



## Association between dietary intake of folate and *MTHFR* and *MTR* genotype with risk of breast cancer

J.M. He<sup>1</sup>, Y.D. Pu<sup>1</sup>, Y.J. Wu<sup>1</sup>, R. Qin<sup>1</sup>, Q.J. Zhang<sup>1</sup>, Y.S. Sun<sup>1</sup>,  
W.W. Zheng<sup>2</sup> and L.P. Chen<sup>2</sup>

<sup>1</sup>Department of General Surgery,  
Hospital of the Chinese People's Liberation Army, Beijing, China  
<sup>2</sup>General Surgery Department, Xinxiang Medical College, Weihui, China

Corresponding author: J.M. He  
E-mail: [wcg\\_xmc@163.com](mailto:wcg_xmc@163.com)

Genet. Mol. Res. 13 (4): 8925-8931 (2014)  
Received July 23, 2013  
Accepted February 6, 2014  
Published October 31, 2014  
DOI <http://dx.doi.org/10.4238/2014.October.31.7>

**ABSTRACT.** We investigated the association between dietary intake of folate, vitamin B6, and the 5,10-methylenetetrahydrofolate reductase (*MTHFR*) genotype with breast cancer. A matched case-control study was conducted, and 413 patients with newly diagnosed and histologically confirmed breast cancer and 436 controls were recruited. Folate intake, vitamin B6, and vitamin B12 levels were calculated, and the *MTHFR* C677T and A1298C and *MTR* A2756G polymorphisms were analyzed by polymerase chain reaction-restriction fragment length polymorphism. Breast cancer cases were generally older, older at first live birth, and younger at menarche, had a higher body mass index, were smokers, had higher energy intake, and more first-degree relatives with breast cancer as well as more live births compared to controls. With respect to energy intake, we found that higher energy intake were more likely to increase the risk of breast cancer. The *MTHFR* 667TT genotype was associated with a moderately increased risk of breast cancer when compared with the CC genotype, and a significant odds

ratio (OR; 95% confidence interval, CI) was found (OR = 1.70, 95%CI = 1.06-2.73). Individuals carrying T allele were associated with higher risk of breast cancer when compared with C allele (OR = 1.34, 95%CI = 1.06-1.70). We did not find a significant effect of the *MTHFR A1298C* and *MTR A2756G* on the risk of breast cancer. We did not find any association between folate intake and *MTHFR C677T* polymorphisms. In conclusion, we found that the *MTHFR C667T* polymorphism is associated with the risk of breast cancer, indicating that this genotype plays a role in breast cancer development.

**Key words:** Folate; Vitamin; MTHFR; Polymorphism; Breast cancer