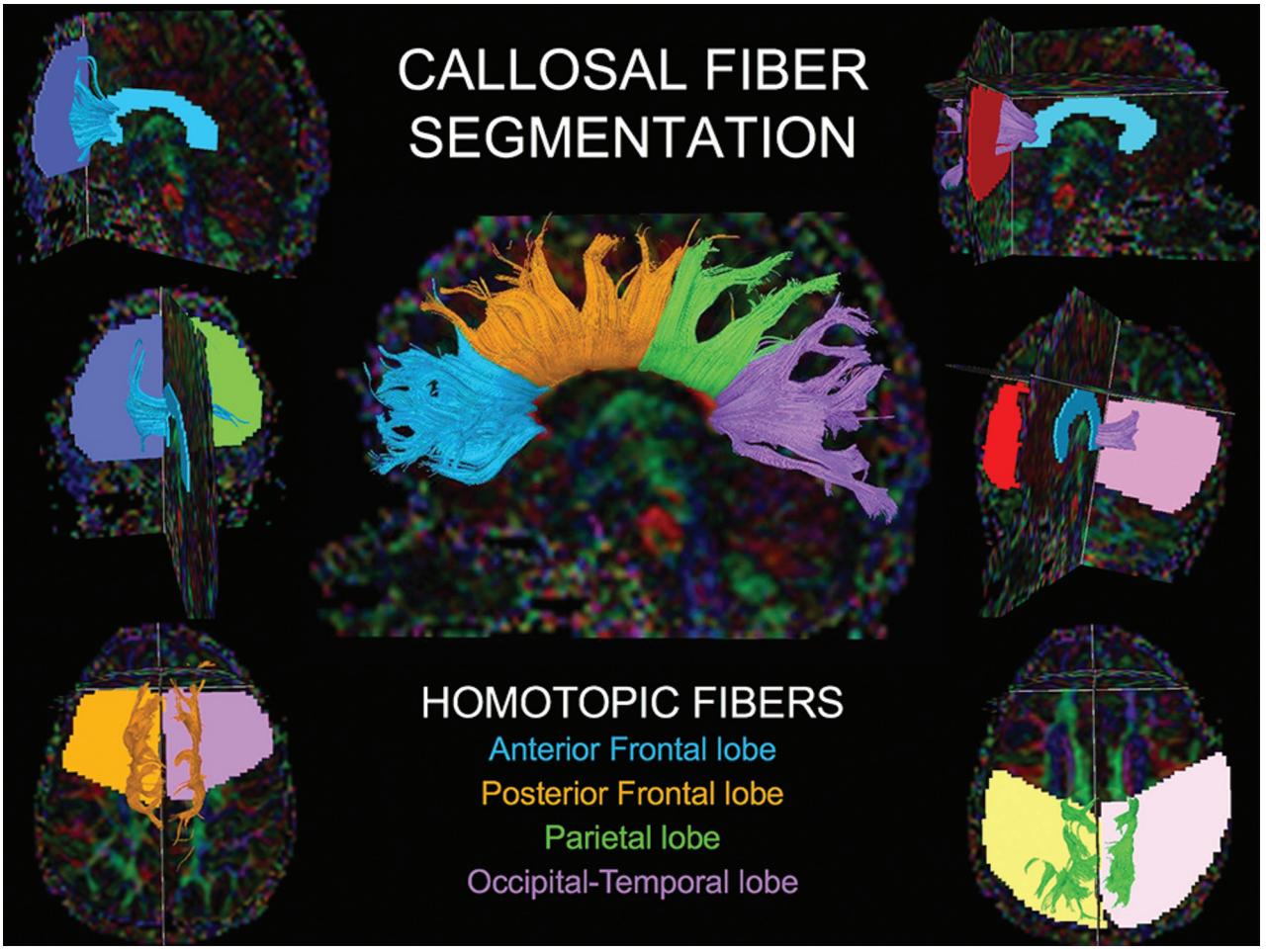
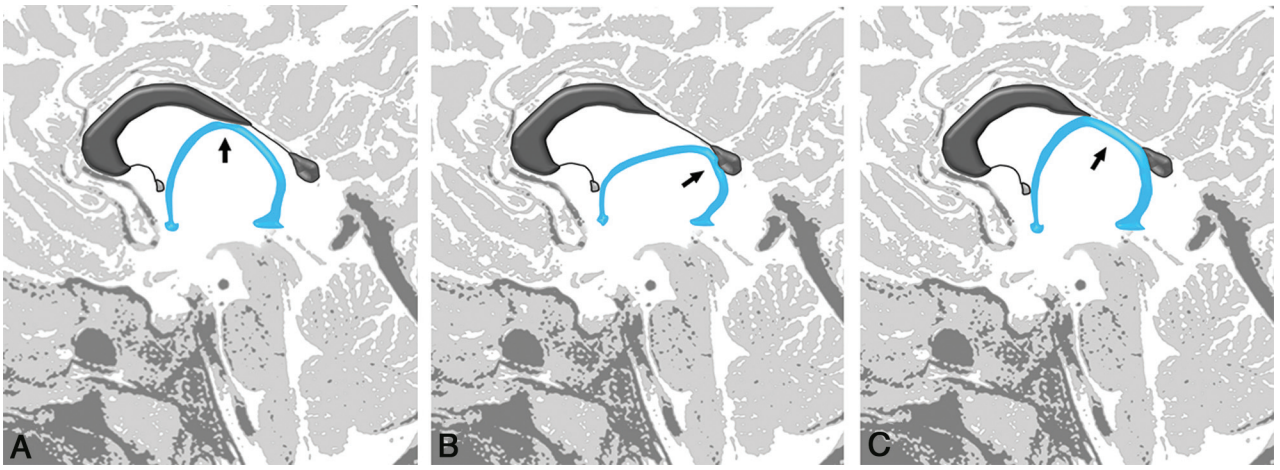
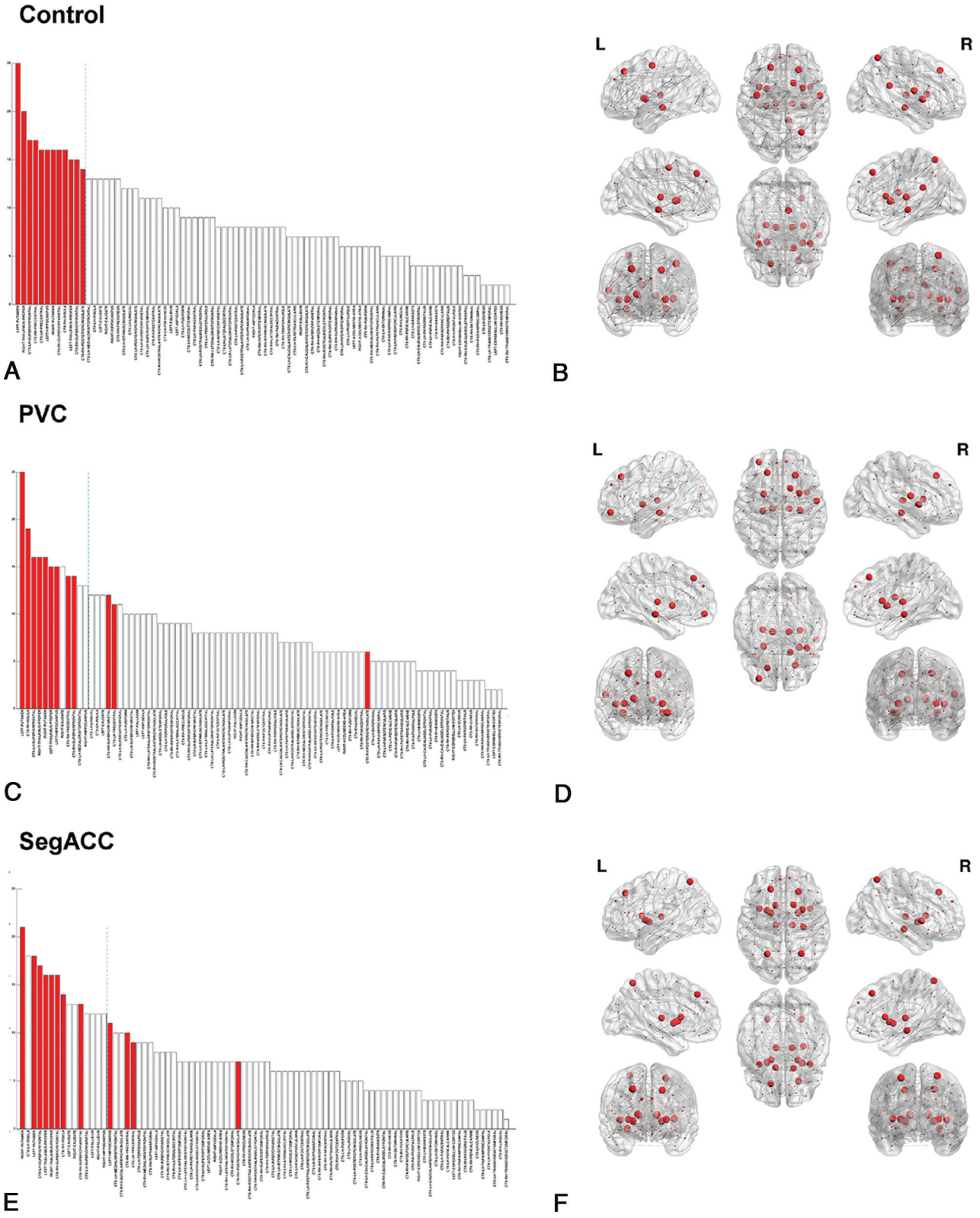


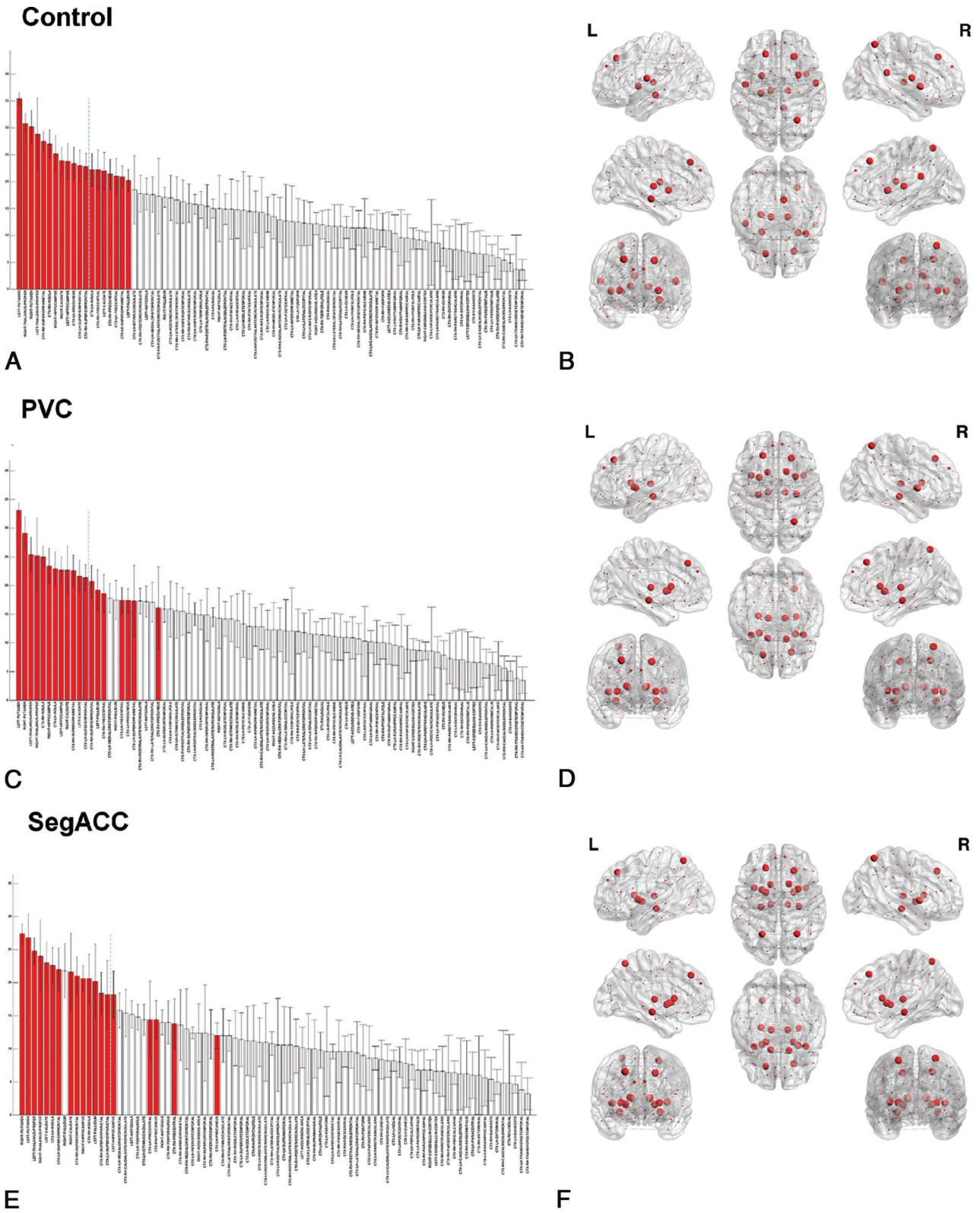
ON-LINE FIG 1. Callosal tract segmentation procedure, shown for a control subject. A region of interest is first drawn on the midline sagittal section of fractional anisotropy colored maps to include all callosal fibers. These fibers are further segmented and colored according to their projections to specific lobar areas (ie, homotopic anterior and posterior frontal, parietal, and occipitotemporal tracts [*central image*]). For the anterior frontal lobe projections, 2 additional ROIs are placed on a coronal section in each hemisphere anterior to the rostrum (*left upper* and *middle images*). For the posterior frontal lobe and parietal lobe projections, an axial section is chosen at the most posterior edge of the parieto-occipital sulcus. Two ROIs for posterior frontal projections are then placed to encompass the region between the coronal section used for anterior frontal fibers and the central sulcus (*left lower image*). Two ROIs for parietal lobe connections are placed on the same axial section, in the region posterior to the central sulcus (*right lower image*). Projections to the occipital and temporal lobes are segmented by using 2 ROIs placed on coronal images posterior to the callosum, encompassing regions inferior to the parieto-occipital sulcus (*right upper and middle images*). Additionally, we reconstructed cingulum, fornices, and Probst bundles: ROIs were placed on coronal images within the Probst bundle and cingulum bilaterally and on axial and coronal images within the fimbria to trace hippocampal axons (not shown).



ON-LINE FIG 2. Anatomic schemes of the 3 types of segmental callosal agenesis. *A*, In segACC type I, the fornices and the hippocampal commissure lie beneath the anterior callosal segment (*arrow*). *B*, In segACC type II, the fornices and the hippocampal commissure lie beneath the posterior callosal segment (*arrow*). *C*, In segACC type III, the intermediate segment of the commissural plate is made of the joining fornices and hippocampal commissure (*arrow*).



ON-LINE FIG 3. Hubs for the consensus connectomes in the control (*A* and *B*), partial virtual callosotomy (*C* and *D*), and segmental callosal agenesis (*E* and *F*) groups. The bar graphs reveal the degree of distribution across nodes for the consensus connectomes (*A*, *C*, and *E*): The *red bars* demonstrate the nodes with degrees greater than mean plus 1 SD for the control consensus connectome in *A*. The *dashed lines* demonstrate the cutoff for mean plus 1 SD in the PVC controls and patients with segACC. The *red bars* in *C* and *E* show the redistribution of hub regions in the PVC and segACC consensus connectomes, compared with control consensus connectomes: Any red node appearing to the right of the *dashed line* has been demoted from hub status and any *white bar* to the left of the *dashed line* is a node that has been promoted to a hub. The 3D schematic graphs depict the spatial distribution of hubs (represented by *larger red circles*) within the corresponding consensus connectomes (*B*, *D*, and *F*). L indicates left; R, right.



ON-LINE FIG 4. Hubs for individual connectomes in the control (*A* and *B*), partial virtual callosotomy (*C* and *D*), and segmental callosal agenesis (*E* and *F*) groups. The bar graphs reveal the mean degree of distribution across nodes for the individual connectomes with SD *error bars* (*A*, *C*, and *E*): The *red bars* demonstrate the nodes with a degree greater than mean plus 1 SD for the controls (*A*). The *dashed lines* demonstrate the cutoff for mean plus 1 SD for the PVC and for segACC. The *red bars* in *C* and *E* show the redistribution of regions in the individual connectomes of the PVC and segACC groups, respectively, compared with the hubs in the individual connectomes of control subjects: Any red node appearing to the right of the *dashed line* has been demoted from hub status, and any *white bar* to the left of the *dashed line* is a node that has been promoted to hub. The 3D schematic graphs depict the spatial distribution of hubs (represented by *larger red circles*) within the corresponding individual connectomes (*B*, *D*, and *F*). L indicates left; R, right.

On-line Table 1: Clinical, genetic, and neuroradiologic findings of patients with segACC

	SegACC Type I			SegACC Type II		SegACC Type III		
	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5	Patient 6	Patient 7	Patient 8
Sex	Male	Male	Female	Female	Male	Male	Male	Female
Ethnic origin	Caucasian	Caucasian	Caucasian	Caucasian	Caucasian	Caucasian	Hispanic	Caucasian
Age at MRI	5 yr 11 mo	1 yr	2 yr	5 yr 10 mo	5 yr 4 mo	5 yr 7 mo	1 mo	1 yr 2 mo
OFC at MRI (cm) (centiles)	56.3 (>97°)	47 (75°–90°)	42.3 (<3°)	49 (5°–10°)	54 (90°–97°)	49 (<3°)	31 (<3°)	46 (75°)
Commissural anomaly/other brain malformations	Ectopic callosal bundle/ isolated	Ectopic callosal bundle, ACH/isolated	ACH/partial empty sella	Pseudo-diencephalic cyst, pontine hypoplasia	Ectopic callosal bundles/IP-II, cervicomedullary neuroschisis, vertebral malformations	ACH/PNH, pontine hypoplasia, ectopic posterior pituitary gland, optic nerve hypoplasia	ACH/isolated	Laterobulbar arachnoid cyst
Delivery	Elective CS for previous CS	Vaginal delivery with stained amniotic fluid	Eutocic	NA	Vaginal delivery with stained amniotic fluid	Urgent CS for cardiotocography alterations	Urgent CS due to preeclampsia	Elective CS for previous CS
Age at delivery (wk)	38	42	40	39	40	38	36 + 2 days	37 + 4 days
Neonatal history	Normal	Normal	Difficulties in sucking	NA	Normal	Intubation for respiratory distress	Intubation for respiratory distress, IUGR	Ventilation mask
Developmental delay	Mild	Severe	Moderate	Moderate	Severe	Severe	Mild	Moderate
Neurologic findings	Right eye esotropia, clumsiness, nasal voice	Alternating esotropia, hypomimia, hypotonia	Bilateral esotropia, nystagmus, dysphagia, hypotonia, hypotrophy, EEG epileptic anomalies (no clinical seizure)	Hypomimia, clumsiness, seizures	Limitation in neck and upper limb movements, mirror movements, upper limb altered somatosensory-evoked potentials	Dysphagia, hypotonia, horizontal nystagmus	Poor spontaneous movements, hypotrophy	Bilateral exotropia, hypotonia, clumsiness, seizures
Sphincter control	Delayed	Not acquired	Not acquired	Delayed	Normal	Not acquired	NA	Partially acquired
Language and communication	Poor expressive language with echolalia	Poor expressive language (2–3 significant words)	Absent	Poor expressive language (about 10 words)	Absent speech	Absent expressive language	NA	Poor expressive language
Behavior/psychiatric disorder	Autism spectrum disorder, hyperactivity	Absent	Self-aggressive, low frustration tolerance	Hyperactivity	Poor social interaction	Hyperactivity, low frustration tolerance	Absent	Absent
VEP/BAEP	−/−	−/−	−/−	−/−	−/−	+ (bilaterally)/−	−/+ (right)	−/−
Dysmorphic features	Macrocrania with turricephaly, broad forehead, blepharophimosis, downturned lids, anteverted nares, wide philtrum, thin lips, crowded teeth, stubby hands, bilateral simian crease and sandal gap sign	Prominent forehead, enophthalmos, mild blepharophimosis, prominent upper lip, retrognathia with horizontal line on the chin	Decreased growth, thick hair with low posterior and anterior hairline, hairy skin, synophrys with thin eyebrows, long eyelashes, short nose, wide philtrum, small mouth with crowded teeth, small posteriorly rotated ears, convex nails, toes clinodactyly	Prominent forehead, hypertelorism, arched eyebrows, round ears, thick everted lips	Low posterior hairline, large low-set ears, short neck, facial asymmetry, thoracolumbar scoliosis	Wide nose with thick columella, simplified wide ears with absent helix, 1 café-au-lait spot	Mild proptosis, downturned eyelid, downturned thin lips	Short stature, straight eyebrows, deep-set eyes, broad and flat nasal bridge, long philtrum, pointed chin, posteriorly rotated low-set ears
Extraneurologic malformations and other findings	Bilateral microphthalmia	VSD, cryptorchidism, sacral dermal sinus, hypothyroidism	Pectus excavatum, GH deficiency	Cardiac malformation	Left hand first finger hypoplasia, bilateral kidney hypoplasia	Congenital unilateral cataract, tapetoretinal degeneration, bilateral cryptorchidism and small penis, GH, ACTH and TSH deficit, hyper-cholesterolemia	Inferior irideal coloboma, large PFO and VSD, bilateral inguinal hernia, penoscrotal hypospadias	Bilateral retinal-choroidal and optic nerve colobomas, VSD, pilonidal sinus
Metabolic testing	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Karyotype and array-CGH	46, XY normal	46, XY normal	46, XX normal	46, XX, de novo dup(8p)	46, XY normal	46, XY normal	Paternal dup(2p25.3); maternal del(5q35.3) and del(16q23.1)	46, XX, de novo del(1p36.3-tel)
Suspected diagnosis	Unknown	Unknown	Cornelia de Lange-like syndrome	8p duplication syndrome	Klippel-Feil syndrome	SOD spectrum	Mowat-Wilson syndrome	1p36 deletion syndrome

Note:—ACH indicates anterior commissure hypoplasia; ACTH, adrenocorticotropic hormone; BAEP, brain stem auditory-evoked potentials; CGH, comparative genomic hybridization; CS, cesarean delivery; del, deletion; dup, duplication; EEG, electroencephalography; GH, growth hormone; IP-II, incomplete partition type II; IUGR, intrauterine growth retardation; NA, not available; OFC, occipital frontal circumference; PFO, patent foramen ovale; PNH, periventricular nodular heterotopia; SOD, septo-optic dysplasia; TSH, thyroid-stimulating hormone; VEP, visual-evoked potentials; VSD, ventricular septal defect; −, normal; +, abnormal.

On-line Table 2. Network consistency (correlation coefficient of connection strengths)

	Control (Mean)	PVC (Mean)	SegACC (Mean)
Consistency of individual networks with the consensus network	0.844 ± 0.02	0.845 ± 0.059	0.852 ± 0.02
Consistency between individual networks	0.704 ± 0.083	0.707 ± 0.082	0.647 ± 0.038[a]

[a] Significantly different from control and PVC groups ($P < .05$).

On-line Table 3. Modules identified in healthy controls, with assignment of nodes to each module

Module 1	Module 2	Module 3	Module 4	Module 5
Left caudal anterior cingulate	Left bankssts	Left paracentral	Left caudal middle frontal	Right bankssts
Left cuneus	Left entorhinal	Right caudal middle frontal	Left frontal pole	Right cuneus
Left isthmus cingulate	Left fusiform	Right insula	Left insula	Right entorhinal
Left posterior cingulate	Left inferior parietal	Right lateral orbitofrontal	Left lateral orbitofrontal	Right fusiform
Left precuneus	Left inferior temporal	Right paracentral	Left medial orbitofrontal	Right inferoparietal
Left rostral anterior cingulate	Left lateral occipital	Right pars opercularis	Left pars opercularis	Right inferotemporal
Left superior parietal	Left lingual	Right pars orbitalis	Left pars orbitalis	Right lateral occipital
Right caudal anterior cingulate	Left middle temporal	Right pars triangularis	Left pars triangularis	Right lingual
Right isthmus cingulate	Left parahippocampal	Right postcentral	Left postcentral	Right middle temporal
Right posterior cingulate	Left pericalcarine	Right precentral	Left precentral	Right parahippocampal
Right precuneus	Left superior temporal	Right rostral middle frontal	Left rostral middle frontal	Right pericalcarine
Right superior parietal	Left supramarginal	Right superior frontal	Left superior frontal	Right superotemporal
	Left temporal pole	Left cerebellum cortex	Right frontal pole	Right supramarginal
	Left transverse temporal	Right accumbens area	Right medial orbitofrontal	Right temporal pole
	Left hippocampus	Right amygdala	Right rostral anterior cingulate	Right transverse temporal
		Right caudate	Left accumbens area	Right hippocampus
		Right cerebellum cortex	Left amygdala	
		Right pallidum	Left caudate	
		Right putamen	Left pallidum	
		Right thalamus proper	Left putamen	
			Left thalamus proper	

Note:—Bankssts indicates cortical areas around superior temporal sulcus.

On-line Table 4: Modules identified in subjects with PVC, with assignment of nodes to each module

Module 1	Module 2	Module 3	Module 4	Module 5
Left caudal anterior cingulate	Left bankssts	Right caudal middle frontal	Left caudal middle frontal	Right bankssts
Left paracentral	Left cuneus	Right frontal pole	Left entorhinal	Right entorhinal
Left posterior cingulate	Left inferior parietal	Right lateral orbitofrontal	Left frontal pole	Right fusiform
Left rostral anterior cingulate	Left inferior temporal	Right medial orbitofrontal	Left fusiform	Right inferior parietal
Left superior frontal	Left isthmus cingulate	Right paracentral	Left insula	Right inferior temporal
Right caudal anterior cingulate	Left lateral occipital	Right pars opercularis	Left lateral orbitofrontal	Right insula
Right cuneus	Left lingual	Right pars orbitalis	Left medial orbitofrontal	Right lateral occipital
Right isthmus cingulate	Left middle temporal	Right pars triangularis	Left parahippocampal	Right lingual
Right posterior cingulate	Left pericalcarine	Right precentral	Left pars opercularis	Right middle temporal
Right precuneus	Left precuneus	Right rostral middle frontal	Left pars orbitalis	Right parahippocampal
Right rostral anterior cingulate	Left superior parietal	Left cerebellum cortex	Left pars triangularis	Right pericalcarine
Right superior frontal	Left superior temporal	Right accumbens area	Left postcentral	Right postcentral
	Left supramarginal	Right amygdala	Left precentral	Right superior parietal
	Left transverse temporal	Right caudate	Left rostral middle frontal	Right superior temporal
		Right cerebellum cortex	Left temporal pole	Right supramarginal
		Right pallidum	Left accumbens area	Right temporal pole
		Right putamen	Left amygdala	Right transverse temporal
		Right thalamus proper	Left caudate	Right hippocampus
			Left hippocampus	
			Left pallidum	
			Left putamen	
			Left thalamus proper	

Note:—Bankssts indicates cortical areas around superior temporal sulcus.

On-line Table 5: Modules identified in patients with segmental callosal agenesis, with assignment of nodes to each module

Module 1	Module 2	Module 3	Module 4
Left bankssts	Left caudal anterior cingulate	Left caudal middle frontal	Right bankssts
Left cuneus	Left medial orbitofrontal	Left entorhinal	Right cuneus
Left inferior parietal	Left rostral anterior cingulate	Left frontal pole	Right entorhinal
Left inferior temporal	Right caudal anterior cingulate	Left fusiform	Right fusiform
Left lateral occipital	Right caudal middle frontal	Left insula	Right inferior parietal
Left lingual	Right frontal pole	Left isthmus cingulate	Right inferior temporal
Left middle temporal	Right lateral orbitofrontal	Left lateral orbitofrontal	Right insula
Left pericalcarine	Right medial orbitofrontal	Left paracentral	Right isthmus cingulate
Left superior temporal	Right paracentral	Left parahippocampal	Right lateral occipital
Left supramarginal	Right pars opercularis	Left pars opercularis	Right lingual
Left transverse temporal	Right pars orbitalis	Left pars orbitalis	Right middle temporal
	Right pars triangularis	Left pars triangularis	Right parahippocampal
	Right posterior cingulate	Left postcentral	Right pericalcarine
	Right precentral	Left posterior cingulate	Right postcentral
	Right rostral anterior cingulate	Left precentral	Right precuneus
	Right rostral middle frontal	Left precuneus	Right superior parietal
	Right superior frontal	Left rostral middle frontal	Right superior temporal
	Right accumbens area	Left superior frontal	Right supramarginal
	Right caudate	Left superior parietal	Right temporal pole
	Right cerebellum cortex	Left temporal pole	Right transverse temporal
	Right pallidum	Left accumbens area	Right amygdala
	Right putamen	Left amygdala	Right hippocampus
	Right thalamus proper	Left caudate	
		Left cerebellum cortex	
		Left hippocampus	
		Left pallidum	
		Left putamen	
		Left thalamus proper	

Note:—Bankssts indicates cortical areas around superior temporal sulcus.