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Effects of meal rich in monounsaturated or saturated fatty acid on energy metabolism
and biological rhythm

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要旨

Energy metabolism is regulated by the clock through daily cycles of feed-fast, sleep-wake and body temperature cycles. High-fat meals, in particular saturated acid, delays circadian rhythm in mice. Aim of the present study was to examine acute effects of monounsaturated (oleic acid) and saturated (palmitic acid) dietary fats on diurnal variation in energy metabolism, core body temperature and clock gene expression and sleep in human. The study was a randomized single-blinded repeated measures design. Ten males participated two sessions of indirect calorimetry in a whole-room calorimeter. In each session, subjects consumed the meal based on safflower oil or meal based on palm oil in three meals. Sleep electroencephalogram was measured during nighttime and blood sampling was collected at 8 time points during 24 h indirect calorimetry to assess clock gene expression in leukocyte. Compared with meal rich in saturated fatty acid, consumption of high monounsaturated fatty acid meal induced the followings: 1) Fat oxidation was significantly enhanced throughout the day, 2) Core body temperature was lowered in the evening and the first half of the sleep (from 19:00 to 2:00), 3) Slow wave sleep was significantly increased in the first sleep cycle. High intake of saturated fatty acids may be a risk factor of obesity through circadian misalignment and inhibit fat oxidation.