

BIOLOGICAL EVALUATION OF LYCOPENE-LOADED SILICA-BASED NANOPARTICLE FOR VULVOVAGINAL CANDIDIASIS

Gabriela Corrêa Carvalho^{1,2,3*}, Gabriel Davi Marena^{2,4}, Rafael Miguel Sábio², Ione Corrêa⁵, Hélder A. Santos³, Marlus Chorilli², Tais Maria Bauab²

¹Faculty of Pharmaceutical Sciences, Food and Nutrition, Federal University of Mato Grosso Do Sul. ²School of Pharmaceutical Sciences, São Paulo State University, Brazil. ³University Medical Center Groningen, University of Groningen, Netherlands. ⁴Institute of Biomedical Sciences, University of São Paulo, Brazil. ⁵Medical School, São Paulo State University, Brazil.

E-mail: gabriela.correa@unesp.br/ gabriela.correa@ufms.br

Introduction

Candida albicans resistant strains make vulvovaginal candidiasis (VVC) a health problem, requiring new treatment options, as lycopene (LYC). Despite LYC features that limit its therapeutic application its association with nanoparticles[1], like mesoporous silica nanoparticles (MSN), seems to surpass it. Though, during LYC@MSN development, organic residues in the MSN was noted, probably from cetyltrimethylammonium bromide (CTAB), toxic to cells[2,3].

Aim

This study aimed to assess LYC@MSN, LYC and MSN activity against *C. albicans* strains and their toxicity by an alternative *in vivo* model.

Methods

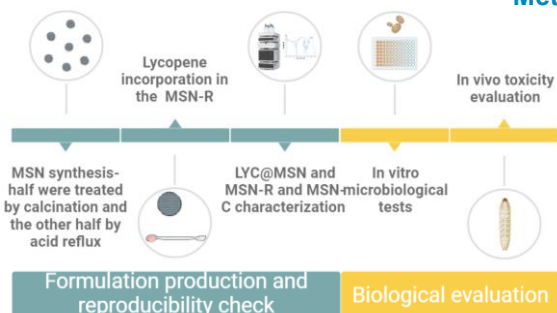


Figure 1: Timeline of this study experimental stages



Figure 2: Sample application process in *Galleria mellonella* larvae.

Results

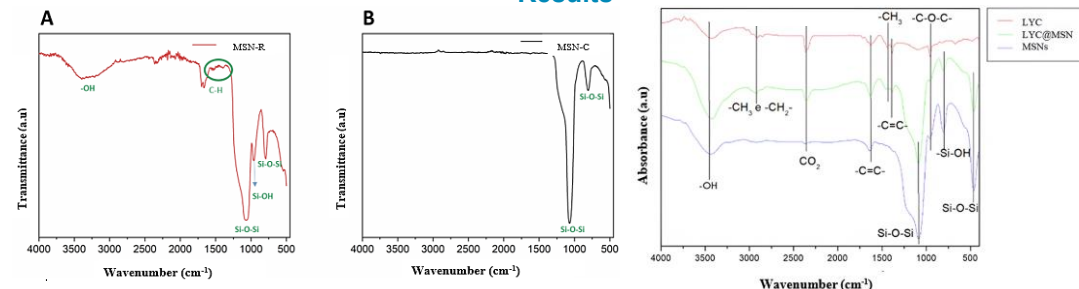


Figure 3: MSN-R and MSN-C infrared spectra. Legend: MSN-R: refluxed mesoporous silica nanoparticle; MSN-C: calcined mesoporous silica nanoparticle

Figure 4: Infrared spectra of LYC, MSN and LYC@MSN diluted in KBr pellet. Legend: LYC: free lycopene; LYC@MSN: mesoporous silica nanoparticle incorporated with lycopene; MSN: pure mesoporous silica nanoparticle

Table 1. Minimum inhibitory concentration of the groups tested

Strains	Minimum inhibitory concentration of the groups tested (µg/mL)					
	Amphotericin B	Fluconazole	Lycopene	MSN-C	MSN-R	LYC@MSN
Clinical -azole resistant (FMB-01)	1.0	125.0	500.0	500.0	NA	NA
ATCC 18804	0.06	1.0	500.0	500.0	1000.0	NA

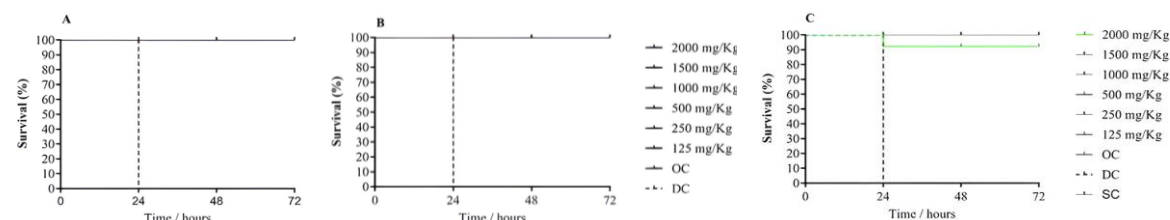


Figure 5: Kaplan-Meier survival curve of *G. mellonella* larvae for the analyzed groups at six different concentrations. Legend: A: MSN-C; B: MSN-R; C: lycopene; “*”: melanization; “+”: loss of motility and alteration in cocoon formation; OC: orifice control group; DC: death control group; SC: solvent control group

Conclusion

Although LYC@MSN didn't show antifungal activity, the present study encourages its use for other human pathologies treatment since the groups evaluated didn't show toxicity in the *in vivo* test. Lastly, this *in vivo* model use is rising not only due the “3Rs” rule premise but also due its immune system similarity with mammals innate immune response, making it ideal to predict toxicity in humans.

Acknowledgments



References

- [1] Carvalho G.C et al. Chorilli M. Trends Food Sci Technol 2021; [2] Carvalho G.C et al. Santos H.A; Chorilli M. Nano Sel 2024; [3]Carvalho G.C et al. Bauab T.M; Chorilli M. Adv Colloid Interface Sci 2022