The efficacy of *klotho* gene as a biomarker of cancer development in kidney transplant recipients

Woo Yeong Park¹, Hyn Kyo Lee², Ohyun Kwon¹, Yaerim Kim¹, Jin Hyuk Paek¹, Kyubok Jin¹, Seungyeup Han¹

¹Division of Nephrology, Department of Internal Medicine, Keimyung University Dongsan Medical Center, Daegu, Korea

²Department of Biochemistry & Molecular Biology, TRS Lab., Daegu, Korea

Background: The *klotho* gene is known as a co-receptor of FGF23 in the chronic kidney disease-mineral bone disease, but recently, it has been reported that *klotho* is associated with the occurrence of cancer in the general population. However, the association between *klotho* gene and the development of cancer in kidney transplant recipients (KTRs) is uncertain. Therefore, we aimed to investigate the effect of *klotho* gene as a biomarker of the cancer development and the factors associated with the development of cancer in KTRs.

Methods: We investigated a total of 45 non-dialysis chronic kidney disease (ND-CKD) patients, dialysis patients, and KTRs diagnosed and treated for gastric cancer, thyroid cancer, and kidney cancer at Keimyung University Dongsan Medical Center from January 2009 to December 2018. We measured the serum *klotho* level and expression status in the tissue, the serum levels of malondialdehyde (MDA), and superoxide dismutase (SOD) as oxidative stress markers, with the stored samples in the biobank.

Results: The serum *klotho* level was the lowest in kidney cancer compared to gastric and thyroid cancer, whereas the level of oxidative stress markers was the highest in kidney cancer. In 12 patients diagnosed to kidney cancer, the serum *klotho* level was the lowest and MDA level was the highest in KTRs, but SOD showed no difference among them. Comparing normal and tumor tissues by western blot analysis, *klotho* expression was decreased in tumor tissues compared to normal tissues in all three groups, but *klotho* expression in KTRs only was decreased in tumor tissues compared to normal tissues by real-time polymerase chain reaction. This shows the relationship between the development of kidney cancer and inhibition of *klotho* gene in KTRs through the mechanism of oxidative stress.

Conclusions: The *klotho* gene may play a role as a biomarker of cancer development with the mechanism of oxidative stress in KTRs.

Corresponding author: Seungyeup Han

E-mail: hansy@dsmc.or.kr

© The Korean Society for Transplantation

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.