

Figure 1 Non-fatigue brain connectivity map of subject No. 5 (a) in non-fatigue state 0~20 minutes (b) in fatigue state 41~60 minutes

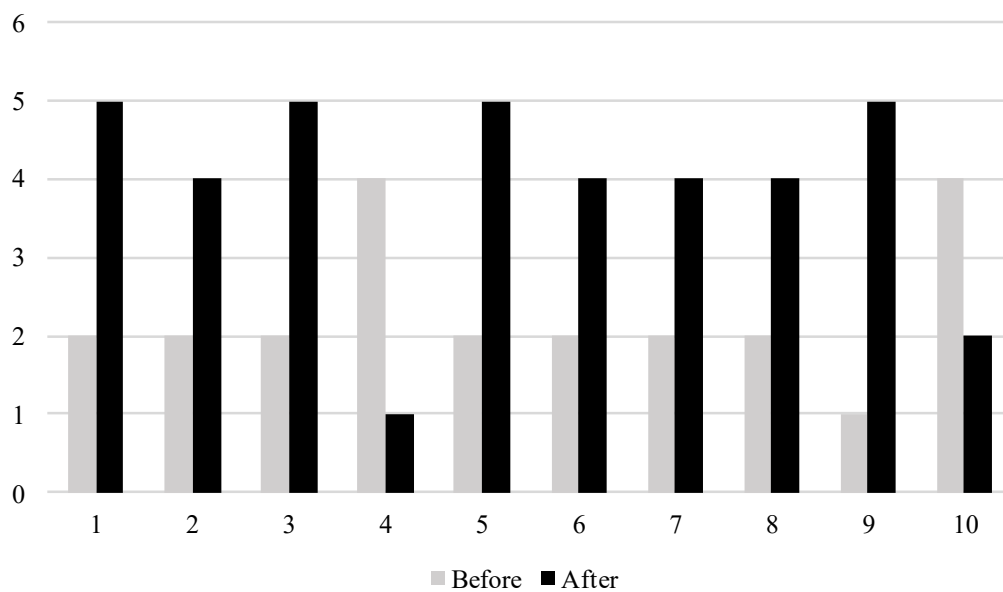


Figure 2 FAS questionnaire results for subject No. 5

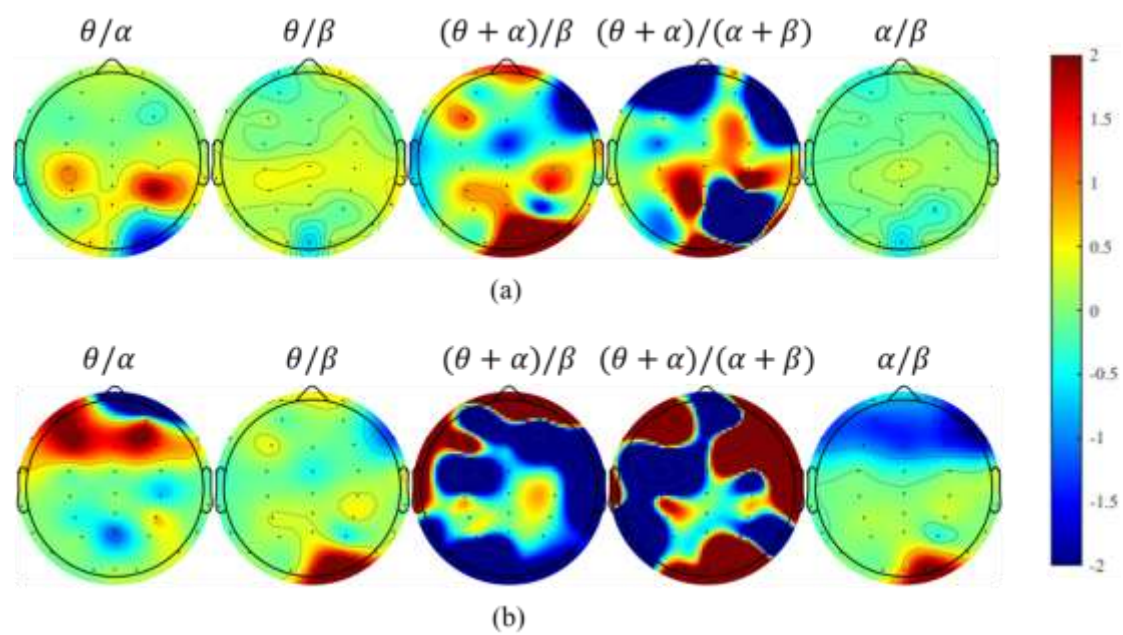


Figure 3 Subject No. 5 frequency band power characteristics (a) non-fatigue characteristics 0 to 20 minutes (b) fatigue characteristics 41 to 60 minutes

Table 1 Top 10 ranking of wPLI for subject No. 5

	1	2	3	4	5	6
1	"FC4-Pz"	"FP2-Pz"	"AF4-F8"	"FP1-FP2"	"FP1-FP2"	"FP1-FP2"
2	"Fz-Pz"	"F8-Pz"	"FP2-F8"	"FC4-Pz"	"C3-Pz"	"FP2-F8"
3	"CP4-Pz"	"CP4-Pz"	"AF4-CP4"	"C3-Pz"	"FP1-Fz"	"FP1-F3"
4	"FP1-FC4"	"FP1-FC3"	"FP1-F8"	"FP2-F8"	"FP1-F4"	"FP1-FC3"
5	"C4-Pz"	"C3-Pz"	"F8-FT8"	"FP2-AF4"	"Fz-FCz"	"FP2-Pz"
6	"FP1-Fz"	"Pz-P4"	"AF4-FCz"	"CP4-Pz"	"FP2-F8"	"FP1-AF3"
7	"FP2-Pz"	"FC4-Pz"	"AF4-Cz"	"FP1-F8"	"FP1-FC3"	"C4-Pz"
8	"FP1-F4"	"C4-Pz"	"FP1-CP4"	"FP1-F3"	"FP1-F3"	"F7-Pz"
9	"FP1-F3"	"FP1-Fz"	"AF4-P4"	"FP1-Fz"	"FP1-FCz"	"Pz-P4"
10	"FP2-F8"	"FC3-Pz"	"AF4-C4"	"F8-Pz"	"FP1-FC4"	"FC4-Pz"
	7	8	9	10	11	12
1	"FP1-F3"	"FP2-Pz"	"FC4-Pz"	"FP1-FCz"	"FP1-F7"	"FP1-F7"
2	"FP1-FP2"	"FC4-Pz"	"Pz-P4"	"AF4-FC4"	"FP1-F8"	"FP1-F3"
3	"FC4-Pz"	"FP2-AF4"	"CP3-Pz"	"FP2-TP7"	"FP1-FP2"	"AF4-FT7"
4	"FP1-F8"	"CP3-Pz"	"F4-Pz"	"FP1-F3"	"CP4-TP8"	"FP1-F4"
5	"C4-Pz"	"C3-Pz"	"CPz-Pz"	"F8-P7"	"FP1-FCz"	"FP1-FC3"
6	"FP1-Cz"	"TP8-Pz"	"CP4-Pz"	"AF4-FCz"	"FP2-F8"	"FP1-FP2"
7	"FP2-F8"	"F7-FCz"	"FC3-T7"	"FP2-FCz"	"C4-Pz"	"F7-P3"
8	"Fz-FCz"	"CP4-Pz"	"Cz-O1"	"F8-TP7"	"FP1-F3"	"FP1-F8"
9	"FP1-FC4"	"C4-Pz"	"FP2-T7"	"P4-O1"	"FCz-Oz"	"F7-Pz"
10	"FP1-Fz"	"CPz-Pz"	"C3-Pz"	"T7-CP3"	"FP1-Fz"	"FCz-O1"
	13	14	15	16	17	18
1	"FP1-F7"	"FP1-F3"	"FP2-F8"	"FP2-F8"	"C4-TP7"	"F3-FT7"
2	"FP1-Fz"	"FT8-Oz"	"FP1-FCz"	"FP1-F8"	"TP8-P4"	"T8-P4"
3	"FP1-FC3"	"FCz-Oz"	"FP1-FP2"	"FP1-F3"	"FP1-F3"	"TP8-P4"
4	"FP1-F3"	"FT8-O2"	"FP1-F8"	"FP1-FCz"	"FCz-TP7"	"FP1-FP2"
5	"FP1-F4"	"FCz-O1"	"FP1-Fz"	"FCz-Oz"	"F8-C3"	"FCz-P7"
6	"FP1-FCz"	"FP1-F7"	"FP1-F3"	"FP1-Fz"	"F8-P3"	"FP1-Fz"
7	"AF4-FCz"	"FP1-Fz"	"FP1-FC3"	"CP4-T8"	"F8-CP3"	"FT7-TP8"
8	"AF4-C4"	"FCz-O2"	"FCz-Oz"	"FP2-F4"	"F4-FCz"	"FT7-T8"

9	"FP1-FC4"	"FP1-FCz"	"F4-P3"	"CP4-TP8"	"FCz-O2"	"FP2-P4"
10	"FP1-F8"	"FT8-O1"	"FP1-F7"	"F8-C3"	"Cz-Oz"	"Cz-O2"
	19	20	21	22	23	24
1	"FP1-FCz"	"FP1-FP2"	"P4-O2"	"FP1-FP2"	"Fz-O1"	"AF4-T7"
2	"FP1-Fz"	"FCz-O1"	"FP2-O2"	"FP2-F8"	"FCz-O1"	"FP1-FP2"
3	"AF4-FCz"	"FCz-P7"	"FC4-P7"	"FP2-AF4"	"FP2-F4"	"FP1-F4"
4	"FCz-Oz"	"Cz-P7"	"F4-P7"	"AF4-FCz"	"FC4-Pz"	"AF4-FCz"
5	"FCz-O1"	"Cz-O1"	"Fz-P7"	"FP1-F8"	"FP1-F3"	"FP2-Oz"
6	"FCz-O2"	"FP1-F3"	"FP1-T7"	"AF4-F8"	"FP1-F8"	"FP1-FCz"
7	"Fz-FCz"	"FP1-FCz"	"FP1-Fz"	"FP2-F4"	"P7-T8"	"FP1-T7"
8	"AF4-Fz"	"FCz-Oz"	"CP3-O2"	"FP1-FC3"	"F4-O1"	"Oz-O2"
9	"FP1-FC3"	"FCz-O2"	"FP1-O2"	"FP2-Fz"	"FP1-FC3"	"FP1-F3"
10	"FP1-F3"	"C4-Pz"	"F7-T7"	"FCz-Oz"	"FP2-AF4"	"F3-T7"
	25	26	27	28	29	30
1	"FT7-T8"	"FCz-O1"	"AF4-FCz"	"FP1-Cz"	"AF4-Cz"	"CP4-Pz"
2	"C3-T8"	"FC4-O1"	"AF4-Cz"	"FP1-F8"	"FP2-AF4"	"FP1-F8"
3	"T8-CP4"	"FT7-C4"	"AF4-Fz"	"FP2-Cz"	"AF4-FCz"	"C4-Pz"
4	"T8-TP8"	"FCz-O2"	"FP1-AF4"	"FCz-Oz"	"AF4-Fz"	"FP2-F8"
5	"FC3-T8"	"F7-F8"	"AF4-CP3"	"F8-FT8"	"AF4-CP4"	"FC4-Pz"
6	"T8-O2"	"FCz-Oz"	"FP1-Fz"	"FCz-O2"	"AF4-CPz"	"AF4-Cz"
7	"FC4-T8"	"FP2-O1"	"FP1-F4"	"Fz-FCz"	"FP1-F8"	"FP2-Pz"
8	"F4-T8"	"FC4-T7"	"AF4-CP4"	"AF4-FCz"	"AF4-C4"	"FP1-FC4"
9	"AF4-T8"	"TP8-T8"	"AF4-P4"	"FP2-F8"	"AF4-P4"	"AF4-FCz"
10	"Cz-T8"	"FP1-FCz"	"AF4-CPz"	"AF4-T7"	"AF4-C3"	"TP8-Pz"
	31	32	33	34	35	36
1	"FP2-Pz"	"FP1-F7"	"CP4-Pz"	"FP2-F8"	"FP2-F8"	"FC4-Pz"
2	"CPz-Pz"	"FP2-F7"	"FCz-O1"	"FP1-Pz"	"CP4-Pz"	"CP4-Pz"
3	"CP4-Pz"	"F7-Pz"	"CP4-O1"	"F7-Pz"	"FC4-Pz"	"C4-Pz"
4	"FC4-Pz"	"FP2-T7"	"FP2-Pz"	"CP4-Pz"	"F8-Pz"	"Pz-P4"
5	"FP2-AF4"	"F7-C3"	"Fz-O1"	"CPz-Pz"	"FP1-F8"	"FP2-Pz"
6	"C4-Pz"	"F7-P4"	"FCz-Oz"	"C3-Pz"	"C4-Pz"	"Fz-Pz"
7	"AF4-FCz"	"F7-C4"	"Cz-O1"	"FC3-Pz"	"F8-P3"	"CPz-Pz"

8	"AF4-F3"	"C4-Pz"	"P3-Oz"	"C4-Pz"	"FP1-F3"	"FP1-Fz"
9	"AF4-F4"	"FP1-F3"	"FP2-F8"	"FP2-F3"	"FP1-Fz"	"FP1-FC4"
10	"AF4-Fz"	"F7-P3"	"Cz-Oz"	"FC4-Pz"	"F8-CP3"	"FP1-C4"
	37	38	39	40	41	42
1	"FP2-F8"	"FP2-F8"	"C3-Pz"	"FP1-FC3"	"FP1-FP2"	"FC4-Pz"
2	"FP1-FC3"	"FP1-FC3"	"FC4-Pz"	"FP1-FP2"	"FP2-F8"	"C4-Pz"
3	"FP1-F3"	"FP1-F8"	"FP1-FP2"	"FP2-F8"	"FP1-F3"	"CPz-Pz"
4	"C3-Pz"	"FP1-F3"	"CPz-Pz"	"FP1-F3"	"FP1-FC3"	"F7-Pz"
5	"FP1-FCz"	"FP1-FP2"	"CP4-Pz"	"FP1-F8"	"C4-Pz"	"Cz-Pz"
6	"FP1-C4"	"FP2-F3"	"Pz-P4"	"FP1-Fz"	"FC4-Pz"	"FC3-Pz"
7	"FP1-Fz"	"F8-FT8"	"F8-Pz"	"FP1-F4"	"FP2-Pz"	"C3-Pz"
8	"F8-Pz"	"FP2-AF4"	"FP1-F3"	"F7-Pz"	"FP1-AF3"	"CP4-Pz"
9	"FP1-C3"	"FP1-Fz"	"FP1-Fz"	"FP1-AF3"	"FP1-Fz"	"F7-FCz"
10	"AF4-F8"	"AF4-Cz"	"FP1-FCz"	"FP1-FCz"	"FP1-T7"	"F7-C4"
	43	44	45	46	47	48
1	"FC4-Pz"	"Pz-P4"	"FP1-F8"	"FP1-FP2"	"FP1-F7"	"FP1-F3"
2	"CP3-Pz"	"FC3-T7"	"FP2-F8"	"FP1-F7"	"FCz-O2"	"FP1-Fz"
3	"FP2-Pz"	"CP3-Pz"	"FP1-FCz"	"FP1-F3"	"FCz-Oz"	"FP1-FC3"
4	"C3-Pz"	"F8-P7"	"FT7-CP3"	"F7-FC4"	"Fz-FCz"	"FP1-FCz"
5	"FP2-F7"	"Pz-O1"	"T7-CP3"	"FP1-Fz"	"FCz-O1"	"FP1-FC4"
6	"FP1-F7"	"T7-C3"	"FP1-FC3"	"FP1-F4"	"FP2-F8"	"FT8-Pz"
7	"FP2-AF3"	"T7-P7"	"FCz-Oz"	"FP1-FC3"	"FP1-Fz"	"FP1-F7"
8	"F7-C3"	"C3-Pz"	"FP2-Cz"	"CP4-TP8"	"FP1-F3"	"FP1-F4"
9	"F7-CP4"	"CP4-P4"	"F8-P4"	"F7-CP4"	"F4-FCz"	"C4-Pz"
10	"F7-FCz"	"T7-TP8"	"FP1-F3"	"FP1-F8"	"FP2-O1"	"FC4-Pz"
	49	50	51	52	53	54
1	"FCz-Oz"	"FP2-F8"	"C4-Pz"	"Cz-O2"	"FP2-F8"	"FCz-O1"
2	"FCz-O1"	"FP1-FP2"	"FP1-F8"	"C4-TP7"	"FP1-Fz"	"FCz-O2"
3	"FP1-F3"	"FP1-F7"	"FP2-F4"	"FCz-O2"	"FCz-O1"	"FP1-FCz"
4	"FP1-FCz"	"FP1-FC3"	"CP4-P3"	"Cz-Oz"	"FP1-FCz"	"FCz-Oz"
5	"FCz-O2"	"FP1-F8"	"F8-C3"	"FC4-TP7"	"AF4-FCz"	"AF4-FCz"
6	"FP1-F8"	"FP1-FCz"	"CPz-TP8"	"F4-FCz"	"Fz-Oz"	"FP1-FP2"

7	"FP1-Fz"	"FP1-F3"	"FP1-F3"	"FCz-Oz"	"FCz-Oz"	"FCz-P7"
8	"FP1-F7"	"CP4-T8"	"CPz-Pz"	"FP2-F4"	"FP2-Fz"	"Fz-FCz"
9	"Cz-Oz"	"FP1-Fz"	"FP1-FP2"	"FCz-P7"	"FP1-F4"	"FP1-Fz"
10	"FP2-F8"	"FCz-CP3"	"FP1-Fz"	"TP8-P4"	"FP1-FP2"	"FP1-F3"
	55	56	57	58	59	60
1	"FCz-O1"	"FP2-F8"	"FP1-F7"	"FP2-F8"	"AF4-T7"	"FT7-TP7"
2	"FC3-C3"	"FP1-FP2"	"FC3-O2"	"FP1-FP2"	"AF4-Fz"	"Cz-T8"
3	"FP1-T7"	"F8-FT8"	"FP2-AF4"	"FT7-FCz"	"AF4-FCz"	"FT7-T8"
4	"Cz-O1"	"FP1-F8"	"FCz-O1"	"FCz-O1"	"FP2-FT8"	"T8-TP8"
5	"FCz-Oz"	"AF4-FCz"	"FP1-F8"	"Fz-O1"	"FT7-T7"	"T8-CP4"
6	"FC4-O1"	"CPz-Pz"	"C3-T8"	"Fz-FT7"	"AF4-F4"	"T8-P4"
7	"FCz-P7"	"FP1-F4"	"FP2-F4"	"F8-FT7"	"FC4-C4"	"FT7-FT8"
8	"F4-CP3"	"F8-T8"	"FC3-O1"	"F3-FT7"	"AF4-F3"	"C3-T8"
9	"F4-C3"	"F8-CP3"	"FP1-FC3"	"FT7-C3"	"FP1-Fz"	"F4-CP3"
10	"F7-T7"	"FP1-F3"	"FP1-F3"	"FT7-FC3"	"FP1-FCz"	"F7-FT7"