Article

Alkali Lignin-Based Biopolymer Formulations for Electro-Assisted Drug Delivery of Natural Antioxidants in Breast Cancer Cells—A Preliminary Study

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I. Supplementary movies (SM 1-4).

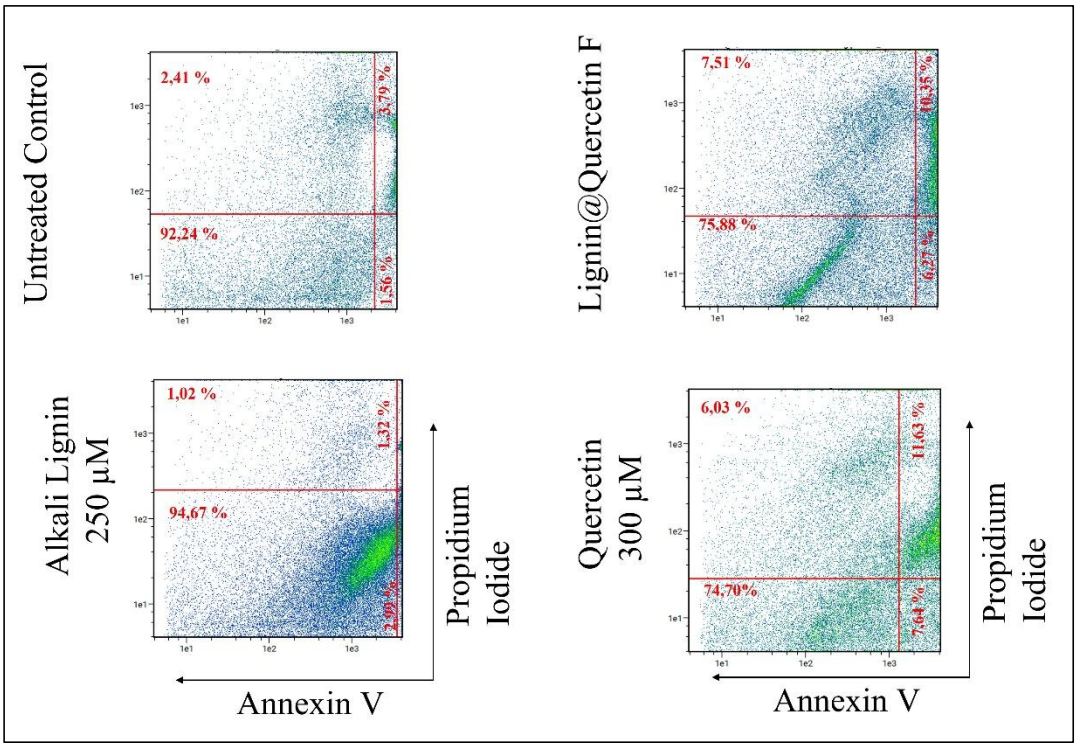
Lens-free microscopy imaging to quantify cell proliferation during 72 hours. Scale bar, 500 μm Proliferation rates, some morphological differences and cells moving fluctuations after treatments is well-shown on the recorded movies. All findings are in full correspondence to presented proliferation curves.

- **SM - 1**– untreated control cells
- **SM - 2** – Cells treated with Alkali lignin (250 μM)
- **SM - 3** – Cells treated with Quercetin (300 μM)
- **SM - 4** – Cells treated with cells treated with separated by size and charge L@Q F (calculated relative concentration: 3.5 μg/mL).

All video files could be found here:
https://drive.google.com/drive/folders/1LfDKxluDBDURiEFE4yIjnq_j9rzG-dFY?usp=drive_link

II. Supplementary Figure S1.

Flow cytometric Annexin V-FITC/PI analysis of apoptosis for the triple-negative tumorigenic highly metastatic MDA-MB-231 induced by 48 hours treatment with: Alkali lignin, Quercetin and *Lignin@Quercetin Formulations*. Cells in the lower left quadrant (Annexin V-FITC−/PI−) are viable; those in the lower right quadrant (Annexin V-FITC+/PI−) are early apoptotic and those in the upper right quadrants (Annexin V-FITC+/PI+) are late apoptotic or necrotic.



III. Supplementary Figure S2.

Cell viability of MDA-MB-231 cells incubated for 24 hours after cell culture medium volume replacement with different percent deionized Milli-Q® water. Cells grown in 100 % culture medium w/o water replacement was used as a control for calculations.

