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P245. Brain Bold Signal-Based Blood Flow Tracking by fMRI with menstrual cycle on healthy women.

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Context: Endogenous estrogens have been reported to increase cerebral blood flow (CBF) via vasodilation, but the invasive nature of CBF measurement has restricted in vivo research. Recently, the method called “lag mapping” can track a signal component of systemic origin. This noninvasive technique for evaluating brain perfusion dynamics may prove a promising biomarker in normal conditions. 1

Objective: This study aimed to clarify the difference of CBF at follicular and luteal phases of menses.?

Methods: We conducted resting-state fMRI scans of subjects on two separate days: one during their follicular phase (days 5~11) and another during their luteal phase (days -5~ -10). Imaging data were motion corrected and spatially normalized to a template space. Then we created “lag maps” using a modified recursive lag tracking method, with the global signal as the initial seed. 2 (This procedure involves finding a set of voxels, using cross-correlation, sharing the delay relative to the current seed signal by 0.5s. These voxels are used as the seed for the next step, with a slightly different temporal profile and a phase shift.) The lag maps from the two sessions were subject to voxel-wise, paired t-testing to find the effect of the menstrual phase on CBF.

Participant(s): We recruited 23 healthy females through a recruiting company.

Main Outcome Measure: To quantitatively compare the blood transit time, we compared the number of voxels more than 3 seconds distant from the global signal phase.

Results: We obtained complete datasets from 18 healthy women. The voxel analysis revealed several venous regions presenting relatively delayed timing in the luteal phase. By contrast, the arterial voxels more than 3-s phase advanced showed significant increase during the luteal phase, suggesting extended brain transit time during the period (two-tailed paired t-test, P=0.019).

Conclusion: We found slower brain perfusion during luteal than follicular menstrual phases, consistent with earlier reports of increased CBF accompanying lower vascular resistance due to vasodilation. The “lag mapping” technique may provide a non-invasive biomarker to evaluate menstrual phase-related disorders.

1. Tong Y, et al. (2017) Journal of Cerebral Blood Flow and Metabolism; 37(2): 564–76.
2. Aso T, et al. (2017) Fronteers in Neuroscience;11:256.

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