ANTIMIKROBNA AKTIVNOST PPIX-SUV LIPOZOMA PREMA *Staphylococcus aureus* i *Bacillus subtillis*

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Mikrobiološka rezistencija ozbiljno komplikuje lečenje zaraznih oboljenja čineći mnoge široko primenjivane lekove skoro neupotrebljivim. Prema Svetskoj zdravstvenoj organizaciji najviše rezistentne bakterije su *Escherichia coli*, *Klebsiella pneumoniae*, *Staphylococcus aureus* and *Streptococcus pneumoniae*. Antimikrobna fotodinamička terapija (aPDT) predstavlja ne-antibiotski metod za inaktivaciju mikroorganizama kombinujući netoksična fotosenzitivna jedinjenja (PS) sa vidljivom svetlošću kako bi se generisali singletni kiseonik i slobodni radikali koji ubijaju mikrobne ćelije. Protoporfirin IX (PPIX) je dobro poznato fotosenzitivno jedinjenje koje ima potencijal za korišćenje u aPDT. PPIX inkorporisan u lipozomima je dobijen pomoću metode suvog lipidnog filma i naknadnog ekstruziranja kroz filtere od 100 nm kako bi se dobili SUV lipozomi (male unilamelarne vezikule). PPIX-SUV lipozomi su dodati u sterilne erlenmajere zasejane bakterijskim kulturama, postavljenim na magnetnoj mešalici sa konstantnim mešanjem. Antimikrobna aktivnost PPIX-SUV lipozoma je inicirana fotosenzitivnom reakcijom sa vidljivom belom svetlošću u cilindričnom ručno napravljenom fotohemijskom reaktoru. Intenzitet svetlosti korišćenih lampi bio je oko 40000 lux. Dobijeni rezultati pokazuju da PPIX-SUV lipozomi imaju inhibitornu aktivnost prema *Staphylococcus aureus* i *Bacillus subtilis.* Broj *Staphylococcus aureus* i *Bacillus subtilis* u kontrolnim uzorcima bio je 7.30±0.05 i 7.38±0.09 log CFU/ml, respektivno. Nakon 10, 20 i 30 min iluminacije broj bakterijskih kolonija bio je 6.66±0.03, 4.94±0.02, 4.55±0.05 log CFU/ml za *Staphylococcus aureus* i 6.33±0.03, 6.15±0.15, 4.25±0.06 log CFU/ml za *Bacillus subtilis*, respektivno. PPIX-SUV lipozomi su pokazali antimikrobnu aktivnost prema obema ispitivanim gram-pozitivnim bakterijama, zavisnu od vremena iluminacije i jačine svetlosti, i predstavlja dobru osnovu za potencijalnu primenu u aPDT terapiji.

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ANTIMICROBIAL ACTIVITY OF PPIX-SUV LIPOSOMES AGAINST *Staphylococcus aureus* and *Bacillus subtillis*

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Microbial resistance seriously complicating the treatment of infectious diseases by making many widely used drugs almost inapplicable. According to World Healh Organisation the most commonly reported resistant bacteria were *Escherichia coli*, *Klebsiella pneumoniae*, *Staphylococcus aureus* and *Streptococcus pneumoniae*. Antimicrobial photodynamic therapy (aPDT) is a non-antibiotic approach to inactivate microorganisms and it combines a non-toxic photosensitizer (PS) with visible light to generate singlet oxygen and free radicals that kill microbial cells. Protoporphyrin IX (PPIX) is a well-known photosensitizer that has potential for use in aPDT. PPIX-loaded liposomes were prepared using dry PPIX-lipid film method and extrusion through filters with 100 nm pores to obtain SUV (small unilamellar vesicles) liposomes. PPIX-SUV liposomes were added in sterile erlenmeyer with bacterial cultures, and placed on magnetic stirrer with continuous stearing. Antimicrobial activity of PPIX-SUV liposomes was initiated by photosensitization reaction with visible white light in cylindrical hand-made photochemical reactor. Light intensity of used lamps was approximately 40000 lux. Obtained results showing that PPIX-SUV liposomes have inhibitory effects in both, *Staphylococcus aureus* and *Bacillus subtilis* environment. The number of *Staphylococcus aureus* and *Bacillus subtilis* in control samples were 7.30±0.05 and 7.38±0.09 log CFU/ml, respectively. After 10, 20 and 30 min of illumination the number of bacterial colony units were 6.66±0.03, 4.94±0.02, 4.55±0.05 log CFU/ml for *Staphylococcus aureus* and 6.33±0.03, 6.15±0.15, 4.25±0.06 log CFU/ml for *Bacillus subtilis*, respectively. PPIX-SUV liposomes have shown antimicrobial activity against both used gram-positive bacteria, which are time and light intensity dependent, representing stable base for their possible use in a PDT therapy.

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