Synthesis of the N-acetylcarnitine nanoparticles and study of their effects on the Caco-2 cells

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INTRODUCTION

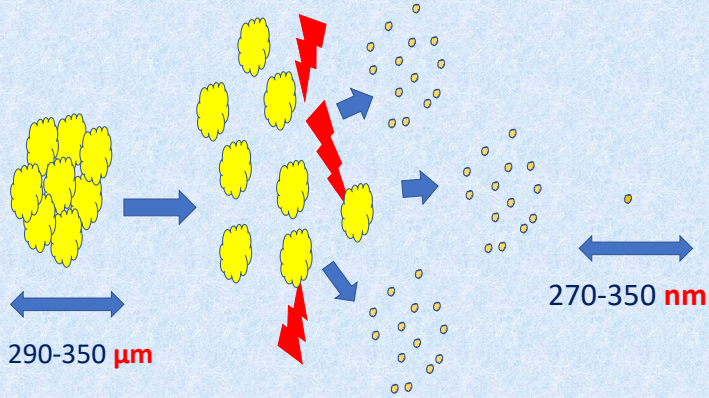
Nanotechnology has several applications in health to improve drug delivery and bioavailability. Currently, conventional drugs are obtained as a polymorphic crystal powder having a micrometric size. Nanotechnology gives a powder having lower diameters showing a higher surface/volume ratio and dimensions comparable to cell receptor size. The improved **nanodrug** potency allows to use lower doses exhibiting low side effects.

N-Acetyl-L-carnitine (ALCAR) is a natural ester derivative of L-carnitine (LCAR) that counteracts memory decline in elderly, tiredness in older adults, nerve pain in diabetes neuropathy and Alzheimer disease.

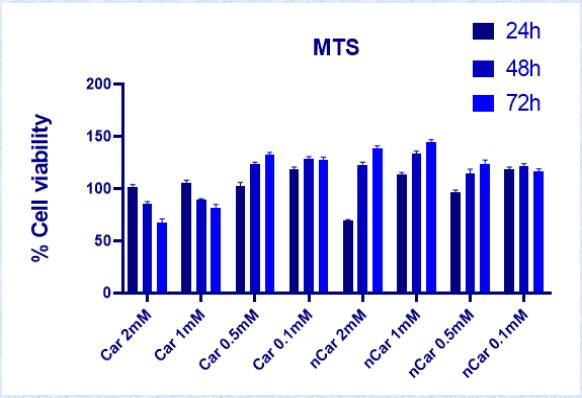
RESULTS

ALCAR powder (about 300 µm) was processed with a planetary ball miller and analysed by Dynamic Light Scattering.

The output showed a polydispersed powder having a medium size of 300 nm ± 5nm and a polydispersion index, PDI, of 0,1214 nm ± 0,0057 nm.



The top-down method was used to comminute the powder.



The human Caco-2 cells were used to study the drug-epithelial gut interaction and drug adsoption. ALCAR dose-response curve (**Car**) and ALCAR nanoparticles (**nCar**) versus cell viability was studied. Caco-2 cells were cultured with different ALCAR and nanoALCAR concentrations to test cell viability at different times by MTS assay.

CONCLUSIONS AND FUTURE PERSPECTIVES

Studies to evaluate the anti-inflammatory ALCAR activity by RT-PCR are ongoing. In Caco-2 cells nanoALCAR seems to be more effective to counteract the TNF-α proinflammatory stimuli than ALCAR.

Nanotechnology allows to reformulate drugs and decrease their effective dosage, this could reduce the low-grade inflammation and the arising side-effects when chronic assumption is required. Furthermore, nanoparticles can exhibit new interactions with biological targets and new therapeutic indications.

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- Charles J. Rebouche doi: 10.1196/annals.1320.003.
- Isabella De Angelis , Laura Turco. doi: 10.1002/0471140856.tx2006s47

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