羥基苯酮及薑黃素脂質奈米載體特性分析

Characterization of oxybenzone and curcumin encapsulated in lipid nanocarriers

中文摘要

長時間的紫外線照射，會使皮膚的抗氧能力漸漸被消耗，使得皮膚面臨強大的氧化壓力(oxidative stress)。防曬劑(UV filter, sunscreen)已被證實可減緩皮膚老化的徵兆及降低皮膚癌的發生率，但也有研究指出防曬劑經紫外線照射後會產生對細胞有害的自由基(free radical)，一旦皮膚細胞內的抗氧化機制失衡就容易導致皮膚疾病甚至誘發癌症的發生，所以只有防曬劑的防護是不夠的，還需搭配抗氧化劑才能提供皮膚適當的保護。近年來的許多臨床試驗報告中皆指出，化學性防曬劑羥基苯酮(oxybenzone)能經由皮膚吸收進入全身性循環，造成使用上的疑慮，所以提昇其使用上的安全性是非常重要的。

本研究目的著重於以脂質奈米載體(lipid nanocarriers)包覆模式藥物化學性防曬劑羥基苯酮與天然萃取抗氧化物薑黃素(curcumin)，探討其粒徑、包覆率、穩定性與被微脂粒包覆前後對體外穿透實驗的影響。實驗所用的脂質奈米載體為微脂粒(liposome)與固體脂質奈米顆粒(solid lipid nanoparticle)。實驗結果得知，微脂粒粒徑主要分佈在 200 nm，羥基苯酮微脂粒包覆率可達 70%，薑黃素微脂粒包覆率可達 60%，雙包覆微脂粒中，羥基苯酮包覆率也可達 70 %，薑黃素包覆率則為 50%，回收率皆達 80%以上。穿透實驗結果顯示以微脂粒包覆羥基苯酮能減緩其穿透過接收室的量，並可增加薑黃素的穿透過接收室的量。薑黃素固體脂質奈米顆粒的包覆率最高可達 70%，回收率介於 40% ~ 60%，而固體脂質奈米顆粒粒徑主要分佈在 400 nm，其分佈指數(polydensity index)較微脂粒小，粒徑較為均一，粒徑分析得知單包覆及雙包覆微脂粒及固體脂質奈米顆粒的穩定性相似。

英文摘要

Chronological ultraviolet irradiation from sun damages human skin. UV irradiation can induce oxidative damage in skin by overwhelming the skin’s antioxidative capacity. Sunscreens are proved to decrease the signs of aging and incidence of skin cancers. However, some researches indicated that sunscreens themselves may become free radicals when activated by UV irradiation. Once the preventive antioxidant network of skin disintegrated, it can lead to oxidative stress related skin diseases and even skin cancer. Therefore, sunscreens may inadequately protect against UV-induced harmful effects. The use of naturally occurring botanicals in skincare products is growing in popularity .The combination of sunscreen and antioxidant in topical application may be a beneficial photoprotection strategy.

The aims of this study are: to develop a co-encapusulate sunscreen-antioxidant liposome system; to improve curcumin skin penetration; to minimize skin absorption of oxybenzone; and to evaluate a new formulation of curcumin loaded solid lipid nanoparticle. Characteristic studies including particle sizes, polydensity index, entrapment efficiency, stability and in vitro membrane diffusion have been conducted in this investigation. The results have revealed that compare with free form oxybenzone, reduction of oxybenzone can be achieve by single and co-encapsulate liposome. Liposomal curcumin can increase skin penetration of curcumin. When curcumin and oxybenzone were incorporated in solid lipid nanoparticle, the entrapment efficiency of curcumin was enhanced.