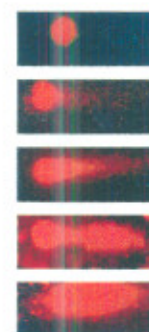




The Effect of Nucleotide Supplementation on Oxidative Stress Induced by High Dietary Fat Intake in Pigs



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Introduction and Objective

Oxidative stress is known to induce genotoxic effects upon immune cells (Rezar et al., 2003). Since nucleotides play a role as immunomodulatory nutrients (Yu et al., 2002; McCowen and Bistran, 2003) their role in the prevention of effects of oxidative stress formation could be of interest.

The aim of the study was to evaluate the effect of nucleotide supplementation on the oxidative stress induced by a high proportion of dietary polyunsaturated fatty acids (PUFAs).

Methods

24 growing pigs (12 kg) were penned individually in balanced cages and after adaptation period divided into three groups that received isocaloric daily rations (2,5xMEM) composed of a basal diet supplemented as follows in the table.

Supplementation of basal diet in experimental groups

Group	CONT	OIL	OIL+NUC
Starch	+	-	-
Linseed oil	-	+	+
Nucleotide preparation*	-	-	+

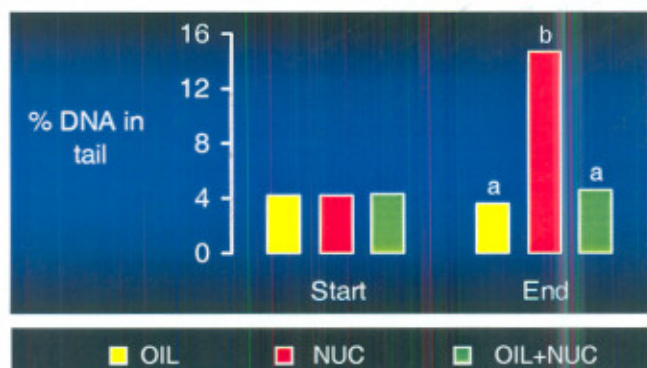
* Ascogen, Chemoforma, Swiss

The oxidative stress was evaluated at the beginning and at the end of the 21-day experimental period by measuring:

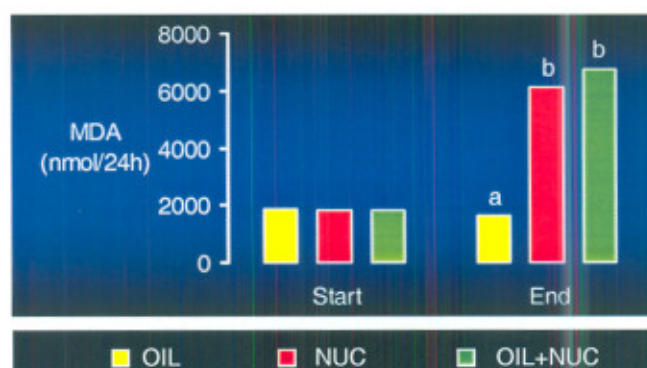
- the degree of DNA damage in leucocyte (single cell gel electrophoresis followed by epifluorescent microscopy and video image analysis)
- 24-h urine malondialdehyde (MDA) excretion rate (HPLC)
- the erythrocyte glutathione peroxidase (GPx) conc. (Randox)
- the total antioxidant status (TAS) of plasma (Randox)

Results

- In comparison with the CONT group, a sig. increase in the MDA excretion rate in urine was found in the OIL group. The degree of DNA damage in the group OIL was also sig. higher.
- Compared with the OIL group, nucleotide supplementation in OIL+NUC group sig. reduced the degree of DNA damage in leucocyte to the level of the CONT group.
- An effect on erythrocyte GPx conc. and on TAS of the plasma was not observed, either in the OIL or in OIL+NUC group.



% of DNA in the tail of comets (fragmented DNA)



Malondialdehyde (MDA) excretion in urine

Conclusion

- The results showed for the first time that nucleotide supplementation effectively eliminates the genotoxic effect of high PUFAs intake to leucocyte.
- Nucleotides proved to be an important nutrient for the repair mechanism of immune cells.
- The results of the experiment demonstrate new evidence for the immunonutritive effect of nucleotides.

References

- McCowen, K. C., Bistran, B. R. 2003. Immunonutrition: problematic or problem solving? *Am. J. Clin. Nut.* 77: 764-770.
- Rezar, V., Pajk, T., Marinšek Logar, R., Ješe-Janežič, V., Salobir, K., Orešnik, A., Salobir, J. 2003. Wheat and oat bran effectively reduce oxidative stress...pigs. *Ann. Nut. Metab.* 47: 78-84.
- Yu, I. T., Wu, J. F., Yang, P. C., Liu, C. Y., Lee, D. N., Yen, H. T. 2002. Role of glutamine and nucleotides in combination on growth, immune responses and FMD antibody titres of weaned pigs. *Anim. Sci.* 75: 379-385.