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TITOLO (maiuscolo)

DESIGN OF SOLUBLE MICRONEEDLES FOR DERMAL DELIVERY OF CATIONIC LIPOSOMES

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Riassunto

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Skin delivery of drugs has been investigated for decades to achieve local or systemic effects, since the strong barrier given by the tightly packed skin corneocytes prevents the passive diffusion of most compounds into the deepest strata. Among the approaches studied to breach the skin barrier, microneedles (MNs) or deformable liposomes seems to be the most effective, especially when used in combination. However, most of the research tracked the skin permeation of the drugs delivered with this approach, whereas the effect of MNs on the skin penetration of liposomes *per se* has been scantly investigated.
In this work microneedle arrays (MNA) made of polymethylmethacrilate (solid MNA) or PVP loaded with liposomes (dissolvable MNA) were prepared by 3D laser lithography and PDMS negative mold, respectively. Squared arrays of 6.4 mm^2 composed of 7x7 pyramidal MNA with 200 µm square base and 1000 µm were designed. The liposome diffusion was evaluated in dermatomized porcine ear skin (~0.8 mm) by applying the liposomal formulation after poking the skin with the solid MNA (30 N, 60 s) or poking the skin with dissolvable MNA. For this purpose cationic FITC-liposomes loaded with Bengal rose dye were prepared.
MNA punctured 4 Parafilm layers (approx. 520 µm depth). Liposomes showed a mean diameter of 140±0.8 nm and positive ζ potential (54±9 mV). Interestingly, liposomes maintained concentration and size after dissolution of dissolvable MNA. Fluorescence imaging indicated that liposomes release started within 20 min and prolonged for more than 6 h.
The skin pretreatment with solid MNA allows a faster and consistent diffusion of liposomes in the skin compared to dissolvable MNA (Figure 1). This data, if confirmed, will open a new opportunity for the delivery of genetic materials intended for local treatment of severe skin pathologies.

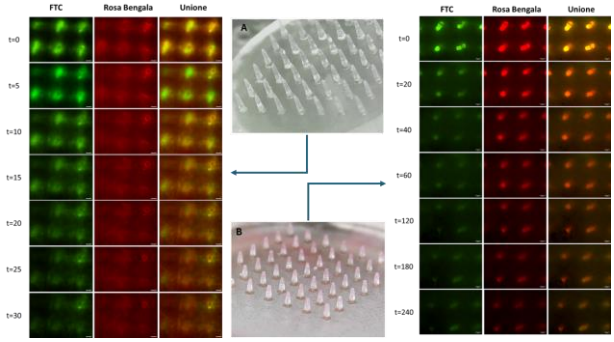

Figure 1- Fluorescence microscopy time-laps images of the diffusion pattern of cationic liposomes and Bengal rose dye in the dermis after skin poking with solid MNA (left) or dissolvable MNA (right).

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