

## BAKTERYJNE BIOSENSORY

Marzena Matejczyk

1. Wstęp. 2. Rodzaje całokomórkowych bakteryjnych biosensorów. 3. Stres jako induktor syntezy białek szoku cieplnego. 4. Odpowiedź komórek bakteryjnych-biosensorów na obecność określonych związków toksycznych. 5. Warunki analizy fluorescencyjnej odpowiedzi komórkowej. 6. Podsumowanie

### Bacterial biosensors

*Abstract:* Industrialisation and new technologies have not only made life more convenient for humans, but have also created various environmental problems, potentially posing serious health problems to living organisms, including people. Organic compounds, originating mostly from the use of petroleum products, are highly toxic and cause concern for soil and drinking water quality. In recent years, bacterial whole cell biosensors have been developed as tools to detect and quantify the toxicity of samples from different environments. It seems that promoter sequences of bacterial heat shock proteins genes are very suitable in bacterial biosensors construction. Exposure of *E. coli* cells to higher temperature or other environmental stresses (viral infection, antibiotics, methylating and alkylating agents, hydrogen peroxide and various pollutant molecules such as aromatic compounds or heavy metals) trigger increased expression of stress proteins, including heat shock response. When the specific compounds are present in the environment, that may cause the changes in promoters of stress proteins, and in the reporter gene expression in all cells. This model of action was used in construction of whole-cell genetically engineered microorganisms (GEMs) called biosensors. In this paper, bacteria strains, which contain such specific genetic fusion of promoters regions of heat shock proteins genes or promoters regions of different chemicals resistance genes and *gfp* (*green fluorescent protein*), *lux* from *Vibrio fischeri* (encoding luciferase) or *lacZ* (encoding  $\beta$ -galactosidase) reporters were described. Some application possibilities of bacteria strains with those gene constructs for detection and estimation the bioavailability and toxicity of different pollutants in the environment were characterised.

1. Introduction. 2. The kinds of bacterial biosensors. 3. Stress as an inducer of heat shock proteins synthesis. 4. The response of bacterial cells-biosensors to different compounds. 5. Conditions of fluorescent cell response analyses. 6. Summary

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Katedra Biologii Sanitarnej i Biotechnologii  
Politechnika Białostocka  
Ul. Wiejska 45 E, 15-351 Białystok  
e-mail: [matejczykm@interia.pl](mailto:matejczykm@interia.pl)

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