Detection of Endocrine-Disrupting Compounds by Novel Yeast Biosensors.

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Abstract

The presence of endocrine-disrupting chemicals (EDC's) in wastewater, surface water, ground water and even drinking water is a major concern worldwide since it affects human health by disrupting normal endocrine function. The steroid receptors, such as estrogen receptor α (ERα) and β (ERβ), the androgen receptor (AR) and the progesterone receptor, are part of the nuclear receptor superfamily which is the largest family of transcription factors in eukaryotes. The yeast *Saccharomyces cerevisiae* provides a relatively simple and well defined eukaryotic system for the expression of genes from other organisms. Yeast cells do not normally express estrogen, androgen or progesterone receptors and thus can be used as a powerful tool for detecting the endocrine disrupting compounds after transcription with plasmids encoding hormonal receptors together with respective reporter elements. There exists a wide variety of yeast-based luminescent, fluorescent or enzymatic assays for the detection of the endocrine-disrupting compounds. These assays, however, are specific and are limited to one group of disrupting compounds per assay. We have transfected *S. cerevisiae* cells with a single plasmid for the expression of the receptor and the reporter gene under the control of the respective hormone response element (HRE). Upon binding of a hormone the receptor forms dimers and binds to HRE, which leads to transcription of the reporter gene. The recombinant yeast strains express the human endocrine receptor via *lacZ* activity in response to the endocrine ligand. The main goal of our study is to design yeast strains with specific fluorescent reporters for the various endpoints to be detected. By coupling this biological assay with high-performance thin layer chromatography (HPTLC), a standard method for EDC separation, a wide variety of compounds could be screened simultaneously.

Keywords: steroid receptors, endocrine, disrupting chemicals, S. cerevisiae

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