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Boosting the anti-inflammatory potential of naringin as a nano-nutraceutical

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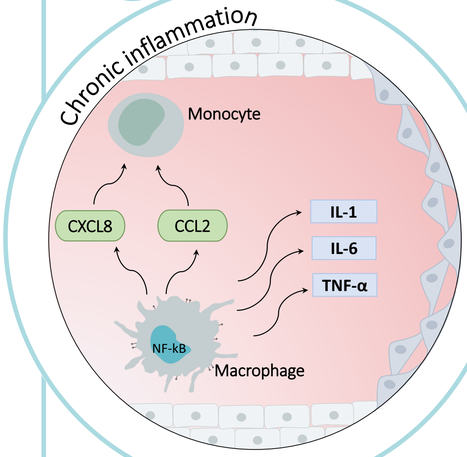
1 BACKGROUND

Inflammation is a vital **defense response**. In normal conditions it is a fast process, however, if not properly regulated, it can lead to **chronic inflammatory conditions**.

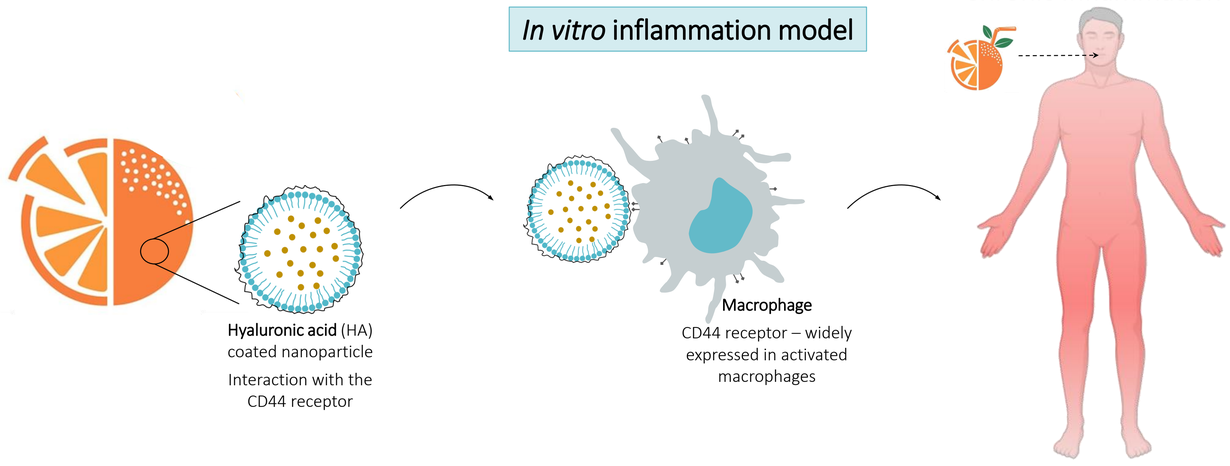
Compounds like **naringin** (NAR) from grapefruit have **anti-inflammatory effects** but limited clinical use due to low bioavailability. Nanotechnology **with lipid nanoparticles enhances NAR efficacy**, allowing controlled release and modulation of inflammatory mediators, promoting new nutraceuticals and functional foods.

2 PROBLEM



3 STRATEGY

In vitro inflammation model



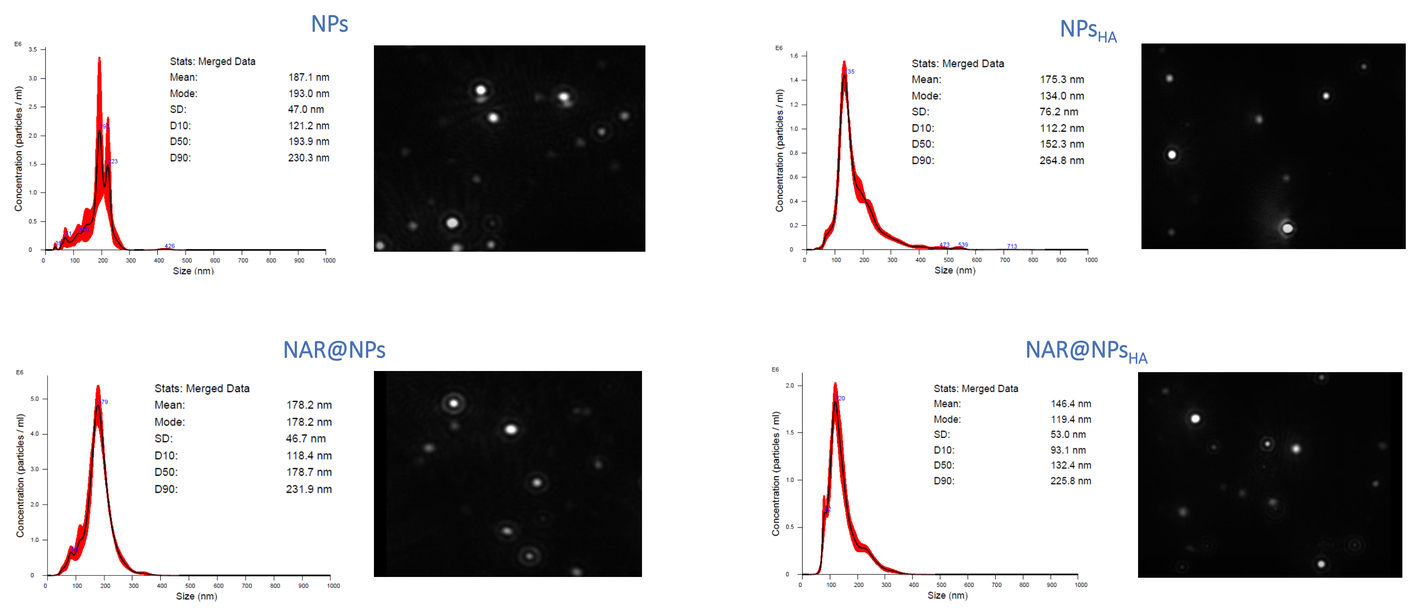
4 RESULTS

Dynamic light scattering characterization

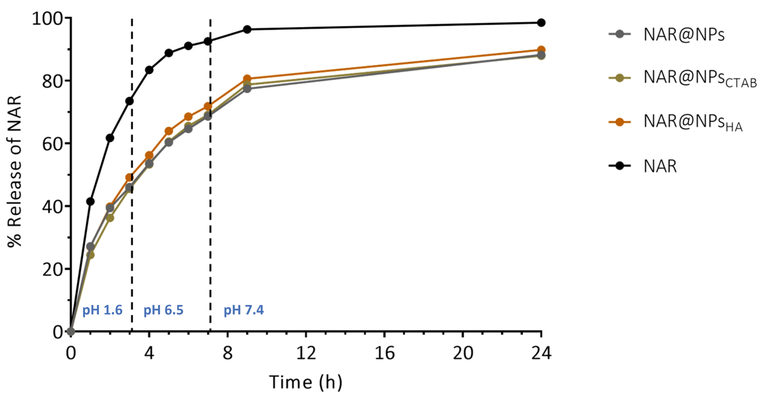
Formulation	Size (nm)	PDI	Zeta (mV)	% EE
NPs	591.2 ± 25.4	0.06 ± 0.03	-25.82 ± 1.52	-
NAR@NPs	592.5 ± 17.9	0.147 ± 0,038	-25.31 ± 1.45	≅30%
NPs_{CTAB}	284.6 ± 1.4	0.156 ± 0.013	24.18 ± 1.12	-
$NAR@NPs_{CTAB}$	286.1 ± 2.6	0.208 ± 0,070	28.66 ± 1.70	≅36%
NPs_{HA}	432.6 ± 4.8	0.197 ± 0.02	9.06 ± 0.55	-
$NAR@NPs_{HA}$	431.0 ± 37.4	0.245 ± 0.040	9.94 ± 1.72	≅35%

The differences in values between the two techniques may indicate that there is HA that does not bind to the nanoparticles

Nanoparticle tracking analysis

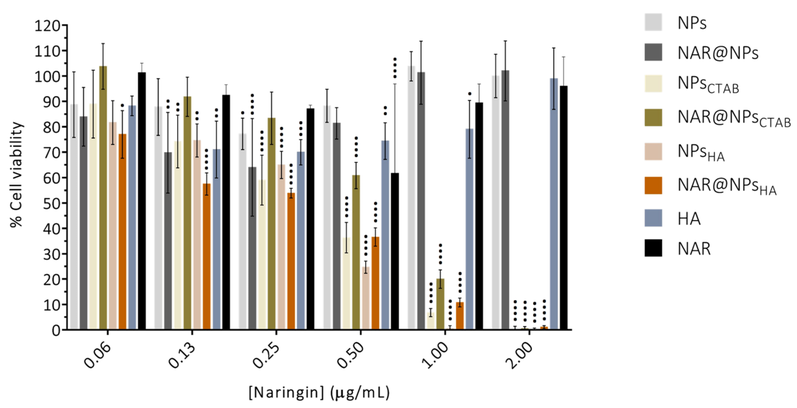


Release study



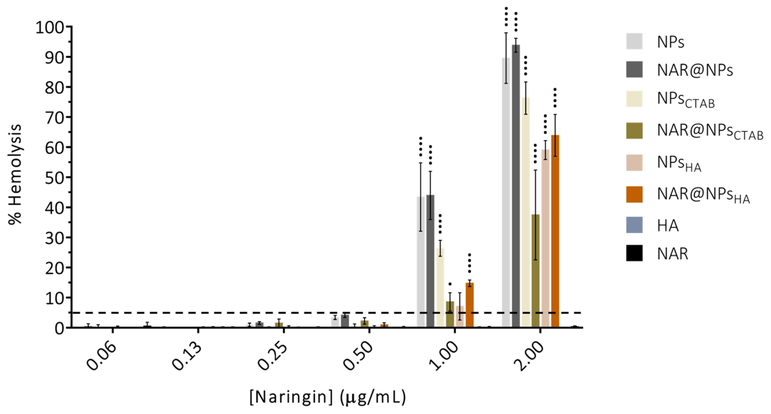
Controlled release of naringin in the presence of nanoparticles

Cell viability studies – THP-1 cell line



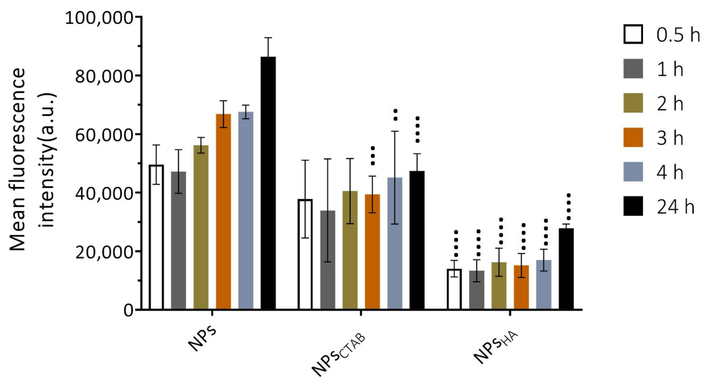
Positive charge of nanoparticles influences cell viability

Hemolysis assay



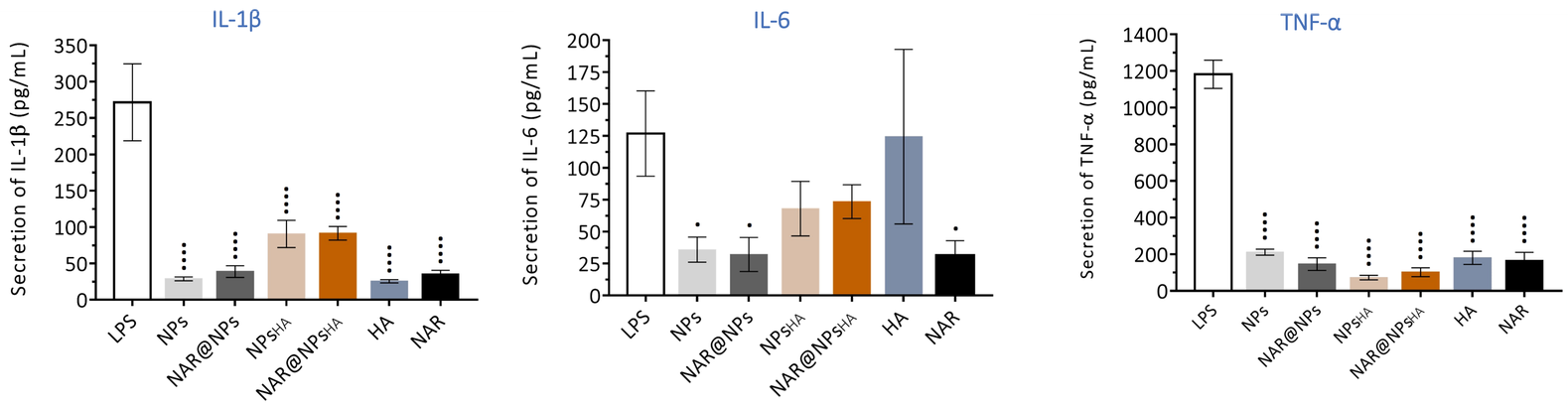
There is no hemolytic activity for concentrations of at least 0.50 ug/mL

Uptake study



Uptake time-dependence for both formulations
In the case of NLC_{HA} there may be a saturation of the CD44 receptor (further studies are needed)

Anti-inflammatory activity



IL-1β ↓ IL-6 ↓ TNF-α ↓

This work aligns with SDG 3 by enhancing naringin's therapeutic efficacy for better health outcomes and disease prevention, and with SDG 12 by using nanotechnology to improve nutraceutical efficiency and promote sustainable production.

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