ECRONICON OPEN ACCESS

EC PHARMACOLOGY AND TOXICOLOGY

Editorial

Diving into the Sea of Synthetic Biosensors: Biological Toxicity Paradigm By The Chemists

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Received: January 29, 2023; **Published:** January 31, 2023

Abstract

Synthesis of different biosensors is an integral part for serving mankind in different realm of ecological niche and socio-economic stature. However, testing the toxicological effects of the biosensors at cellular level becomes a crucial part of the whole host-guest interaction discovery process to detect micro-molecules at organismal or cellular level. Only then can these synthetic biosensors benefit human kind in actual form in innumerable ways.

Keywords: *Synthetic Biosensors; Host-Guest Interaction; Toxicity Testing; Biological Application*

Introduction

Anionic and cationic biosensors play a pivotal role in a various environmental and biological processes. Several trace elements ubiquitously present in different life processes ranging from physiological, metabolomics, genomics, etc., are required at optimum level for normal functioning of cells, tissues and organism as a whole. Their deficiency or excess may lead to several disorders, sometimes leading to severe health hazards and associated complications. Synthetic biosensors aid in maintaining optimum balance of these molecules by selectively binding to the anions or cations of interest, via host-guest interaction and highlighting their level by proportionate "ratiometric" fluorescence detected instrumentally. Further, detection of environmental pollutants, food toxicants, elements in drug substance, on and so forth using synthetic biosensors are not only life saving hacks but also are extremely sensitive, provide time bound result and cost-effective in nature. However, testing toxicological parameters in biological system becomes essential before envisaging their host-guest interaction in different applicable formats. As to the fact that most of these biosensors prepared by true chemists by heart and researchers by profession are made in organic solvents in which they show highest activity but often found to be “enemy” i.e. harmful/toxic to cells and tissues when exposed. Biosensor for Zinc is dissolved in dimethyl sulfoxide (DMSO) [1] , biosensor for ATP is prepared in acetonitrile N,N-dimethylformamide (CH_3CN–DMF) [2,3], Fl^- ion sensor in chloroform ($CHCl_3$) [4], Cl^- ion in CH_3CN–DMSO [5], Hg^{2+} and glutathione sensor in tetrahydrofuran (THF-H_2O) and acetonitrile (CH_3CN-H_2O) [6-8], Cu^{2+} and CN^- ions in CH_3CN-H_2O [9] and many others have already been reported. It has been observed that the cellular cyto-toxicity of these anionic or cationic biosensors are often not tested and therefore the increased number of% of cyto-toxic cells imposed on their exposure inhibit their actual translational reformation as manufacturing kits or dyes for biological application based on their selective sensitivity which would reduce the overall cost of biological, environmental and toxicological research.

Conclusion

Therefore, in spite of the fact that biosensors are necessary as markers or indicators in analysing and assessing level of different molecules in several models, it becomes very necessary to undertake this particular issue of enforcing and igniting the fire of strict biological toxicology testing amongst the hearts of Chemists and Chemistry researchers to elevate the consciousness in the whole scientific community for safe use of biosensors which would reciprocate in the entire transition development and marketing of host-guest interaction based selective sensitive kits and dyes for paving towards lowering the cost of biological research for serving greater number of mankind in the most possible way the scientific world can afford.

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Volume 11 Issue 2 February 2023