Lateral parietal lobe: 7PC, IP0, IPS1, LIPv, PGp, TPOJ2, VIP

Medial parietal lobe: 23c, DVT

Medial occipital lobe: ProS, V1, V2, V3, V4

Dorsal visual area: V3a, V3b, V6, V7

Ventral visual stream: FFC, V8, VMV1, VMV2, VMV3, VVC

Lateral occipital lobe: FST, LO1, LO2, LO3, MT, MST, PH, V3cd, V4t

White matter connections:

Structurally connected to the IFOF and MdLF. There are inconsistent projections with FM. IFOF projections terminate at frontal lobe parcellations 8BM and 8BL. The MdLF fibers run parallel to the IFOF then course laterally to the superior temporal gyrus to terminate at A4 and MBelt. Short association bundles are connected to V3b and V7

Traditional Acupoint Correlates:

GV19

Functionally Connected Acupoints:

BL7 (2, 7PC)

BL9 (V1)

GB9 (TPOJ2)

GB10 (PH)

GB17 (1, 3a, 3b, 4)

TW19 (PH)

GV18 (V1, V2)

GV21 (SCEF)

BL8 (IP0, IPS1, V3b, V7)

GB5 (43, OP4)

GB10 (FST, PH)

GB16 (FEF)

GB19 (V4)

GV17 (V1)

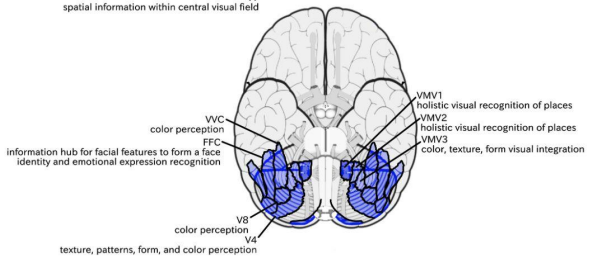
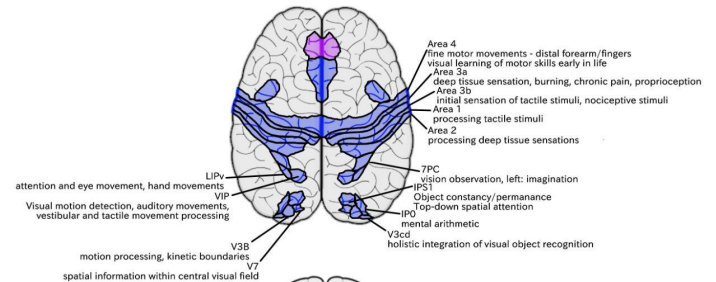
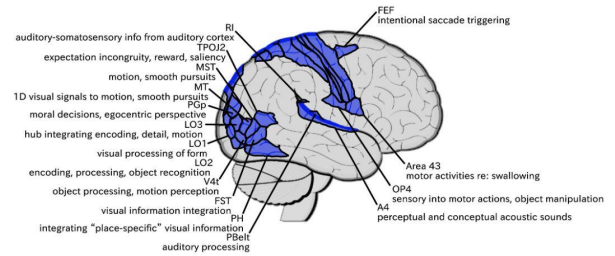
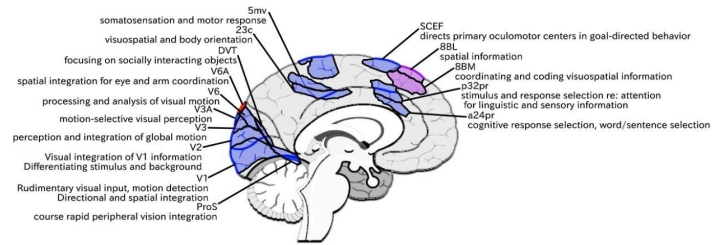
GV20 (3a, 3b, 4)

Structurally Connected Acupoints:

BL3 (8BL)

BL8 (V3b)

GV22 (8BL)



9.14 Area V7 (Visual Area)

Location:

On the superior surface of the occipital lobe near the interhemispheric cleft, roughly lateral to the superior most point of the intraparietal sulcus

Functions:

-Contains a relatively narrow retinotopic map of the central visual field surrounding the foveal point and shows increased stimulation in response to attention directed toward a visual stimulus
 -Uses this visual information to integrate spatial information within the central visual field

Functional Connectivity:

Sensorimotor strips: area 1, 2, 3a, 3b, 4

Premotor region: FEF

Medial frontal lobe: a24pr, p32pr, SCEF

Insula opercular regions: 43, A4, LBelt, MI, OP4, PBelt, RI

Parietal lobe: 23c, DVT, IP0, IPS1, LIPv, VIP

Medial occipital lobe: ProS, V1, V2, V3, V4

Dorsal visual area: V3a, V3b, V6, V6a

Ventral visual stream: FFC, V8, VMV1, VMV2, VMV3, VVC

Lateral occipital lobe: FST, LO1, LO2, LO3, MT, MST, PH, V3cd, V4t

White matter connections:

Structurally connected with IFOF, MdLF, and ILF. The termination of the IFOF is inconsistent across brains. The MdLF fibers run parallel to the IFOF then course laterally to the superior temporal gyrus to terminate at A5, STSda, STSdp, STSva, and TGd. ILF projections travel through the temporal lobe to end at TGv and TGd. Short association bundles are connected to LO1, LO2, LO3, V3cd, V3a, V6a, and V6

Traditional Acupoint Correlates:

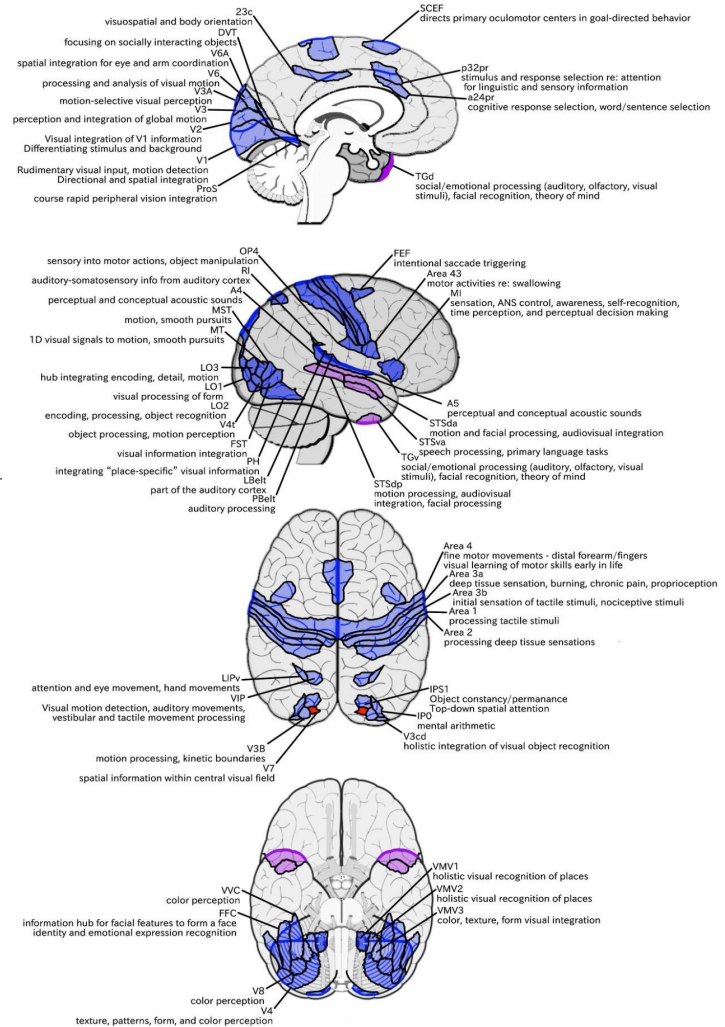
BL8

Functionally Connected Acupoints:

BL7 (2)	BL8 (IP0, IPS1, V3b)
BL9 (V1)	GB5 (43, OP4)
GB10 (FST, PH)	GB11 (PH)
GB16 (FEF)	GB17 (1, 3a, 3b, 4)
GB19 (V4)	TW19 (PH)
GV17 (V1)	GV18 (V1, V2)
GV19 (V6a)	GV20 (3a, 3b, 4)
GV21 (SCEF)	

Structurally Connected Acupoints:

GB3 (STSda, STSva)	GB7 (A5, STSdp)
TW20 (STSdp)	TW22 (STSda, STSdp, STSva)
GV19 (V6a)	



9.15 Area V3a (Visual Area 3a)

Location:

In the superior surface of the occipital lobe, near the interhemispheric fissure. It is positioned similar to the superior limb of V4, which as described above, is hypoplastic compared to V3

Functions:

- High motion sensitivity and high contrast sensitivity in the central visual field surrounding the foveal point indicating its role in motion-selective visual perception
- Integrates spatial information from contralateral and ipsilateral visual input sources

Functional Connectivity:

- Sensorimotor strips: area 1, 3a, 3b, 4
- Premotor region: 5mv, FEF
- Medial frontal lobe: a24pr, p32pr, SCEF
- Insula opercular regions: 43, 52, A4, FOP3, FOP4, LBelt, OP2-3, OP4, PBelt, PFcm, Pol1, RI
- Parietal lobe: IP0, IPS1, LIPv, PFop, PGp, TPOJ2, VIP
- Medial parietal lobe: 23c, DVT
- Medial occipital lobe: ProS, V1, V2, V3, V4
- Dorsal visual area: V3b, V6, V6a, V7
- Ventral visual stream: FFC, V8, VMV1, VMV2, VMV3, VVC
- Lateral occipital lobe: FST, LO1, LO2, LO3, MT, MST, PH, V3cd, V4t

White matter connections:

Structurally connected to the IFOF, MdLF, and FM. The IFOF has consistent terminations to the frontal lobe at parcellations 8BL, 9a, 9p, 9m, 10pp, and 10d. There are projections from the MdLF to the superior temporal gyrus that terminate at STGa. FM connections course through the splenium of the corpus callosum to terminate at contralateral V3a. V3a has short association bundles connected to V6A, V3b, V6, V7, and V3. Right hemisphere has inconsistent projections with the IFOF when compared to left hemisphere

Traditional Acupoint Correlates:

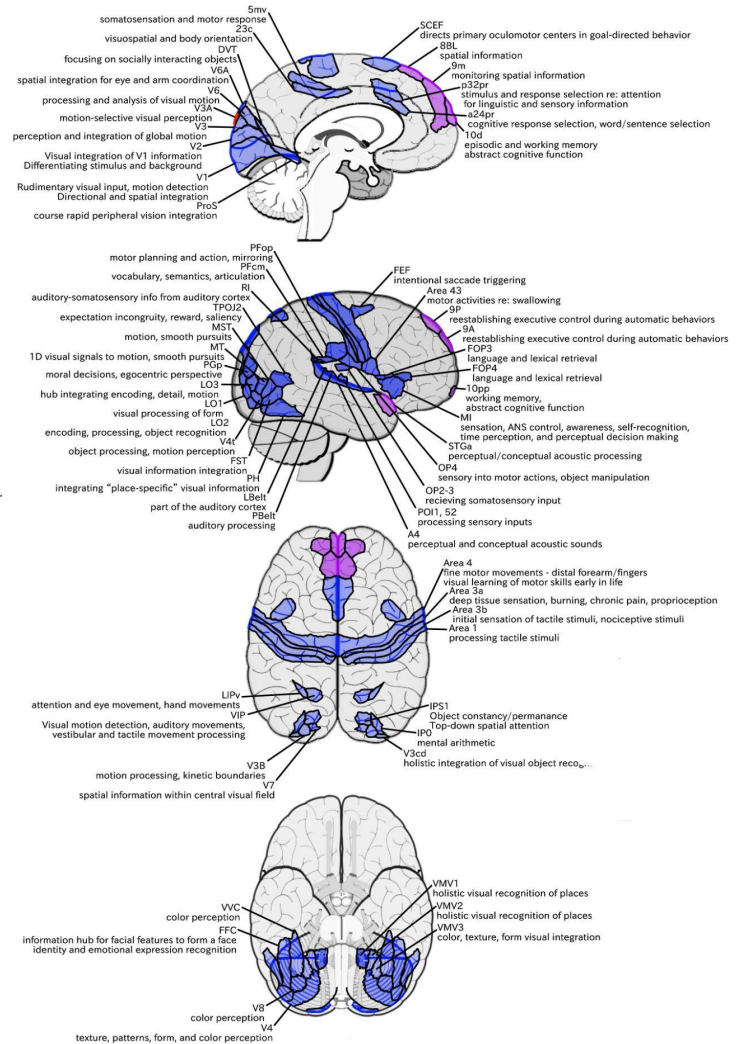
N/A (between GV18 and GV19)

Functionally Connected Acupoints:

- | | |
|--------------------------|----------------|
| BL8 (IP0, IPS1, V3b, V7) | BL9 (V1) |
| GB5 (43, OP4) | GB6 (52, Pol1) |
| GB9 (TPOJ2) | GB10 (FST, PH) |
| GB11 (PH) | GB16 (FEF) |
| GB17 (1, 3a, 3b, 4) | GB19 (V4) |
| TW19 (PH) | GV17 (V1) |
| GV18 (V1, V2) | GV19 (V6a) |
| GV20 (3a, 3b, 4) | GV21 (SCEF) |

Structurally Connected Acupoints:

- | | |
|---------------|----------------|
| BL2 (10pp) | BL3 (8BL, 9p) |
| BL8 (V3b, V7) | GV19 (V6a) |
| GV22 (8BL) | GV23 (9m, 10d) |
| GV24 (10d) | |



9.16 Area V3b (Visual Area 3b)

Location:

On the superior occipital surface

Functions:

- Relay point, collecting motion-sensitive information from the dorsal stream
- Processing motion information and discerning the edges of moving objects, known as kinetic boundaries

Functional Connectivity:

Premotor region: FEF

Medial frontal lobe: a24pr, p32pr, SCEF

Insula opercular regions: 43, PBelt, RI

Lateral parietal lobe: 7PC, IP0, IPS1, VIP

Medial parietal lobe: 23c, DVT

Medial occipital lobe: ProS, V1, V2, V3, V4

Dorsal visual area: V3a, V6, V6a, V7

Ventral visual stream: FFC, V8, VMV1, VMV2, VMV3, VVC

Lateral occipital lobe: FST, LO1, LO2, LO3, MT, MST, PH, V3cd, V4t

White matter connections:

Structurally connected with local parcellations. There are connections with IFOF and MdLF but this is inconsistent across brains. Short association bundles are connected to MIP, IP0, IPS1, V4, and V3cd

Traditional Acupoint Correlates:

BL8

Functionally Connected Acupoints:

BL7 (7PC)

BL9 (V1)

GB10 (FST, PH)

GB16 (FEF)

TW19 (PH)

GV18 (V1, V2)

GV21 (SCEF)

BL8 (IP0, IPS1, V7)

GB5 (43)

GB11 (PH)

GB19 (V4)

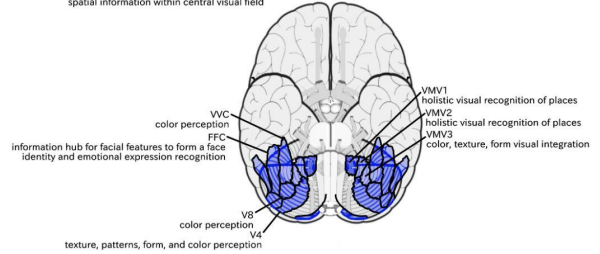
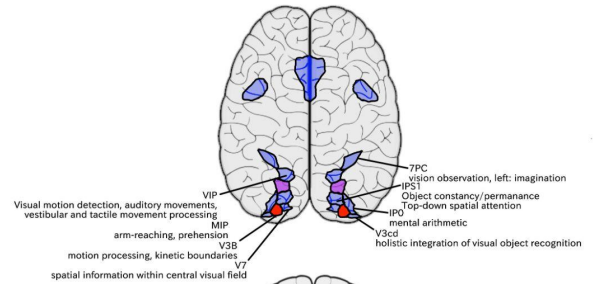
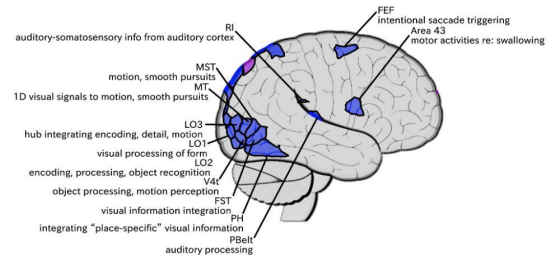
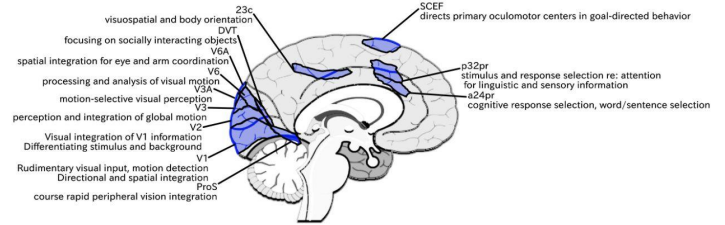
GV17 (V1)

GV19 (V6a)

Structurally Connected Acupoints:

BL8 (IP0, IPS1)

GB19 (V4)



Lateral Surface Areas

9.17 Area V3cd (Visual Area 3c/d)

Location:

A vertical strip in the posterosuperior portion of the lateral occipital lobe, just posterior to the angular gyrus

Functions:

-Integrates object detail information, such as contrast and kinetic edges, to create a holistic image for object recognition

Functional Connectivity:

Premotor region: FEF

Insula opercular regions: PBelt

Lateral parietal lobe: 7PC, AIP, IP0, IPS1, Lipv, PGp, VIP

Medial parietal lobe: DVT

Medial occipital lobe: ProS, V1, V2, V3, V4

Dorsal visual area: V3a, V3b, V6, V6a, 7

Ventral visual stream: V8, VMV1, VMV2, VMV3, VVC

Lateral occipital lobe: FST, LO1, LO2, LO3, MT, MST, PH, V3cd, V4t,

White matter connections:

Structurally connected to local parcellations. Short association bundles are connected to V3b, V3cd, V4t, V7, LO1, LO2, LO3, MST, and MT

Traditional Acupoint Correlates:

N/A

Functionally Connected Acupoints:

BL7 (7PC)

BL9 (V1)

GB11 (PH)

GB18 (AIP)

TW19 (PH)

GV18 (V1, V2)

BL8 (IP0, IPS1, V3b, V7)

GB10 (FST, PH)

GB16 (FEF)

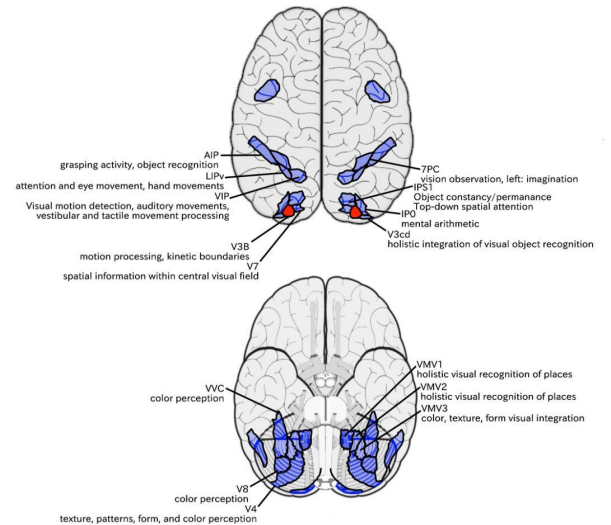
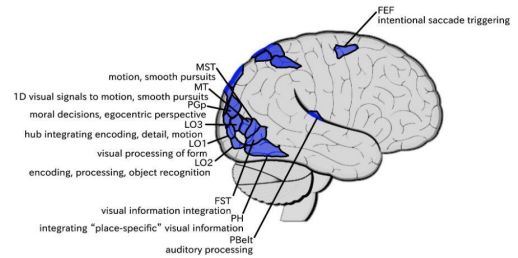
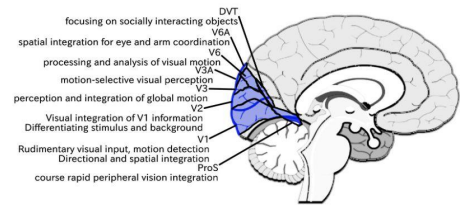
GB19 (V4)

GV17 (V1)

GV19 (V6a)

Structurally Connected Acupoints:

BL8 (V3b, V7)



9.18 Area LO1 (Lateral Occipital 1)

Location:

A small vertically oriented area in the posterior occipital lobe, just anterior to the occipital pole

Functions:

A higher order visual structure that receives detail, motion, and characteristic information about the central visual field from both the dorsal and ventral streams

-Preferentially activates in response to orientation-selective and boundary information to process the form of objects

Functional Connectivity:

Premotor region: FEF

Insula opercular regions: A4

Parietal lobe: IP0, IPS1, LIPv, VIP

Medial parietal lobe: DVT

Medial occipital lobe: V1, V2, V3, V4

Dorsal visual area: V3a, V3b, V6, V6a, V7

Ventral visual stream: FFC, V8, PIT, VMV1, VMV2, VMV3, VVC

Lateral occipital lobe: FST, LO2, LO3, MT, PH, V3cd, V4t

White matter connections:

Structurally connected to local parcellations. Short association bundles are connected to V3a, V3b, V3cd, LO2, and LO3

Traditional Acupoint Correlates:

N/A (lateral to GV18)

Functionally Connected Acupoints:

BL8 (IP0, PS1, V3b, V7)

GB10 (FST, PH)

GB16 (FEF)

TW19 (PH)

GV18 (V1, V2)

BL9 (V1)

GB11 (PH)

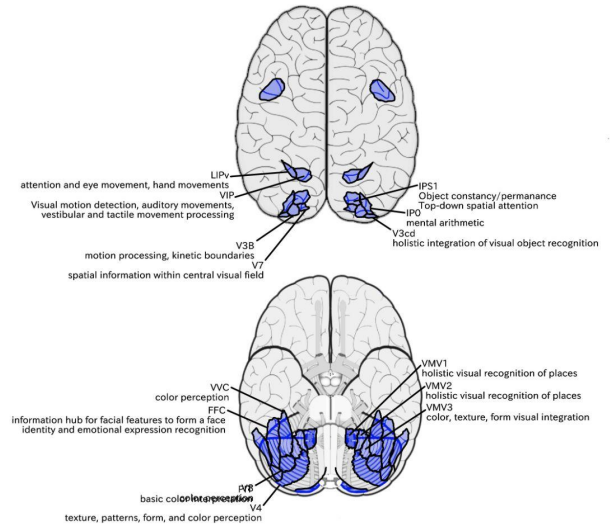
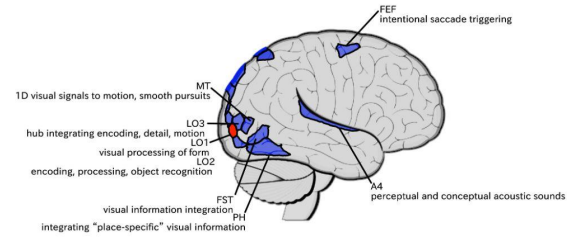
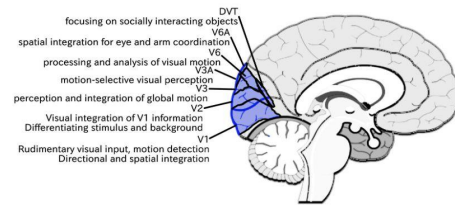
GB19 (V4)

GV17 (V1)

GV19 (V6a)

Structurally Connected Acupoints:

BL8 (V3b)



9.19 Area LO2 (Lateral Occipital 2)

Location:

A small horizontally oriented area just anterior to the occipital pole and slightly superior to the tentorium

Functions:

- Preferential retinotopic activation in the peripheral visual field, and integrates inputs from the ventral and dorsal streams to encode information about the shapes of stimuli
- High activation in the processing, encoding, and recognition of objects

Functional Connectivity:

Premotor region: FEF

Insula opercular regions: PBelt

Parietal lobe: IPS1, LIPv, VIP

Medial occipital lobe: V1, V2, V3, V4

Dorsal visual area: V3a, V3b, V6, V6a, V7

Ventral visual stream: FFC, V8, PIT, VMV3, VVC

Lateral occipital lobe: FST, LO1, LO3, MT, PH, V3cd, V4t

White matter connections:

Structurally connected to local parcellations. Short association bundles are connected to V3a, V3b, V3cd, LO1, and LO3

Traditional Acupoint Correlates:

N/A (lateral to GV18)

Functionally Connected Acupoints:

BL8 (IPS1, V3b, V7)

GB10 (FST, PH)

GB16 (FEF)

TW19 (PH)

GV18 (V1, V2)

BL9 (V1)

GB11 (PH)

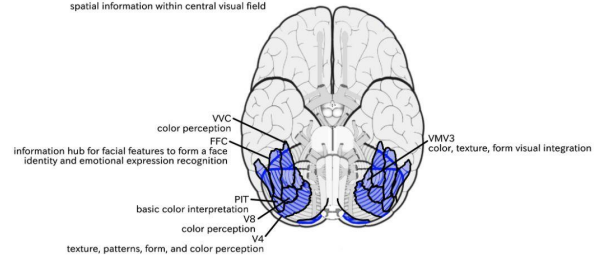
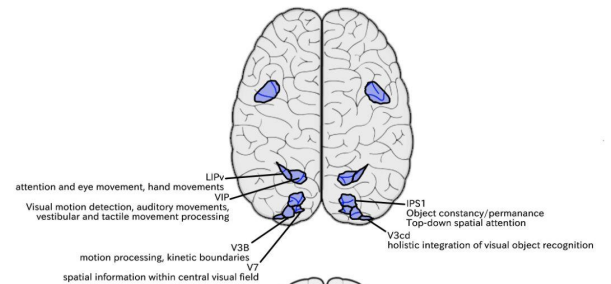
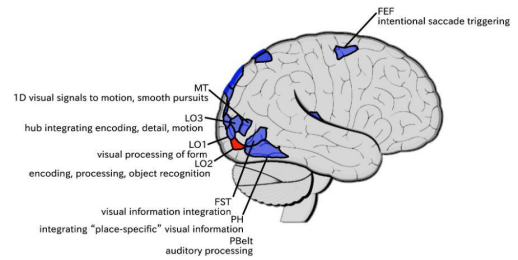
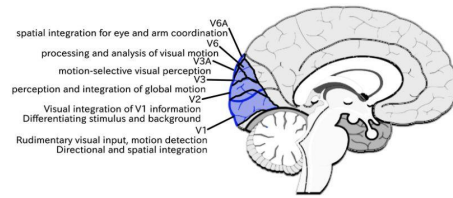
GB19 (V4)

GV17 (V1)

GV19 (V6a)

Structurally Connected Acupoints:

BL8 (V3b)



9.20 Area LO3 (Lateral Occipital 3)

Location:

A small vertically oriented area in the superior central portion of the lateral occipital lobe just inferior to the posterior angular gyrus

Functions:

-An important hub between the dorsal and ventral streams to integrate, encode, and process detail, motion, and shape information for object recognition and encoding

Functional Connectivity:

Sensorimotor strips: 1, 2, 3a, 3b, 4

Premotor region: 5mv, FEF

Cingulate regions: SCEF

Insula opercular regions: 43, A4, OP4, PBelt, PFcm, RI

Lateral parietal lobe: 7PC, IP0, IPS1, LIPv, PFop, PGp, TPOJ2, TPOJ3, VIP

Medial parietal lobe: 23c, DVT

Medial occipital lobe: V1, V2, V3, V4

Dorsal visual area: V3a, V3b, V6, V6a, V7

Ventral visual stream: FFC, PIT, V8, VMV1, VMV2, VMV3, VVC

Lateral occipital lobe: FST, LO1, LO2, MT, PH, V3cd, V4t,

White matter connections:

Structurally connected to the ILF and local parcellations. ILF projections travel through the temporal lobe to terminate at TGv. Short association bundles are connected to V3a, V3b, V3cd, LO1, LO2, PH, and FST

Traditional Acupoint Correlates:

N/A (lateral and superior to GV18)

Functionally Connected Acupoints:

BL7 (2, 7PC)

BL9 (V1)

GB9 (TPOJ2)

GB11 (PH)

GB17 (1, 3a, 3b, 4)

TW19 (PH)

GV18 (V1, V2)

GV20 (3a, 3b, 4)

BL8 (IP0, IPS1, V3b, V7)

GB5 (43, OP4)

GB10 (FST, PH)

GB16 (FEF)

GB19 (V4)

GV17 (V1)

GV19 (V6a)

GV21 (SCEF)

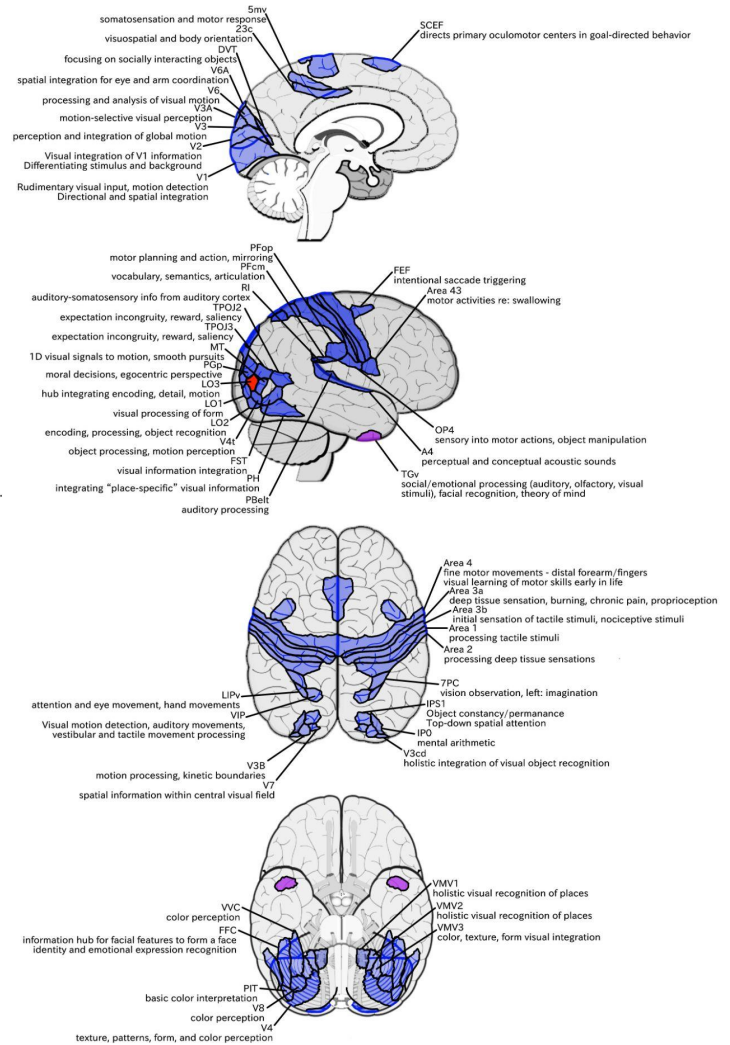
Structurally Connected Acupoints:

BL8 (V3b)

GB11 (PH)

GB10 (FST, PH)

TW19 (PH)



9.21 Area V4t (Visual Area 4t)

Location:

A horizontal area in the central portion of the lateral occipital cortex

Functions:

- Integrates information from both the ventral and dorsal streams
- High activity in response to both motion and shape-sensitive information, indicating its significance in the integration of object processing and global-motion perception

Functional Connectivity:

Sensory strip: area 1, 2, 3a, 3b

Motor strip: area 4

Premotor region: FEF

Insula opercular regions: A4, PBelt, RI

Parietal lobe: IPS1, LIPv, VIP

Medial occipital lobe: V2, V3, V4

Dorsal visual area: V3a, V3b, V6, V6a, V7

Ventral visual stream: V8, VMV1, VMV2, VMV3, VVC

Lateral occipital lobe: FST, LO3, MT, MST, PH, V3cd

White matter connections:

Structurally connected with local parcellations. Tracts originating from this region such as SLF and ILF are inconsistent across brains. Short association bundles are connected to V4t, LO3, MST, MT, LO1, and V3cd

Traditional Acupoint Correlates:

N/A (posterior to GB9)

Functionally Connected Acupoints:

BL7 (2)

GB10 (FST, PH)

GB16 (FEF)

GB19 (V4)

GV18 (V2)

GV20 (3a, 3b, 4)

BL8 (IPS1, V3b, V7)

GB11 (PH)

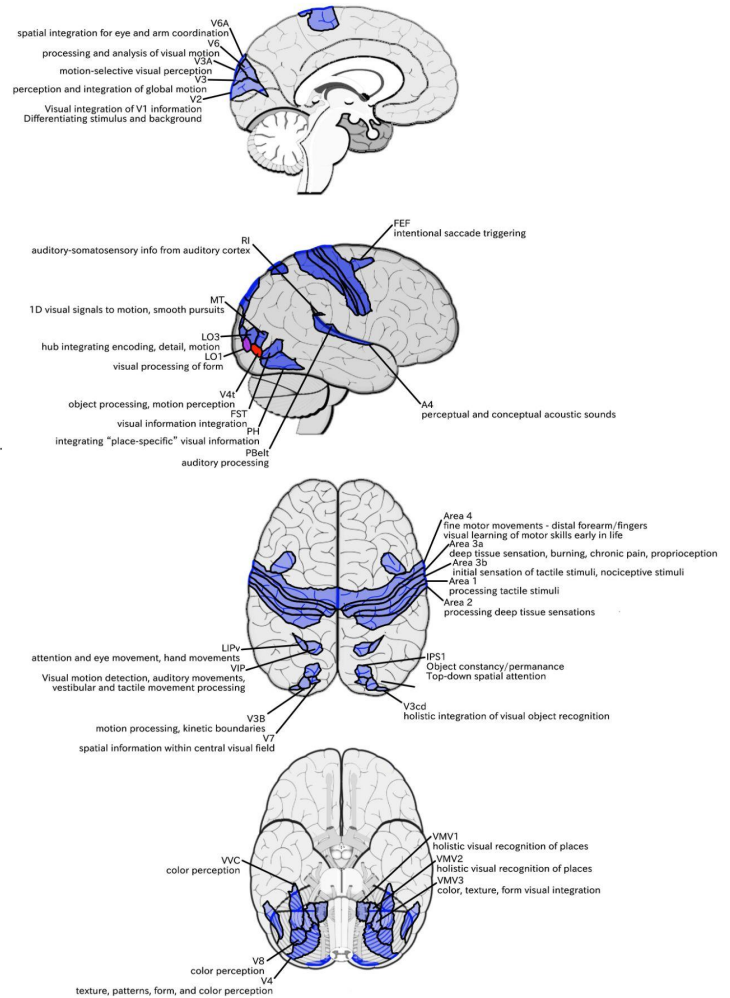
GB17 (1, 3a, 3b, 4)

TW19 (PH)

GV19 (V6a)

Structurally Connected Acupoints:

N/A



9.22 Area MT (Middle Temporal)

Location:

A vertically oriented area in the superior part of the central lateral occipital lobe located just inferior to the angular gyrus

Functions:

- Neurons in this area respond to direction-sensitive visual motion and are responsible for the integration of one-dimensional visual signals into a two-dimensional visual motion pattern, binocular disparity tuning, noise reduction, segmentation of figure and background in complex and moving stimuli
- Initiation of smooth-pursuit eye movements

Functional Connectivity:

Sensorimotor strips: area 1, 2, 3a, 3b, 4

Insula opercular regions: A4, A5, OP4, PBelt, RI

Parietal lobe: IPS1, LIPv, VIP

Medial occipital lobe: V2, V3, V4

Dorsal visual area: V3a, V3b, V6, V6a, V7

Ventral visual stream: FFC, V8, VMV3, VVC

Lateral occipital lobe: FST, LO1, LO2, LO3, MST, PH, V3cd, V4t

White matter connections:

Structurally connected with the ILF. These projections are inconsistent across brains. ILF projections travel through the temporal lobe to end at TF. There are many short association bundles connecting to MST, LO1, LO2, LO3, TPOJ2, TPOJ3, FST, PH, V3b, and IP0

Traditional Acupoint Correlates:

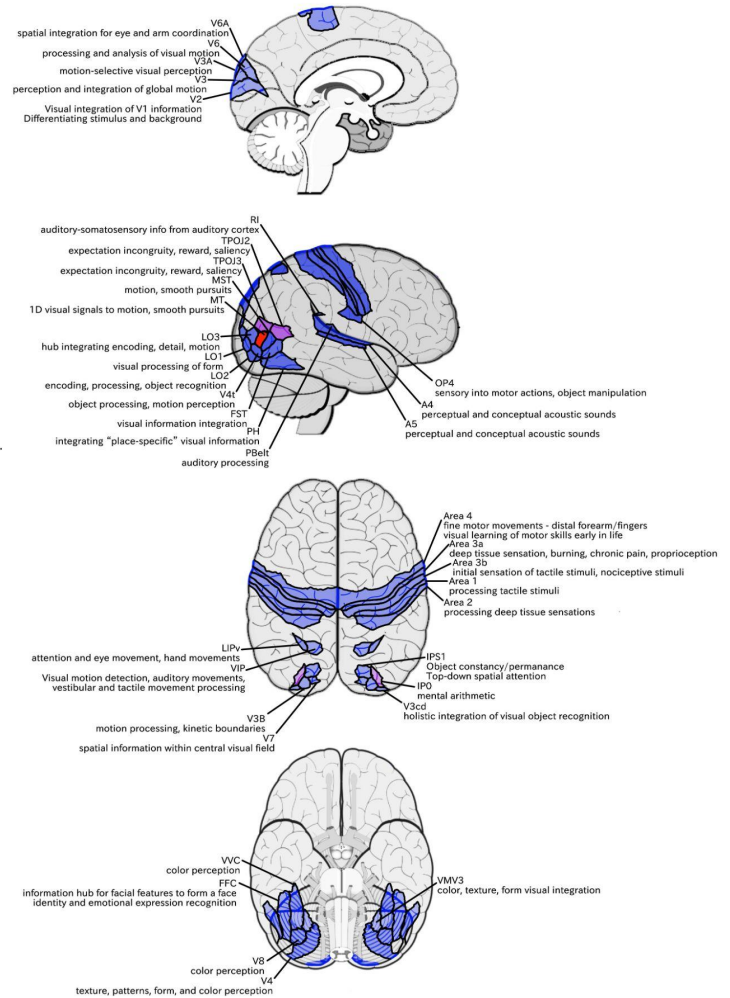
N/A (Superior and posterior to GB10)

Functionally Connected Acupoints:

BL7 (2)	BL8 (IPS1, V3b, V7)
GB5 (OP4)	GB7 (A5)
GB10 (FST, PH)	GB11 (PH)
GB16 (FEF)	GB17 (1, 3a, 3b, 4)
GB19 (V4)	TW19 (PH)
GV18 (V2)	GV19 (V6a)
GV20 (3a, 3b, 4)	

Structurally Connected Acupoints:

BL8 (IP0, V3b)	GB9 (TPOJ2)
GB10 (FST, PH)	GB11 (PH)
TW19 (PH)	



9.23 Area MST (Medial Superior Temporal Area)

Location:

A vertically oriented area found paralleling and just anterior to MT, just below the angular gyrus

Functions:

- Receives direct, functional input from area MT and is responsible for the integration and analysis of global, visual motion and the perception of self-motion
- Execution and continuation of smooth pursuit eye movements, in coordination with the frontal eye fields

Functional Connectivity:

Sensorimotor strips: area 1, 2, 3a, 3b, 4

Premotor region: 6v, FEF

Cingulate region: 24dd, SCEF

Insula opercular regions: 43, A4, LBelt, OP1, OP4, PBelt, PFcm, RI

Parietal lobe: 7PC, IPS1, LIPv, TPOJ2, VIP

Medial occipital lobe: V2, V3, V4

Dorsal visual area: V3a, V3b, V6, V6a, V7

Ventral visual stream: FFC, PIT, V8, VMV3, VVC

Lateral occipital lobe: FST, LO1, LO2, LO3, MT, PH, V3cd, V4t

White matter connections:

Structurally connected to the ILF. This parcellation also has inconsistent SLF connections. ILF projections travel through the temporal lobe to terminate at TGv. Short association bundles are connected to MT, PH, TE2p, and FST

Traditional Acupoint Correlates:

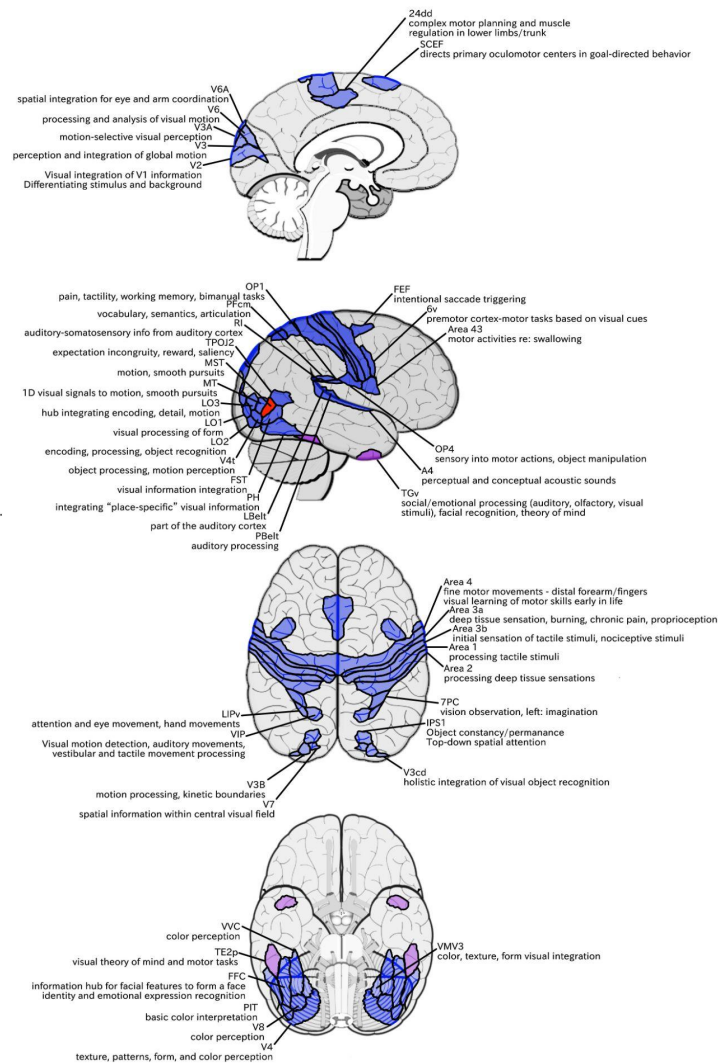
N/A (Superior and posterior to GB10)

Functionally Connected Acupoints:

BL7 (2, 7PC)	BL8 (IPS1, V3b, V7)
GB4 (6v)	GB5 (43, OP4)
GB9 (TPOJ2)	GB10 (FST, PH)
GB11 (PH)	GB16 (FEF)
GB17 (1, 3a, 3b, 4)	GB19 (V4)
ST8 (6v)	TW19 (PH)
GV18 (V2)	GV19 (V6a)
GV20 (3a, 3b, 4)	GV21 (SCEF)

Structurally Connected Acupoints:

GB10 (FST, PH)
GB11 (PH)
TW19 (PH)



9.24 Area FST (Fundus of the Superior Temporal Area)

Location:

An oblique to slightly vertically oriented area in the anterior portion of the lateral occipital lobe. It is just posterior to the end of the MT gyrus

Functions:

- A major hub in the visual system, integrating massive amounts of visual information from both the dorsal and ventral streams
- Perception of image content by integrating detail, motion and form-sensitive information
- Processing of spatial reference frames leading to continuous global-motion perception and spatial map formation
- Stimulus filtering due to heightened attention-based motion selectivity

Functional Connectivity:

Sensorimotor strips: area 1, 2, 3a, 3b, 45619

Premotor region: 5mv, 6a, 6d, 6mp, 6r, FEF, PEF

Cingulate region: 24dd, p32pr, SCEF

Insula opercular regions: 43, A4, FOP2, LBelt, OP1, OP4, PBelt, PFcm, Pol1, Pol2, RI

Temporal lobe: PHT, TE2p

Parietal lobe: 7AL, 7AM, 7PC, 7PL, AIP, IP0, IPS1, LIPv, PFop, PFm, PFt, TPOJ2, TPOJ3, VIP

Medial parietal lobe: 23c, DVT

Medial occipital lobe: V2, V3, V4

Dorsal visual area: V3a, V3b, V6, V6a, V7

Ventral visual stream: FFC, PIT, V8, PIT, VMV1, VMV2, VMV3, VVC

Lateral occipital lobe: MT, MST, V3cd, V4t, LO1, LO2, LO3, PH

White matter connections:

Structurally connected with the SLF and ILF. SLF projections are consistent and terminate at the premotor area at parcellation 8C. ILF projections are inconsistent. Short association bundles are connected to PHT, LO1, LO2, LO3, MST, MT PH, and V4

Traditional Acupoint Correlates:

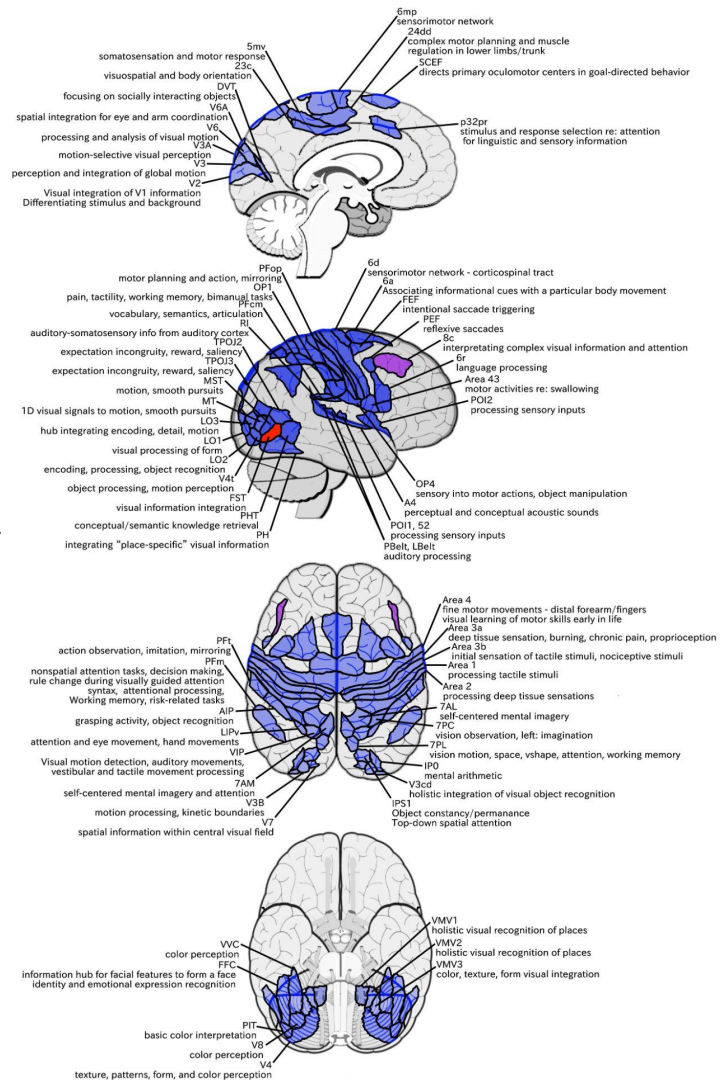
GB10

Functionally Connected Acupoints:

BL6 (6a, 6d)	BL7 (2, 7AL, 7PC)
BL8 (IP0, IPS1, V3b, V7)	GB4 (6r)
GB5 (43, OP4)	GB6 (Pol1)
GB9 (TPOJ2)	GB10 (PH, PHT)
GB11 (PH)	GB16 (FEF)
GB17 (1, 3a, 3b, 4)	GB18 (AIP, PFm)
GB19 (V4)	ST8 (6r, PEF)
TW19 (PH, PHT)	GV18 (V2)
GV19 (V6a)	GV20 (3a, 3b, 4)
GV21 (SCEF)	

Structurally Connected Acupoints:

GB8 (PHT)	GB10 (PH, PHT)
GB11 (PH)	GB15 (8C)
GB19 (V4)	TW19 (PH, PHT)



9.25 Area PH

Location:

A horizontally oriented area in the anteroinferior lateral occipital lobe. It is roughly in line with the ITG and is mostly lateral to the occipito-temporal sulcus, of which it forms a small portion of its lateral bank. Thus, it spills onto the basal surface slightly.

Functions:

- A higher level holistic perception region of the visual system that acts as a hub of ventral stream input, integrating "place-specific" information, while showing little to no activity to objects or faces
- Encodes a representation of the local scene and, due to its location, allows it to be remembered and subsequently recognized, implicating it in the formation of spatial maps, place encoding, and place recognition

Functional Connectivity:

Lateral frontal lobe: p9-46v, IFSa, IFSp, IFJa, IFJp

Sensorimotor strips: 1, 2, 3a, 4

Premotor region: 5mv, 6a, 6r, 6v, FEF, PEF

Cingulate region: SCEF

Insula opercular regions: A4, LBelt, PBelt, Pol2

Temporal lobe: PeEc, PHA3, PHT, TE2p

Parietal lobe: 7AM, 7PC, 7PL, AIP, IP0, IP2, IPS1, LIPd, LIPv, MIP, PF, PPop, PGp

Medial parietal lobe: 23c, DVT

Medial occipital lobe: V1, V2, V3, V4

Dorsal visual area: V3a, V3b, V6, V6a, V7

Ventral visual stream: FFC, V8, PIT, VMV1, VMV2, VMV3, VVC

Lateral occipital lobe: FST, LO1, LO2, LO3, MT, MST, V3cd, V4t

White matter connections:

Structurally connected to the SLF and ILF. SLF projections are consistent across brains and terminate at 44 and 45. ILF projections are also consistent travel through the temporal lobe to end at TGv and TGd. Short association bundles are connected to FST, MST, MT, PHT, V4T, and TE1p

Traditional Acupoint Correlates:

GB10, GB11, TW19

Functionally Connected Acupoints:

BL6 (6a)	BL7 (2, 7PC)
BL8 (IP0, IPS1, V3b, V7)	BL9 (V1)
GB4 (6r, 6v)	GB10 (FST, PHT)
GB13 (p9-46v)	GB15 (p9-46v)
GB16 (FEF)	GB17 (1, 3a, 4)
GB18 (AIP, IP2, LIPd)	GB19 (V4)
ST8 (6r, 6v, IFJp, PEF)	TW19 (PHT)
GV17 (V1)	GV18 (V1, V2)
GV19 (V6a)	GV20 (3a, 4)
GV21 (SCEF)	

Structurally Connected Acupoints:

GB10 (FST, PHT)
TW19 (PHT)
TW20 (TE1p)

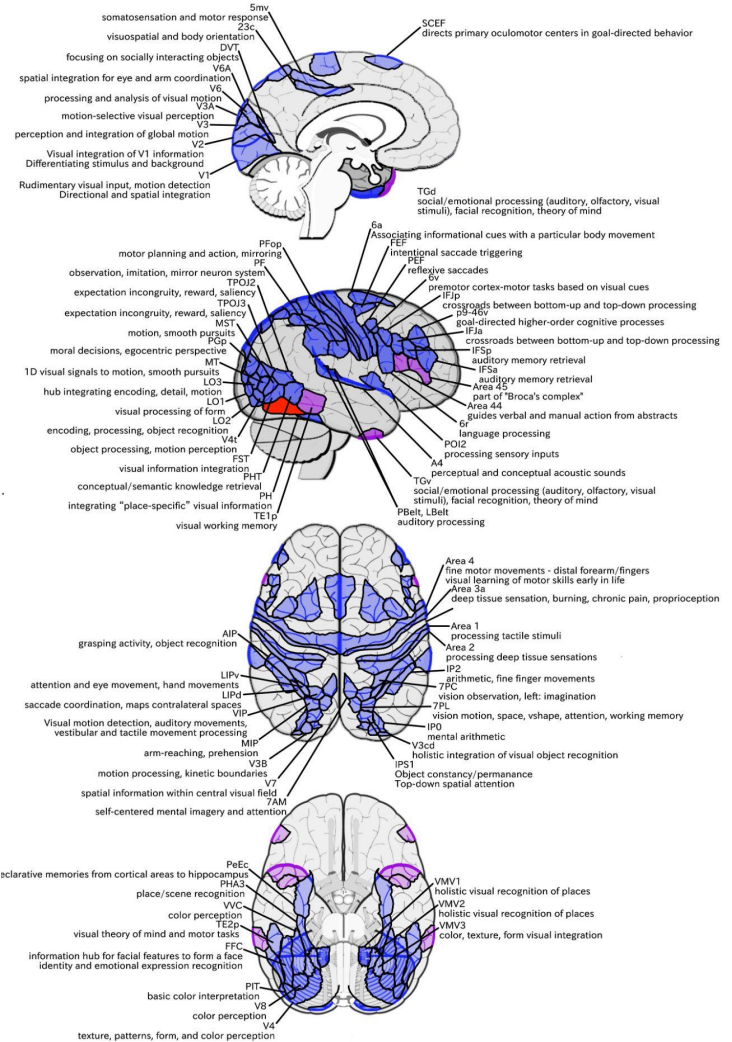


Table 1 Traditional Acupuncture Point Associations

Acupoint	Cortical Parcellation Correlation
BL2	10pp
BL3	8Ad, 8BL, 9p
BL4	8Ad, 8Av, 9-46d, Area 46
BL5	8Ad, 8Av, i6-8
BL6	6a, 6d
BL7	Area 2, 7AL, 7PC
BL8	IP0, IPS1, V3b, V7
BL9	V1, cerebellum
BL10	cerebellum
GB2	TE2a
GB3	STSda, STSva, TE1a
GB4	6r, 6v
GB5	Area 43, OP4
GB6	Area 52, A1, Ig, Pol1
GB7	STSdp, A5
GB8	STV, TPOJ1
GB9	TPOJ1, TPOJ2
GB10	FST, PH, PHT
GB11	PH, cerebellum
GB12	cerebellum
GB13	p9-46v
GB14	a10p, a47r, p10p
GB15	8Av, 8C, p9-46v, Area 46
GB16	55b, FEF
GB17	Area 1, 3a, 3b, 4
GB18	AIP, IP2, LIPd, PFm
GB19	V4, cerebellum
GB20	cerebellum
ST8	6r, 6v, IFJp, PEF
TW19	PH, PHT
TW20	STSdp, STSvp, TE1p
TW21	TE1m
TW22	STSda, STSdp, STSva, STSvp
GV16	cerebellum
GV17	V1, cerebellum
GV18	V1, V2
GV19	7PM, V6a
GV20	3a, 3b, 4, 5m
GV21	SCEF, SFL
GV22	8BL
GV23	9m, 10d
GV24	10d
Yintang	10v

Conflict of Interest Statement

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.