Supplementary Table 1: Wavefront sensing parameters

Figure	Window type	Depth (µm)	Guide star excitation power (mW) at surface	Guide star integration time (s)	AO correcting field (µm^2)
Fig. 1c	Closed cranial	4	5	1.8	100×100
		400	20	3	
		800	100	30	
Fig. 2a	Closed cranial	690	33	8	100×100
		770	48	20	
Fig. 2f	Closed cranial	710	46	25	50×36
Fig. 3a	Closed cranial	700	60	20	140×140
Fig. 3f	Closed cranial	100	4	30	100×100
		400	5		
		600	70		
		700	90		
Supp. Fig. 4b	Closed cranial	4	5	1.8	100×100
		100	7	1.8	
		200	12	1.8	
		300	12	3	
		400	20	3	
		500	32	4	
		600	60	8	
		700	75	12	
		800	100	30	
		850	135	30	

Figure	Window type	Depth (µm)	Guide star excitation power (mW) at surface	Guide star integration time (s)	AO correcting field (µm^2)
Supp. Fig. 5a	Closed cranial	692	75	20	140×140
Supp. Fig. 5c	Closed cranial	806	100	25	140×140
Supp. Fig. 6b	Closed cranial	850	100	20	100×100
Supp. Fig. 7b	Closed cranial	560	75	8	150×150
		610	75	10	
		660	75	10	
		710	75	15	
		760	75	40	
Supp. Fig. 8b	Closed cranial	570	75	10	300×300 (tiling)
Supp. Fig. 9e	Closed cranial	350	32	5	20×20
Supp. Fig. 9g	Closed cranial	650	90	20	20×20
Supp. Fig. 10b	Thinned skull	225	30	10	140×140
		325	80	15	
		425	120	30	
		525	120	30	
Supp. Fig. 10d	Thinned skull	383	80	20	140×140
Supp. Fig. 10f	Thinned skull	541	120	30	140×140
Supp. Fig. 11b,e	Thinned skull	320	90	10	300×300 (tiling)
Supp. Fig. 12a	Thinned skull	100	20	10	100×100
Supp. Fig. 12b	Thinned skull	200	30	10	100×100
Supp. Fig. 12c	Thinned skull	386	32	20	100×100

Figure	Window type	Depth (µm)	Guide star excitation power (mW) at surface	Guide star integration time (s)	AO correcting field (µm^2)
Supp. Fig. 12e	Thinned skull	517	100	35	100×100
Supp. Fig. 13b	Closed cranial	660	90	30	50×50
Supp. Fig. 14a	Closed cranial	650	90	30	100×100
Supp. Fig. 15a	Closed cranial	740	100	20	100×100
Supp. Fig. 15b	Closed cranial	732	90	30	100×100
Supp. Fig. 15c	Closed cranial	540	60	15	100×100

Supplementary Table 2: Vascular imaging parameters using Cy5.5-dextran at the excitation wavelength of 1.25 µm

Figure	Mouse line	Imaging power at surface (mW)	Imaging depth (µm)	Image field (µm^2) or volume (µm^3)	Number of pixels	Pixel dwell time (ns)	Number of frames in average
Fig. 1b	C57BL/6J	5-135	4-1100	400×400×1100	512×512×550	1600	3-8
Fig. 1e	C57BL/6J	5	4	100×100	512×512	1600	10
		40	400				
		135	800				
Supp. Fig. 4b	C57BL/6J	4	4	100×100	512×512	1600	10
		8	100				
		8	200				
		20	300				
		45	400				
		45	500				
		75	600				
		75	700				
		135	800				
		135	850				
Supp. Fig. 5a	C57BL/6J	35	692	140×140	512	800	10
Supp. Fig. 5c	C57BL/6J	52	806	140×140	512	800	10
Supp. Fig. 10a	C57BL/6J	5-120	1-600	140×140×600	512×512×600	800	2-10
Supp. Fig. 10b	C57BL/6J	13	225	140×140	512×512	800	10
		30	325				
		40	425				
		75	525				
Supp. Fig. 10d	C57BL/6J	55	383	140×140	512×512	800	10

Figure	Mouse line	Imaging power at surface (mW)	Imaging depth (µm)	Image field (µm^2) or volume (µm^3)	Number of pixels	Pixel dwell time (ns)	Number of frames in average
Supp. Fig. 10f	C57BL/6J	105	541	140×140	512×512	800	10
Supp. Fig. 11d,e	B6.Cg-Tg (Thy1-YFP-SLICK A) AGfng/J	100	320	300×300	768×768	1600	10
Supp. Fig. 15a	C57BL/6J	30	740	100×100	512×512	800	10
Supp. Fig. 15b	C57BL/6J	120	732	100×100	512×512	800	10
Supp. Fig. 15c	C57BL/6J	120	540	100×100	512×512	800	10

Supplementary Table 3: Neuronal imaging parameters

Figure	Mouse line	Imaging fluorophore	Excitation wavelength (µm)	Imaging power at surface (mW)	Imaging depth (µm)	Image field (µm^2) or volume (µm^3)	Number of pixels	Pixel dwell time (ns)	Number of frames averaged
Fig. 2a	B6.Cg-Tg(Thy1-YFP-SLICK A)AGfng/J	EYFP	1.04	35	690	100×100	512×512	1600	5
				85	770				
Fig. 2e and Supp. Fig. 7a	Tg(Rbp4-cre)KL100Gsat	mRuby2	1.07	15-200	1-810	150×150×810	512×512×810	1000	5-15
Fig. 2f	Tg(Rbp4-cre)KL100Gsat	mRuby2	1.07	90	710	50×36×10	289×206	800	10
Fig. 3a	Tg(Rbp4-cre)KL100Gsat	jRGECO1a	1.07	165	700	140×140	512×512	800	100
Fig. 3f	C57BL/6J	SF-Venus-iGluSnFR	1.03	50	100	100×100	300×300	800	20-200
				85	400				
				170	600				
				200	700				
Fig. 3g	C57BL/6J	SF-Venus-iGluSnFR	1.03	30-200	30-730	150×150×700	400×400×350	800	5-20
Supp. Fig. 6b	B6.Cg-Tg(Thy1-YFP-SLICK A)AGfng/J	EYFP	1.04	110	850	100×100	512×512	1600	5
Supp. Fig. 7b	Tg(Rbp4-cre)KL100Gsat	mRuby2	1.07	85	560-565	150×150	512×512×5	1000	10
				95	610-615				10
				120	660-665				10
				150	710-715				10
				200	760-765				15

Figure	Mouse line	Imaging fluorophore	Excitation wavelength (µm)	Imaging power at surface (mW)	Imaging depth (µm)	Image field (µm^2) or volume (µm^3)	Number of pixels	Pixel dwell time (ns)	Number of frames averaged
Supp. Fig. 8a,b	B6.Cg-Tg(Thy1-YFP-SLICKA)AGfng/J	EYFP	1.04	150	570	300×300	768×768	1600	10
Supp. Fig. 9d	C57BL/6J	SF-Venus-iGluSnFR	1.03	35-200	50-730	100×100	300×300	800	20-200
Supp. Fig. 9e	Tg(Rbp4-cre)KL100Gsat	SF-Venus-iGluSnFR	1.03	22	350	20×20	80×80	1000	100
Supp. Fig. 9g	Tg(Rbp4-cre)KL100Gsat	SF-Venus-iGluSnFR	1.03	185	650	20×20	80×80	1000	100
Supp. Fig. 11a,b	B6.Cg-Tg(Thy1-YFP-SLICKA)AGfng/J	EYFP	1.04	50	320	300×300	768×768	1600	10
Supp. Fig. 12a	C57BL/6J	jRGECO1a	1.07	40	100	100×100	512×512	800	20
Supp. Fig. 12b	C57BL/6J	jRGECO1a	1.07	65	200	100×100	512×512	800	20
Supp. Fig. 12c	Tg(Thy1-jRGECO1a)GP8.31Dkim/J	jRGECO1a	1.07	155	385	100×100	300×300	1000	200
Supp. Fig. 12e	Tg(Thy1-jRGECO1a)GP8.31Dkim/J	jRGECO1a	1.07	115	517	100×100	300×300	1000	200
Supp. Fig. 13b	C57BL/6J	SF-Venus-iGluSnFR	1.03	150	660	50×50	200×200	1200	80
Supp. Fig. 14a	Tg(Rbp4-cre)KL100Gsat	jRGECO1a	1.07	120	650	100×100	400×400	800	100