

# DNA OXIDATIVE STRESS TEST

## 8-Hydroxy-2-deoxyguanosine (8-OHdG)

**Now the DUTCH Complete™ comes with even more information to assist patients in living a long, healthy life!**

We've added a biomarker, 8-OHdG, which measures the effect of endogenous oxidative damage to DNA. The marker is used to estimate the risk for various cancers and degenerative diseases.

Adjusting treatments and lifestyle to minimize the presence of 8-OHdG is a productive step toward health and longevity.

### 8-HYDROXY-2-DEOXYGUANOSINE (8-OHDG)

A biomarker of oxidative stress associated with:

- High Cortisol
- High Blood Pressure
- Diabetes
- Cystic Fibrosis
- Atopic Dermatitis
- Rheumatoid Arthritis
- Parkinson's Disease
- Alzheimer's Disease
- Huntington's Disease
- Pancreatitis
- Chronic Hepatitis
- Breast Cancer and other Various Cancers

8-OHdG is also used to estimate the DNA damage in humans after exposure to cancer-causing agents, such as tobacco smoke, asbestos fibers, heavy metals, and polycyclic aromatic hydrocarbons.

### WHAT HAPPENS?

When local antioxidant systems fail, oxidative damage permanently occurs to lipids of cellular membranes, proteins, and DNA. In nuclear and mitochondrial DNA, 8-OHdG is predominantly formed due to free radical-induced oxidative (pro-mutative) lesions.

### STUDIES AND CANCER

60 women with malignant tumors in a breast cancer study<sup>1</sup> and 82 men in a prostate cancer study showed 8-OHdG levels significantly higher than controls<sup>2</sup>. Levels did not decrease with prostatectomy but did decrease with androgen suppression hormone therapy.

### TREATMENT IDEAS WHEN ELEVATED

- Address the cause. Reduce stress and avoid toxins.
- Encourage increased intake of fruits and vegetables.
- Support antioxidant status. (Vit. C, Melatonin, Vit. E)
- Assess and evaluate glutathione (N-Acetyl Cysteine).



# DNA OXIDATIVE STRESS TEST

## 8-Hydroxy-2-deoxyguanosine (8-OHdG)

### ADDITIONAL INFORMATION

Orange juice (but not pomegranate, apple, grapefruit or cranberry) reduced oxidative stress measured by 8-OHdG<sup>3</sup>. Whether normal or high polyphenol content, orange juice consumption decreased 8-OHdG levels over controls, and lead to weight loss in people with high BMI metabolic syndrome<sup>4</sup>.

Taking micronutrient and mineral supplements with antioxidants improved 8-OHdG in people who otherwise did not eat vegetables<sup>5</sup>.

When renoprotective effects of Berberine were measured by 8-OHdG in patients with both hypertension and Type 2 diabetes, Berberine reduced 8-OHdG among other measures<sup>6</sup>.

8-OHdG increased in the kidney and liver with a copper releasing implant, and researchers supposed that this might also happen with copper IUDs in humans<sup>7</sup>.

Smokers who have high 8-OHdG can lower it by taking pretty moderate amounts of fish oil with combined EPA/DHA<sup>8</sup>.

Urinary BPA increases associated with urinary 8-OHdG increase<sup>9</sup>.

Urinary methylparaben (MP) and ethylparaben (EP) increase along with 8-OHdG in pregnant women and their infants<sup>10</sup>.



### REFERENCES

1. Kuo HW, Chou SY, Hu TW, Wu FY, Chen DJ. 2007. Urinary 8-hydroxy-2-deoxyguanosine (8OHdG) and genetic polymorphisms in breast cancer patients. *Mutation Research Genetic Toxicology and Environmental Mutagenesis*. 631(1):62-68.
2. Miyake H, Hara I, Kamidono S, Eto H. 2004. Oxidative DNA Damage in Patients with Prostate Cancer and its Response to Treatment. 171(4):1533-1536.
3. Hyson DA. A review and critical analysis of the scientific literature related to 100% fruit juice and human health. *Adv Nutr* 2015, Jan;6(1):37-51.
4. Rangel-Huerta OD, Aguilera CM, Martin MV, Soto MJ, Rico MC, Vallejo F, et al. Normal or high polyphenol concentration in orange juice affects antioxidant activity, blood pressure, and body weight in obese or overweight adults. *J Nutr* 2015, Aug;145(8):1808-16.
5. Kim YJ, Ahn YH, Lim Y, Kim JY, Kim J, Kwon O. Daily nutritional dose supplementation with antioxidant nutrients and phytochemicals improves DNA and LDL stability: A double-blind, randomized, and placebo-controlled trial. *Nutrients* 2013, Dec 18;5(12):5218-32.
6. Dai P, Wang J, Lin L, Zhang Y, Wang Z. Renoprotective effects of berberine as adjuvant therapy for hypertensive patients with type 2 diabetes mellitus: Evaluation via biochemical markers and color doppler ultrasonography. *Exp Ther Med* 2015, Sep;10(3):869-76.
7. Toyokuni S, Sagripanti JL. Increased 8-hydroxydeoxyguanosine in kidney and liver of rats continuously exposed to copper. *Toxicol Appl Pharmacol* 1994, May;126(1):91-7.
8. Ghorbanihaghjo A, Safa J, Alizadeh S, Argani H, Rashtchizadeh N, Taghinia MV, Abbasi MM. Protective effect of fish oil supplementation on DNA damage induced by cigarette smoking. *J Health Popul Nutr* 2013, Sep;31(3):343-9.
9. Watkins DJ, Ferguson KK, Anzalota Del Toro LV, Alshawabkeh AN, Cordero JF, Meeker JD. Associations between urinary phenol and paraben concentrations and markers of oxidative stress and inflammation among pregnant women in Puerto Rico. *Int J Hyg Environ Health* 2015, Mar;218(2):212-9.
10. Kang S, Kim S, Park J, Kim HJ, Lee J, Choi G, et al. Urinary paraben concentrations among pregnant women and their matching newborn infants of Korea, and the association with oxidative stress biomarkers. *Sci Total Environ* 2013, Sep 1;461-462:214-21.
11. Forlenza M and Miller G. 2006. Increased serum levels of 8-hydroxy-2-deoxyguanosine in clinical depression. *Psychosomatic Medicine*. 68:1-7.
12. Lord R and Bralley JA. 2008. Laboratory Evaluations for Integrative and Functional Medicine. Metamatrix Institute; Duluth, GA.
13. Pilger A and Rudiger HW. 2006. 8-Hydroxy-2deoxyguanosine as a marker of oxidative DNA damage related to occupational and environmental exposures. *Internal Archives of Occupational and Environmental Health*. 80(1):1-15.
14. Subash P, Gurumurthy P, Sarasabharathi A, and Cherian KM. 2010. *Indian Journal of Clinical Biochemistry*. 25(2):127-132.
15. Targ DC, Liu TY, and Huang TP. 2004. Protective effect of vitamin C on 8-hydroxy-2-deoxyguanosine level in peripheral blood lymphocytes of chronic hemodialysis patients. *Kidney Int*. 66(2):820-31.
16. Thompson H, et al. 1999. Effect of increase vegetable and fruit consumption on markers of oxidative cellular damage. 20(12):2261-2266.
17. Valavanidis A, et al. 2009. 8-hydroxy-2-deoxyguanosine (8-OHdG): A Critical Biomarker of Oxidative Stress and Carcinogenesis. *J of Environmental Science and Health*. 27(2):120-139.