**Supplemental Digital Content**

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**Figure 1.** Parameter selection for dynamic connectivity analysis. The cumulative sum of explained variance plots as a function of the number of retained principal components (PC) is shown in (A). The stability index which quantifies the reproducibility of clustering solutions for the studied dataset (smaller value suggests a higher agreement level) and the number of clusters (mean across 100 realizations; B). Fractional occupancy (FO) of the connectivity state associated with baseline (left) and anesthetic state (right; from loss of consciousness to the discontinuation of anesthetic agent; mean across 100 realizations; C). Under the assumption that the subjects were unconscious during anesthesia, the connectivity state associated with baseline ideally should differ from those during general anesthesia (see Figure 2), thus a smaller value of FO in anesthesia suggesting a better clustering solution. Overall, a 3-cluster solution showed the best performance (B) followed by 4- to 7- cluster solutions but balancing statistical robustness with the aforementioned assumption and supported by the empirical findings the 7-cluster solution was determined to be the optimal fit. For the 7-cluster solution, the stability index (mean ± SD) and fractional occupancy in baseline (blue line) and anesthesia (red line; mean ± SD) as a function of the cumulative sum of explained variance are shown (D and E, respectively). When the retained principal components contained 30-40% of variance, the stability index demonstrated better performance, but the baseline-associated state demonstrated worse performance. When the explained variance achieved 90% or higher, both methods demonstrated stable performance; therefore, we chose the retained principal components that explained 90% of the variance.

 **Figure 2.** Representative connectograms from subject E01 showing the three weighted phase lag index connectivity bands used for *post hoc* analysis of the temporal variation in cortical connectivity during the stable surgical anesthesia period which is shown in Figure 5. Note the prefrontal-frontal (2-6.5 Hz, and 7-13 Hz) and frontal-parietal (7-13 Hz) functional connectivity bands used for analysis.

**A**



**B**



**C**



**Figure 3.** Association of age and temporal variations in the three dominant connectivity patterns (prefrontal-frontal 2-6.5Hz [left column], prefrontal-frontal 7-13Hz [middle column], and frontal-parietal 7-13Hz [right column] bands) during the stable surgical anesthesia period. Multivariable linear regressions showing the association of age and the coefficient of variation for the weighted phase lag index controlling for the: average minimum alveolar concentration during the stable surgical anesthesia period (n=49; panel A), intraoperative morphine equivalents (n=49; panel B), or maintenance of general anesthesia supplemented with (n=11) or without (n=38) nitrous oxide (panel C). Regression lines for panels A and B are plotted at the mean average minimum alveolar concentration (MAC) and intraoperative morphine equivalents (MorphineEq), respectively. The regression lines for panel C are plotted for both the binary outcome (yes/no) variables for supplementation with (red circle) or without (blue circle) nitrous oxide (N2O). The line equation and p-values for slopes are shown in the upper left corner of each connectivity band. \*denotes statistical significance (p<0.05).