

Mesoporous silica nanoparticles reduce aflatoxin-induced cell damage

Bianca Guimarães Furtado¹, Geovana Dagostim Savi¹, Elton Torres Zanoni¹, Rahisa Scussel¹, Emily da Silva Córneo¹, Domingos Lusitâneo Pier Macuvel^{2,3}, Janaína Nones⁴, Paulo Emilio Feuser¹, Ricardo Andrez Machado-de-Ávila¹, Elidio Angioletto¹

¹*Universidade do Extremo Sul Catarinense, Iparque - Parque Científico e Tecnológico, Criciúma, SC, Brazil.*

²*Núcleo de Estudos em Ciência e Tecnologia (NECET), Universidade Rovuma, Lichinga, Niassa, Moçambique*

³*Universidade Federal de Santa Catarina, Florianópolis, SC, Brasil.*

⁴*Universidade do Vale do Itajaí, Balneário Camboriú, SC, Brasil.*

biancagf23@gmail.com

geovanasavi@gmail.com

elton.tz@hotmail.com

rscussel@unesc.net

emilycorneo@hotmail.com

lusitaneom24@gmail.com

janainanones@gmail.com

paulofeuser@hotmail.com

r_andrez@yahoo.com.br

ean@unesc.net

Sessão do trabalho: Sessão 7 (Fungos e Micotoxinas)

One major mycotoxin affecting human and animal health is the Aflatoxin B₁ (AFB₁), a toxin produced mainly by *Aspergillus* strains. It is well established that AFB₁ cytotoxicity might contribute to DNA adducts formation and the ability to cause oxidative damage. The toxicity studies of mesoporous silica nanoparticles (MSNs) with AFB₁ using NIH3T3 cells and hemolysis test were investigated in the current work. The obtained MSNs (39.97±7.85) presents various shapes and higher BET surface area. The results showed no reduction of the cell viability occurred after the MSNs treatment (0.5–2.0 mg/mL) using NIH3T3 cells. Moreover, MSNs treatment completely reversed the cytotoxic effect of AFB₁ at all concentrations. It been known that the aflatoxins have been linked to hemolytic anemia and have led to the destruction

of erythrocytes (hemolysis). Our study evaluated the impact of the MSNs on human red blood cells (RBCs) using a standard hemolysis assay, which revealed no hemolysis in the MSNs evaluated alone and in those combined with AFB₁. The reduction of the aflatoxin-induced cell damage occurs mainly due the adsorption capacity already verified by same authors in previous studies, which AFB₁ was adsorbed in the first minutes in contact with the MSNs, reaching up to an adsorption capacity of ~70% after 15 minutes. Our study indicates that MSNs do not affect the viability of NIH3T3 cells *in vitro* and display high blood biocompatibility. Moreover, the application of MSNs led to a reduction in cytotoxicity caused by AFB₁ in NIH3T3 cells *in vitro*, which might also positively influence different kinds of cells *in vivo* due to their high adsorption capacity.

Keywords: Aflatoxin B₁. Mesoporous silica nanoparticles. NIH3T3 cells.