

# Evaluation of Alginate Nanoparticles Co-loaded with Ascorbic Acid and Rifampicin as Therapeutic Treatment of Intracellular Pulmonary Infections †

Ivana R. Scolari <sup>1</sup>, Ximena Volpini <sup>2</sup>, María L. Fanani <sup>3</sup>, Benjamín De La Cruz-Thea <sup>2</sup>, Lautaro Natali <sup>2</sup>, Melina M. Musri <sup>2,\*</sup>, Gladys E. Granero <sup>1,\*</sup>

<sup>1</sup> UNITEFA, CONICET and Departamento de Ciencias Farmacéuticas, Facultad de Ciencias Químicas, Universidad Nacional de Córdoba, Córdoba X5000HUA, Argentina, romina.scolari@unc.edu.ar (I.R.S.); glagranero@unc.edu.ar (G.E.G.)

<sup>2</sup> Instituto de Investigación Médica Mercedes y Martín Ferreyra, Consejo Nacional de Investigaciones Científicas y Técnicas, Universidad Nacional de Córdoba (INIMEC-CONICET-UNC), Córdoba X5000HUA, Argentina, ximenavolpini@unc.edu.ar (X.V.); benjamindlct@gmail.com (B.D.L.C.T.); lnatali@immf.uncor.edu (L.N.); mmusri@immf.uncor.edu (M.M.M.)

<sup>3</sup> Departamento de Química Biológica Ranwel Caputto, Facultad de Ciencias Químicas, Universidad Nacional de Córdoba, Córdoba X5000HUA, Argentina; Centro de Investigaciones en Química Biológica de Córdoba (CIQUIBIC), CONICET, Córdoba X5000HUA, Argentina, lfanani@unc.edu.ar (M.L.F.)

\* Correspondence: mmusri@immf.uncor.edu (M.M.M.); glagranero@unc.edu.ar (G.E.G.);

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**Abstract:** Nanotechnology is a promising technological tool to combat health problems associated with the loss of effectiveness of currently used antibiotics. Previously, we developed a formulation consisting of chitosan and tween 80-decorated alginate nanocarrier co-loaded with rifampicin and the antioxidant ascorbic acid (RIF/ASC NPs), intended for the treatment of respiratory intracellular infections. Here, we investigated the effects of RIF/ASC-loaded NPs on the respiratory mucus and the pulmonary surfactant. In addition, we explored their *in vitro* cytotoxicity for lung cells and their biodistribution on rat lungs after intratracheal administration. The results showed that RIF/ASC-loaded NPs display a favorable lung biocompatibility profile and a uniform distribution throughout lung lobules. RIF/ASC-loaded NPs were mainly uptaken by lung macrophages, their primary target. In summary, the experimental data support results that show that our novel-designed RIF/ASC NPs could be a suitable system for antibiotic lung administration with promising perspectives for treating pulmonary intracellular infections.

**Keywords:** rifampicin; ascorbic acid; nanoparticles; intratracheal administration; cytotoxicity; respiratory barriers; macrophages.

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## **Conflicts of Interest**

The authors declare no conflict of interest.