

# Comparison of Brain Metabolites Changes Associated with Visual Sexual Arousal in Premenopausal and Menopausal Women: Functional MR Spectroscopy

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**Synopsis:** With menopause, women underwent changes of overall hormones, leading to functional changes of organs. A majority of menopausal women experience some exchanges in sexual function. Using fMRI technique, a few papers concerning differential brain activation patterns between premenopausal and menopausal women were published. However, it is unclear how brain metabolite change in menopause affects sexual arousal.

The purpose of this study was to investigate the brain metabolic changes associated with visual sexual arousal in premenopausal and menopausal women using functional MR spectroscopy (fMRS).

**Subject and Methods:** Twelve premenopausal (mean age: 32.2±8.8) and 11 menopausal (mean age: 55.8±2.7) women, who are healthy, drug-free, were participated. The criterion for enrollment into the menopausal group was the level of follicle-stimulating hormone, which should be greater than 40 mIU/mL. The fMRS experiments were performed on a 3.0T MRI scanner (Magnetom Tim Trio, Siemens Medical Solutions, Germany). The parameters for fMRS were as follows: TR/TE = 2000/30 ms, number of acquisitions = 96 and voxel size = 7.2 (1.8 × 2 × 2) cm<sup>3</sup>. The fMRS was performed without visual stimulation (REST) and during the visual stimulation with erotic video clips (ACTIVATION). The spectra were acquired from the anterior cingulate gyrus (ACgG) which is one of the most important areas related to sexual arousal. The variation in brain metabolites was analyzed with the independent *t*-test using SPSS (ver. 17.0).

**Results:** In the REST condition, the menopausal women showed significantly lower levels of NAA and Lip than did the premenopausal women (*p*<0.1) (Table 1). In the ACTIVATION condition, the menopausal women showed lower levels of NAA and β-γ-Glx (*p*<0.01) (Table 1, Fig. 1). However, the levels of Lip were about the same in both premenopausal and menopausal women. It is important to note that decreases of both NAA and β-γ-Glx in menopausal women may be related to reduction of neuronal firing rate during visual sexual stimulation.

**Conclusion:** The fMRS shows the brain metabolite differences between premenopausal and menopausal women during the sexual arousal evoked by visual stimulation. These findings will be useful to evaluate the neural mechanism associated with sexual arousal in conjunction with changes of the brain metabolites following menopause.

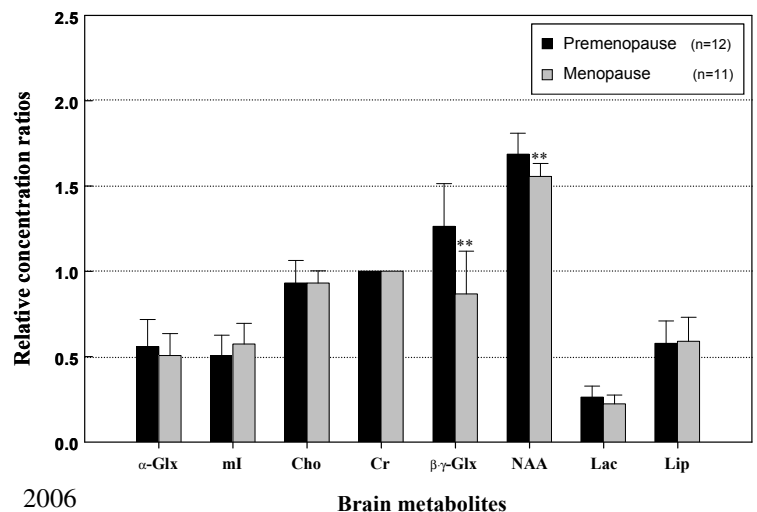
Table 1. Brain metabolites changes with menopause in the anterior cingulate gyri

Brain metabolites	Premenopausal (n=12)		Menopausal (n=11)	
	Rest	Activation	Rest	Activation
α-Glx	0.47 ± 0.12	0.56 ± 0.16	0.45 ± 0.10	0.51 ± 0.13
mI	0.48 ± 0.11	0.51 ± 0.12	0.52 ± 0.08	0.57 ± 0.12
Cho	0.89 ± 0.10	0.93 ± 0.13	0.87 ± 0.09	0.93 ± 0.07
Cr	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00
β,γ-Glx	1.06 ± 0.21	1.26 ± 0.25	1.02 ± 0.20	0.87 ± 0.25 (** <i>p</i> =0.001)
NAA	1.61 ± 0.11	1.68 ± 0.12	1.51 ± 0.15 (* <i>p</i> =0.083)	1.55 ± 0.08 (** <i>p</i> =0.006)
Lac	0.23 ± 0.06	0.26 ± 0.06	0.21 ± 0.06	0.22 ± 0.05
Lip	0.58 ± 0.07	0.58 ± 0.13	0.46 ± 0.09 (* <i>p</i> =0.005)	0.59 ± 0.14

\* significant difference between the metabolite concentration in premenopausal and menopausal women in "Rest" condition

\*\* significant difference between the metabolite concentration in premenopausal and menopausal women in "Activation" condition

Fig. 1. Comparison of the brain metabolites in the anterior cingulate gyrus during visual stimulation with erotic video clips



## References

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3. Dove et al, *J Reprod Fert* 1971;24:1–8.

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