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Temporal evolution of quantitative EEG within 3 days of birth in early preterm infants

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Temporal evolution with gestational age dependencies

Figure S1 presents a visualisation of the changing temporal trajectories with increasing GA specific to these 6 features. For example, for infants born at 24 weeks of gestation, there is a large increase in δ -band spectral power (approximately $700 \mu V^2$) over the first 60 hours of life. For infants born at 32 weeks of gestation however, there is a small decrease in the spectral power (approximately $50 \mu V^2$) over the same time period.

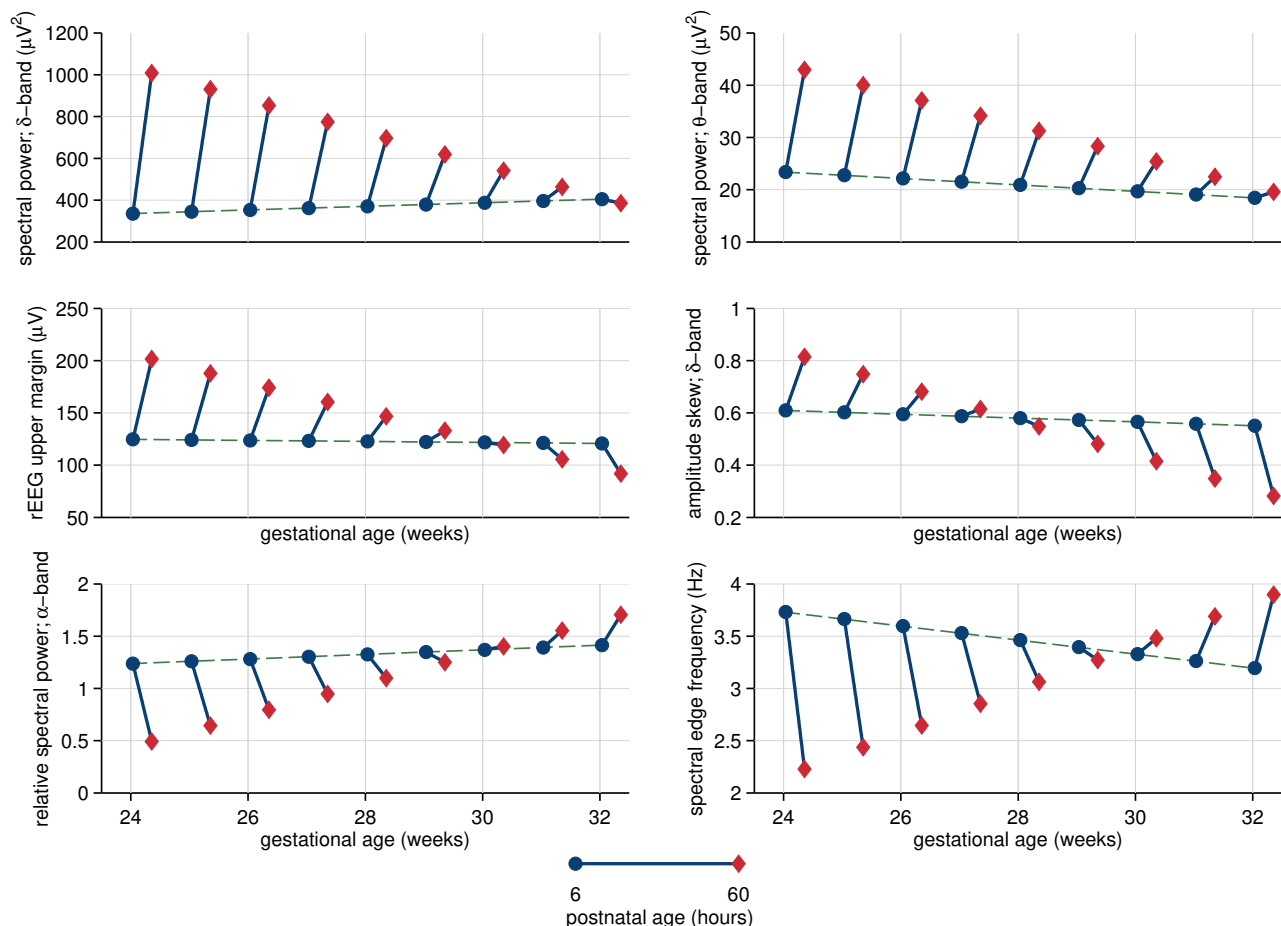


Figure S1. Trajectories of the time fixed-effect (postnatal age, as solid lines) plotted at selected gestational ages. The dashed line represents a baseline at 6 hours PNA.

Medication and qEEG: multiple linear regression

Estimates of the independent variable representing medication therapies: surfactant in Table S1 and fentanyl in Table S2. GA is also included as an independent variable with the time-averaged qEEG feature as the dependent variable.

Table S1. Coefficient estimates for surfactant replacement therapy.

Feature type				Regression coefficient			
group	feature	FB	C _{th}	coefficient	(95% CI)	P-value	
power	SP (μV^2)	δ		8.2	(-174.5, 193.9)	0.939	
		θ		2.6	(-6.9, 11.0)	0.622	
		α		0.58	(-1.33, 3.14)	0.624	
		β		0.13	(-0.93, 1.1)	0.792	
	rEEG (μV)			50th	0.25	(-7.30, 8.34)	0.945
				5th	0.48	(-2.51, 3.07)	0.717
				95th	0.56	(-30.17, 28.07)	0.973
discontinuity	r-AS skew			0.039	(-0.047, 0.117)	0.251	
		δ		0.078	(-0.033, 0.192)	0.134	
		θ		0.011	(-0.020, 0.049)	0.438	
		α		0.0045	(-0.0007, 0.0119)	0.108	
		β		0.018	(-0.017, 0.058)	0.361	
		δ		0.45	(-0.75, 1.71)	0.387	
	kurtosis	θ		2.8	(-2.5, 8.4)	0.214	
		α		2.6	(-1.0, 6.8)	0.176	
		β		0.71	(-2.39, 3.85)	0.702	
				95th	-0.45	(-2.57, 1.56)	0.764
	IBI (s)		50th	-0.22	(-0.62, 0.27)	0.452	
				0.03	(-8.66, 6.99)	0.995	
	burst#			9.2	(-29.0, 72.0)	0.686	
spectral distribution	RSP (%)	δ		-0.41	(-2.00, 1.46)	0.650	
		θ		0.59	(-0.46, 2.19)	0.367	
		α		0.075	(-0.318, 0.39)	0.696	
		β		-0.045	(-0.274, 0.101)	0.645	
	SF	δ		-0.0077	(-0.0336, 0.0179)	0.569	
		θ		0.007	(-0.029, 0.039)	0.671	
		α		-0.014	(-0.033, 0.004)	0.073	
		β		-0.0051	(-0.0368, 0.0167)	0.698	
	SEF (Hz)			0.13	(-0.81, 0.98)	0.764	
		FD		0.00064	(-0.03717, 0.03142)	0.972	
	connectivity	coherence	δ		-0.0010	(-0.0322, 0.0303)	0.949
			θ		0.0070	(-0.0138, 0.0345)	0.559
			α		-0.0025	(-0.0178, 0.0179)	0.792
β				-0.0091	(-0.0253, 0.0091)	0.279	

Frequency bands (FB): 0.5–3 Hz (δ), 3–8 Hz (θ), 8–15 Hz (α), and 15–30 Hz (β); C_{th}: centile; CI: confidence intervals; SP: spectral power; rEEG: range EEG; r-AS: rEEG asymmetry; IBI: inter-burst interval; burst%: burst ratio; burst#: number of bursts. Statistical significance: * for $P < 0.05$.

Table S2. Coefficient estimates of fentanyl (with suxamethonium) therapy.

Feature type				Regression coefficient			
group	feature	FB	C _{th}	coefficient	(95% CI)	P-value	
power	SP (μV^2)	δ		28	(-187, 244)	0.786	
		θ		4.7	(-5.7, 15.0)	0.353	
		α		1.3	(-1.0, 3.7)	0.240	
		β		0.22	(-0.80, 1.24)	0.655	
	rEEG (μV)			50th	-0.11	(-7.37, 7.16)	0.976
				5th	0.16	(-2.53, 2.85)	0.903
				95th	14	(-19, 47)	0.394
discontinuity	r-AS skew	δ		0.046	(-0.022, 0.114)	0.164	
		θ		0.11	(0.01, 0.21)	0.019*	
		α		0.014	(-0.015, 0.043)	0.324	
		β		0.00093	(-0.00497, 0.00682)	0.746	
	kurtosis	δ		0.0025	(-0.0384, 0.0433)	0.901	
		θ		0.41	(-0.65, 1.46)	0.427	
		α		3.8	(-0.6, 8.2)	0.075	
		β		2.0	(-2.0, 6.0)	0.305	
	IBI (s)			95th	-0.18	(-3.92, 3.56)	0.922
				50th	-0.89	(-3.92, 2.14)	0.546
	burst% (%)				-0.23	(-0.81, 0.35)	0.413
		burst#			0.12	(-9.10, 9.34)	0.978
	spectral distribution	RSP (%)	δ		7.2	(-38.7, 53.2)	0.746
θ				-0.65	(-2.47, 1.17)	0.464	
α				0.71	(-0.59, 2.00)	0.263	
β				0.17	(-0.21, 0.55)	0.365	
SF		δ		-0.064	(-0.259, 0.131)	0.498	
		θ		-0.0052	(-0.0326, 0.0222)	0.698	
		α		0.011	(-0.022, 0.044)	0.502	
		β		-0.011	(-0.026, 0.005)	0.154	
SEF (Hz)				-0.0041	(-0.0304, 0.0222)	0.749	
		FD			0.15	(-0.73, 1.04)	0.722
connectivity		coherence	δ		0.0032	(-0.0330, 0.0394)	0.857
			θ		0.011	(-0.019, 0.041)	0.458
			α		0.018	(-0.005, 0.041)	0.107
			β		0.0064	(-0.0128, 0.0255)	0.494
				0.00035	(-0.01696, 0.01766)	0.967	

Frequency bands (FB): 0.5–3 Hz (δ), 3–8 Hz (θ), 8–15 Hz (α), and 15–30 Hz (β); C_{th}: centile; CI: confidence intervals; SP: spectral power; rEEG: range EEG; r-AS: rEEG asymmetry; IBI: inter-burst interval; burst%: burst ratio; burst#: number of bursts. Statistical significance: * for $P < 0.05$.