Retinyl acetate stimulates ferritin synthesis in Caco-2 cells in vitro

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Differentiated cultures of Caco-2 human colon cancer cells provide a widely used model system to study the accumulation and transport of nutrients. This cell line is responsive to iron in that ferritin synthesis occurs as a result of exposure to the metal (1). In this study we have examined some of the interactions between iron and retinyl acetate in the synthesis of ferritin. Concomitant addition of retinyl acetate and iron for 24h showed no interaction, however incubation of the cells for 72h in the presence of retinyl acetate prior to the addition of iron resulted in a significant increase in ferritin synthesis. In the absence of added iron, retinyl acetate increased ferritin synthesis slightly but significantly.

Retinyl acetate added (μmol/L)	Exposure time prior to addition of iron (h)	Cell Ferritin ng/mg protein No added iron	Cell Ferritin ng/mg protein Iron (20 μmol/L)
0	0	8.9	894
0	72	10.1	787
6.25	0	11.3	971
6.25	72	12.6	1070
12.5	0	11.2	983
12.5	72	15.4	1160
25	0	10.7	990
25	72	22.8	1510
Pooled SE		1.3	49

When β-carotene was added to the cultures there was a small increase in the amount of ferritin produced, although duration of exposure appeared to have no effect.

Addition of either phytic acid or black tea infusion reduced ferritin synthesis in a dose-dependent manner. Addition of vitamin A partially overcame the effect of phytic acid, but not tea, whereas β-carotene had no effect. This study shows that the model system can be useful in unravelling some of the more complex interactions between nutrients and antinutrients in foods.

Reference

1. Glahn RP, Lee OA, Yeung A, Goldman MI, Miller DD. Caco-2 cell ferritin formation predicts nonradiolabelled food iron availability in an in vitro digestion/Caco-2 cell culture model. J Nutr 1998; 128: 1555–1561.

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