A comparison of different silicon dietary supplements on integrity and extracellular matrix of intestinal epithelium model

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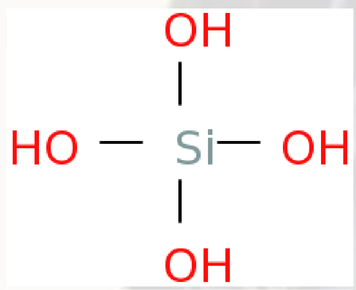
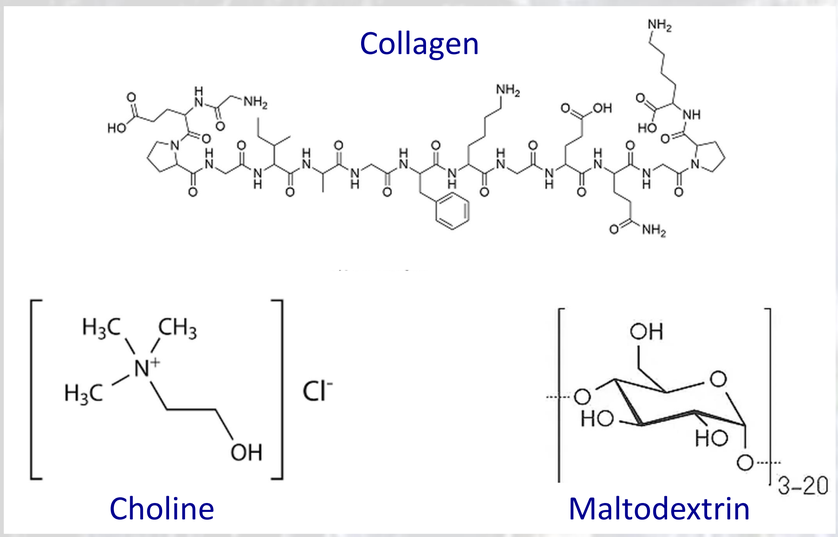
INTRODUCTION: Silicon (Si) can be found in cosmetic products, beverages and foods. In the last decades its use has been exponentially increased especially as a dietary supplement. Si has numerous health properties, such as extracellular matrix element, collagen synthesis, bone mineralization, immune system modulation, decrease metal accumulation in Alzheimer's disease and the risk for atherosclerosis. Given its poor intestinal absorption, Si is assumed as orthosilicic acid (OSA) which promotes its bioavailability.

AIM: to compare different OSA-stabilized commercial dietary supplements



Orthosilicic acid (OSA)



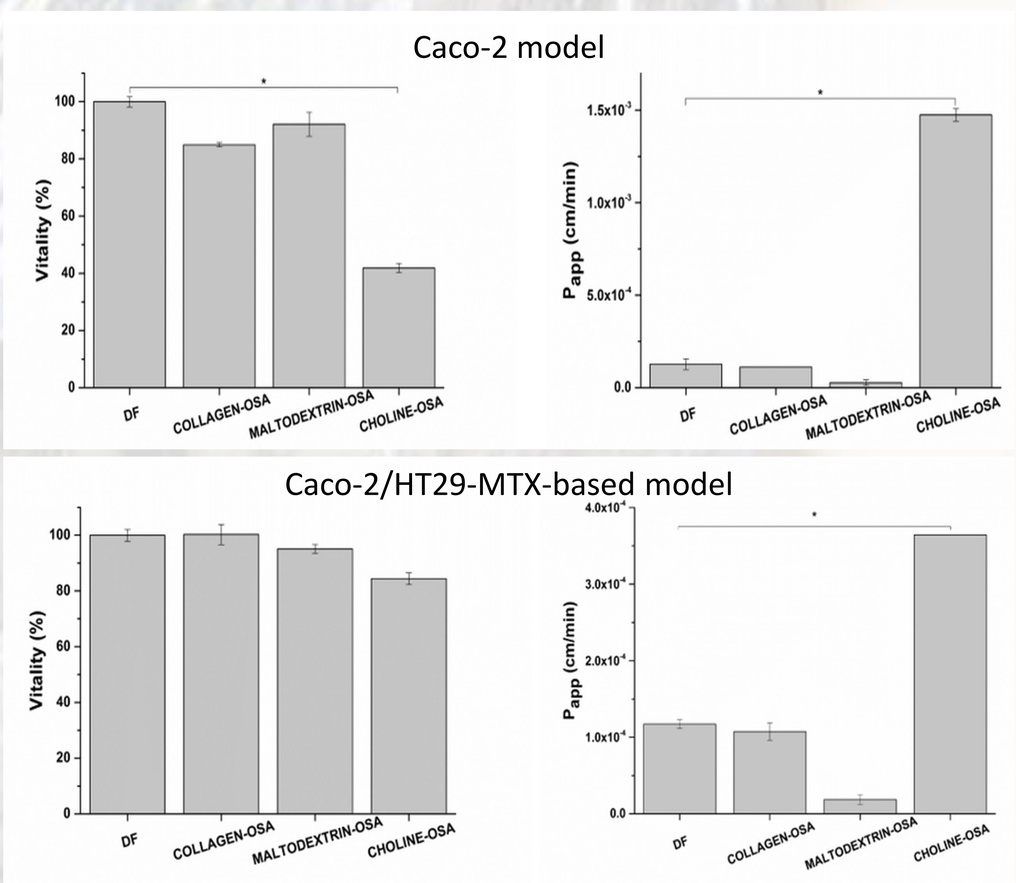
Si Type	Batch number
Collagen-OSA	0159.17
Maltodextrin-OSA	OSP18184
Choline-OSA	17C13

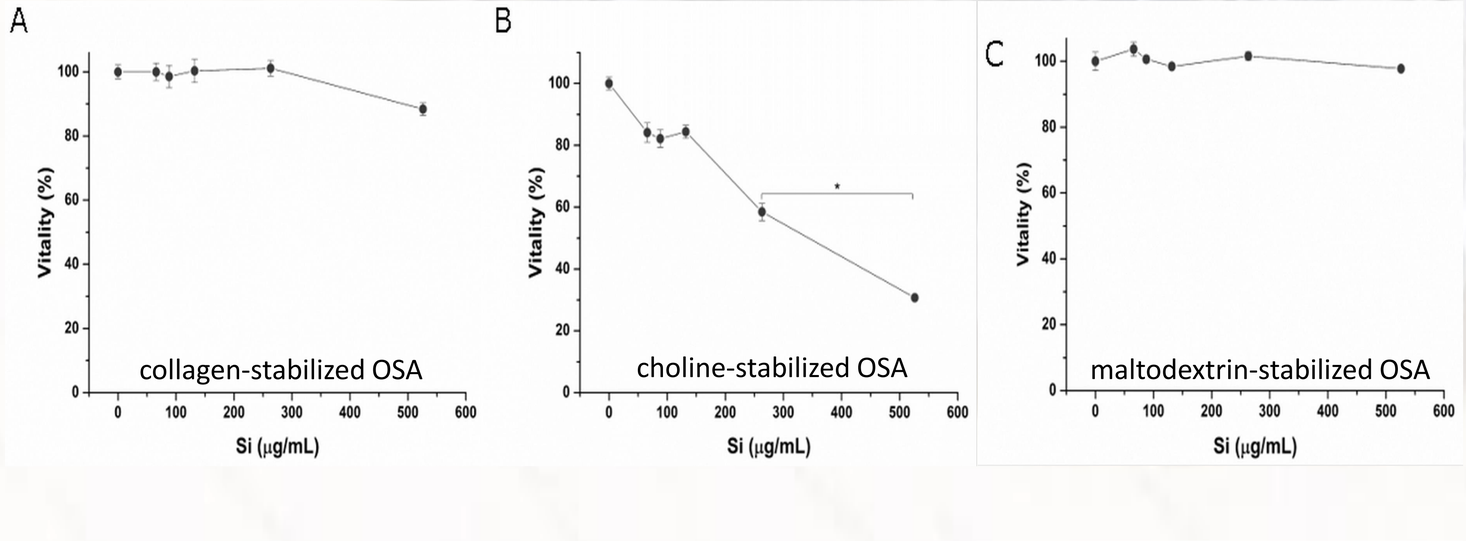
Bioaccessibility, bioavailability and safety in a model of human intestinal epithelium and biocompatibility within glycocalix.

1. Si bioaccessibility (available for absorption) measured by *in vitro* digestive process
2. OSA formulations effects (digested Si) on intestinal epithelium viability by MTS assay in Caco-2- and Caco-2/HT29-MTX-based models
3. Bioavailability (and absorption) of OSA formulations (digested Si) measured by transwell system
4. Barrier integrity in Caco-2 and Caco-2/HT29-MTX monolayer models analyzed after exposure to OSA formulations (digested Si)
5. Si retention at intestinal glycocalyx level evaluated after exposure of the *in vitro* intestinal epithelia to OSA formulations (digested Si)

Formulation	Bioaccessibility (%)	Bioavailability (%)	
		1 h	3 h
Collagen-OSA	25.0	83.0	73.4
Maltodextrin-OSA	35.6	6.3	5.7
Choline-OSA	11.0	98.4*	73.4*

* These values are imputable to the strong adverse effect of choline-stabilized OSA on intestinal epithelium measured by TEER





Formulation	Intestinal glycocalyx Si retention (% ± SD)
Collagen-OSA	32.2 ± 4.4
Maltodextrin-OSA	1.9 ± 0.1
Choline-OSA	5.9 ± 0.1

Conflict of interest
The authors declare no conflict of interest

CONCLUSIONS

Great diversity of absorption and bioavailability - and harmfulness - depending on the silicon stabilizer

Collagen-stabilized OSA represents the best Si dietary supplement

The most beautiful thing we can experience is the mysterious. It is the source of all true art and science. Albert Einstein