Development of Redispersible Nano-size Dried Liposomes Loaded with Quercetin

GYI AE YUN

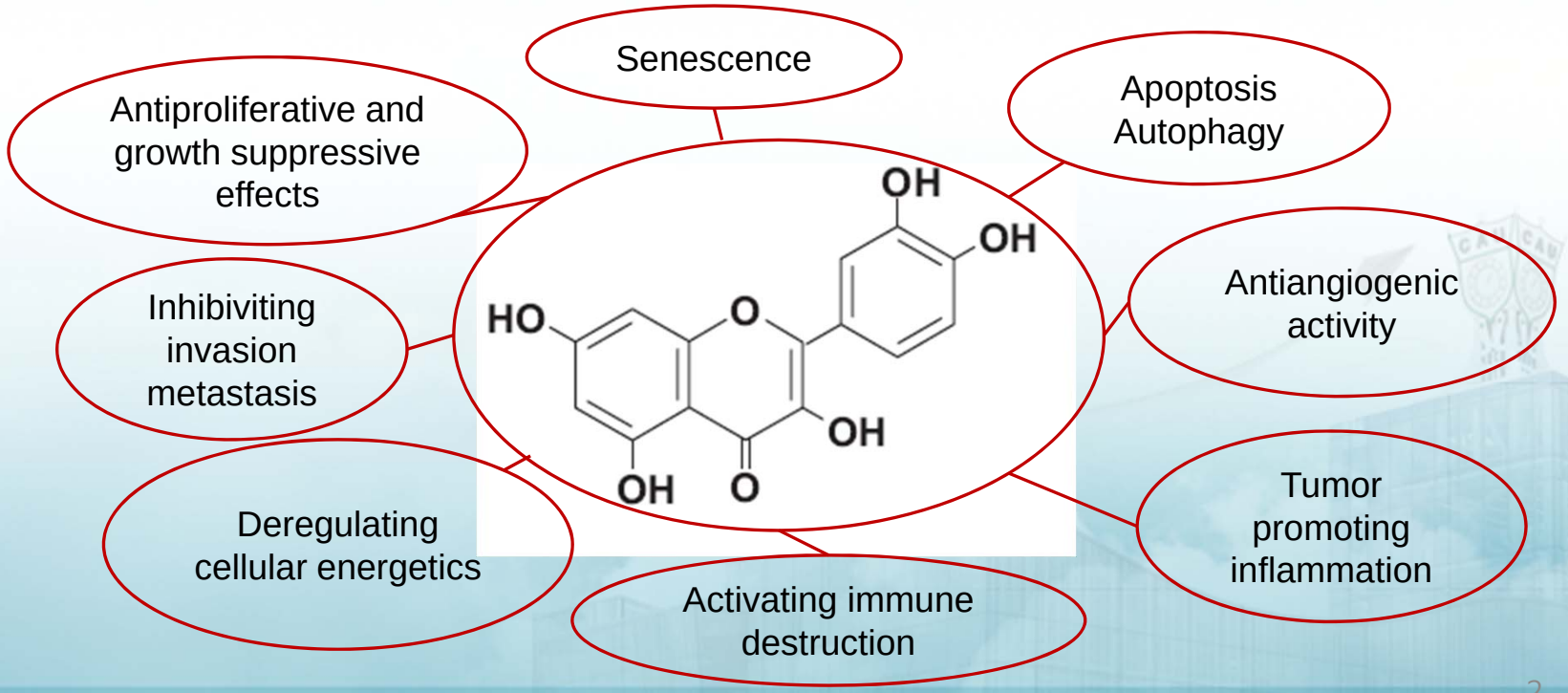
CHUNG-ANG UNIERSITY

한국의 중앙에서
세계의 중앙으로
TOWARD THE UNIVERSITY OF THE WORLD FROM CHUNG-ANG OF KOREA

Introduction

Quercetin (QC)

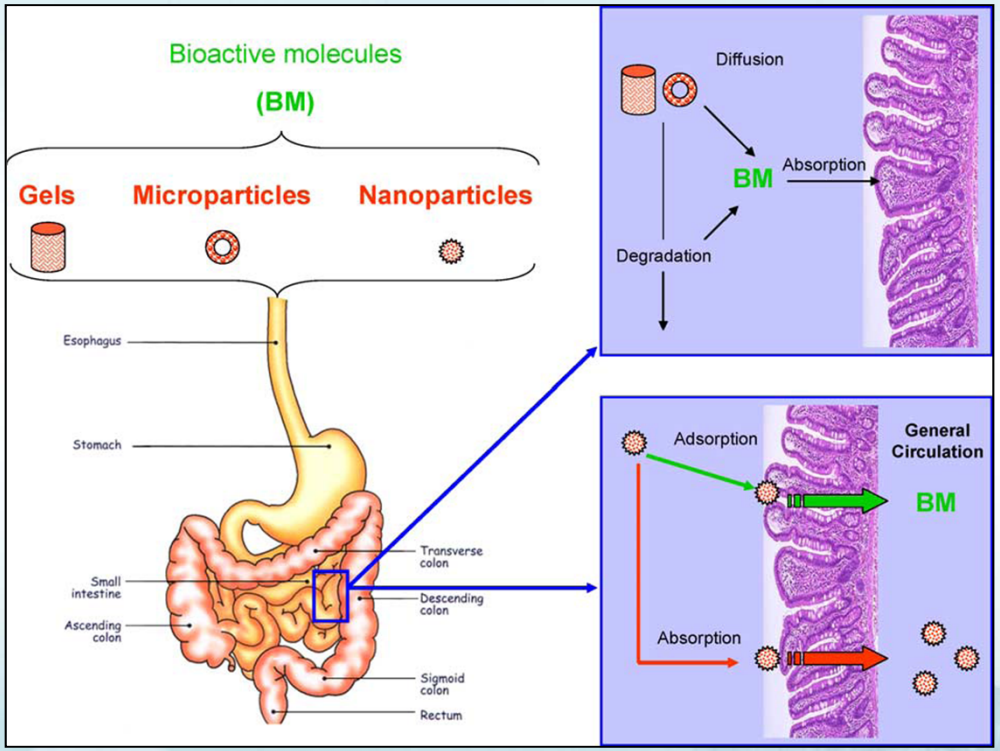
- Many beneficial health effects
- Taken up in the gastro-intestinal tract by passive diffusion
- Poor bioavailability: low solubility and fast metabolism



Introduction

Nanoparticles

- Dissolution rate of such a poorly water-soluble compound can be improved.
- Improvement of permeability and residence time



Trends in Food Science & Technology 17
(Chen *et al*, 2006)

Introduction

Liposomes

- Constructed of polar lipids characterized by having a lipophilic and hydrophilic group on the same molecules
- Physical and chemical instabilities in aqueous dispersion for long- term storage
  - Hydrolysis
  - Oxidation of phospholipids
  - Encapsulated solute leakage
  - Liposome aggregation
- Methods for improving stability of liposomes
  - Lyophilization
  - Spray drying

Objectives

- To prepare redispersible nano-sized liposomes loaded with QC by lyophilization

- To set up optimum lyophilization conditions minimizing damage of nano-liposomes while freeze-drying

Methods

Dissolution of quercetin and phospholipid in organic solvent

Evaporation of solvent under vacuum (formation of lipid film at 37°C)

Hydration (added water or solution of cryoprotectant) and vortexing

Sonication (5 min) and cooling

Centrifugation of liposomal quercetin (3000 g, 3 min)

Extrusion by polycarbonate membrane filter (200 nm)

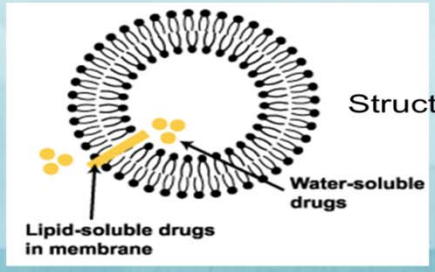
Measurement of size, PDI and ζ-portential

Freeze-drying of nano-liposome

Reconstitution of nano-liposomes in distilled water

Evaluation of size change (7days at 4 °C)

- **Measurement of loading amount**
  - Removal of supernatant
  - Dissolution in methanol
  - Measurement of absorbance (UV-Visible spectroscopy at 420 nm)



Summary

- Average size of liposome after extrusion was 147nm at initial 1mg quercetin
- Sucrose or trehalose: effective cryoprotectants to protect nano-liposomal QC while freeze-drying
- Stable to maintain nano size when reconstituted
- Storable dried nano-liposomes for long period
- Applicable to manufacture various diet supplements with enhanced bioavailability of insoluble functional compounds

Thank you for listening