doi:10.1017/S1431927622005724
Microsc. Microanal. 28 (Suppl 1), 2022

Adherence of *Candida albicans* on Cellulose and Polyethylene Terephthalate after 60 Days of Incubation Observed by Scanning Electron Microscopy

Alva Rocío Castillo-González[1], María Alejandra Favila Pérez[1], María Cecilia Ishida-Gutiérrez[1], Celia María Quiñonez-Flores[1], Manuel Román-Aguirre[2], César Leyva-Porras[2], Javier Camarillo-Cisneros[1], Carlos Arzate-Quintana[1]

[1]Facultad de Medicina y Ciencias Biomédicas UACH

[2]Centro de Investigación en Materiales Avanzados de Chihuahua CIMAV

Surface survival of pathogenic microorganisms is an important factor for the contamination of biomaterials and medical instruments [1]. *Candida albicans* has a relevant multidrug resistance [2] that complicates chemotherapy against infections acquired in the hospital environment, being immunocompromised patients the most vulnerable [3,4]. Survival of the microorganism on surfaces for long periods can be attributed to the production of biofilms [5] that increase the probability to spread infections on hospitalized patients. Since polymers are a frequently used component of medical and biomedical devices it is important to test survivability of this yeast on plastics of diverse chemical composition. Cellulose is a potential material for the synthesis of coating biocomposites with antimicrobial activity [6] and the study of the interaction at a microscopic level is needed to determine the stability of this material in presence of living microorganisms. Since there are no reports of polyethylene terephthalate (PET) antimicrobial activity, this polimer was selected as a negative control to compare the possible changes in cell morphology or growth inhibition of *C.albicans* to the ones observed in cellulose films.

Materials and Methods

Sample of PET was obtained from a commercial source. Chitosan and cellulose films were prepared by plasticization of powder cellulose with glycerol and N-oxyde-4-methylmorpholine in water.

For the surface adherence tests, 10x10 mm samples of the polymers were inoculated with 10µl of a *C.albicans* solution containing a concentration of a $1x10^7$ yest/ml. Films were incubated at room temperature for 60 days. SEM analysis was performed in order to determine if yeast cells and pseudohyphae were present in the surface of the polymers.

Results

The SEM analysis of cellulose and PET films showed no observable difference between the morphology of *C. albicans* adhered to PET (Fig. 1A) and cellulose (Fig. 1B) films. However, the surface of cellulose was irregular and presented multiple topography irregularities, which is not a desirable characteristic on antimicrobial biomaterials.

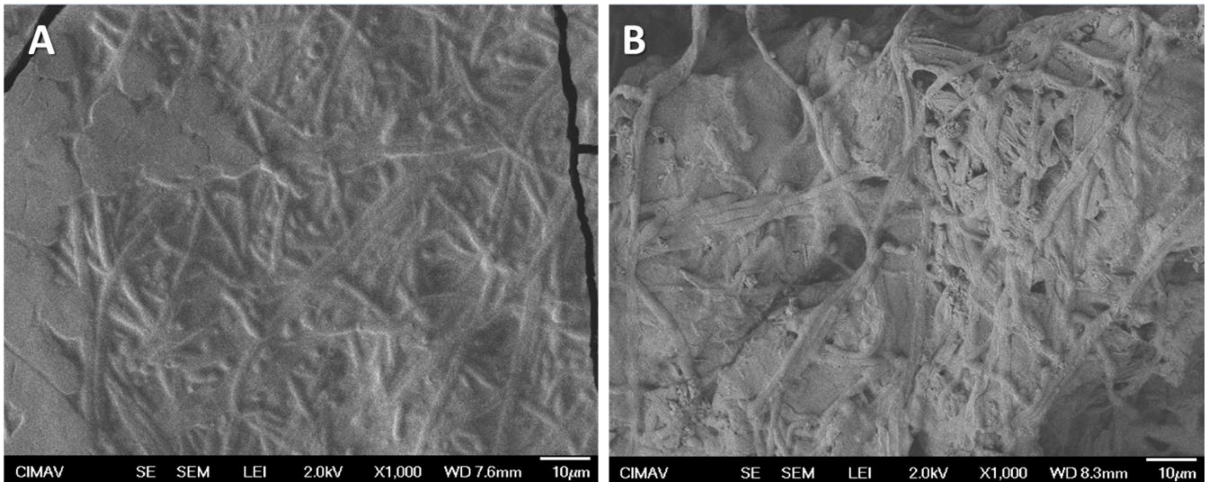

Figure 1. SEM analysis of PET (Fig 1A), chitosan (Fig. 1B) and cellulose films

References:

[1] Colin P. McCoy, Nicola J. Irwin, Louise Donnelly, David S. Jones, John G. Hardy, Louise Carson, Anti-Adherent Biomaterials for Prevention of Catheter Biofouling, International Journal of Pharmaceutics, Volume 535 (2018), Issues 1–2, Pp.420-427, doi.org/10.1016/j.ijpharm.2017.11.043.

[2] Lee, Y., Puumala, E., Robbins, N., & Cowen, L. E. Antifungal Drug Resistance: Molecular Mechanisms in Candida albicans and Beyond. Chemical Reviews, 121(6)(2020), 3390–3411. doi:10.1021/acs.chemrev.0c00199

[3] Chen, H., Zhou, X., Ren, B., and Cheng, L. The regulation of hyphae growth in Candida albicans. Virulence, 11(1)(2020): 337–348. doi:10.1080/21505594.2020.1748930. PMID:32274962.

[4] Sharma, J., Rosiana, S., Razzaq, I., and Shapiro, R.S. Linking cellular morphogenesis with antifungal treatment and susceptibility in Candida pathogens. J. Photochem. Photobiol. B Biol. 5: 17(2019). doi:10.3390/jof5010017.

[5] Atriwal T, Azeem K, Husain FM, Hussain A, Khan MN, Alajmi MF & Abid M. Mechanistic Understanding of Candida albicans Biofilm Formation and Approaches for Its Inhibition. Frontiers in Microbiology 12(2021). doi: 10.3389/fmicb.2021.638609

[6] Alavi, M. & Nokhodchi, A. An overview on antimicrobial and wound healing properties of ZnO nanobiofilms, hydrogels, and bionanocomposites based on cellulose, chitosan, and alginate polymers. Carbohydrate Polymers, 227(2020), 115349–. doi:10.1016/j.carbpol.2019.115349

https://doi.org/10.1017/S1431927622005724 Published online by Cambridge University Press