Preparation and Characterization of Liposomal Murrayafoline A

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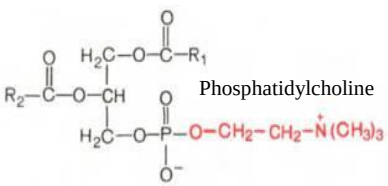
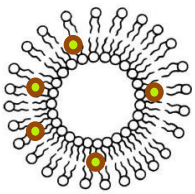
Introduction

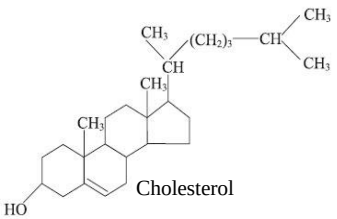
Murrayafoline A (MuA), isolated from Murraya koenigii in Vietnam, is a carbazole derivative that shows biological activity as cytotoxic agent [1, 2]. Liposomal form of MuA (Lip-MuA), obtained using combination of the thin film hydration and sonication methods, can be used to reduce the drug toxicity, improve its bioavailability and create the drug delivery system.

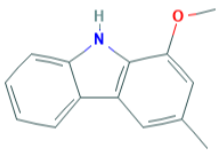
Liposomes were prepared from the mixtures of egg phosphatidylcholine (PC), cholesterol (Ch) and MuA in chloroform using sonication-rehydratation method.

Composition of liposomes:
phosphatidylcholine:cholesterol:
Murrayafoline A (wt.) 1:0.25:(0.25, 0.5, 1)









1-Methoxy-3-methyl-9H-carbazole
Murrayafoline A

Results

The mean diameter (D) and zeta potential (ZP), measured using dynamic light scattering (Zetasizer NanoZS, Malvern), were in range from 190 to 520 nm and from -44.8 to -31.8mV for different formulations respectively (table 1).

Table 1. Characteristics of Lip-MuA

Formulations	D, nm	ZP, mV
PC,Ch,MuA 5%	222±23	-44.8±0.6
PC,MuA 5%	300±44	-37.3±2.0
PC,Ch,MuA 10%	220±28	-43.2±0.3
PC,MuA 10%	192±21	-31.8±2.3
PC,Ch,MuA 20%	254±32	-43.8±0.6
PC,MuA 20%	520±160	-37.6±3.4

Liposomes from PC, Ch and 5–10% (wt.) of MuA had less size as well as zeta potential which indicates its higher stability in comparison with Lip-MuA (20%) and cholesterol-free formulations.

The stability studies, performed at 20^{0}C for 7 days, were shown no significant difference in size and zeta potential for Lip-MuA formulations.

Acording to the SEM-data (JCM-6000Plus (JEOL) of Lip-MuA, liposomes have round shape and diameter 370-610 nm (fig.1), which slightly more than hydrodynamic diameter due to its deformation after adsorption on the surface.

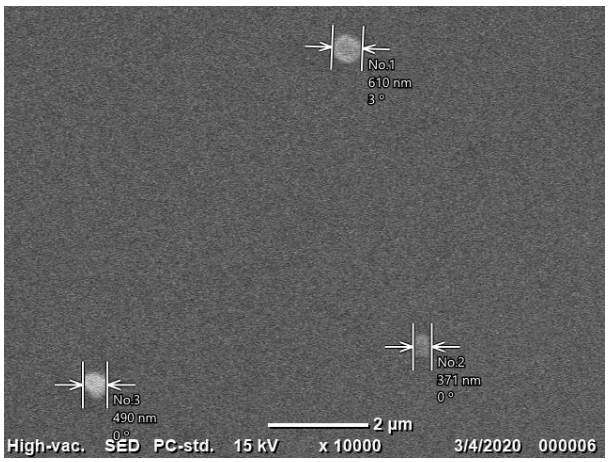


Figure 1. SEM-image of Lip-MuA (PC,Ch,MuA 10%)

Using Folin-Ciocalteu's reagent, it was shown the difference in absorption of MuA and liposomal MuA in equal concentration, which is about 30-40 % (770 nm). The main reason for decreasing in absorption is that MuA incorporate into the lipid membrane (fig.2).

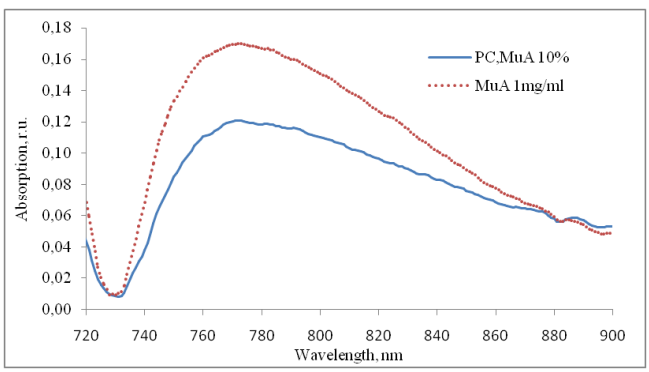


Figure 2. Absorption spectra of Lip-MuA, 10%

Conclusion

It was obtained and characterized stable negatively charged liposomal Murrayafoline A (5 - 10% wt.) that can be used in biomedicine.

Referenses:

1. *L.Anh, N.Thi, H.Ly et.al.* Synthesis and cytotoxic activity evaluation of novel derivatives of murrayafoline A// J. of Science and Technology.-2016.- **54** (2C).-P. 502-508.
2. *Itoigawa M., Kashiwada Y., et al.* - Antitumor agent. 203. Carbazole alkaloids murrayaquinone A and related synthetic carbazolequinones as cytotoxic agents// J. Nat.Prod. -2000.-**63**.- P.893-897.

This research is funded by VAST under grant number QTBY01.03 / 20-21 and BRFFR under grant number X20V-001.