

Some Notes about Medical Applications for Microbial Biosurfactants

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Abstract

Biosurfactants are amphiphilic biological compounds generated by yeast, bacteria and filamentous fungi in extracellular or cell membrane part. It's made up of a hydrophilic moiety, and a hydrophobic moiety. The biosurfactants advantage includes Biodegradability, low toxicity, Biocompatibility and digestivity, availability of raw materials and specificity. The Medical application for Biosurfactant includes, Antimicrobial activity by having toxicity on cell membrane permeability, Anti-cancer activity, the microbial extracellular glycolipids used as reagent for cancer cell treatment, Antiviral activity. *C. bombicola* Sophorolipids surfactants is powerful spermicidal and virucidal agent, Anti-adhesive agents, The Adhesion inhibition for pathogenic microbe to solid surfaces or infection site, Anti-Fungal Activity, The *P. Flocculosa* Flocculosin having antifungal activity against pathogenic yeast and human mycose. Immunological adjuvant, the mixing of Bacterial lipopeptides with classic antigens having active nontoxic, non pyrogenic, Gene delivery, the liposomes based on biosurfactants having higher efficiency for gene transfection.

Keywords: Biosurfactant, medical Applications, microorganism

Introduction

Biosurfactants are amphiphilic biological compounds created extracellular or cell membrane part by yeast, bacteria and filamentous fungi [3]. Biosurfactants are made up of a hydrophilic moiety, acid, peptide, cations, anions, mono, di, or polysaccharides; and a hydrophobic moiety, its unsaturated or saturated hydrocarbon chains, or fatty acids [2]. The biosurfactants advantages are Biodegradability, low toxicity, biocompatibility and digestivity, availability of raw materials and specificity [7,12,13]. There are many methods for biosurfactant production such as hemolytic activity, oil displacement test emulsification index, surface tension reduction, blue agar plate or CTAB agar plate, Hydrocarbon overlay agar [1,9,14]. The biosurfactant groups depend on molecular weight, is a low molecular mass molecules with worthily lower surface and interfacial tensions are generally glycolipids or lipopeptides, and high molecular mass polymers, which bind in tight mode to surfaces [13]. The chemical nature for biosurfactants divided to: Glycolipids, Lipoproteins lipopeptides, Lipopolysaccharides, Neutral lipids, Fatty acids, and Phospholipids, Polymeric and Particulate biosurfactants [4]. Different microorganisms having ability for producing of biosurfactant, rhamnolipid from *Pseudomonas aeruginosa* DS10-129, sophorose lipid from *Torulopsis, bombicola* and *Bacillus subtilis* ATCC 2132 by to create surfactin.

Medical application of biosurfactant

Antimicrobial activity

Biosurfactants having ability to be toxic on cell membrane permeability as detergent effect. Marine *B. circulans* biosurfactant

having antimicrobial activity against bacteria and Multi Drug Resistant strain [5].

Anti-cancer activity

Several microbial glycolipids generate cell differentiation and proliferation in human promyelocytic leukemia cell line. Developing activity of acetylcholine esterase and Disconnect the cell cycle at G1 phase that formed after exposure of PC cells to MEL due to overgrowth of neurites and Neuronal cellular differentiation, which is the best work for using of microbial extracellular glycolipids as reagent for cancer cell treatment [8].

Antiviral activity

The inhibiting of HIV virus growth in leucocyte induced by biosurfactants. The inhibiting for presence HIV in women, by controlling, and using safe vaginal topical microbicide. *C. bombicola*, Sophorolipids have structural analogues similar to sophorolipid diacetate ethyl ester which is kill human sperm and virus [11].

Anti-adhesive agents

The biosurfactant having ability for inhibition for pathogenic microbe to solid surfaces or infection site. Using of surfactin solution by running with pre coating vinyl urethral catheter before inoculation with media causing to decreasing in bio film formation by many bacteria Rodrigues et al. recorded the *C. albicans* adhesion inhibiting about 85% was recorded after pretreatment of silicone rubber with *S. thermopiles* surfactant [11].

Anti-Fungal Activity

Antifungal activity for biosurfactant against human pathogens was

tested. Flocculosin is a glycolipid produced by *P. flocculosa* which having antifungal activity against pathogenic yeasts and human mycoses [10].

Immunological adjuvants

Bacterial lipopeptides when mix with classic antigens having active nontoxic, non pyrogenic immunological adjuvants. The increasing of humoral response was explained when Iturin AL antigen and herbicolin A [5]

Gene delivery

Many methods for gene transfection, lipofection [15] utilize cationic liposomes to transmit foreign gene to aim cells even side effects. The liposomes rely on biosurfactants having higher efficiency for gene transfection than cationic liposomes trading use [6].

Results

1. **Biosurfactants** are amphiphilic biological compounds produced in extracellular or cell membrane part by a different of yeast, bacteria and filamentous fungi.
2. **Many advantages for biosurfactant include** Biodegradability, generally low toxicity, Biocompatibility and digestivity, Availability of raw materials and Specificity.
3. **There are many medical application** for Microbial biosurfactant include antimicrobial activity, anticancer activity, antiviral activity, antiadhesive agents, immunological adjuvants, gene delivery

Conclusions and recommendations: Biosurfactants play an important role in industrial applications

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