Genetics and Molecular Research

Metabolic response of LLC xenografted mice to oxythiamine, as measured by [^{1}H] NMR spectroscopy

H. Lu[1], W.X. Lan[2], L. Bo[1], C. Niu[2], J.J. Zhou[1] and H.L. Zhu[1]

[1]Department of Respiratory Medicine, Huadong Hospital, Fudan University, Shanghai, China
[2]Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences, Shanghai, China

Corresponding author: H.L. Zhu
E-mail: zhuhuili999@126.com

Genet. Mol. Res. 14 (3): 11043-11051 (2015)
Received February 4, 2015
Accepted June 8, 2015
Published September 21, 2015
DOI http://dx.doi.org/10.4238/2015.September.21.17

ABSTRACT. Oxythiamine (OT) has been proven to be a potential anticancer drug. With the help of NMR-based metabonomics, we studied the metabolic changes within tumor-bearing mice with different levels of OT administration using a C57BL/6 mouse Lewis lung carcinoma tumor transplantation model. We administered different concentrations of OT (75, 150, 300, and 600 mg·kg^{-1}·day^{-1}) to the mice orally for 2 weeks, recorded animal weights and tumor volumes, sacrificed the animals, and collected blood and tumor mass samples for nuclear magnetic resonance determination. Compared with the findings for the control (untreated) group, the tumor weights and volumes of the 150, 300, and 600 mg·kg^{-1}·day^{-1} groups decreased with no difference among these OT groups. A large metabolite difference was observed in plasma metabolites between the blank and control groups, which indicated the success of the tumor-bearing model. The metabolites in tumor associated with thiamine-dependent enzymes (TDEs) underwent considerable change between the OT and control groups, exhibiting concentration dependence and enzyme specificity. The restriction

of TDEs by OT may be a major mechanism underlying its anticancer effect. The role of OT as a potential anticancer drug and a dehydrogenase inhibitor should therefore be taken into consideration in future tumor research.

Key words: Oxythiamine; Thiamine-dependent enzymes; Tumor; Nuclear magnetic resonance; Metabonomics

