SUPPLEMENTARY INFORMATION

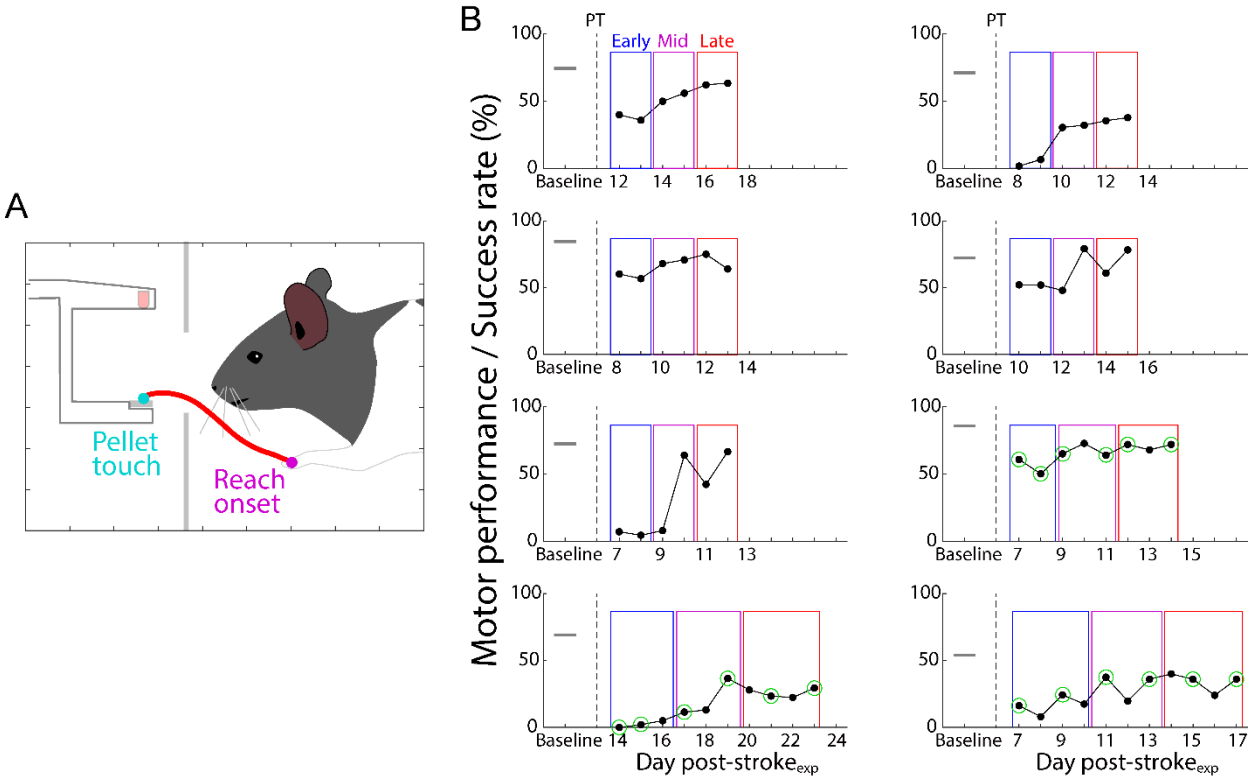

Figure S1. Reach-to-grasp task and success rates over all recovery periods.
(A), Cartoon example of reach-to-grasp motor task with lateral view. Mageta and cyan dots represents reach onset and pellet touch position, respectively. Red trace represents an example of mean trajectory within a single session.
(B), Pellet retrieval success rates in an individual animal (n=8 rats). Three colored boxes repsents the presumed tertile recovery periods after induction of PT stroke$_{exp}$. In three rats in which motor recovery was monitored more than 6 days, we used two representative sessions per period (green circles).

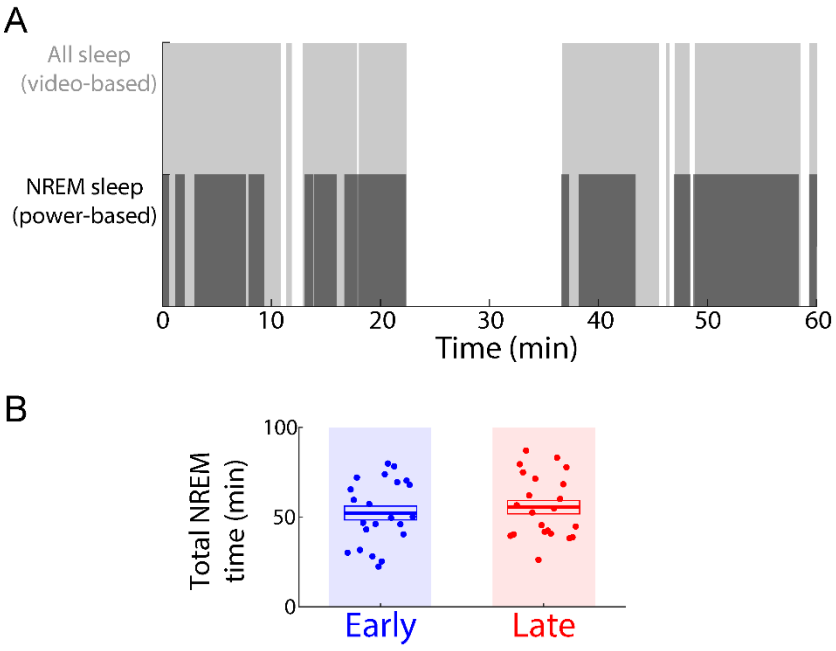

Figure S2. Sleep detection and NREM sleep duration.
(A), Examples of detections of all sleep using a degree of movement (gray; see Methods) and NREM sleep using power spectral density in 0.1-4 Hz and gamma (30-60 Hz) bands (black).
(B), Mean NREM sleep time during early and late period after stroke. NREM sleep time across all sessions: 52.2 ± 3.9 min during early period (n = 28 sessions in 14 rats), 55.5 ± 3.7 min during late period (n = 28 sessions in 14 rats). No significant difference; early vs. late: mixed-effects model, $t_{54} = 0.93$, P = 0.36. Mean in solid line ± s.e.m. in box.

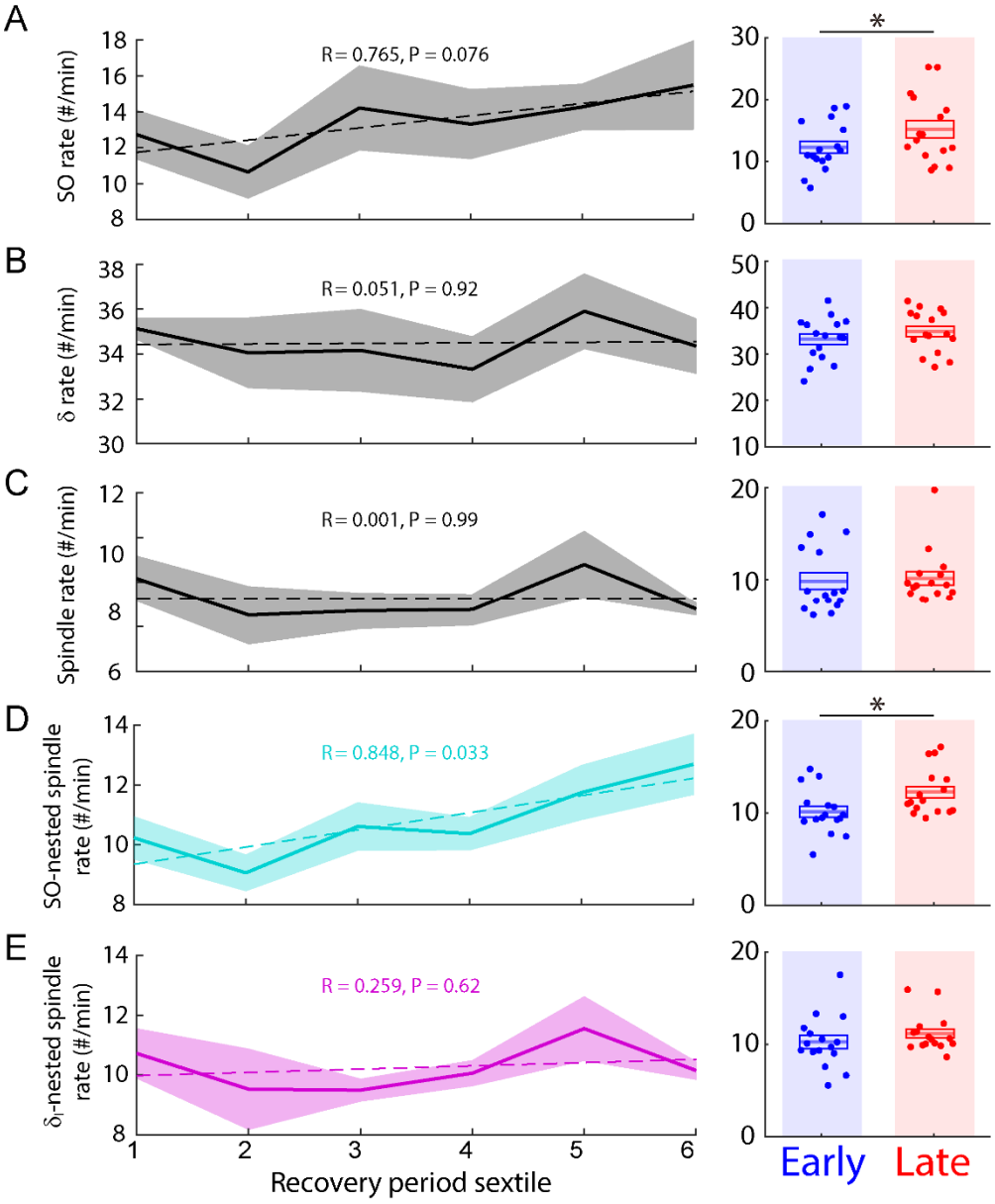

Figure S3. Sleep waves rates over the recovery period.
Left, average time courses in the rates of SO (**A**), δ-waves (**B**), spindles (**C**), SO-nested spindles (**D**), and δ_I-nested spindles (**E**) over the recovery period sextile (n = 11 rats). Dashed line represents linear fitting (linear regression; SO: R = 0.765, P = 0.076; δ: R = 0.051, P = 0.92; spindles: R = 0.001, P = 0.99; SO-nested spindles: R = 0.848, P = 0.033; δ_I-nested spindles: R = 0.259, P = 0.62). Right, comparisons between early period and late period in each corresponding metric (early vs. late, mixed-effect model; SO: t_{30} = 2.21, *P = 0.035; δ-waves: t_{30} = 1.65, P = 0.11; spindles: t_{30} = 0.28, P = 0.77; SO-nested spindle: t_{30} = 2.52, *P = 0.017; δ_I-nested spindles: t_{30} = 1.18, P = 0.25). Mean in solid line ± s.e.m. in box.

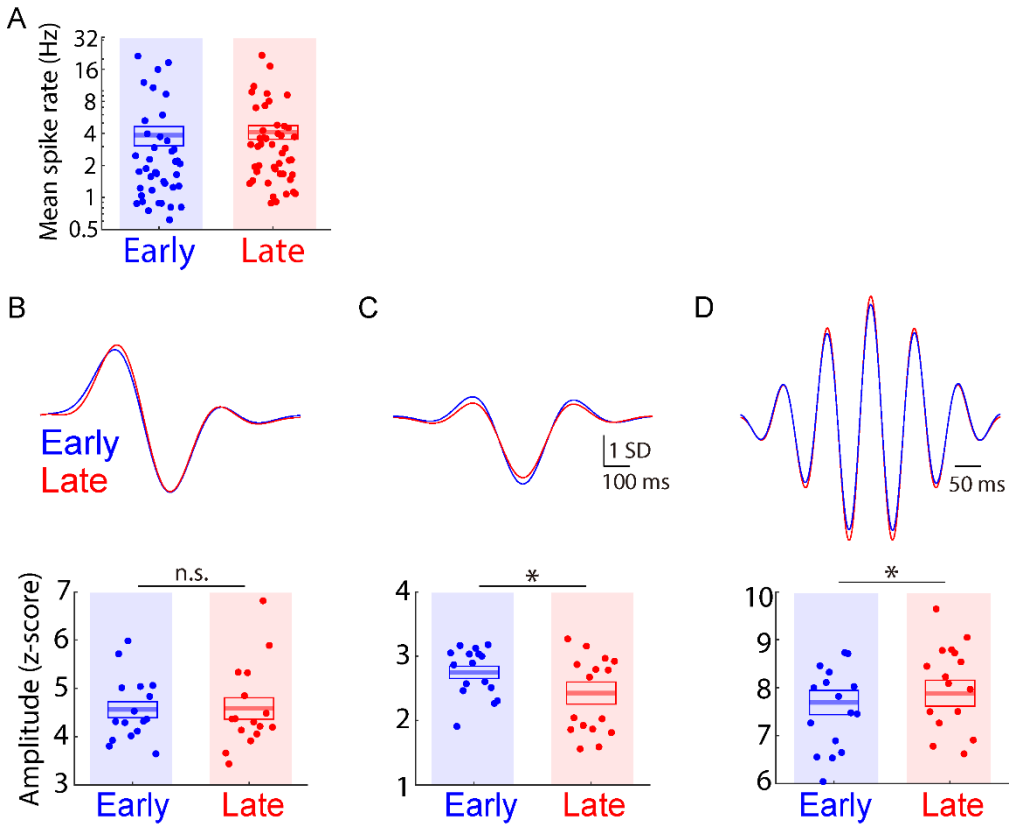

Figure S4. Spike activity and Sleep waves amplitude.
(A), Mean spike rates of units during NREM sleep for early period and late period after $stroke_{exp}$. There was a similar activity for both periods (mixed-effects model, $t_{97} = –0.29$, P = 0.77).
(B-D), Top, averages of event-triggered LFPs of SO (**B**), δ_l (**C**), and SO-nested spindles (**D**) for early period (blue; n = 16 sessions, 8 rats) and late period after $stroke_{exp}$ (red; n = 16 sessions, 8 rats). LFP was normalized; subtracting by the mean and dividing by the standard deviation in each sleep session. Bottom, mean peak-to-trough amplitude corresponding to top. There were significant changes for δ_l and SO-nested spindles from early period to late period (SO: mixed-effects model, $t_{30} = 0.13$, P = 0.90; δ_l: mixed-effects model, $t_{30} = –2.60$, *P = 0.014; SO-nested spindles: mixed-effects model, $t_{30} = 2.26$, *P = 0.031). Mean in solid line ± s.e.m. in box.

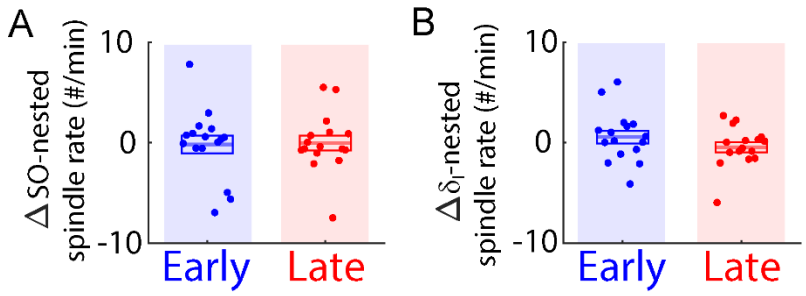

Figure S5. Changes in spindles' rates within a single session
Changes of rates in the SO-nested spindles (**A**) and the δ_I-nested spindles (**B**) within a single session (i.e., from pre-training to post-training sleep) in each column of the two recovery periods. ΔSO-nested spindles (early, n = 16 sessions in 8 rats, –0.60 ± 0.45% vs. late, n = 16 sessions in 8 rats, 0.33 ± 0.61%, mixed-effects model, t_{30} = 1.27, P = 0.21). $\Delta\delta_I$-nested spindles (early, n = 16 sessions in 8 rats, 0.56 ± 0.63% vs. late, n = 16 sessions in 8 rats, –0.43 ± 0.50%, mixed-effects model, t_{30} = –1.34, P = 0.19). Mean in solid line ± s.e.m. in box.

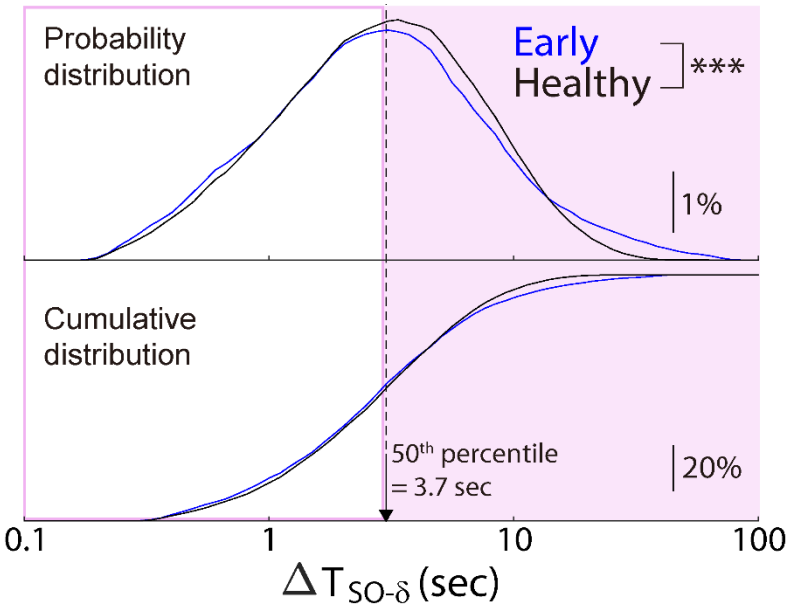

Figure S6. Redistribution of δ_I-waves relative to SO after stroke$_{exp}$ in the same animal. Example distributions of $\Delta T_{SO-\delta}$ are shown for sleep sessions in the early recovery (blue; n = 1 rats) and sleep sessions in the intact brain before inducing ET-1 stroke$_{exp}$ in the same rat. (black; n = 1 rat; Kolmogorov-Smirnov test, KS-statistic = 0.18, ***P < 10^{-9}).

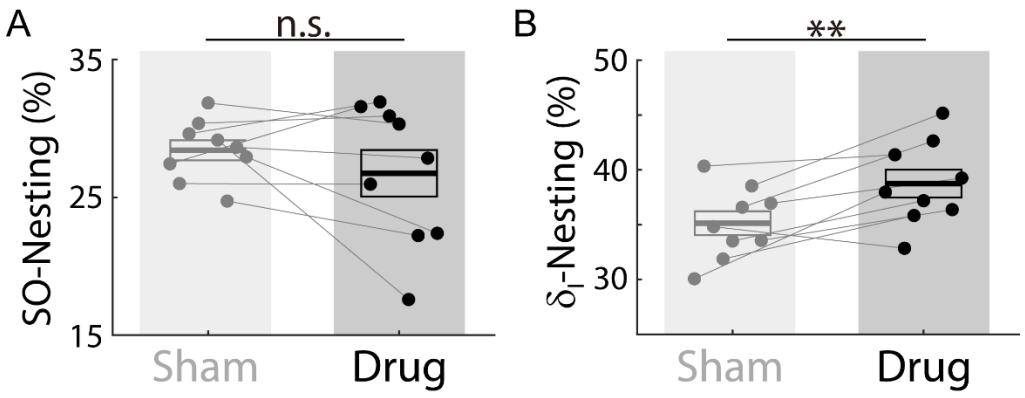

Figure S7. Blocking $GABA_A$ α5-subtype receptor in healthy animals.
Comparison of the drug (L655,708) effect on SO-Nesting **(A)** and δ_I-Nesting **(B)** in healthy animals. SO-Nesting was not changed while δ_I-Nesting was stronger, with the drug compared to the sham (SO-Nesting: sham, n = 9 sessions, 28.4 ± 0.73% vs. drug, n = 9 sessions, 26.8 ± 1.7%, mixed-effects model, $t_{16} = -1.14$, P = 0.27; δ_I-Nesting: sham, 35.2 ± 1.1% vs. drug, 38.7 ± 1.3%, mixed-effects model, $t_{16} = 3.59$, $^{**}P < 10^{-2}$).

	Rat ID	Figures 1, 2, 3, 5, and 6				Figure 1	Figure 7			Figure 4	
		$stroke_{exp}$ + motor training				Healthy	$stroke_{exp}$ + spontaneous recovery			$stroke_{exp}$ + motor training	
		Baseline	Early	Middle	Late		Baseline	Sham	Drug	Sleep	No-sleep
Contribution (number of sessions)	1	2#	2	2	2	-	-	-	-	-	-
	2	2#	2	2	2	-	-	-	-	-	-
	3	2#	2	2	2	-	-	-	-	-	-
	4	2#	2	2	2	-	-	-	-	-	-
	5	2#	2	2	2	-	-	-	-	-	-
	6	2#	2	2	2	-	-	-	-	-	-
	7	2#	2	2	2	-	-	-	-	5	-
	8	2#	2	2	2	-	-	-	-	5	-
	9	-	-	-	-	2*	2*	3	3	-	-
	10	-	-	-	-	2*	2*	3	3	-	-
	11	-	-	-	-	2*	2*	3	3	-	-
	12	-	-	-	-	-	-	3	3	-	-
	13	-	-	-	-	-	-	3	3	-	-
	14	-	-	-	-	-	-	2	2	-	-
	15	-	-	-	-	2	-	-	-	-	-
	16	-	-	-	-	1	-	-	-	-	-
	17	-	-	-	-	-	-	-	-	6#	-
	18	-	-	-	-	-	-	-	-	5#	-
	19	-	-	-	-	-	-	-	-	5#	-
	20	-	-	-	-	-	-	-	-	4#	-
	21	-	-	-	-	-	-	-	-	-	6#
	22	-	-	-	-	-	-	-	-	-	4#
	23	-	-	-	-	-	-	-	-	-	4#
	24	-	-	-	-	-	-	-	-	-	2#
	25	-	-	-	-	-	-	-	-	-	3#
	26	-	-	-	-	-	-	-	-	-	4#
	27	-	-	-	-	-	-	-	-	-	3#
	28	-	-	-	-	-	-	-	-	-	2#
	Total	16	16	16	16	9	6	17	17	29	28

Table S1. The number of sessions contributed by each rat to the respective experiment types.
All numbers indicate independent contributions to each condition except the numbers marked by star; * indicate the same session that is counted for two conditions. # indicates the sessions in which electrophysiology was not monitored. Rat 9-16 was monitored only for sleep without behavior tasks. $Stroke_{exp}$ models: photothrombotic/PT for Rat 1-8, 12-14, and 17-28, and ET-1 induced for Rat 9-11.