Analysis of Traditional Scalp Acupuncture Point Locations as Local Cortical Region and Functional Network Node Targets in Non-Invasive Brain Network Neuromodulation
Section 7 - The Posterior Cingulate Cortex, Medial Parietal Lobe, and Parieto-Occipital Sulcus

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 posterior cingulate cortex, medial parietal lobe, and parieto-occipital sulcus 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, parietal lobe, medial parietal, posterior cingulate

Subparietal Areas

Area 31a (31 anterior)

Location:
On the anterior half of the subparietal gyrus, directly posterior to the marginal sulcus

Functions:
-Considered a part of the dorsal posterior cingulate cortex (dPCC) that is highly active during tasks that require external focus, especially concerning visuospatial, and body orientation
-Specifically involved in working memory processing of place and body images; focusing on socially interacting objects vs randomly moving geometric shapes; and recognizing emotional faces over neutral objects

Functional Connectivity:
Lateral frontal lobe: a9-46v, p10p, 10d, 8AD, 8AV, 8C, s6-8, i6-8
Medial frontal lobe: 8BM, p32, d32
Temporal lobe: PreS, TE1p
Lateral parietal lobe: PGi, PGs, IP2, IP1
Medial parietal lobe: 23d, v23ab, d23ab, POS2, POS1, PCV, RSC, 7PM, 7m, 31pv, 31pd

White matter connections:
Structurally connected to the cingulum and local parcellations of the precuneus. There are tracts that connect the contralateral hemisphere through the corpus callosum but this is inconsistent across individuals. The cingulum fibers project anteriorly from 31a with connections to the cingulate sulcus and superior frontal gyrus ending at areas p24, d32, and a24pr. Short association bundles project posterior to connect 7m
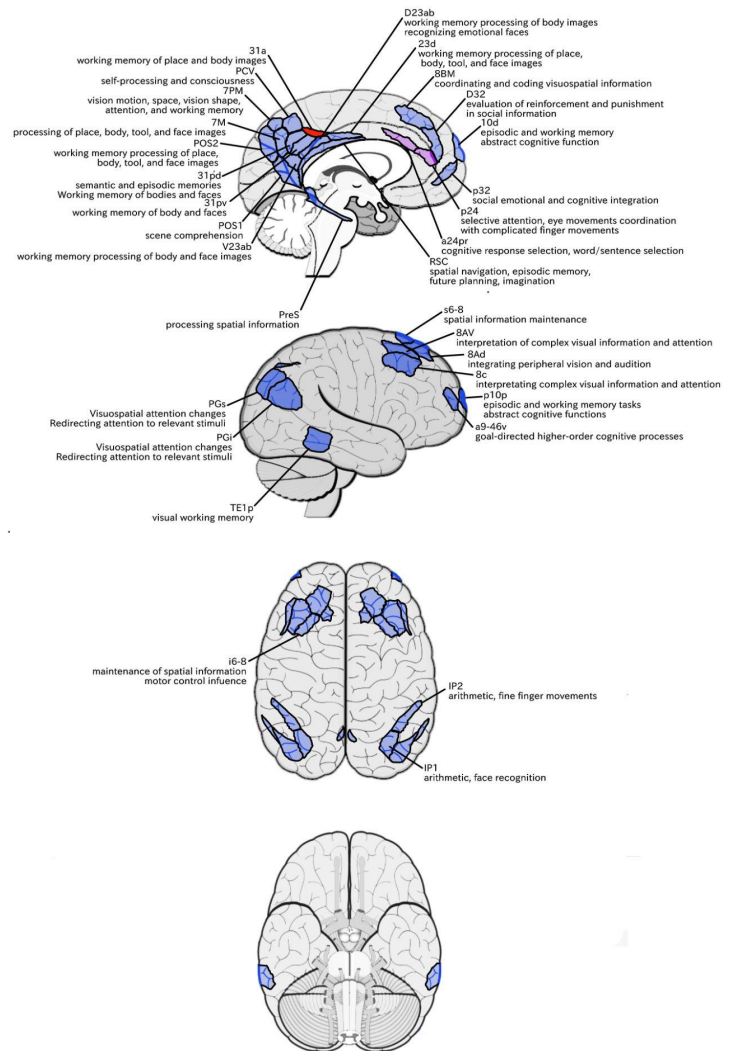
Traditional Acupoint Correlates:
N/A

Functionally Connected Acupoints:
BL3 (8AD)
BL5 (8AD/8AV/i6-8)
GB7 (TE1p)
GB14 (p10p)
GB18 (PGs/IP1)

BL4 (8AD/8AV)
BL8 (IP1)
GB8 (TE1p)
GB15 (8AD/8AV/8C)
GV19 (7PM)

Structurally Connected Acupoints:
N/A

Area 31pd (31 posterior dorsal)

Location:
On the posterior superior portion of the subparietal gyrus

Functions:
-Considered a part of the ventral posterior cingulate cortex (vPCC), which is active during self-relevant tasks, including retrieval of semantic and episodic memories
-Specifically involved in working memory processing of body and face images; listening to stories vs answering arithmetic questions; and focusing on socially interacting objects vs randomly moving geometric shapes

Functional Connectivity:
Lateral frontal lobe: a9-46v, 45, 47L, 47s, 10d, 8AD, 8AV, 8BL, 9a, 9p
Medial frontal lobe: SFL, 9m, 10r, 10v, d32
Temporal lobe: TGd, STSva, STSvp, STSda, STSdp, TE1a, hippocampus
Lateral parietal lobe: PGi, PGs, IP2
Medial parietal lobe: 23d, v23ab, d23ab, POS2, POS1, PCV, RSC, 7m, 31pv, 31a

White matter connections:
Structurally connected to the cingulum, contralateral hemisphere, and local parcellations of the precuneus. The cingulum fibers project anteriorly from 31pd with variable connections along the cingulate sulcus and superior frontal gyrus. Connections project through the body of the corpus callosum to the contralateral precuneus to terminate at 31a, 7m, and 31pd. Short association bundles are connected to 7m and PCV

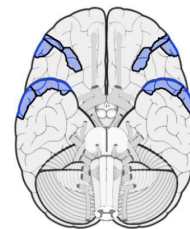**Traditional Acupoint Correlates**:
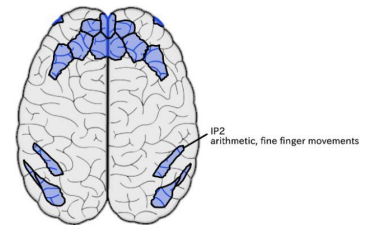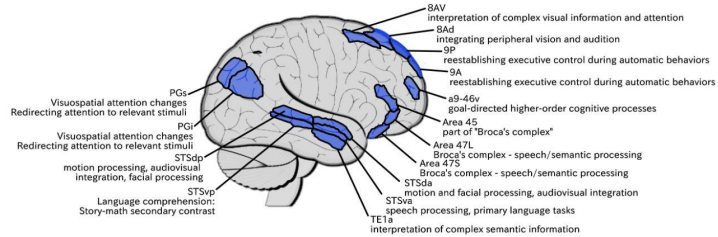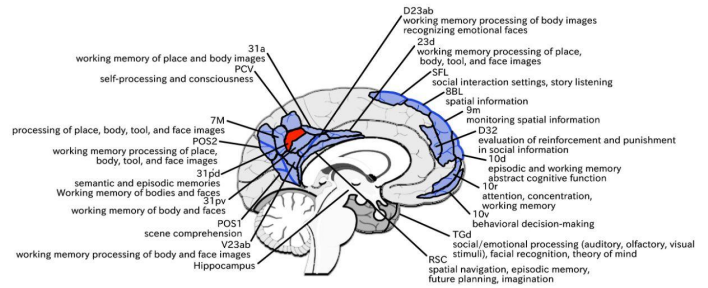N/A

Functionally Connected Acupoints:
BL3 (8AD/8BL/9P)   BL4 (8AD/8AV)
BL5 (8AD/8AV)
GB6 (STSda/STSdp/STSva/STSvp/TE1a)
GB15 (8AD/8AV)   GB18 (PGs)
GV22 (8BL)   GV23 (9m/10d)
GV24 (10d)   Yintang (10v)

Structurally Connected Acupoints:
N/A

Area 31pv (31 posterior ventral)

Location:
On the posterior inferior subparietal gyrus where it spills across the cingulate sulcus onto the posterior cingulate gyrus

Functions:
-Considered a part of the vPCC, which is active during self-relevant tasks, including retrieval of semantic and episodic memories
-Specifically involved in working memory processing of body and face images; listening to stories over answering arithmetic questions; and recognizing emotional faces over neutral objects

Functional Connectivity:
Lateral frontal lobe: 47L, 47s, p10p, 10d, 8AD, 8AV, 8BL, 8C, 9a, 9p
Medial frontal lobe: SFL, 9m, 10r, 10v, a24, p32, d32
Temporal lobe: TGd, STSva, STSvp, TE1a, TE1m, PreS, hippocampus
Lateral parietal lobe: PGi, PGs, PFm
Medial parietal lobe: 23d, v23ab, d23ab, POS2, POS1, RSC, 7m, 31a, 31pd

White matter connections:
Structurally connected to the cingulum, contralateral hemisphere and local parcellations of the precuneus. The cingulum fibers project anteriorly from 31pv with variable connections along the cingulate sulcus and superior frontal gyrus. Connections project through the body of the corpus callosum to the contralateral precuneus to terminate at 31pv, 31a, and 31pd. Short association bundles are connected to 23c, 23d, 31a, 31pd, 31pv, and 7m

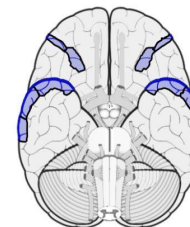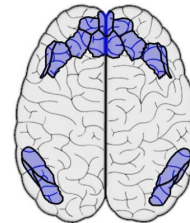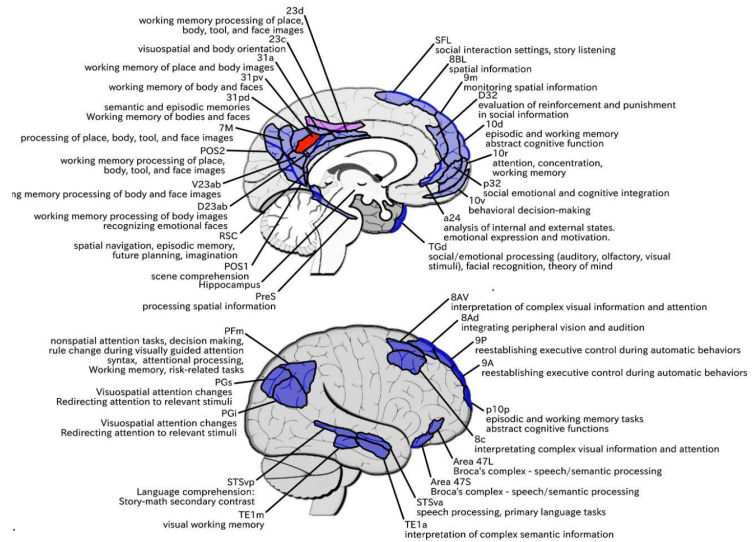**Traditional Acupoint Correlates**:
N/A

Functionally Connected Acupoints:
BL3 (8AD/8BL/9P)   BL4 (8AD/8AV)
BL5 (8AD/8AV)
GB6 (STSva/STSvp/TE1a/TE1m)   GB7 (TE1m)
GV14 (p10p)   GB15 (8AD/8AV/8C)
GB18 (PFm/PGs)   GV22 (8BL)
GV23 (9m/10d)   GV24 (10d)
Yintang (10v)

Structurally Connected Acupoints:
N/A

Posterior Cingulate Cortex

Area d23ab (dorsal 23 section a-b)

Location:
On the posterior cingulate gyrus, just superior to the splenium of the corpus callosum

Functions:
-Considered part of the dPCC, which is highly active during tasks that require an external focus, especially concerning visuospatial and body orientation
-Specifically involved in working memory processing of body images; listening to stories over answering arithmetic questions; and recognizing emotional faces over neutral objects

Functional Connectivity:
Lateral frontal lobe: a47r, p10p, i6-8, s6-8, 10d, 8AD, 8AV, 8BL, 8C, 9p
Medial frontal lobe: 8BM, 9m, 10r, a24, d32
Temporal lobe: STSva, STSvp, TE1a, TE1m, TE1p, PreS, hippocampus
Lateral parietal lobe: IP1, PGi, PGs, PFm
Medial parietal lobe: 23d, v23ab, POS2, POS1, RSC, 7m, 31a, 31pv, 31pd

White matter connections:
Structurally connected to the cingulum. The cingulum fibers project anteriorly from d23ab with connections to the anterior cingulate cortex and cingulate sulcus as it curves around the genu of the corpus callosum to terminate at a32pr and p24. Short association bundles project posterior to v23ab

Traditional Acupoint Correlates:
N/A

Functionally Connected Acupoints:
BL3 (8AD/8BL/9P)	BL4 (8AD/8AV)
BL5 (8AD/8AV/i6-8)	BL8 (IP1)
GB6 (STSva/STSvp/TE1a/TE1m)	GB7 (TE1m/TE1p)
GB8 (TE1p)	GV14 (p10p)
GB15 (8AD/8AV/8C)	GB18 (PFm/PGs)
GV22 (8BL)	GV23 (9m/10d)
GV24 (10d)	

Structurally Connected Acupoints:
N/A
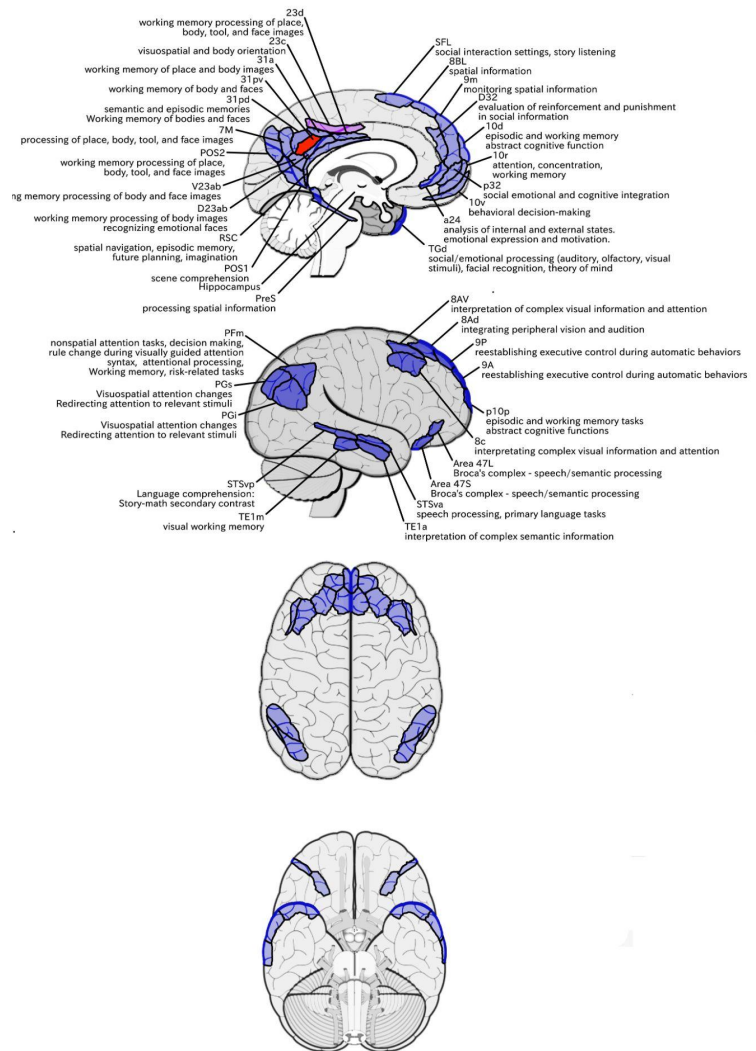
Area v23ab (ventral 23 section a-b)

Location:
On the posterior most portion of the posterior cingulate area near the superior portion of the cingulate isthmus

Functions:
-Considered a part of the vPCC, which is active during self-relevant tasks, including retrieval of semantic and episodic memories
-Specifically involved in working memory processing of body and face images; listening to stories over answering arithmetic questions; recognizing emotional faces over neutral objects; and focusing on socially interacting objects over randomly moving geometric shapes

Functional Connectivity:
Lateral frontal lobe: a47r, p10p, s6-8, 10d, 8AD, 8AV, 8BL, 8C, 9p
Medial frontal lobe: 8BM, 9m, 10r, 10v, a24, s32, d32
Temporal lobe: STSva, TGd, TE1a, TE1m, PreS, hippocampus
Lateral parietal lobe: IP1, PGi, PGs
Medial parietal lobe: d23ab, POS1, RSC, 7m, 31a, 31pv, 31pd

White matter connections:
Structurally connected to the cingulum. The cingulum fibers project anteriorly from v23ab with connections to the anterior cingulate cortex and cingulate sulcus as the fibers curve around the genu of the corpus callosum, these fibers end at a24, p24, and 32pr. The cingulum fibers continue wrapping around the genu with its connections splitting to project to the anterior pole of the frontal lobe at p32 and 10r, as well as following the rostrum of the corpus callosum to end at 25. Short association bundles are connected to POS1 and 7m

Traditional Acupoint Correlates:
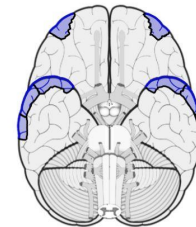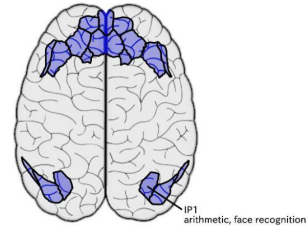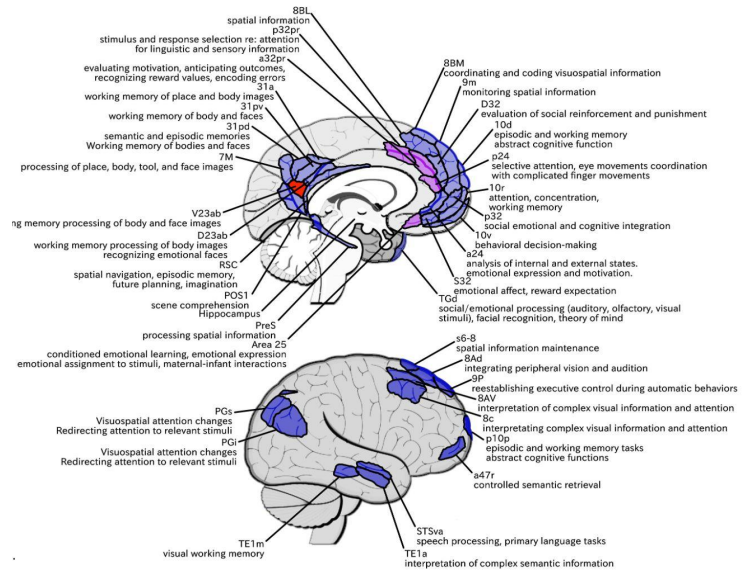N/A

Functionally Connected Acupoints:
BL3 (8AD/8BL/9P)	BL4 (8AD/8AV)
BL5 (8AD/8AV)	BL8 (IP1)
GB6 (STSva/TE1a/TE1m)	GB7 (TE1m)
GV14 (p10p)	GB15 (8AD/8AV/8C)
GB18 (PGsIP1)	GV22 (8BL)
GV23 (9m/10d)	GV24 (10d)
Yintang (10v)	

Structurally Connected Acupoints:
N/A

Area 23c

Location:
A long, thin area that lies on the inferior bank of the posterior cingulate sulcus, and that makes up the posterior bank of the marginal ramus of this sulcus as it ascends.

Functions:
-Considered a part of the dPCC, which is highly active during tasks that require an external focus, especially concerning visuospatial and body orientation
-Specifically involved in working memory processing of place and body images as well as focusing on socially interacting objects over randomly moving geometric shapes

Functional Connectivity:
Premotor regions: SCEF, FEF, PEF, 6r, 6a, 6ma
Middle/posterior cingulate: 24dv, a24pr, p24pr, a32pr, p32pr, 5mv
Dorsolateral frontal lobe: IFSa, 9-46d, 46
Superior insula opercular regions: 43, OP4, PFcm, FOP1, FOP3, FOP4, FOP5
Lower opercula and Heschl's gyrus: 52, PoI1, PoI2, MI
Temporal lobe: PHA3
Lateral parietal lobe: AIP, MIP, LIPv, LIPd, IP0, PGp, PFop, PF, PFt, 7AL, 7PC
Medial parietal lobe: 31a, POS2, RSC, 7AM, 7PM, PCV, DVT
Medial Occipital lobe: V1, V2, V3, V4
Dorsal visual stream: V3b, V7, V6, V6a
Lateral occipital lobe: PHT, PH TPOJ2, TPOJ3, FST, LO3

White matter connections:
Structurally connected to the contralateral hemisphere and local parcellations. 23c also has short projections with the cingulum but these fibers end before reaching the anterior cingulate cortex. There are consistent connections through the body of the corpus callosum to contralateral 5mv, 5m, 23c, and 5L. Short association bundles project superiorly to end at 24dd, 24dv, 5L, 5m, and 5mv

Traditional Acupoint Correlates:
N/A

Functionally Connected Acupoints:
BL4 (9-46d/46)
BL7 (7AL/7PC)
GB4 (43/6r)
GB8 (PH)
GB15 (p9-46v/46)
GB18 (AIP/LIPv)
GV18 (V1/V2)
GV21 (SCEF)

BL6 (6a)
BL8 (IP0/V3b/V7)
GB5 (PoI2)
GB9 (PH/PHT/FST)
GB16 (FEF)
ST8 (6r/PEF)
GV19 (7PM/V6a)

Structurally Connected Acupoints:
GV20 (5m)

Area 23d

Location:
On the superior half of a section of the posterior cingulate gyrus. It lies just superior to the posterior part of the body of the corpus callosum

Functions:
-Considered a part of the dPCC, which is highly active during tasks that require an external focus, especially concerning visuospatial and body orientation
-Specifically involved in working memory processing of place, body, tool, and face images

Functional Connectivity:
Lateral frontal lobe: a47r, p10p, s6-8, 8AV
Medial frontal lobe: 8BM, 8C, 9m, a24, p24, p24pr, p32, d32
Temporal lobe: TE1m
Lateral parietal lobe: IP1, PGi, PFm, PGs
Medial parietal lobe: d23ab, POS2, RSC, 7m, 31a, 31pv, 31pd

White matter connections:
Structurally connected to the cingulum. The cingulum fibers project anteriorly from 23d with connections to the anterior cingulate cortex and cingulate sulcus, as the fibers curve around the genu of the corpus callosum, these fibers end at a24, p24, and a32pr. The cingulum fibers continue wrapping around the genu with its connections splitting to project anteriorly to 9m, as well as following the rostrum of the corpus callosum to end at 25. Short association bundles primarily project posteriorly to connect to d23ab and v23ab
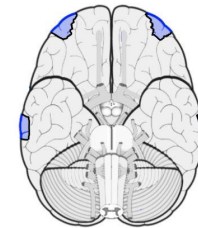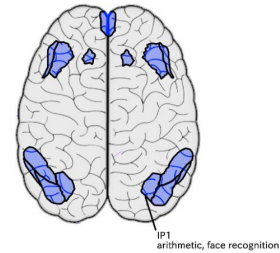
Traditional Acupoint Correlates:
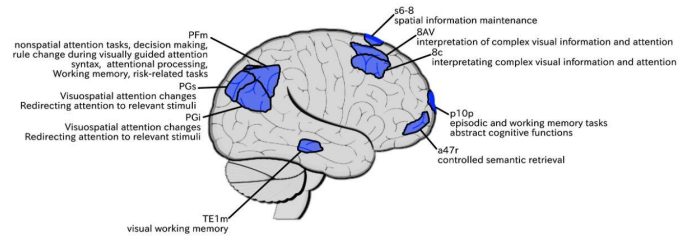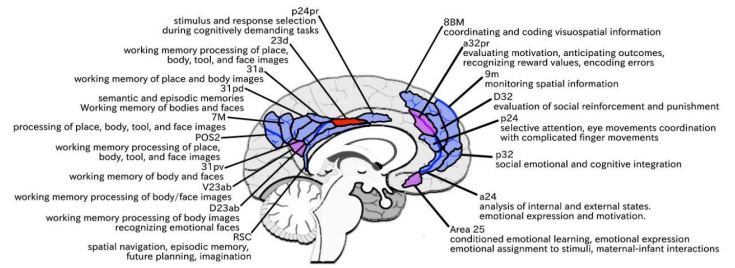N/A

Functionally Connected Acupoints:
BL4 (8AV)	BL5 (8AV)
BL8 (IP1)	GB6 (TE1m)
GB7 (TE1m)	GB14 (p10p)
GB15 (8AV/8C)	GB18 (PFm/PGs/IP1)
GV23 (9m)	

Structurally Connected Acupoints:
GV23 (9m)

Area RSC

Location:
A long thin area of posterior cingulate cortex that is immediately adjacent to the callosal sulcus wrapping around the splenium. Its length begins just superior to the midportion of the corpus callosum body, and it follows the cingulate sulcus until the bottom of the isthmus of the cingulum, where the parahippocampal gyrus begins

Functions:
-Transitioning between allocentric (view-independent) spatial perspectives and egocentric (view-dependent) spatial perspectives
-Spatial navigation, episodic memory, future planning, and imagination
-Retrieval of recent autobiographical information from memory

Functional Connectivity:
Lateral frontal lobe: 9-46d, p10p, 8AD
Medial frontal lobe: 8BM, 9m, a24, p24, a32pr, p32, d32
Lateral parietal lobe: IP1, IP2, PGs
Medial parietal lobe: 23d, v23ab, d23ab, POS2, POS1, PCV, DVT, 7PM, 7m, 31a, 31pv, 31pd

White matter connections:
Structurally connected to the cingulum. The cingulum fibers project both anteriorly and posteriorly from RSC, following the full length of the cingulate cortex. Posterior projections continue around the splenium of the corpus callosum ending at the parahippocampal gyrus at area EC. Anterior cingulum projections split near the genu of the corpus callosum to project superiorly to 10d and 9m, and inferiorly to 25. White matter tracts in the right hemisphere have more consistent connections with the precuneus when compared to left

Traditional Acupoint Correlates:
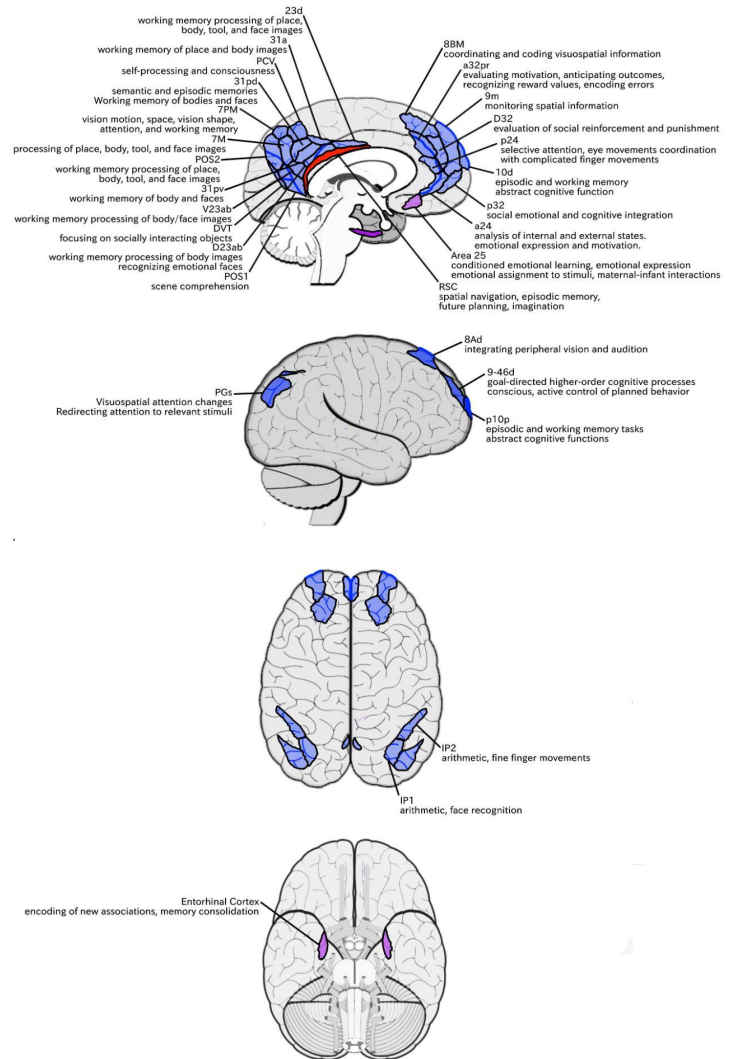N/A

Functionally Connected Acupoints:
BL3 (8AD)	BL4 (8AD/9-46d)
BL5 (8AD)	BL8 (IP1)
GB14 (p10p)	GB18 (PGs/IP1)
GV23 (9m)	

Structurally Connected Acupoints:
GV23 (9m/10d)	GV24 (10d)

Precuneus Areas

Area PCV (Precuneus Visual Area)

Location:
In the anterior precuneus, just posterior to the marginal ramus of the cingulate sulcus

Functions:
-Part of the precuneus, which is involved in visual-spatial perception (including spatial reflection, visual motion perception, and spatial conflict resolution), episodic memory retrieval, self-processing, and consciousness
-Specifically involved in working memory processing of place, body, tool, and face images and recognizing emotional faces over neutral objects

Functional Connectivity:
Lateral frontal lobe: 9-46d, 46, 8AD
Medial frontal lobe: a24pr, 5mv, 23c, s32
Insula opercular region: STV
Temporal lobe: PHA2, PHA3, PHT
Lateral parietal lobe: 7AL, 7PL, IP0, LIPd, PF, PGp
Medial parietal lobe: 23d, POS2, POS1, RSC, DVT, 7AM, 7PM, 7m, 31a, 31pd
Medial occipital lobe: V1, V2
Dorsal visual stream: V6
Lateral occipital lobe: TPOJ2, TPOJ3

White matter connections:
Structurally connected to local parcellations and the contralateral hemisphere. Connections through the splenium of the corpus callosum terminate at contralateral 5m, 7am, PCV, and 7AL. Short association bundles project superiorly to connect to 7am, 7pm, and 5m

Traditional Acupoint Correlates:
N/A

Functionally Connected Acupoints:
BL3 (8AD)   BL4 (8AD/9-46d/46)
BL5 (8AD)   BL7 (7AL)
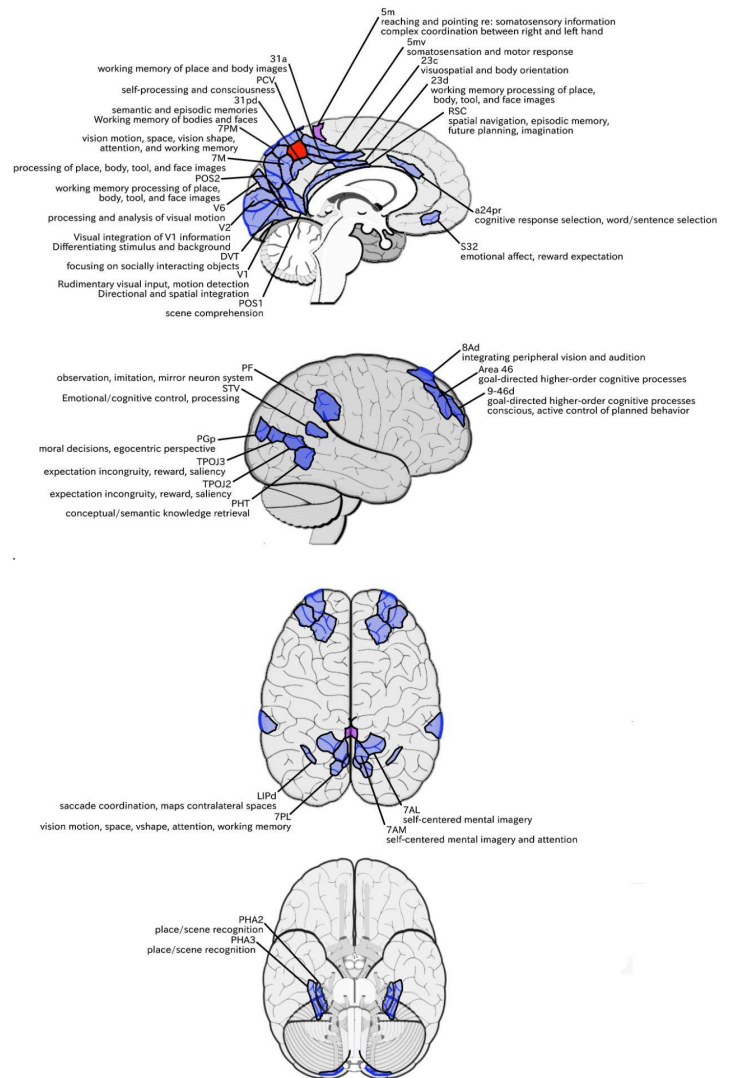GB8 (PHT)   GB9 (PHT)
GB15 (8AD/46)   GV18 (V1/V2)
GV19 (7PM)

Structurally Connected Acupoints:
GV20 (5m)

Area 7m (7 medial)

Location:
In the posterior precuneus, just anterior to the parieto-occipital sulcus

Functions:
-Part of the precuneus, which is involved in visual-spatial perception (including spatial reflection, visual motion perception, and spatial conflict resolution), episodic memory retrieval, self-processing, and consciousness
-Specifically involved in working memory processing of place, body, tool, and face images; listening to stories over answering arithmetic questions; focusing on socially interacting objects over randomly moving geometric shapes; recognizing emotional faces over neutral objects; and comparing featural dimensions of objects vs matching objects based on verbal classifications

Functional Connectivity:
Lateral frontal lobe: 8AV, 8BL, 8AD, i6-8, 47s, 9a, 9p, 10d, 10v, 10r
Medial frontal lobe: 9m, a24, d32, s32
Temporal lobe: STSva, STSvp, TGd, TE1a, TE1m, TE1p, PreS, hippocampus
Lateral parietal lobe: PFm, PGi, PGs
Medial parietal lobe: 23d, v23ab, POS2, POS1, PCV, RSC, 7PM, 31a, 31pv, 31pd

White matter connections:
Structurally connected to the cingulum and contralateral hemisphere. Cingulum fibers project anteriorly from 7m and have connections along the midcingulate and anterior cingulate cortex to d32, a24, p24, a24pr, and p24pr. Connections through the splenium of the corpus callosum terminate at contralateral 7m and PCV. Short association bundles connect to POS1, POS2, 7pm, and PCV

Traditional Acupoint Correlates:
N/A

Functionally Connected Acupoints:
BL3 (8AD/8BL/9p)   BL4 (8AD/8AV))
BL5 (8AD/8AV/i6-8)
GB6 (STSva/STSvp/TE1a/TE1m)   GB7 (TE1m/TE1p)
GB8 (TE1p)   GB15 (8AD/8AV)
GB18 (PFm/PGs)   GV22 (8BL)
GV23 (9m/10d)   GV24 (10d)
Yintang (10v)

Structurally Connected Acupoints:
GV19 (7PM)
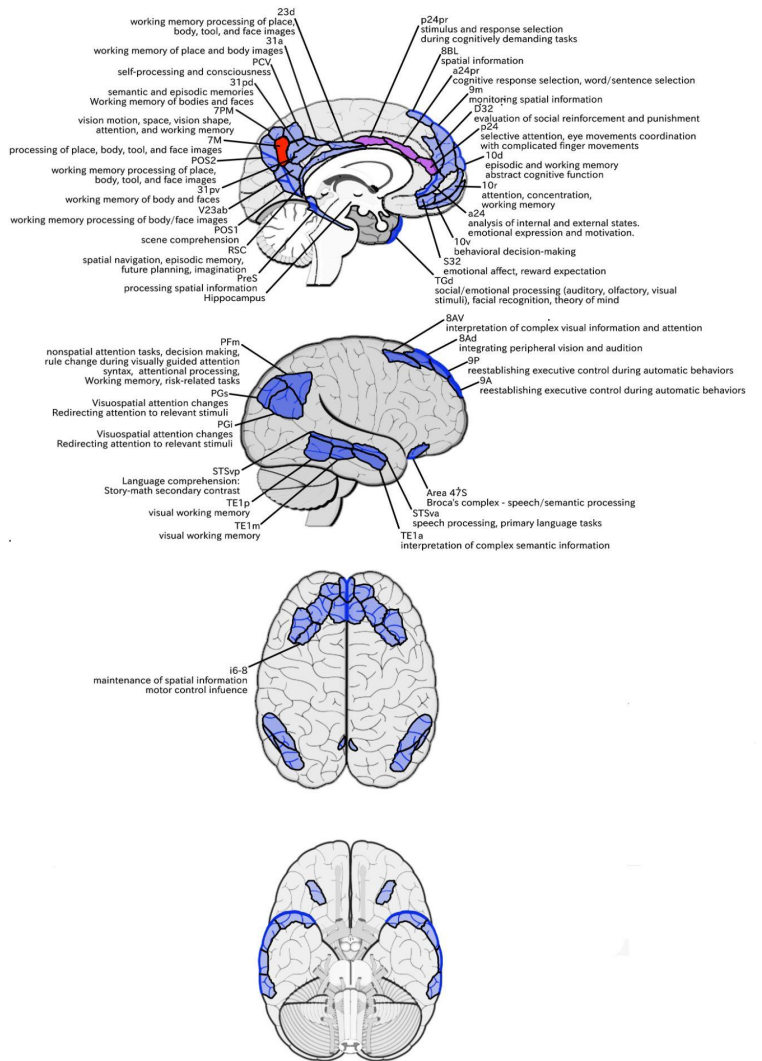
Parieto-Occipital Sulcus Areas

Area POS2 (Parieto-Occipital Sulcus 2)

Location:
On the anterior bank of the parieto-occipital sulcus and makes up the superior half of that bank

Functions:
-Strong, coupled functional correlation with the RSC
-Working memory processing of place, body, tool, and face images; processing of visual cues instructing movement, and comparing featural dimensions of objects vs matching objects based on verbal classification

Functional Connectivity:
Lateral frontal lobe: Area 46, 9-46d, i6-8, 8C, p10p, a10p
Medial frontal lobe: 8BM, 9m, a24, p24, a32pr, p32, d32
Lateral parietal lobe: IP1, IP2, PFm, PGp, PGs
Medial parietal lobe: 23d, d23ab, POS1, PCV, RSC, DVT, 7AM, 7PM, 7m, 31a, 31pv, 31pd

White matter connections:
Structurally connected to local parcellations and the contralateral hemisphere. The white matter tracts from this parcellation are highly variable. Connections to the contralateral hemisphere travel with the forceps major fiber bundle to end at V1, though the termination of this tract is inconsistent. Short association bundles are connected to DVT, POS1, V2, and 7pm

Traditional Acupoint Correlates:
N/A

Functionally Connected Acupoints:
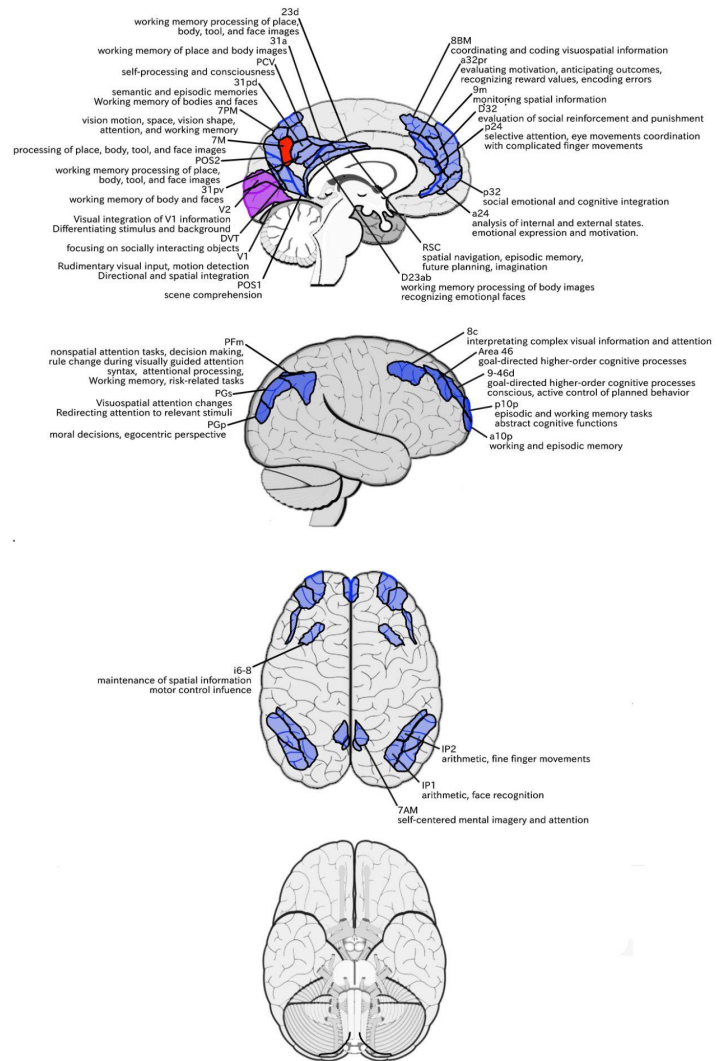|	
BL4 (9-46d/46)	BL5 (i6-8)
BL8 (IP1)	GB14 (a10p/p10p)
GB15 (8C/46)	GB18 (PFm/PGs/IP1)
GV19 (7PM)	GV23 (9m)

Structurally Connected Acupoints:
GV18 (V1/V2)	GV19 (7PM)

Area POS1 (Parieto-Occipital Sulcus 1)

Location:
On the anterior bank of the parieto-occipital sulcus and makes up the inferior half of that bank

Functions:
-Working memory processing of place images
-Greater functional activity related to socially interacting objects vs randomly moving geometric shapes
-Scene-comprehension with the RSC

Functional Connectivity:
Lateral frontal lobe: 8AD, i6-8, 47m, 10d, 10v, 10r
Medial frontal lobe: 9m, a24, s32, p32, d32
Temporal lobe: STSva, TE1a, PHA1, PHA2, PHA3, PreS, hippocampus
Lateral parietal lobe: PGi, PGp, PGs
Medial parietal lobe: ProS, v23ab, d23ab, POS2, PCV, RSC, DVT, 7PM, 7m, 31a, 31pv, 31pd

White matter connections:
Structurally connected to the contralateral hemisphere and to anterior and parahippocampal cingulum projections. Anterior cingulum fibers have connections to the anterior cingulate cortex at a24, a24pr, and p24. Posterior cingulum fibers curve around the splenium of the corpus callosum to end at the parahippocampal gyrus at area EC. Connections to contralateral V1 connect with FM. Short association bundles are connected to V1, V2, POS2, and V6

Traditional Acupoint Correlates:
N/A

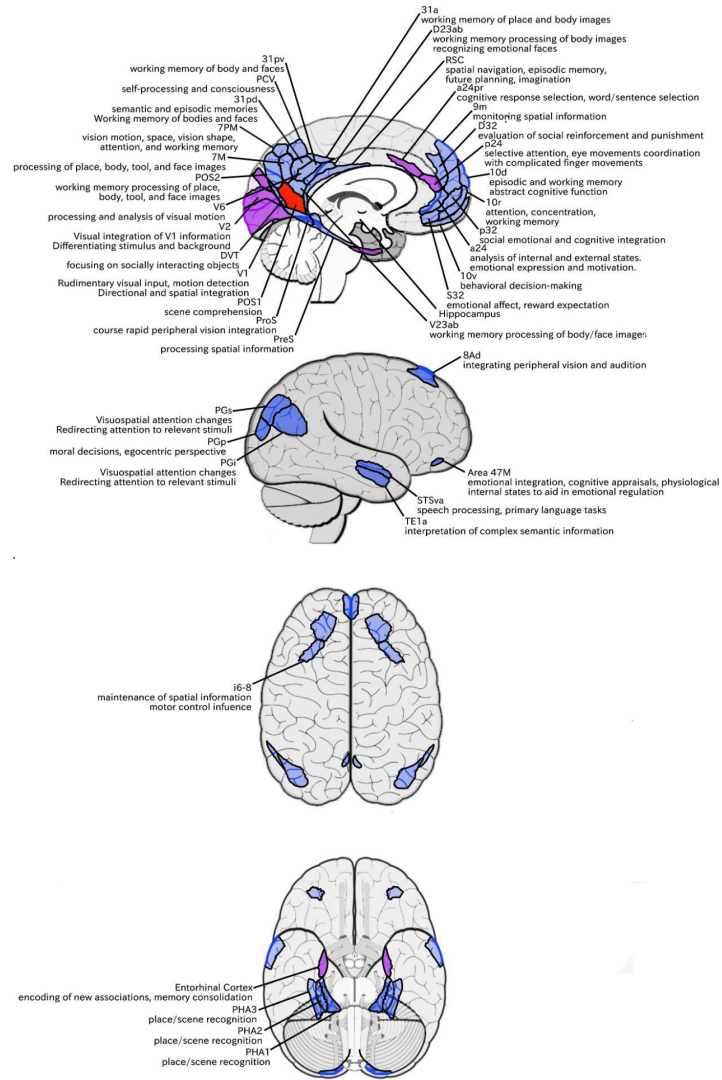Functionally Connected Acupoints:
BL3 (8AD)   BL4 (8AD)
BL5 (8AD/i6-8)   GB6 (STSva/TE1a)
GB15 (8AD)   GB18 (PGs)
GV19 (7PM)   GV23 (9m/10d)
GV24 (10d)   Yintang (10v)

Structurally Connected Acupoints:
GV18 (V1/V2)

Area DVT (Dorsal Visual Transition Area)

Location:
A long thin area that makes up the entire posterior bank of the parieto-occipital sulcus

Functions:
-Transitional function between the early visual cortex and posterior cingulate association cortex
-Functionally connected to the dorsal stream visual cortex, which perceives where stimuli are located, as well as the superior posterior parietal cortex, which plays an important role in planned movements, spatial reasoning, and attention, lending to its probable transitional function between these two areas
-Focusing on socially interacting objects vs randomly moving geometric shapes

Functional Connectivity:
Premotor region: SCEF, FEF, 6ma, 6a
Lateral frontal lobe: 9-46d, 46
Cingulate regions: p32pr, a24pr, 5mv, 23c
Insula and opercular region: FOP4, PFcm, 43, 52
Temporal lobe: PHA1, PHA2, PHA3, PHT
Lateral parietal lobe: 7PC, 7AL, 7PL, PGp, PF, PFop, AIP, VIP, LIPd, LIPv, IP0, IPS1
Medial parietal lobe: 7AM, 7PM, RSC, POS2, POS1, PCV
Medial occipital lobe: V1, V2, V3, V4
Dorsal visual area: V3a, V3b, V7, V6, V6a
Ventral visual stream: FFC, VVC, V8, VMV1, VMV2, VMV3
Lateral occipital lobe: TPOJ2, TPOJ3, V3cd, LO1, LO3, PH, FST

White matter connections:
Structurally connected to the IFOF, MdLF, and contralateral hemisphere. IFOF projections pass just posterior to the insula to end at the anterior pole of the frontal lobe with terminations extending from 8BL to a10p. MdLF projections course from the DVT to the superior temporal gyrus to end at STGa. Connections to contralateral V1, V2, V3, DVT, POS1, and POS2 follow the forceps major through the splenium of the corpus callosum. Short association bundles are connected to V6, DVT, POS1, and POS2

Traditional Acupoint Correlates:
N/A

Functionally Connected Acupoints:
BL4 (9-46d/46)	BL6 (6a)
BL7 (7AL/7PC)	BL8 (IP0/IPS1/V3b/V7)
GB4 (43)	GB8 (PHT)
GB9 (PH/PHT/FST)	GB15 (46)
GB16 (FEF)	GB18 (AIP/LIPv)
GV18 (V1/V2)	GV19 (7PM/V6a)
GV21 (SCEF)	

Structurally Connected Acupoints:
BL3 (8BL)	GB14 (a10p)
GV18 (V1/V2)	GV22 (8BL)

Area ProS (Prostriate)

Location:
In the prostriate cortex, which lies at the anterior most limit of the calcarine fissure. ProS lies between the anteroinferior tip of the parieto-occipital sulcus and the calcarine fissure and is just behind the isthmus of the cingulate gyrus

Functions:
-Transitional function between the early visual cortex and posterior cingulate association cortex like DVT, and is suspected to be primarily responsible for the coarse, rapid integration and analysis of peripheral visual stimuli
-Coordination responses and shifts in attentional focus across multiple cortical systems
-Most activated during working memory and relational functions when compared to other areas in the anterior bank of the parietal-occipital sulcus

Functional Connectivity:
Temporal lobe: PHA1, PHA2, PreS
Lateral parietal lobe: IP0, DVT, POS1, PGp
Medial occipital lobe: V1, V2, V3, V4
Dorsal visual area: V3a, V3b, V7, V6, V6a
Ventral visual stream: VVC, V8
Lateral occipital lobe: V3cd

White matter connections:
Structurally connected to local parcellations, the contralateral hemisphere, and parahippocampal cingulum projections. Parahippocampal fibers from ProS end at PeEc. Connections to contralateral V1 course with forceps major through the splenium of the corpus callosum. Short association bundles project superiorly to V6 and POS2, and posteriorly to V1

Traditional Acupoint Correlates:
N/A

Functionally Connected Acupoints:
BL8 (IP0/V3b/V7)   GV18 (V1/V2)
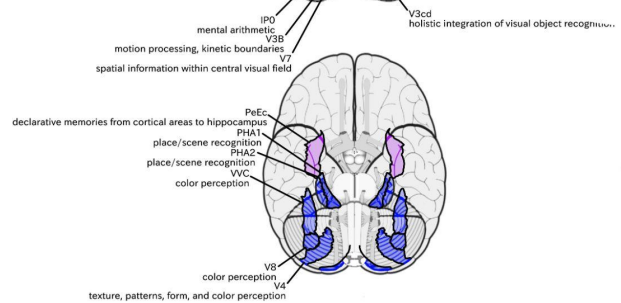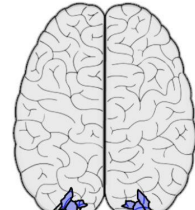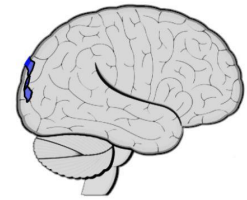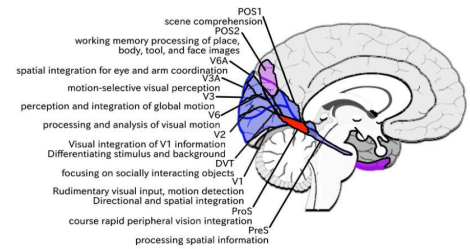GV19 (V6a)

Structurally Connected Acupoints:
GV18 (V1)

Table 1 Traditional Acupuncture Point Associations With The Medial Parietal Lobe

Acupoint	Cortical Parcellation Correlation
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, IP1, IPS1, V3b, V7
GB4	Area 43, 6r
GB5	A1, A4, A5, POI2, TA2
GB6	STSda, STSdp, STSva, STSvp, TE1a, TE1m
GB7	TE1m, TE1p, TE2a, TE2p
GB8	PHT, TE1p
GB9	PH, PHT, FST
GB13	p9-46v
GB14	a10p, a47r, p10p
GB15	8AD, 8AV, 8C, p9-46v, Area 46
GB16	55b, FEF
GB17	Area 1, 2, 3a, 3b, 4
GB18	AIP, Lipv, PFm, PGs, IP1
ST8	6r, 6v, IFJp, PEF
TW20	TE2p
TW22	TE2a
GV18	V1, V2
GV19	7PM, V6a
GV20	Area 1, 3a, 3b, 4, 5m
GV21	SCEF, SFL
GV22	8BL
GV23	9m, 10d
GV24	10d
Yintang	10v

Conflict of Interest Statement