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Urinary 8-OHdG: a marker of oxidative stress to DNA and a risk factor for cancer, atherosclerosis and diabetics.

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Abstract

Reactive oxygen species (ROS) produced either endogenously or exogenously can attack lipid, protein and nucleic acid simultaneously in the living cells. In nuclear and mitochondrial DNA, 8-hydroxydeoxyguanosine (8-OHdG), an oxidized nucleoside of DNA, is the most frequently detected and studied DNA lesion. Upon DNA repair, 8-OHdG is excreted in the urine. Numerous evidences have indicated that urinary 8-OHdG not only is a biomarker of generalized, cellular oxidative stress but might also be a risk factor for cancer, atherosclerosis and diabetes. For example, elevated level of urinary 8-OHdG has been detected in patients with various cancers. In human atherosclerotic plaques, there were increased amounts of oxidatively modified DNA and 8-OHdG. Elevated urinary 8-OHdG and leukocyte DNA were also detected in diabetic patients with hyperglycemia, and the level of urinary 8-OHdG in diabetes correlated with the severity of diabetic nephropathy and retinopathy. We have discussed various methods for determining 8-OHdG in the tissue and urine, including HPLC with and without extraction, and ELISA. Using the ELISA we developed, we found that the normal range of urinary 8-OHdG for females was 43.9 +/- 42.1 ng/mg creatinine and 29.6 +/- 24.5 ng/mg creatinine for males, respectively. We found that the normal value between females and males is significantly different ($p < 0.001$).

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