



Mesoporous Cellular Foam (MCF): an efficient and biocompatible nanomaterial for the controlled release of Chlorambucil

Juliana M. Juárez¹  · Jorgelina Cussa¹ · Oscar A. Anunziata¹ · Marcos B. Gómez Costa¹

Accepted: 5 May 2022 / Published online: 3 June 2022
© The Author(s), under exclusive licence to Springer
Science+Business Media, LLC, part of Springer Nature 2022

Abstract

Nanotransporters have entered a great deal of exploration attention because of their promising openings in medicine delivery. We propose in this work, the Mesostructured siliceous cellular (MCFs) nanomaterial as a promising new host for drug delivery systems because both their specific physicochemical properties, in addition to the high biocompatibility, biodegradability, and low toxicity, make them seductive for controlled medicine release operations. Chlorambucil, is used as a chemotherapy drug administered for treating some types of cancer, chronic lymphocytic leukemia, low-grade non-Hodgkin's lymphoma, Hodgkin's lymphoma and ovarian cancer.

Chlorambucil-loaded Mesostructured cellular foam (MCF-CLB) was prepared and characterized by XRD, TEM, UV-Vis DRS, FTIR, and texture analysis determining the adsorption capacity and its release, achieving the required therapeutic efficacy.

The release of the drug was conducted by simulating the physiological conditions to reproduce the conditions of the organism. The mechanism of drug release from the MCF-CLB host was evaluated. Different mathematical models were used to adjust the experimental data, the best model describing the phenomenon under study over the entire period is the Weibull model. The auspicious results we attained for the release of the drug using the new material. The main advantage of this release is that the rate of release is fast at the beginning and then gradually decreases until 24 h practically all the drug contained in the carrier is released (>95%).

Keywords MCF · CHLORAMBUCIL · NANOTRANSPORTERS · DRUG-DELIVERING DEVICE · NANOSCALEMEDICINE