Escola Superior de Tecnologia da Saúde
Politécnico de Coimbra

Nanoencapsulation of curcumin and health benefits

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Introduction

CURCUMIN is a polyphenol that is naturally present in the rhizome of curcuma (Curcuma Longa)[1-3]. It is a difuloylmethane [1,7-bis(4-hydroxy3-methoxyphenyl)-1,6-heptadiene-3,5-dione], a lipophilic compound[2], of low molecular weight[2,4]. It is considered a preservative[5], flavoring and natural coloring agent[4,5],and there has been a growing interest in its use in both food and pharmaceutical industry[2].

Fig.1 – Chemical structure[1] of curcumin and its properties [2-5].

Limitations of curcumin

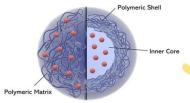
- ↓ water solubility[4,6,8];
- ↑ decomposition capacity in neutral[6,9] or alkaline pH[6,9,10];
- ↓ absorption[3,10,11], distribution and bioavailability[1,3,8,10];
- Rapid elimination from the body[8,10,11];
- Susceptibility to photochemical degradation[1,6,12] and heat[4,12].

NANOENCAPSULATION is a process of packaging substances in nanostructures, on a scale of 1nm-100nm, which can be performed using different materials, such as biopolymers or lipids, and using different techniques already developed[12,13-15].

Aim

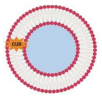
Analysis of the literature of current knowledge on the use of nanoencapsulation of curcumin and its benefits in the treatment of various pathologies.

Results



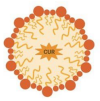
Polymers

- Application in food products[2].
- ↑ solubility, stability and biological activity[11,16].
- Anti-proliferative and apoptotic effect on pancreatic cancer cells[17].
- Strong inhibition of colon and prostate cancer cells[11].
- ↑ cytotoxicity towards breast cancer cells[5].



Nanoliposomes

- ↑ the bioavailability of curcumin[6].
- ↓ of liver damage induced by CCl4[6].



Nanoemulsions

- Alternative way of transporting curcumin for neuroprotective purposes, with > efficiency and ↓ toxicity[18].
- Antioxidant activity of nanoencapsulated curcumin > free curcumin[3].
- Antifungal and antimicrobial activity[8].
- ↑ cytoxicity in breast cancer cells[8].
- ↑ solubility[19].

Lipid core nanoparticles

- Beneficial effect on the inflammatory process of arthritis, with a consequent ↓ in the associated inflammation signs[1].

Methods

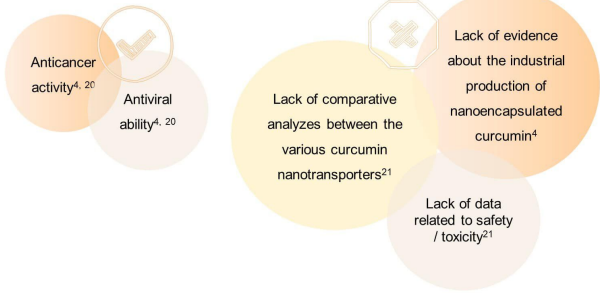
Scientific Databases

ScienceDirect PubMed b-on

Keywords

"nanoencapsulation" "food safety"
"nanotecnology" "food science"
"curcumin"

Discussion



Conclusion

- The therapeutic efficacy of curcumin nanotransporters has been proven in *in vitro* and *in vivo* studies.
- Nanotechnology in the food field: concerns about safety for human consumption.
- More research is needed in this area, as well as the creation of guidelines.

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