

Antibiotics HABs Treatment: Pro et Contra

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Abstract – The purpose of the paper is to raise awareness on HABs as one of burning environmental problems. Antibiotics treatment is one of the problem`s solution. Literature analysed, Ampicillin and Streptomycin under heat-shock treatment showed more pronounced effect if increasing concentratioesn. Yet under freezing treatment the effect was lesser.

Keywords – Antibiotic treatment, HABs, bacteria mutations, Ampicillin, antibiotic resistance, Streptomycin.

Introduction

HABs has become one of environmental burning issues worldwide. Even though public awareness on the topic does not fall behind authorized state targets, the problem does not fall in scales. Several methods are known for HABs reduction. Among them using antibiotics is questioned on giving decentralized positive results.

Even though using antibiotics in HABs treatment evokes controversy in an environmental protection, such method of treatment is still present both in experimental and procedural studies. The interactions between antibiotics and microorganisms have attracted enormous research attentions. Tan *et al.* have investigated the effects of two typical aminoglycoside antibiotics on the aggregation of the model cyanobacterium, *Synechococcus elongatus*, and the dominating strain in algal blooms, *Microcystis aeruginosa*, for instance. I strongly believe that antibiotics HABs treatment should be paid closer scientific critical attention to study all pro et contra cases for selected implementation.

Antibiotic Resistance

It is easy to find mutants resistant to antibiotics when we are talking about large populations that are located on antibiotics involved nutrient mediums.

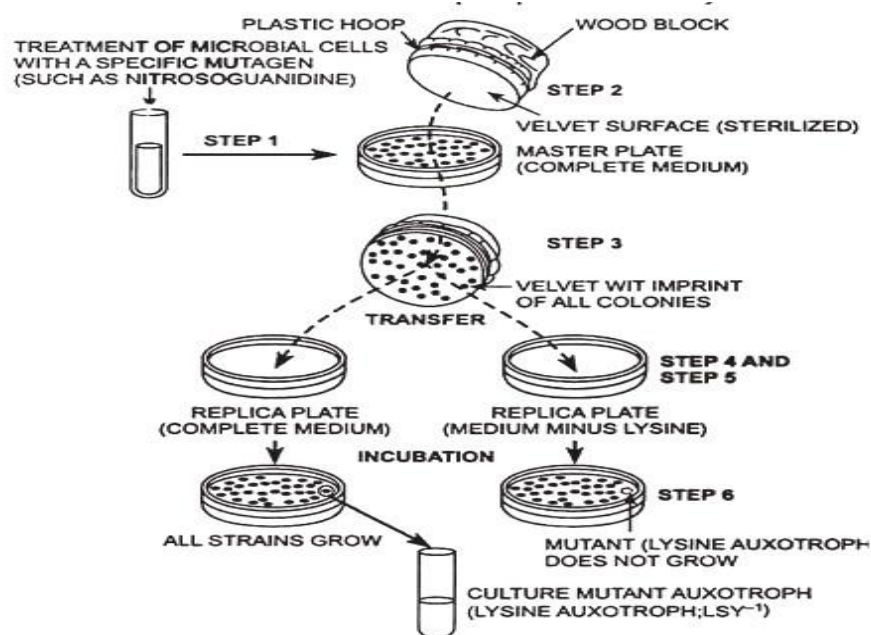


Fig.1. Spontaneous mutations in bacteria by Joshua and Esther Lederberg [1]

In 1952 Esther and Joshua Lederbergs have scientifically demonstrated that bacteria can be grown and maintained. Isolated colonies into which bacteria grow can be reproduced from an original plate to new plates by stamping the original plate with a cloth and then stamping empty plates with the same cloth. Bacteria from each colony are picked up on the cloth and then deposited on the new plates by the cloth. It has been hypothesized that antibiotic resistant strains of bacteria surviving an application of antibiotics had the resistance before their exposure to the antibiotics, not as a result of the exposure. More detailed is illustrated on Fig.1.

Jeffrey C. Cameron *et al.* in their studies have come to conclusion that glutathione contributes to antibiotic resistance in the cyanobacterium *Synechocystis* sp. PCC 6803. Study results of the scientists also suggest that glutathione protects photosystem from oxidative damage resulting from growth in the presence of gentamicin. It has also been discovered that antibiotic resistance can be manifested in many ways by the cell through enzymatic antibiotic modification, exclusion, export, and modulation of core metabolic pathways. [2]

Algal Growth under Antibiotics

Jai Eun HUH has studied effect of antibiotics on eukaryotic chloroplasts of *Chlorella Vulgaris* to see the growth of algae when treated with different types of antibiotics. In the study algae were cultivated with commonly used antibiotics such as Penicillin, Ampicillin, Chloramphenicol, Kanamycin, Cefazedone, Gentamycin, and Streptomycin and measured for growth after 48 hours. For 530 nm, only the algae treated with Ampicillin had a higher absorbance level than that of the control group. The algae treated with other antibiotics showed similar growth with that of the control group, while the algae treated with Cefazedone had a noticeably reduced growth.

To see if antibiotics specifically target algae's inner system, algal mixtures went through Heat-Shock Treatment to allow antibiotics to bypass algal cell wall and membrane, and inner organelles were directly exposed to antibiotics. Results obtained from algal Heat-Shock Treatment have shown that for both Streptomycin and Ampicillin, the higher the concentrations, the effect on algal growth was more pronounced. If bacteria were treated with higher concentration of antibiotics, bacteria would have died. But algae, when having been directly exposed to higher concentrations of antibiotics, showed less severe response to freezing. Thus, algae, when subjected to the initial stress from antibiotics, might have turned on self-defense mechanism to prevent severe damage from freezing. [3]

Conclusion

Both evolutionally and experimentally it has been proved that microalgae can bloom under certain antibiotics content. This means that applying antibiotics as one of means for HABs treatment might lead to controversial results depending on the temperature, dosage conditions.

References

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