

**FUNCTIONAL TOXICOGENOMIC ANALYSIS FOR  
THE DETECTION OF GENOTOXICITY OF SOME  
ENVIRONMENTAL POLLUTIONS**

**By**

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# تحليلات سمية جينومية لتحديد السمية الوراثية لبعض الملوثات البيئية

رسالة مقدمة من

هبة حسن حسن صلاح الدين  
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للحصول على  
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(الوراثة)

قسم الوراثة  
كلية الزراعة  
جامعة عين شمس

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## ABSTRACT

**Heba Hassan Hassan Salah El-Din: Functional toxicogenomic analysis for the detection of genotoxicity of some environmental polutions, Unpublished Master Thesis, Department of Genetics, Faculty of Agriculture, Ain Shams University, 2017.**

Many chemicals compounds are added to foods and beverages to extend storage half - life or to enhance color, flavor, and texture. Food additives must be cleared by the US Food and Drug Administration (FDA) before being released into the food supply chains , and thorough testing is done on laboratory animals to determine any effects on cancer as part of this process. Sodium benzoate and Butylted Hydroxyanisole (BHA) are common additives which are usually present in very small quantities in food, and some are nutrients that may have beneficial effects. *Saccharomyces cerevisiae* is useful model for testing recommended concentrations (0.1 % for sodium benzoate and 0.02% for BHA) of food additives because of its partial homologous with human genome that reaches up to 46% and could, therefore, confer the expression of genes related to human cancer cells. A set of yeast knockout (YKO) strains representing a wide range of deleted genes were subjected to different concentrations of each of the two additives. After treatment, YKO strains and growth rate evaluated, treated human colon cancer cell line with the same concentration of both sodium benzoate and BHA and estimated the growth of those cell b via Neutral red uptaking technique. Real-time PCR is widely used for quantification of mRNA levels for gene expression of cancer-related genes in human colon cancer cells line after treated them by each of the two food additives. Comparison between data obtained from *S. cerevisiae* with those resulting from different human cancer cell lines revealed significant deleterious effects of the tested food additives on human health.

**Key words:**

Toxicogenomics, Food Additives , *Saccharomyces cerevisiae*  
gene knockout strains growth rates, Human cell lines ,  
Sodium benzoate and Butylted Hydroxyanisole (BHA),  
Protein interaction



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