Mannose-conjugated chitosan nanoparticles for delivery moxifloxacin against *Mycobacterium tuberculosis*

Spósito, L.[a], Meneguin, A. B.[b], Pavan, F. R.[a]

larissa.sposito@unesp.br

a São Paulo State University (UNESP), School of Pharmaceutical Sciences, Department of Biological Sciences, Araraquara, SP, Brazil
b São Paulo State University (UNESP), School of Pharmaceutical Sciences, Department of Drugs and Medicines, Araraquara, SP, Brazil.

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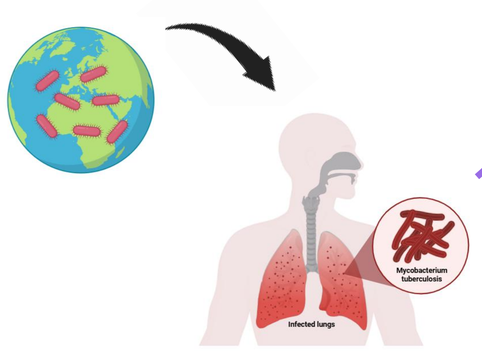
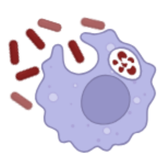
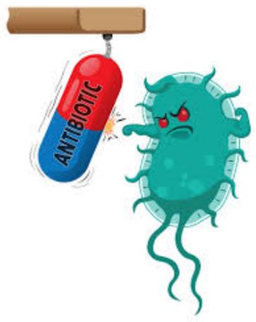
Problem

Mycobacterium tuberculosis





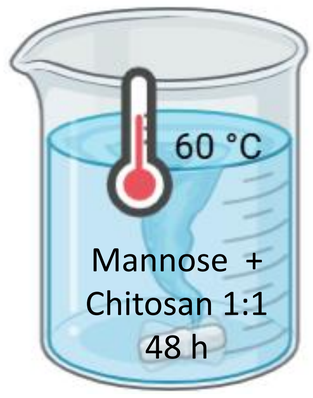
Macrophage infected

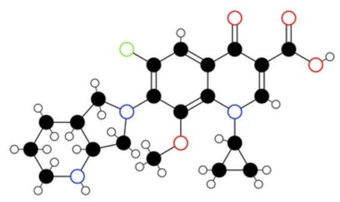


Antimicrobial Resistance

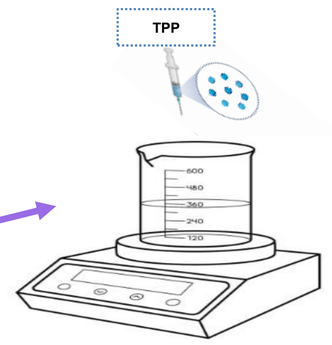
Our Goal

Mannose-modified chitosan





Moxifloxacin

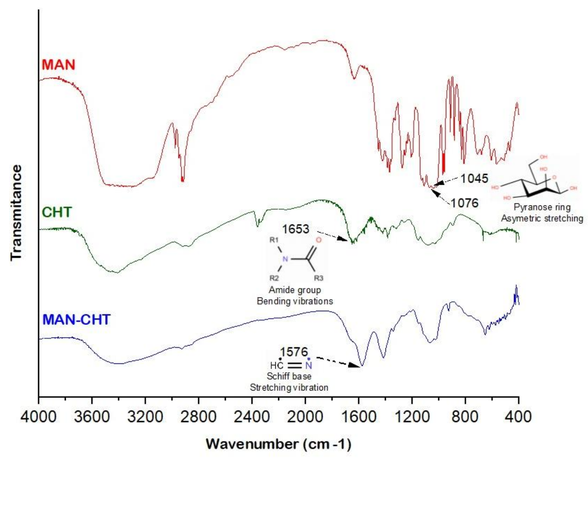


Mannose-modified chitosan nanoparticles with moxifloxacin

Our Findings

Mannose-modified chitosan

FTIR

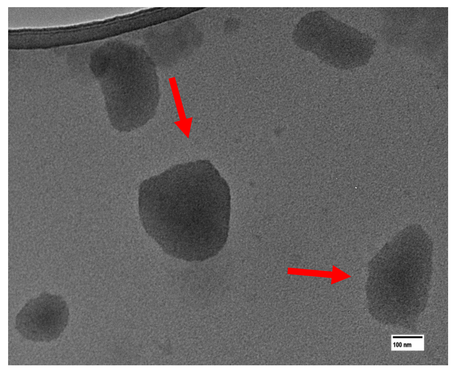


Nanoparticles

Samples	MAN + CHT : STT	Moxifloxacin	Size (nm) ± SD	PDI	Zeta potential (mV) ± SD	Encapsulation efficiency
F1	2,5:1	No	271,3 ± 50,5	0,2	+ 9,8 ± 0,8	-
F1 M		Yes	274,5 ± 66,6	0,2	+ 10,1 ± 0,6	~ 20%
F2	3:1	No	267 ± 51,8	0,3	+ 9,6 ± 0,7	-
F2 M		Yes	243,9 ± 83,6	0,2	+ 11,1 ± 1,2	~ 35%
F3	3,5:1	No	163,1 ± 5,77	0,1	+ 10,7 ± 0,7	-
F3 M		Yes	144, 3 ± 13,6	0,1	+ 11,1 ± 0,6	~ 58 %
F4	4:1	No	136,6 ± 2,2	0,1	+ 10,4 ± 0,7	-
F4 M		Yes	139,1 ± 0,5	0,1	+ 11,6 ± 1,3	~ 68%

* CHT: chitosan; MAN: Mannose; STT: Sodium tripolyphosphate; SD: Standard deviation; PDI: Polydispersity index

Morphology

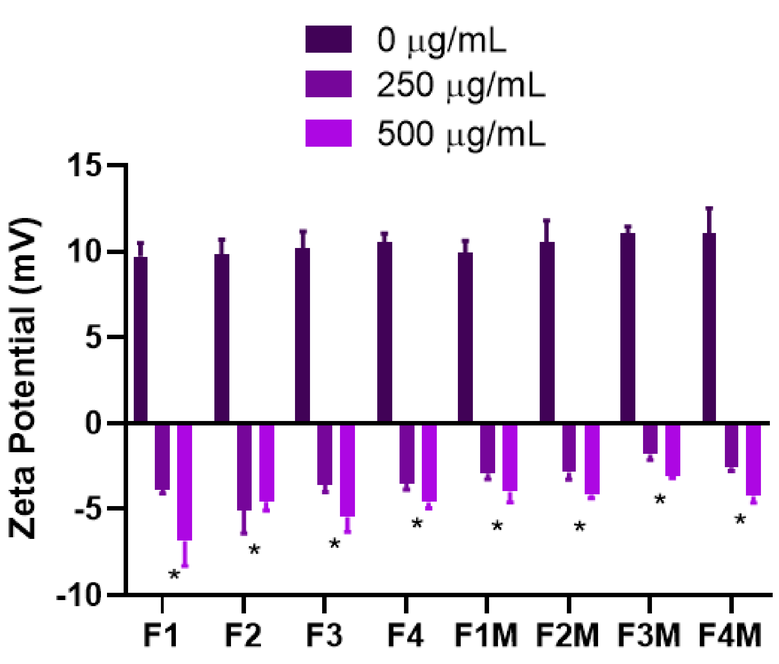


Cytotoxicity – RAW 164.7

Samples	IC_{50} (µg/mL) 24hrs	IC_{50} (µg/mL) 72hrs
Moxifloxacin	>100	70
F1	>100	>100
F1 M	>100	>100
F2	>100	>100
F2 M	>100	>100
F3	>100	>100
F3 M	>100	>100
F4	>100	>100
F4 M	>100	>100

* Inhibitory concentration (IC_{50})

Interaction with mucin pH 7.4



*p<0.0001 relative to mucin concentrations

Conclusions

Successful mannose functionalization chitosan. Stable, spherical, and mucoadhesive nanoparticles with a suitable size and positive surface charge. Moxifloxacin successfully incorporated into these particles. Potential as a targeted pulmonary delivery system for moxifloxacin in tuberculosis treatment.

Acknowledgements

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Reference

Hatami et al., Jornal Brasileiro de Pneumologia. 2022: e20210384; Jain et al., Journal of Controlled Release. 2010: 359–367.; Spósito et al., European Journal of Pharmaceutics and Biopharmaceutics. 2024: 114280