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# Use of Fluorescent Yeast-Based Biosensors for Evaluation of the Binding Affinities of New Steroid Hormone and Bile Acid Derivatives for Select Steroid Receptors †

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† Presented at the 2nd International Electronic Conference on Biosensors, 14–18 February 2022; Available Online: https://sciforum.net/event/IECB2022.

**Abstract:** Biosensors developed in yeast cells represent an attractive research area in biomedicine because they allow for the detection of molecules of various structures and biological activities, economically and simply, without the use of harmful radioactive materials. We focused our attention on the identification of androgen, glucocorticoid and estrogen receptor α/β ligands using fluorescent biosensors in yeast. Identification of compounds that modulate the activity of androgen (AR) or estrogen receptors (ER) is one of the major goals in the design of new treatments of hormone-dependent cancers. Similarly, glucocorticoid receptor (GR) ligands are used to treat autoimmune and inflammatory diseases, but due to a large number of side effects and drug resistance, great effort has been directed to finding new modulators. In this study, ligand-binding domains (LBDs) of AR, ERα, ERβ or GR fused with yellow fluorescent protein (YFP) were expressed in *Saccharomyces cerevisiae*. Recombinant yeast cells were treated with tested steroid hormone or bile acid derivatives, and, due to the fluorescence resonance energy transfer phenomenon following ligand binding, relative binding affinities were quantified fluorometrically. Our results show that some of the tested compounds have moderate to high binding affinity for particular steroid receptors, similar to natural ligands, while the affinities of other compounds were low or negligible. To elucidate the mechanisms of action for these compounds, additional experiments are necessary, and to better understand the molecular interactions within the ligand-binding pocket of the receptor, molecular docking analysis can be conducted. In summary, the yeast-based biosensors used in this work have proven to be very useful for in vitro screening of novel anticancer and anti-inflammatory drug candidates, as well as for the elimination of compounds that do not deserve further attention and resources due to their lack of desired bioactivities.

**Keywords:** steroid receptor; cancer; ligand; modified steroid; bile acid; biosensor; FRET



**Citation:** Bekić, S.S.; Kuzminac, I.; Bjedov, S.; Ajduković, J.; Savić, M.; Petri, E.; Ćelić, A. Use of Fluorescent Yeast-Based Biosensors for Evaluation of the Binding Affinities of New Steroid Hormone and Bile Acid Derivatives for Select Steroid Receptors. *Eng. Proc.* **2022**, *16*, 4. https://doi.org/10.3390/IECB2022-12282

Academic Editors: Giovanna Marrazza and Sara Tombelli

Published: 15 February 2022



**Supplementary Materials:** The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/IECB2022-12282/s1.

**Author Contributions:** Conceptualization, A.Ć. and E.P.; methodology, S.S.B.; software, S.S.B.; validation, A.Ć., E.P. and S.S.B.; formal analysis, S.S.B.; investigation, S.S.B., I.K., S.B., J.A. and M.S.; resources, A.Ć., E.P. and M.S.; data curation, S.S.B. and A.Ć.; writing—original draft preparation, S.S.B.; writing—review and editing, A.Ć. and E.P.; visualization, S.S.B.; supervision, A.Ć. and E.P.; project administration, M.S.; funding acquisition, M.S. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research was funded by the Provincial Secretariat for Higher Education and Scientific Research of the Autonomous Province of Vojvodina [Project: New steroid derivatives—potential chemotherapeutics, No. 142-451-2667/2021].

**Institutional Review Board Statement:** Not applicable.

**Informed Consent Statement:** Not applicable.

**Conflicts of Interest:** The authors declare no conflict of interest.