DEEP EUTECTIC SOLVENTS AS ALTERNATIVE SOLVENTS IN ANTIMICROBIAL PHOTODYNAMIC THERAPY

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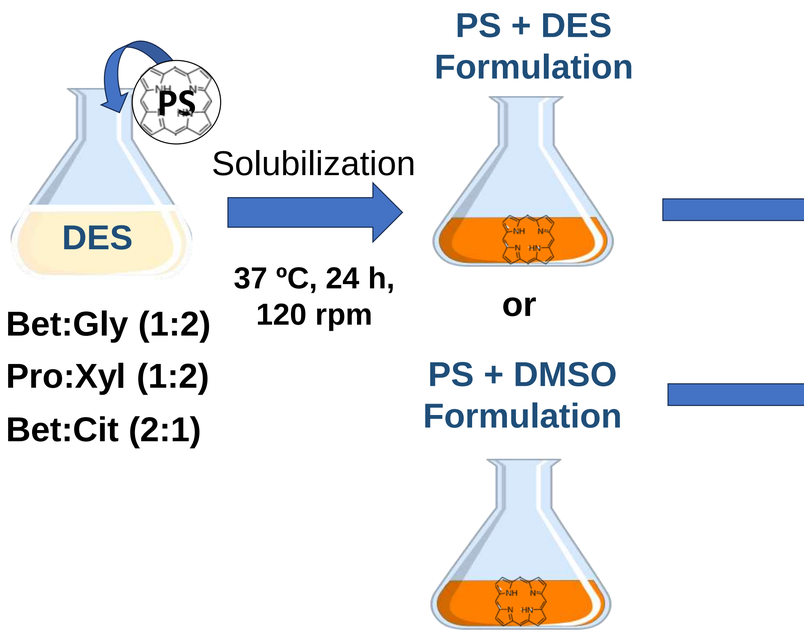
Introduction

- **Antimicrobial Photodynamic Therapy** (**aPDT**) is an effective approach against a broad spectrum of microorganisms [1,2];
- The photodynamic efficiency of a **photosensitizer** (**PS**) is compromised by its low solubility in aqueous media **requiring the use of toxic organic solvents** that are often incompatible with their application in the field [3].

Goal

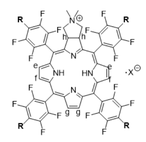
In this study, the potential **of Deep Eutectic Solvents** (**DES**) to prepare **formulations of PSs** with different water-solubilities was investigated.

Methodology

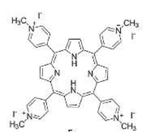


Evaluation of

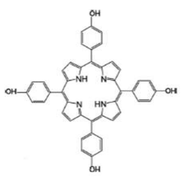
- **PSs solubility**
- **PSs formulations stability (60 days)**
- **Cytotoxicity**
- **Photodynamic activity against *Escherichia coli***



ChL^{5+}



Tetra-Py(+)-Me

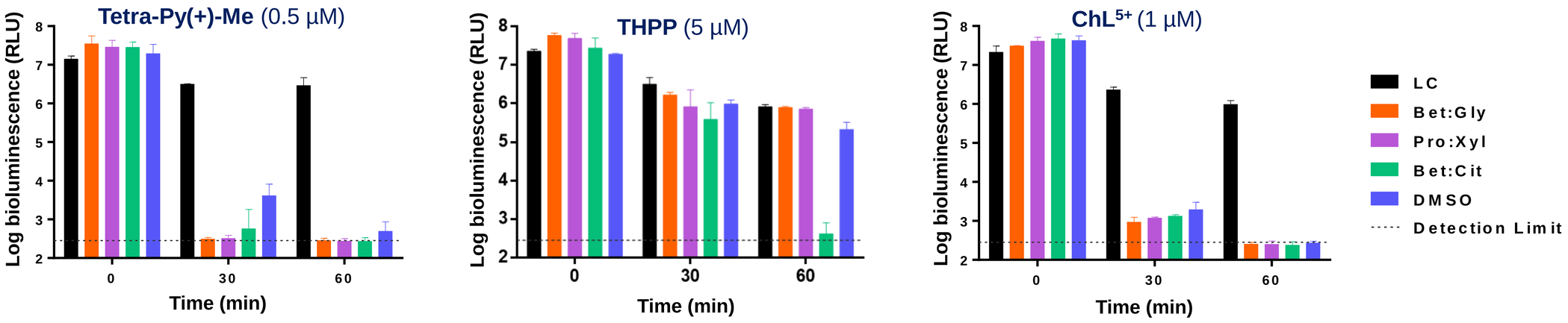


THPP

Betaine (**Bet**); Glycerol (**Gly**); Proline (**Pro**); Citric acid (**Cit**); Xylitol (**Xyl**) ; Dimethyl sulphoxide (**DMSO**)

Results

Photodynamic inactivation of *E. coli*



- **Bet:gly and pro:xyl have no toxicity towards mammalian cells** and improved **Tetra-Py(+)-Me photodynamic activity against *E. coli;***
- **Bet:cit** enhance **the photodynamic action of** both **THPP** and **Tetra-Py(+)-Me, however it is highly toxic to mammalians cells** (> 0.2%).

PSs formulations stability

	Bet:Gly	Pro:Xyl	Bet:Cit	DMSO
Tetra-Py(+)-Me				
THPP				
ChL^{5+}				

Stability of PSs formulations: 100 % – 10 %

All **PSs were soluble in the** selected **DES** and their **stability was highly depended on the solvent**;

Conclutions

The DES herein investigated have a high potential to prepare PSs formulations, in some cases improving the PSs stability and antimicrobial photodynamic activity

References

[1] Almeida, A. Antibiotics. 2020; 9(4):138.; [2] Vieira, C.; Santos, A.; Mesquita, M.Q.; Gomes, A.T.P.C.; Neves, M.G.P.M.S.; Faustino, M.A.F.; Almeida, A. J. Porphyr. Phthalocyanines. 2019; 23:534–545.; [3] Niculescu A-G, Grumezescu AM. Applied Sciences. 2021; 11(8):3626.

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