

Natural or synthetic vitamin E for mink kits

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Why Vitamin E?

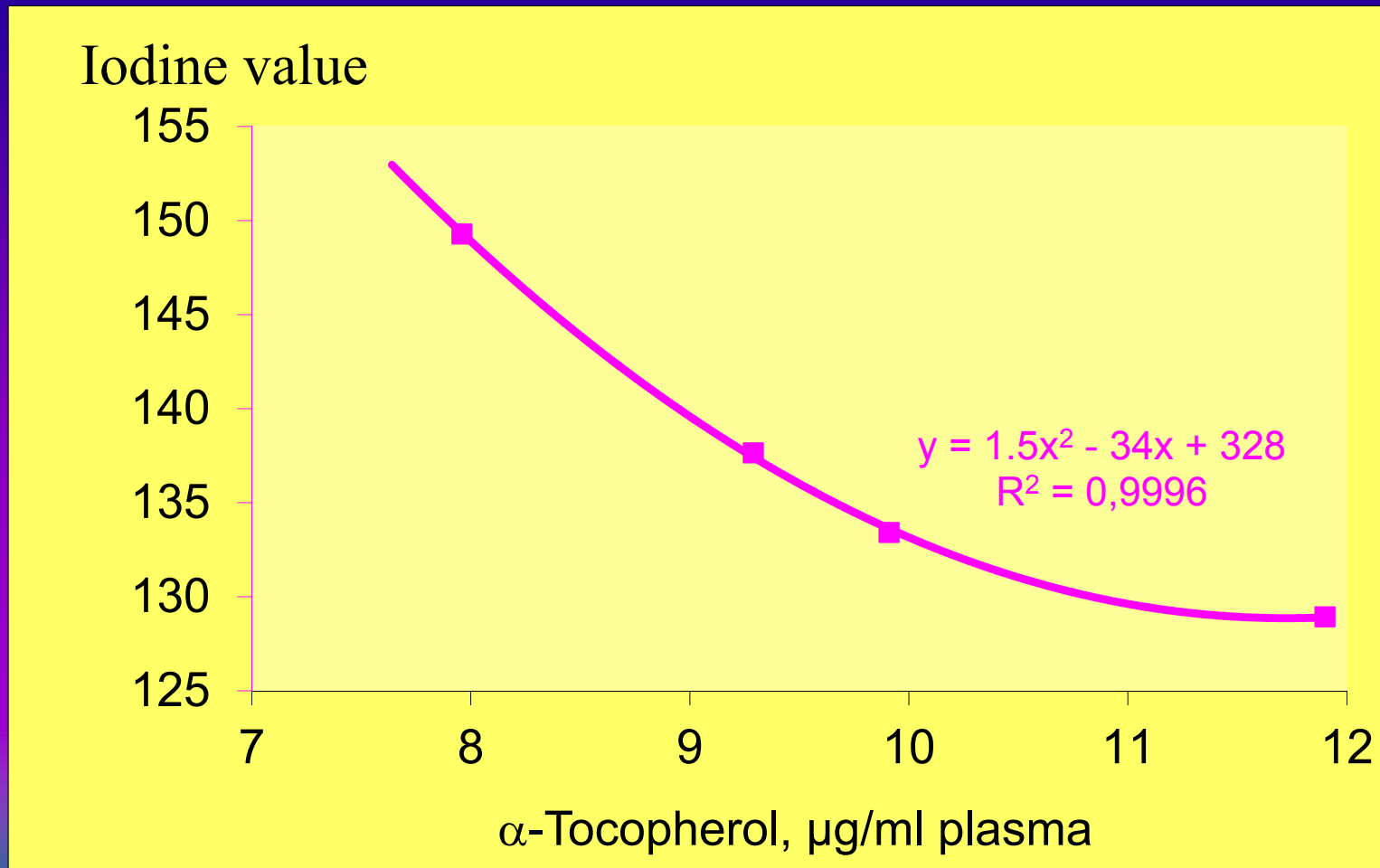
- Mink are fed high amounts of polyunsaturated fatty acids
- Mink feed ingredients may have been challenged by different microorganisms
- Mink feed contain high amount of prooxidative cations (Fe and Cu)
- Mink feed may contain high amount of reactive oxygen species



Why Vitamin E?

- Antioxidant in cell membranes
- Protect double bonds in unsaturated fatty acids
- Have immuno modulation properties

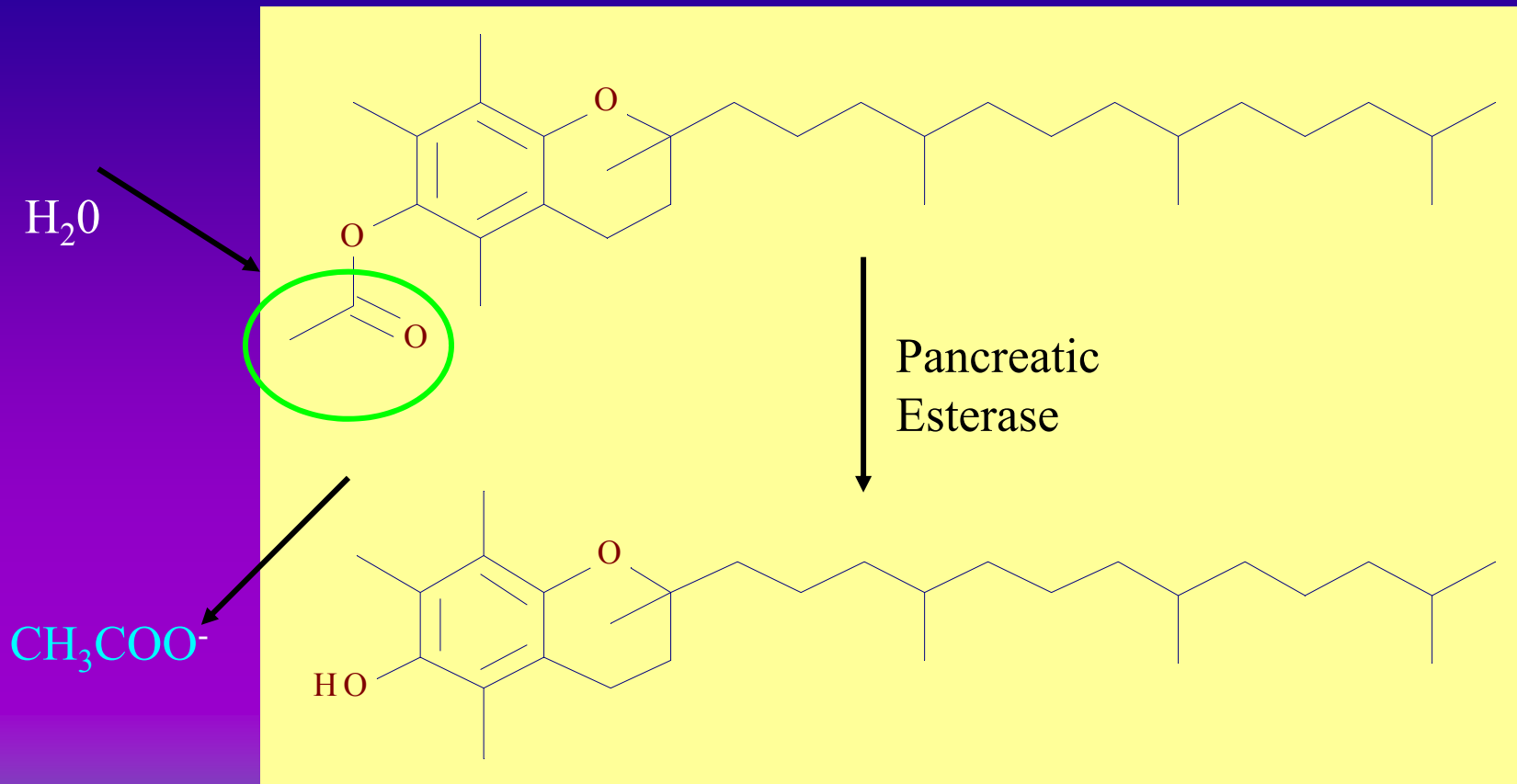
Relationship between content of unsaturated fatty acids (iodine value) and vitamin E status in mink



Three commercial forms of vitamin E

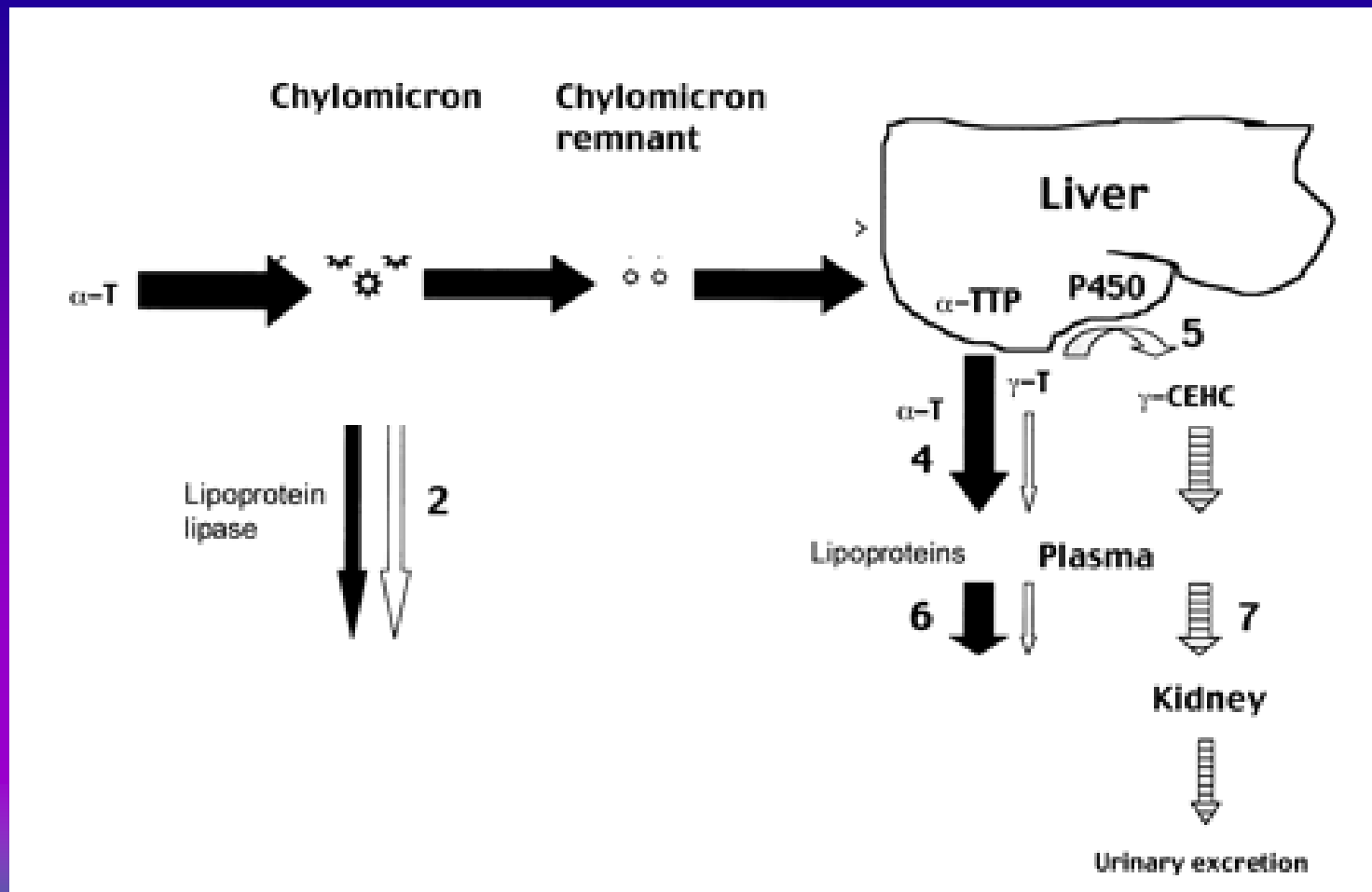
	Alcohol	Acetate
RRR <i>Natural</i>	High activity Unstable, expensive	High activity Stable, expensive
All-rac <i>Synthetic</i>		Low activity Stable, cheap

Hydrolysis of α -tocopherol acetate in the small intestine



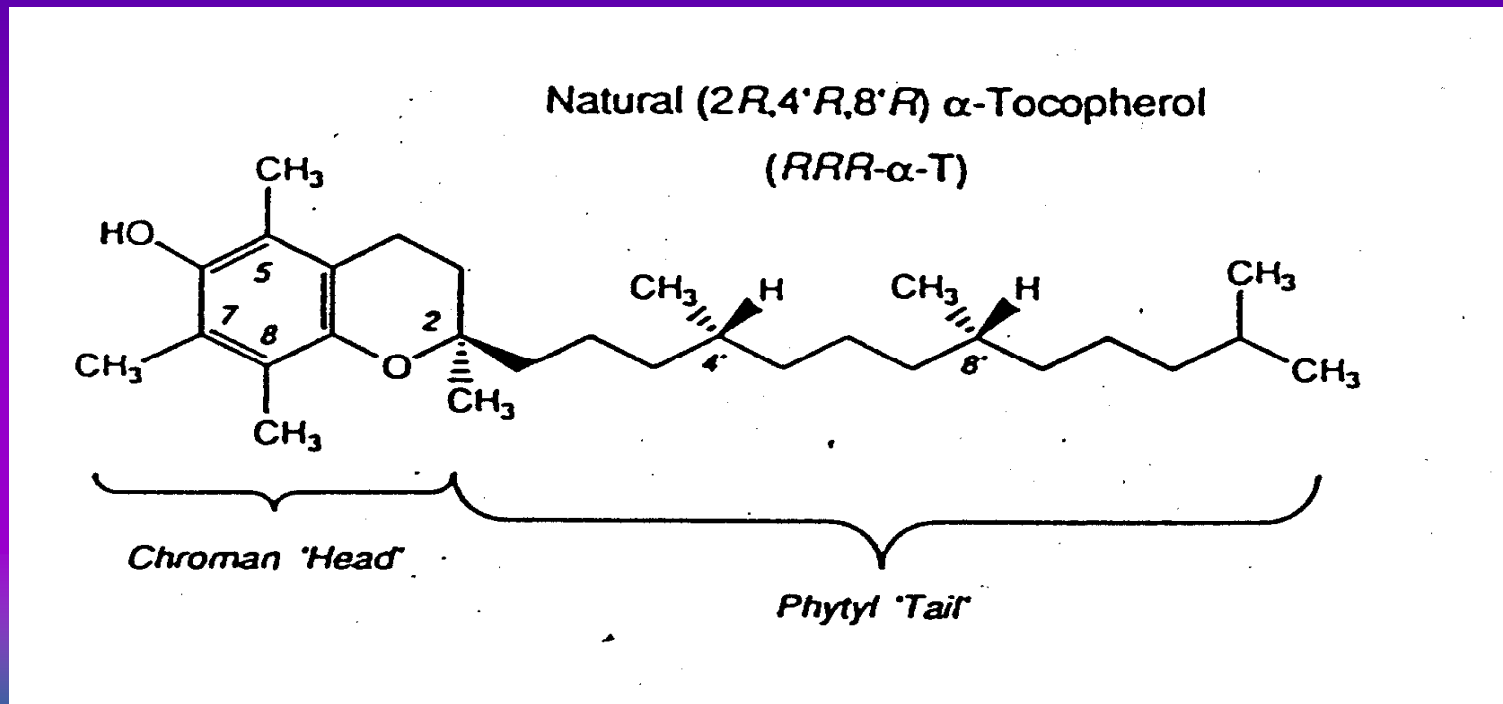
α -Tocopherol transport protein

Liver is main discrimination site



α -Tocopherol: alcohol versus acetate

- Alcohol: Natural – unstable
- Synthetic: Acetate – stable

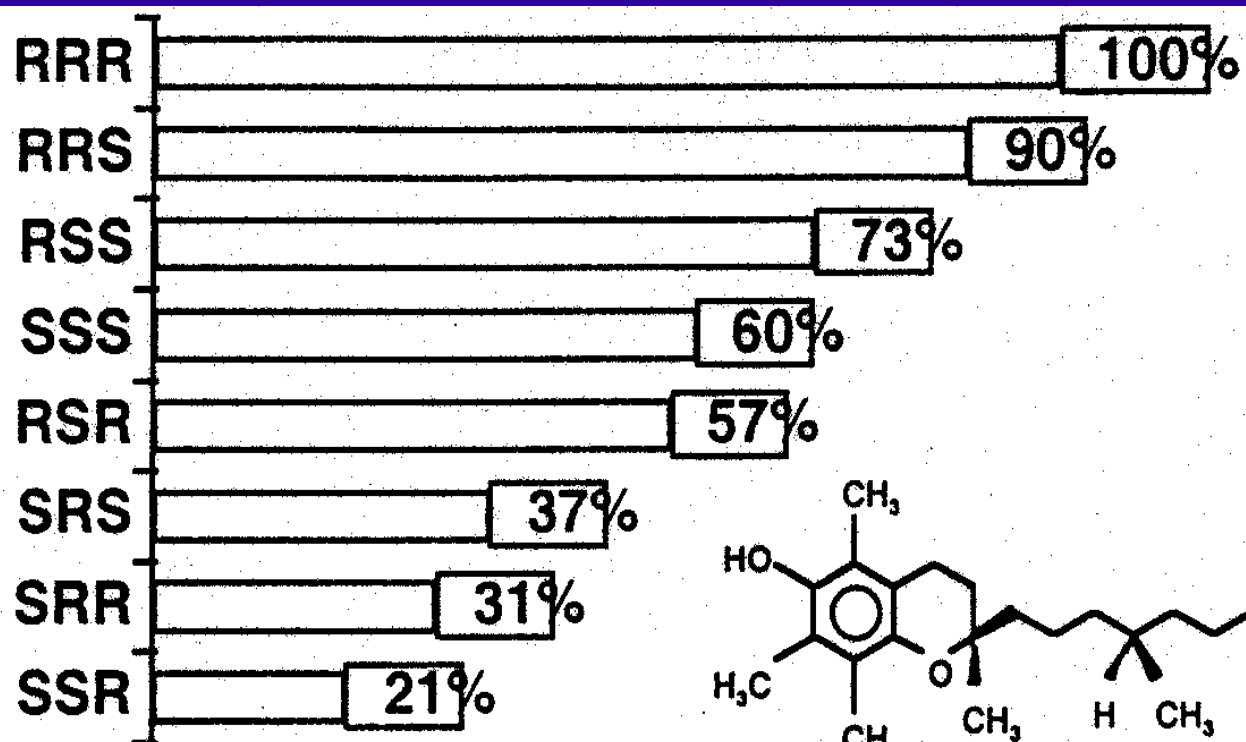


When two compounds are
stereoisomers

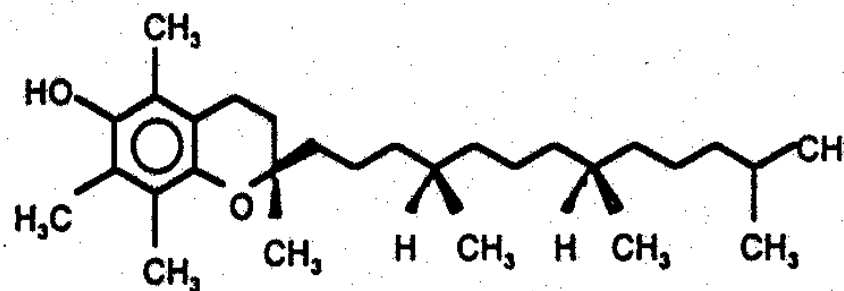
they differ in the same way as
right hand differs from left hand



Biological activity of the 8 stereoisomers of *all-rac*- α -tocopherol determined by the **rat resorption gestation test**



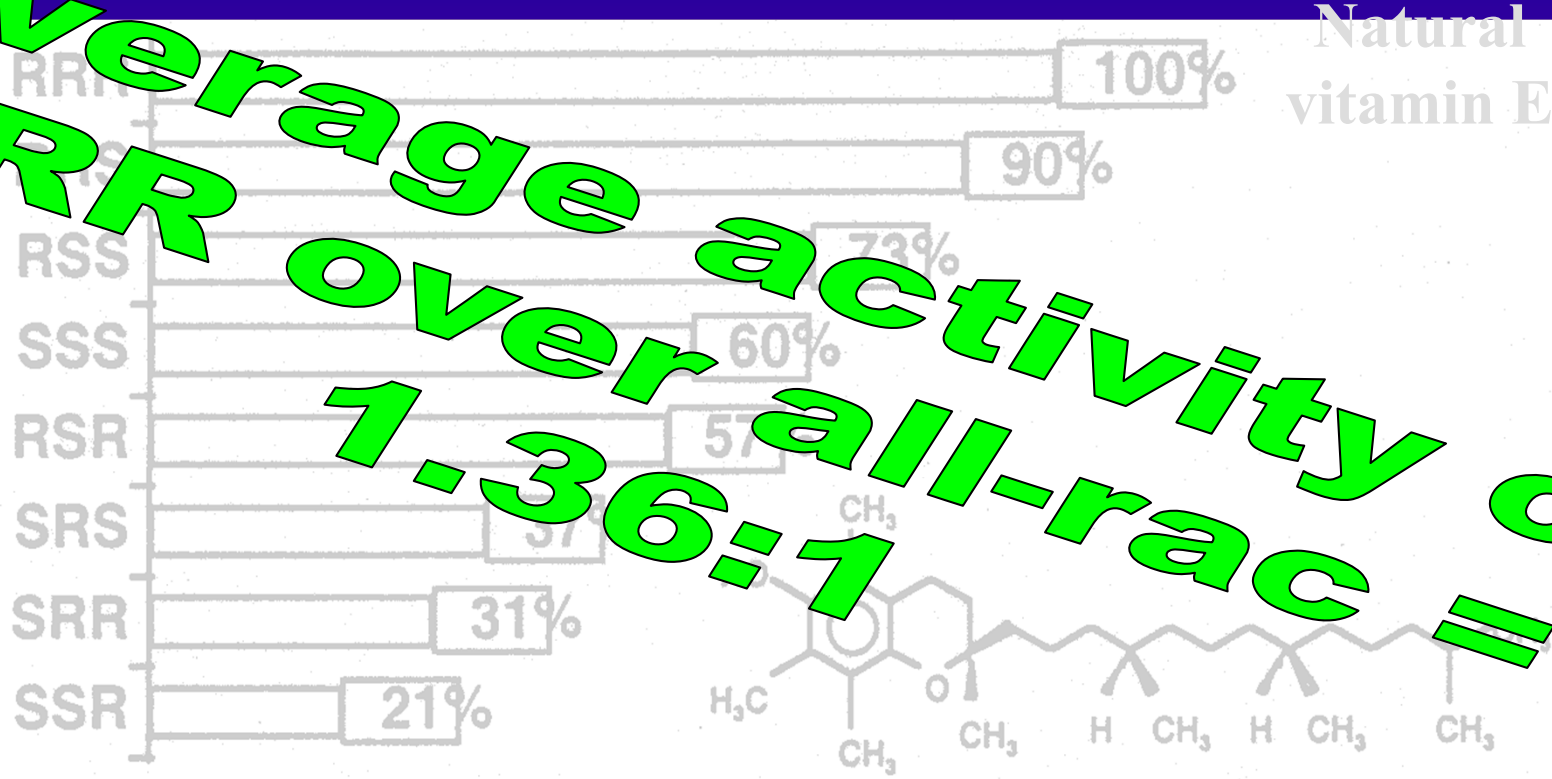
Natural
vitamin E



Weiser, H. and M. Vecchi. Internat. J. Vit. Nutr. Res. 52: 351-370, 1982.

Relative activity of the 8 stereoisomers of vitamin E

Average over activity of all-rac = 1.36



Weiser, H. and M. Vecchi. Internat. J. Vit. Nutr. Res. 52: 351-370, 1982.

Vitamin E and mink kits

- Mink are born without measureable vitamin E in the body
- Vitamin E from milk are well absorbed
- Mink milk can be enriched through the mothers feed

Feeding experiment

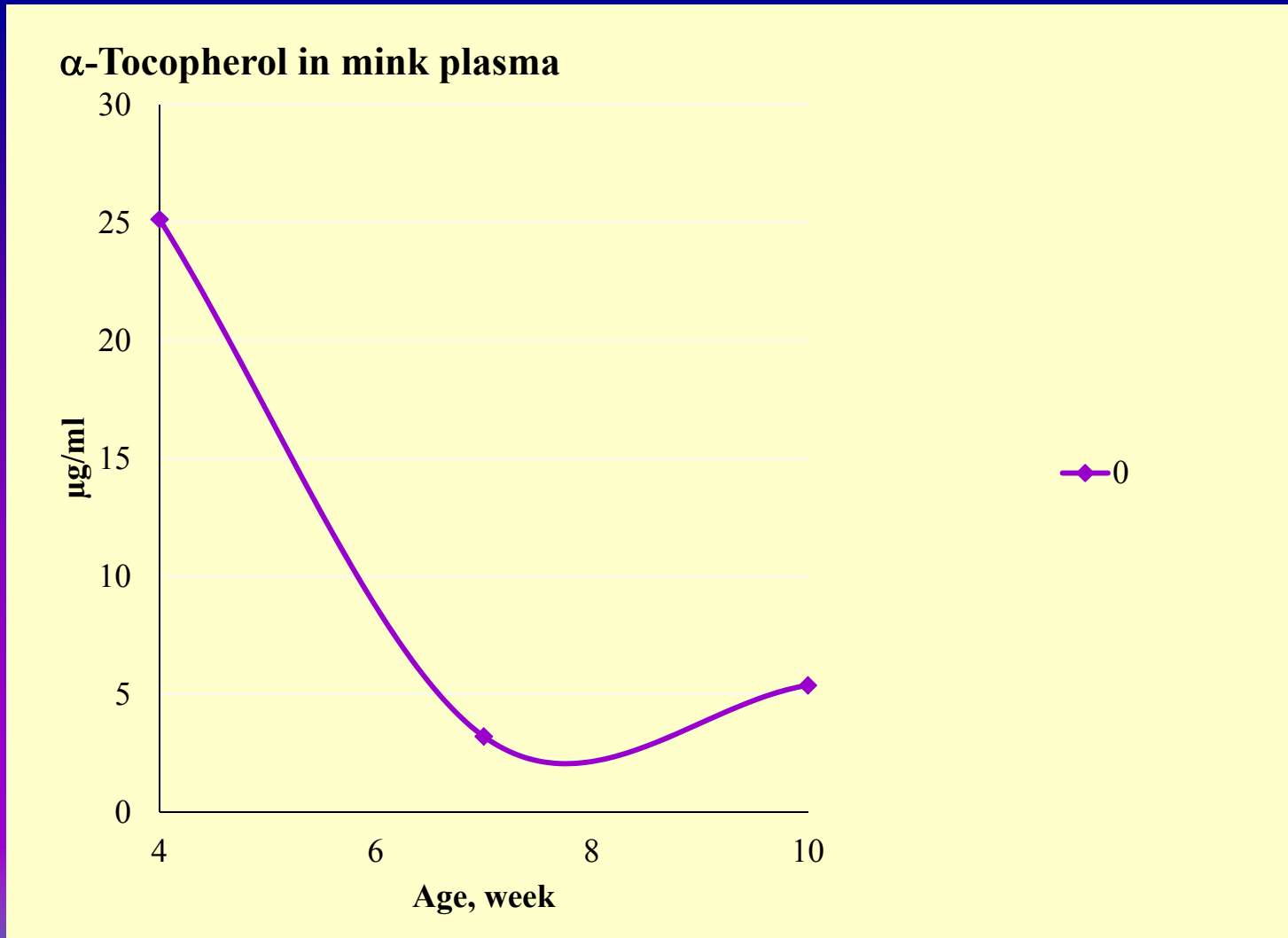
- 168 mink kits 4 week of age
- Experimental period 6 week
- 3 types of vitamin E
 - RRR-OH (Natural alcohol)
 - RRR-Ac (Natural acetate)
 - All-rac-Ac (Synthetic acetate)
- Control group (0 mg vit E)
- 4 dosage levels (50, 75, 100, 150 mg/kg feed)

Sampling

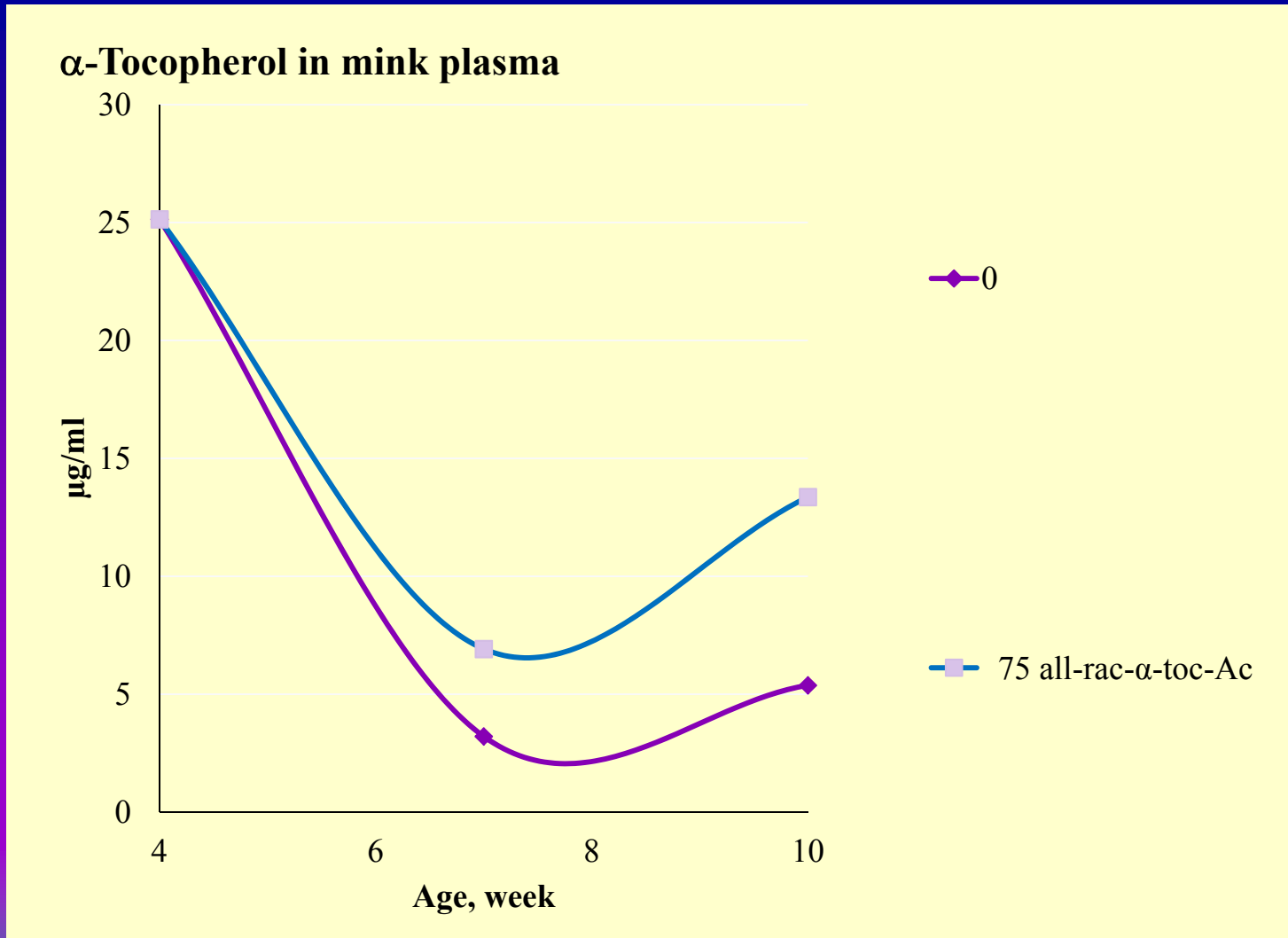
- Feed analysed
- 12 kits euthanized at experimental starts
- 6 kits from each group after 3 wk in exp.
- 6 kits from each group after 6 wk in exp.

- Mink and organs weighed
- Plasma and liver analysed for tocopherols and α -tocopherol stereoisomers

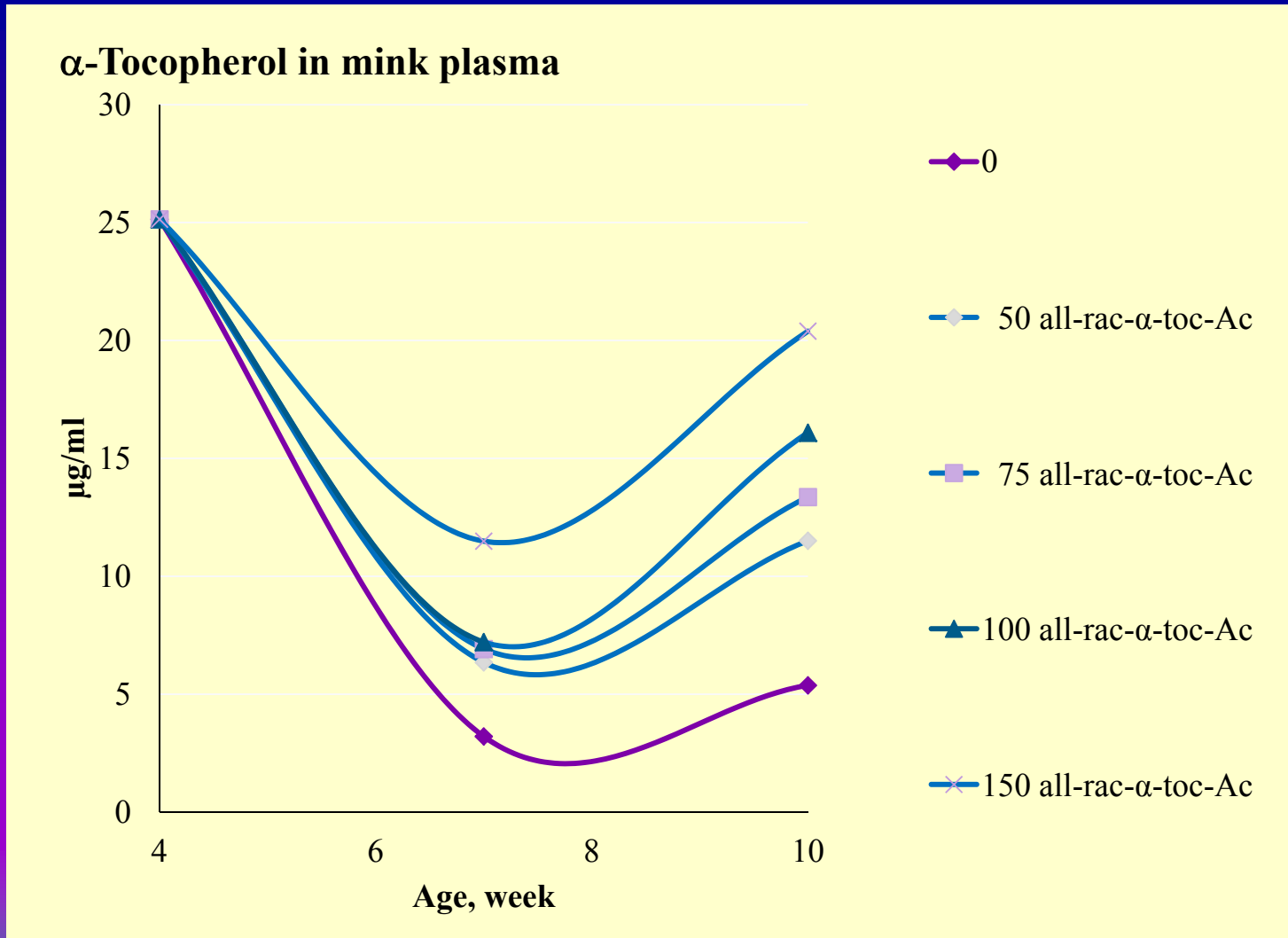
Results – plasma



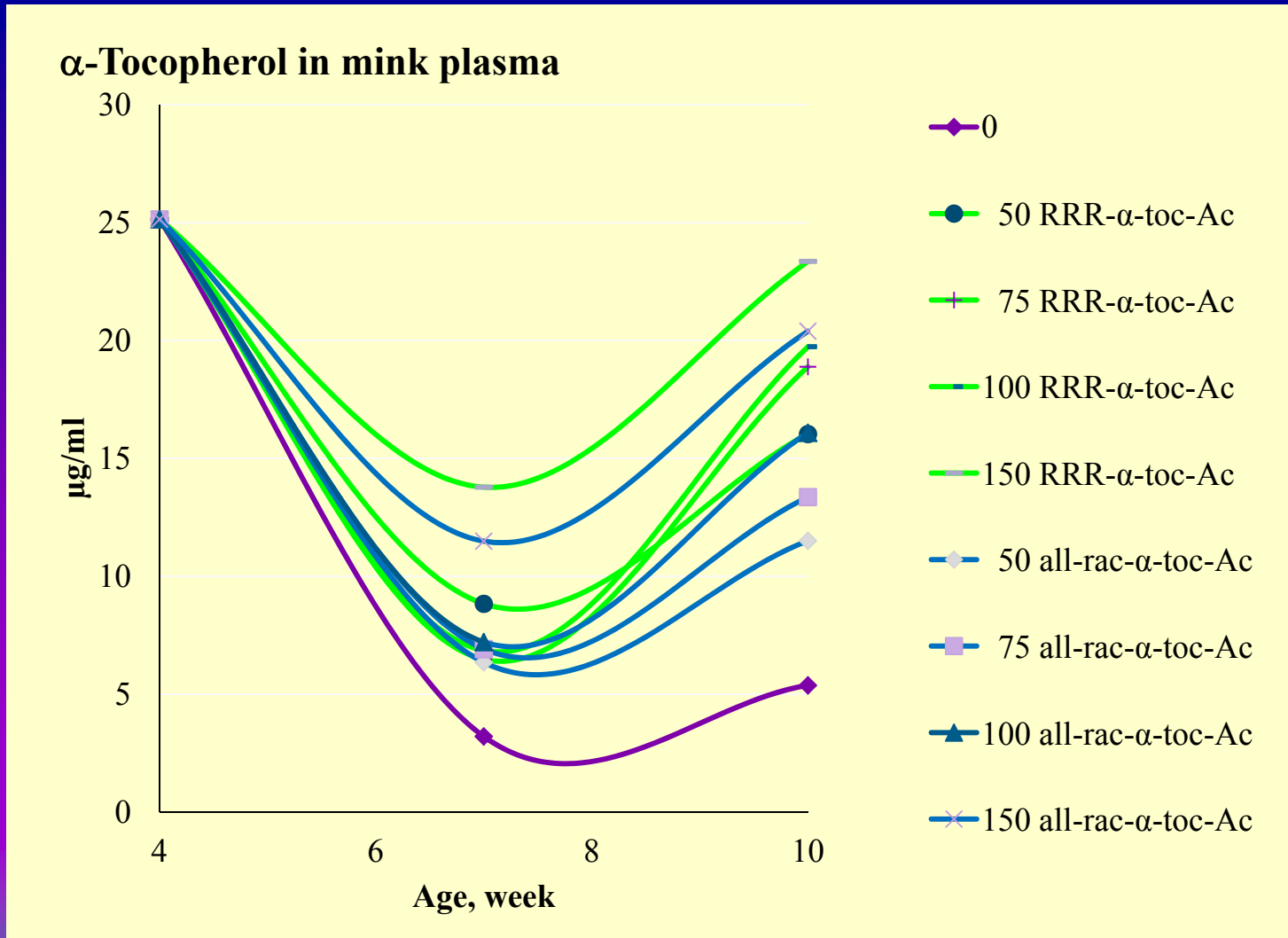
Results – plasma



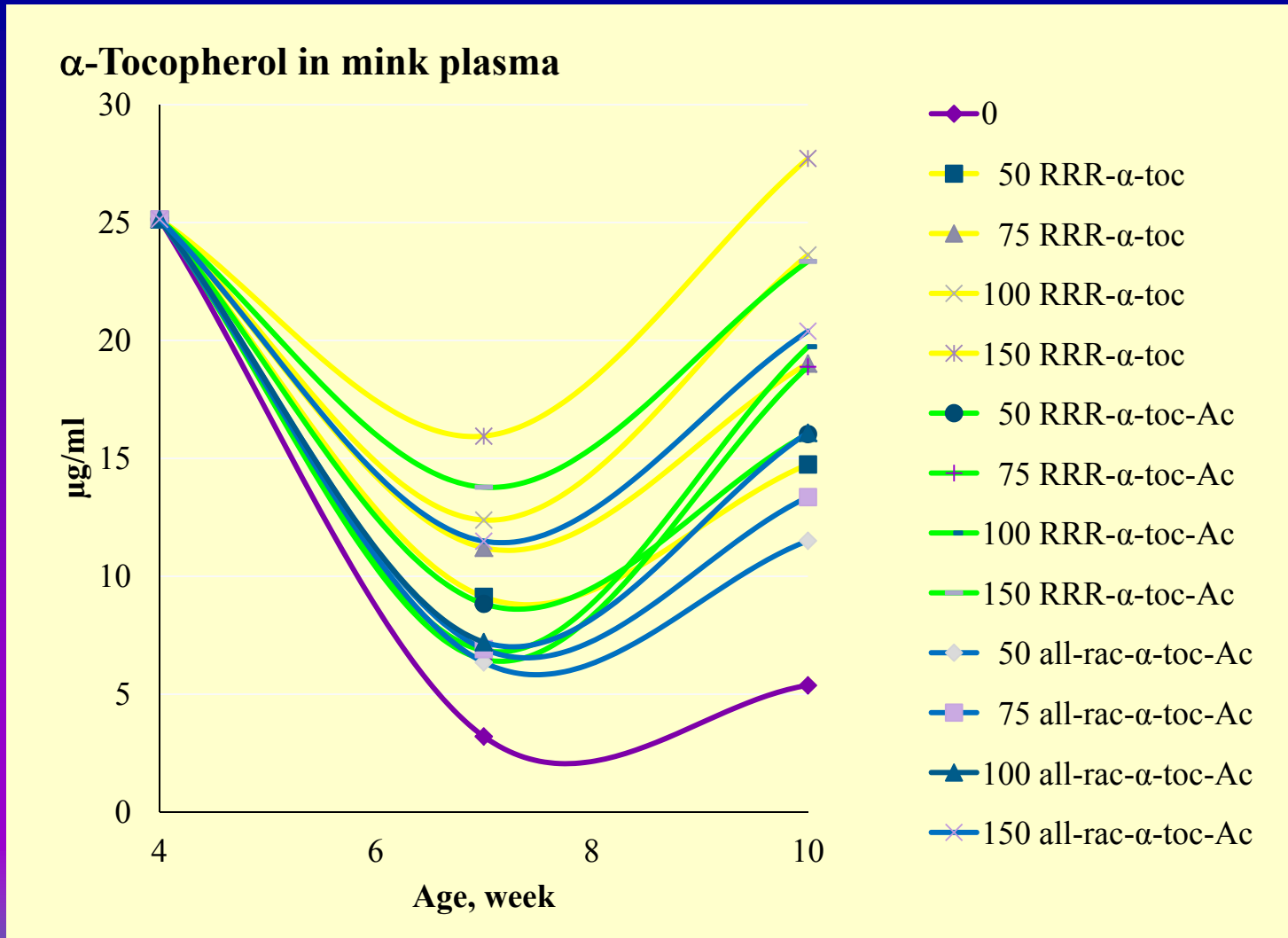
Results – plasma



Results – plasma

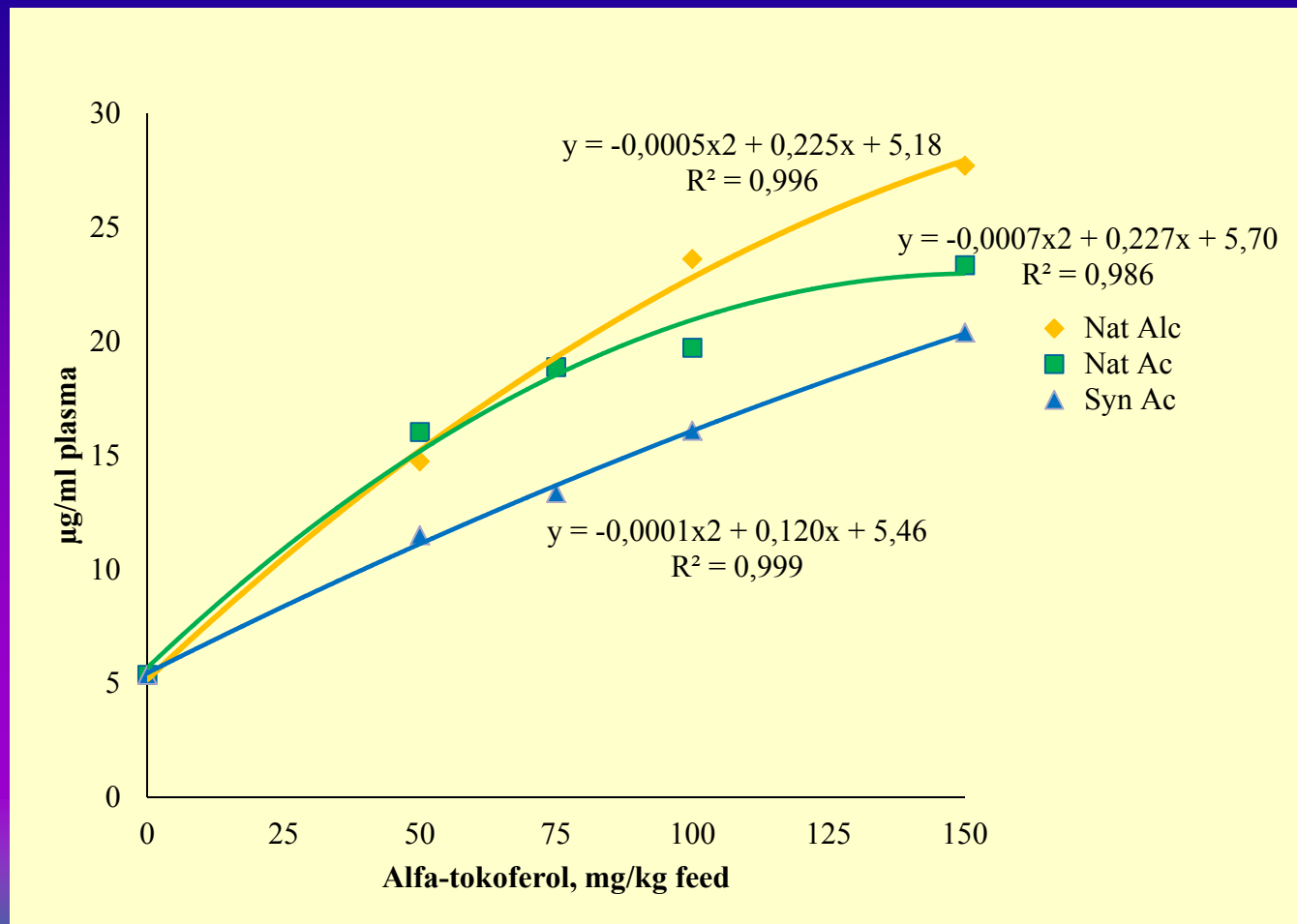


Results – plasma

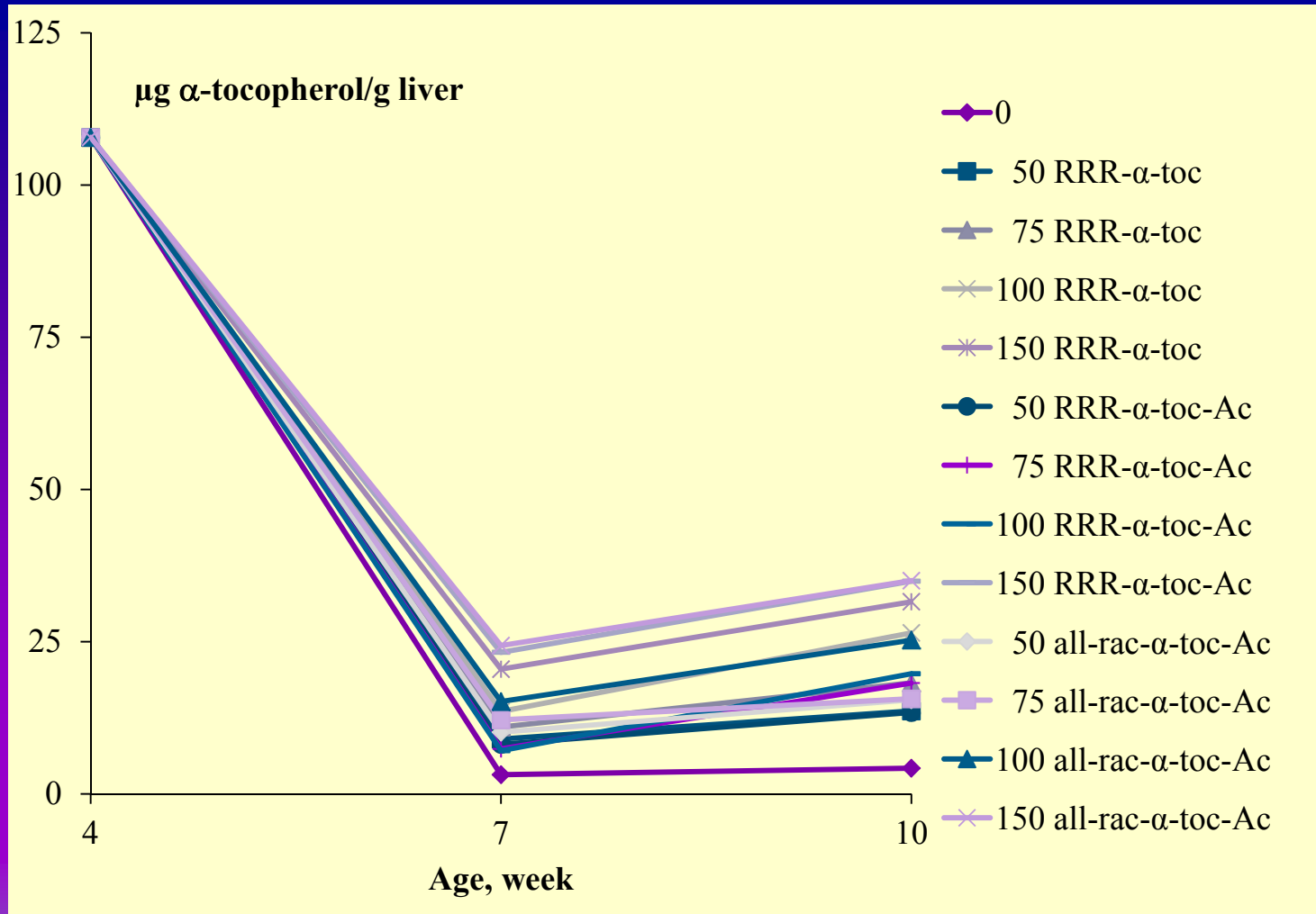


α -Tocopherol in plasma after 6 weeks of vitamin supplementation

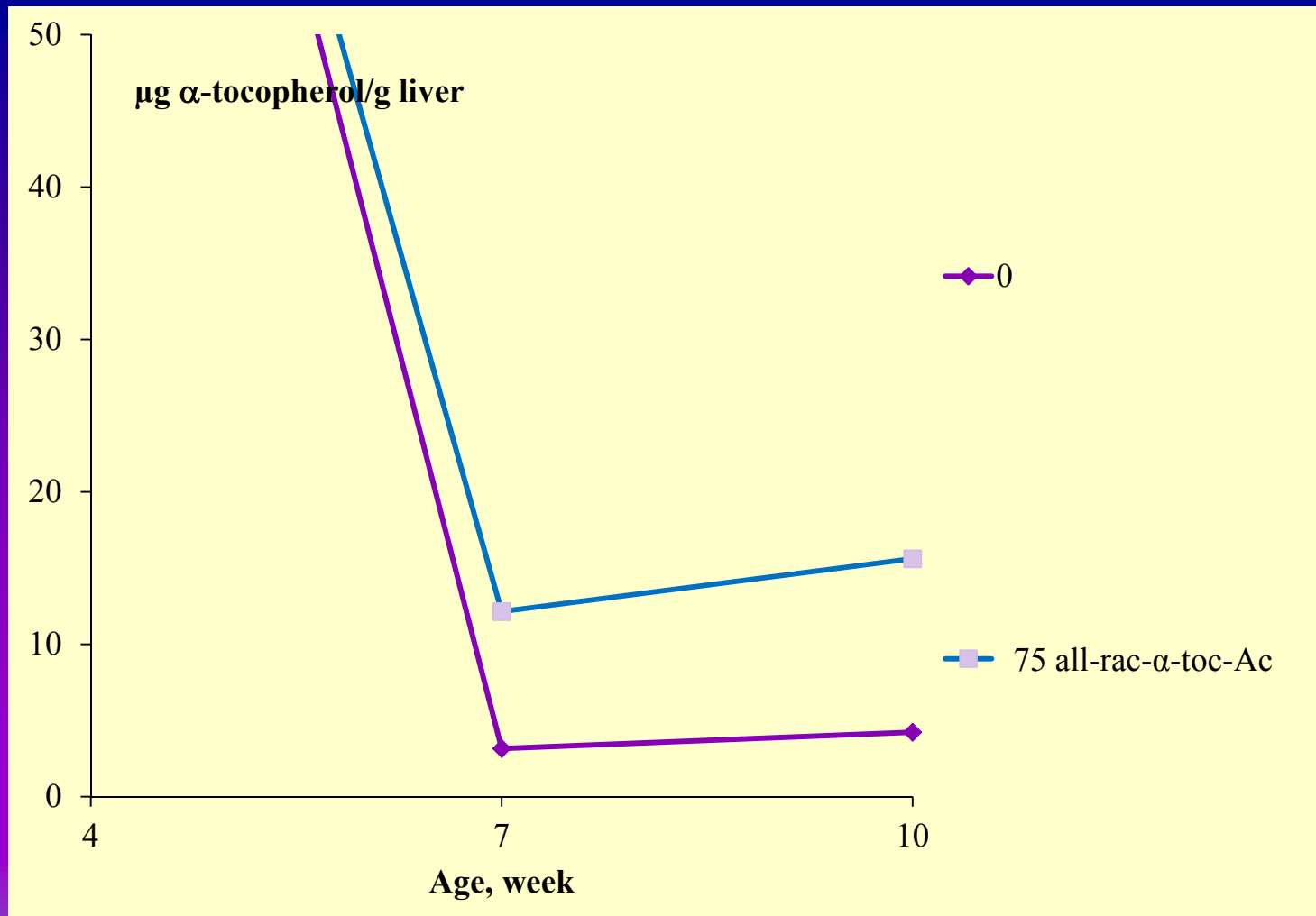
Dose vs source



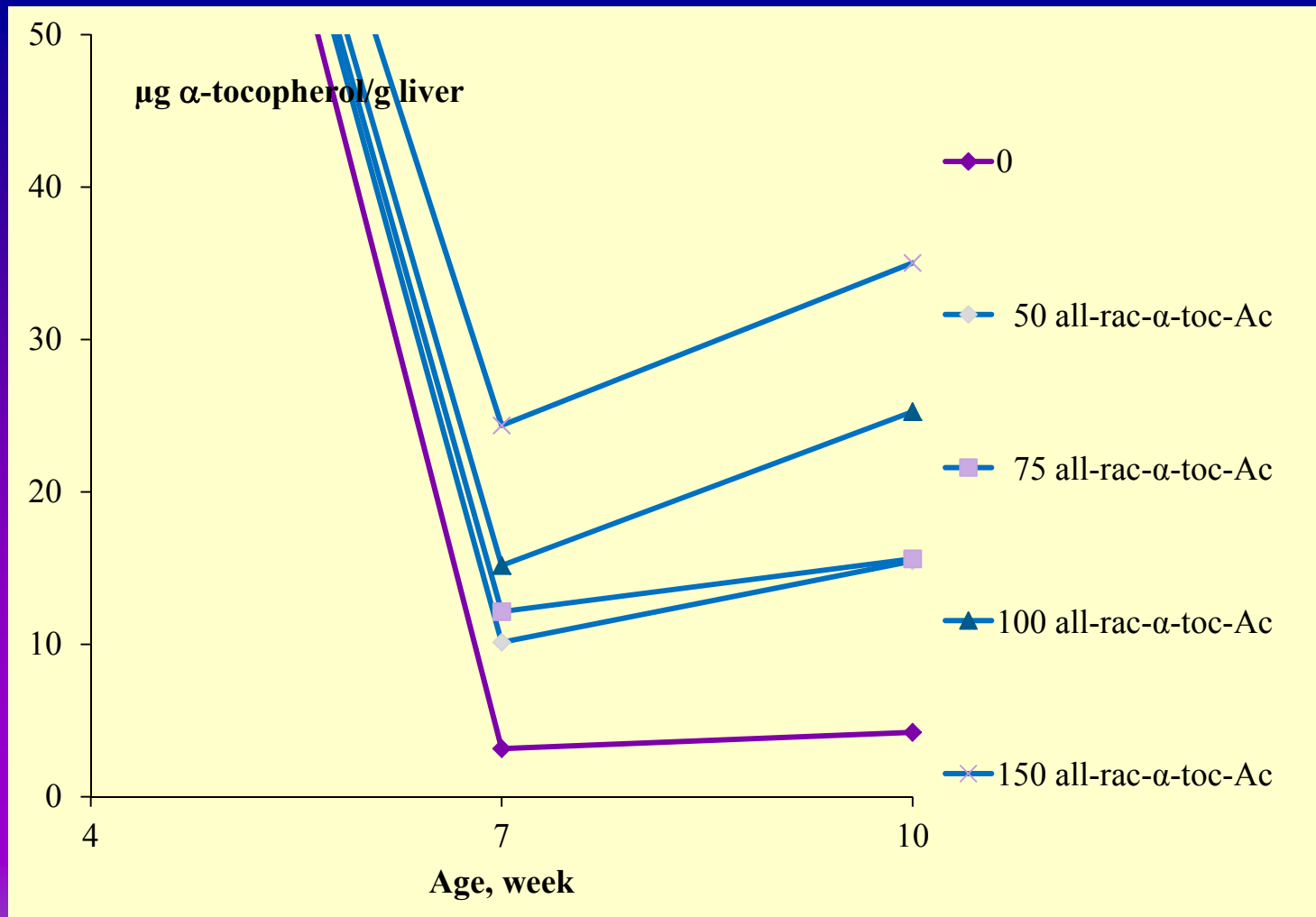
Results – liver



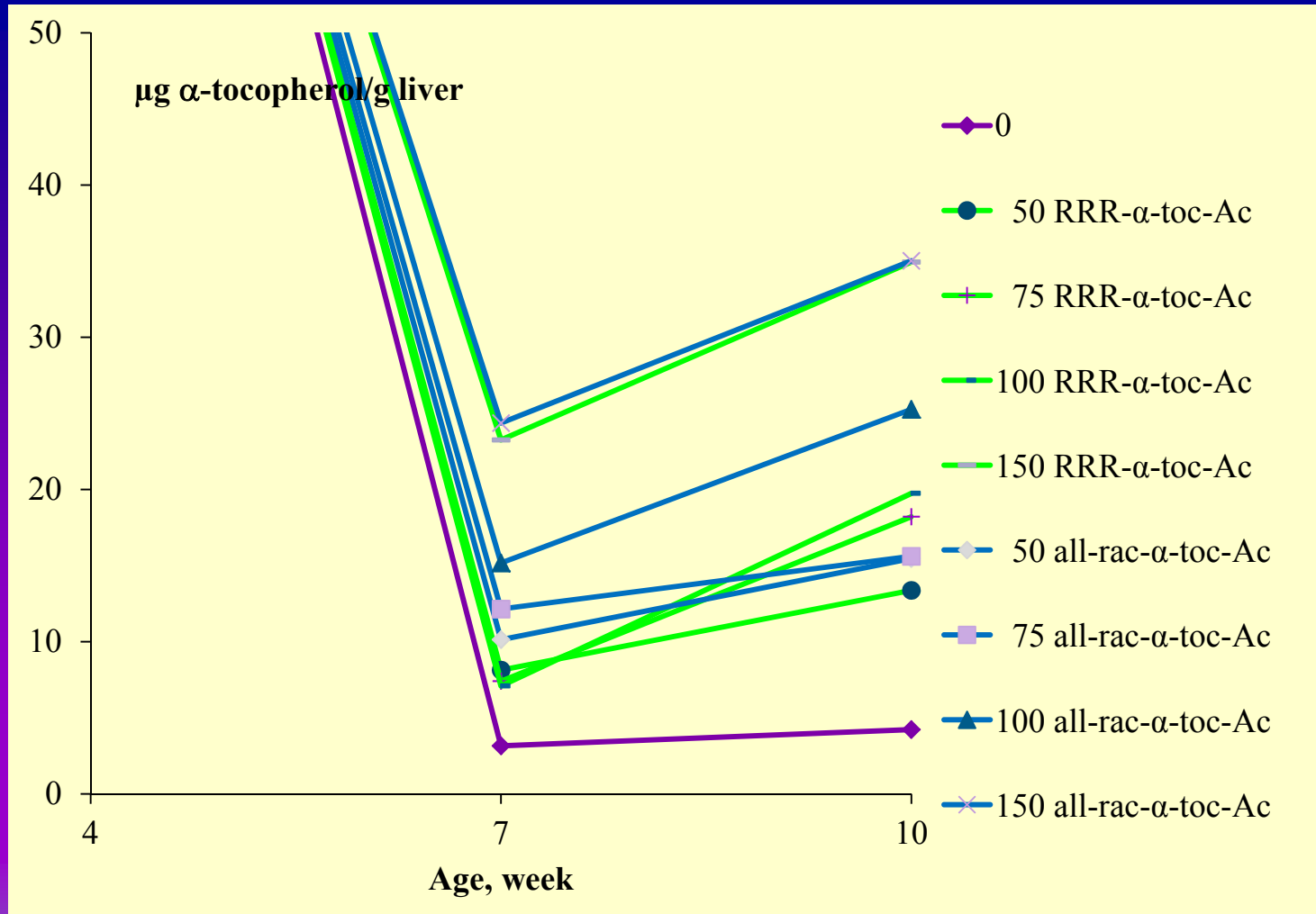
Results – liver



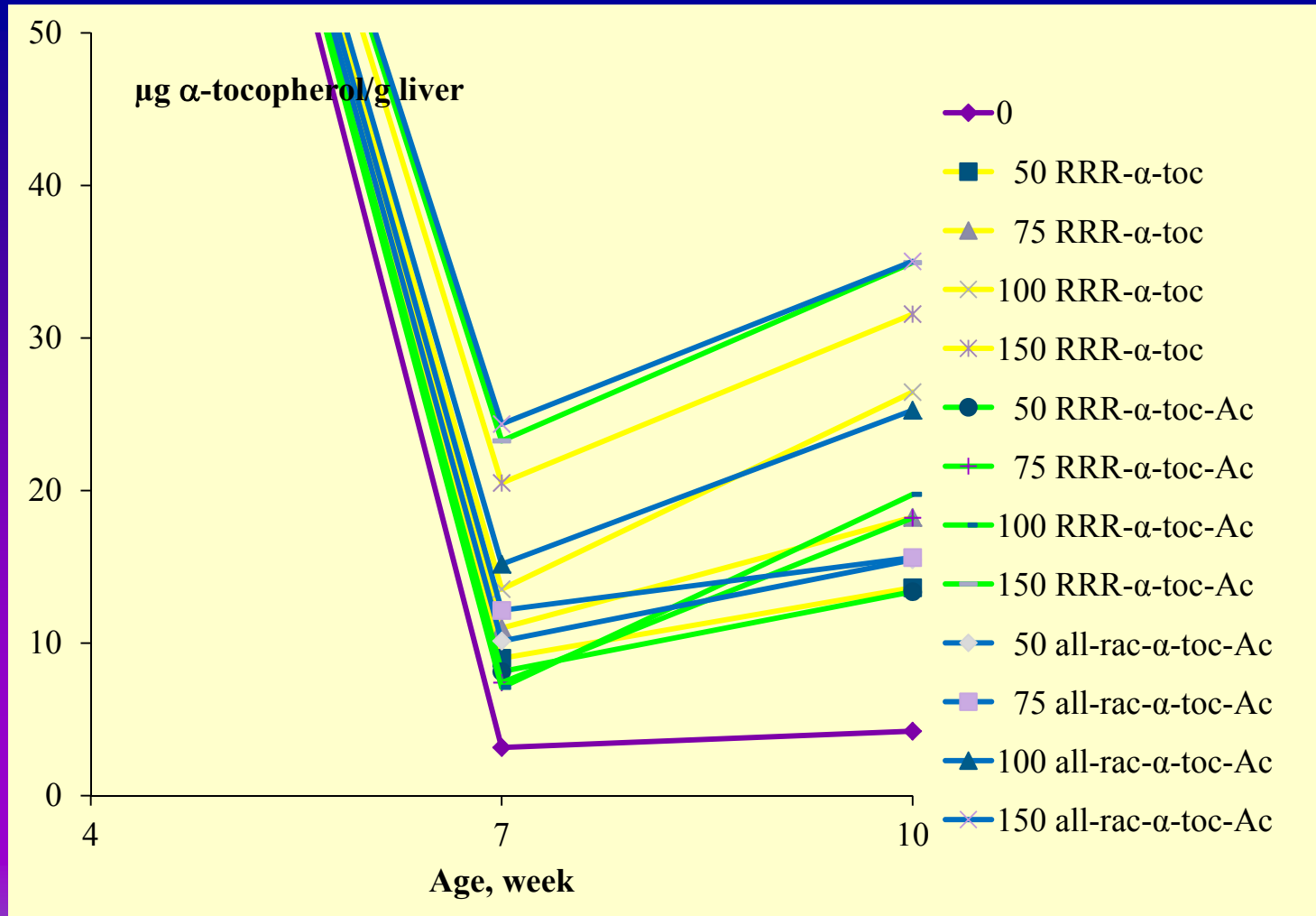
Results – liver



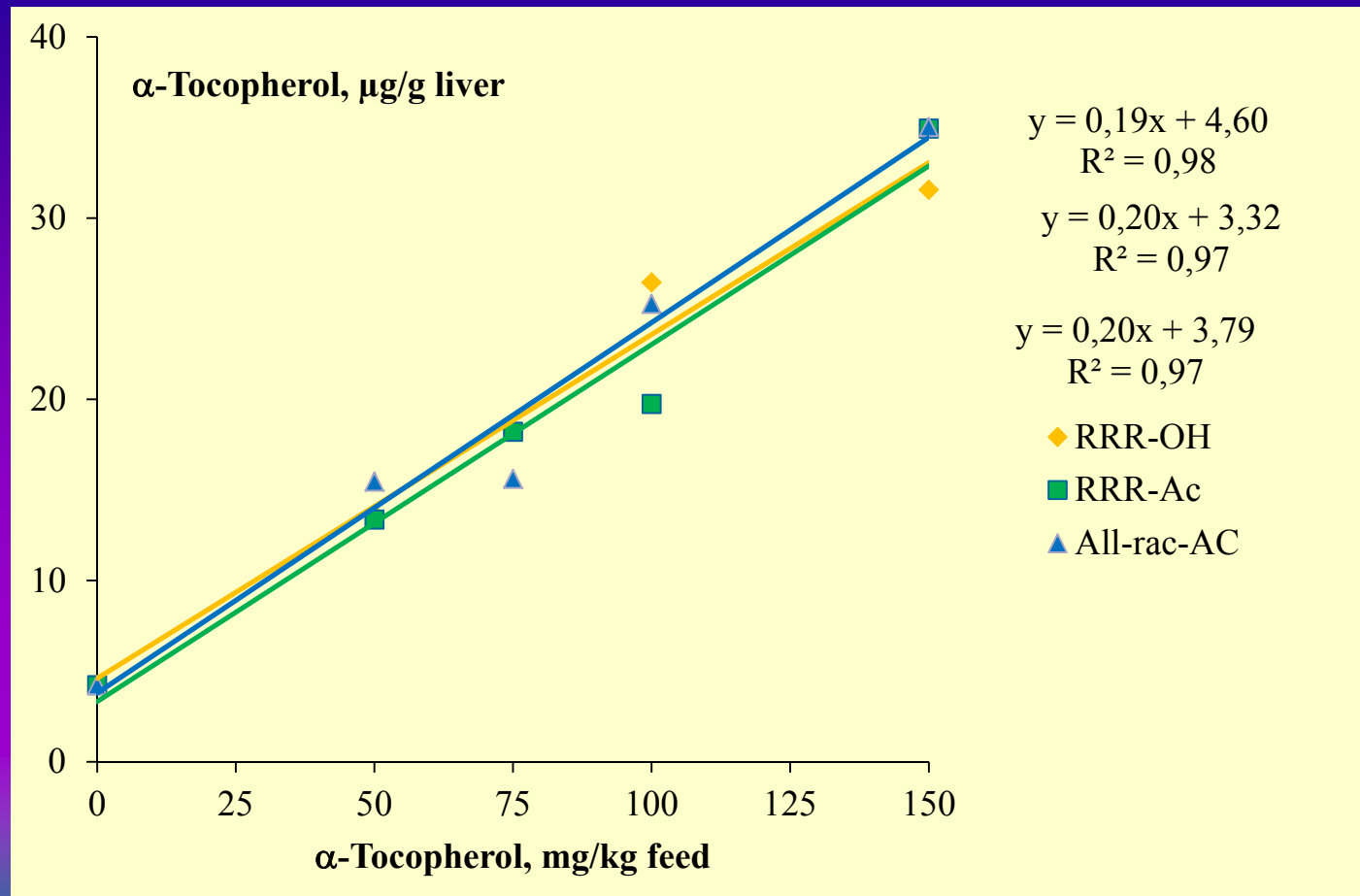
Results – liver



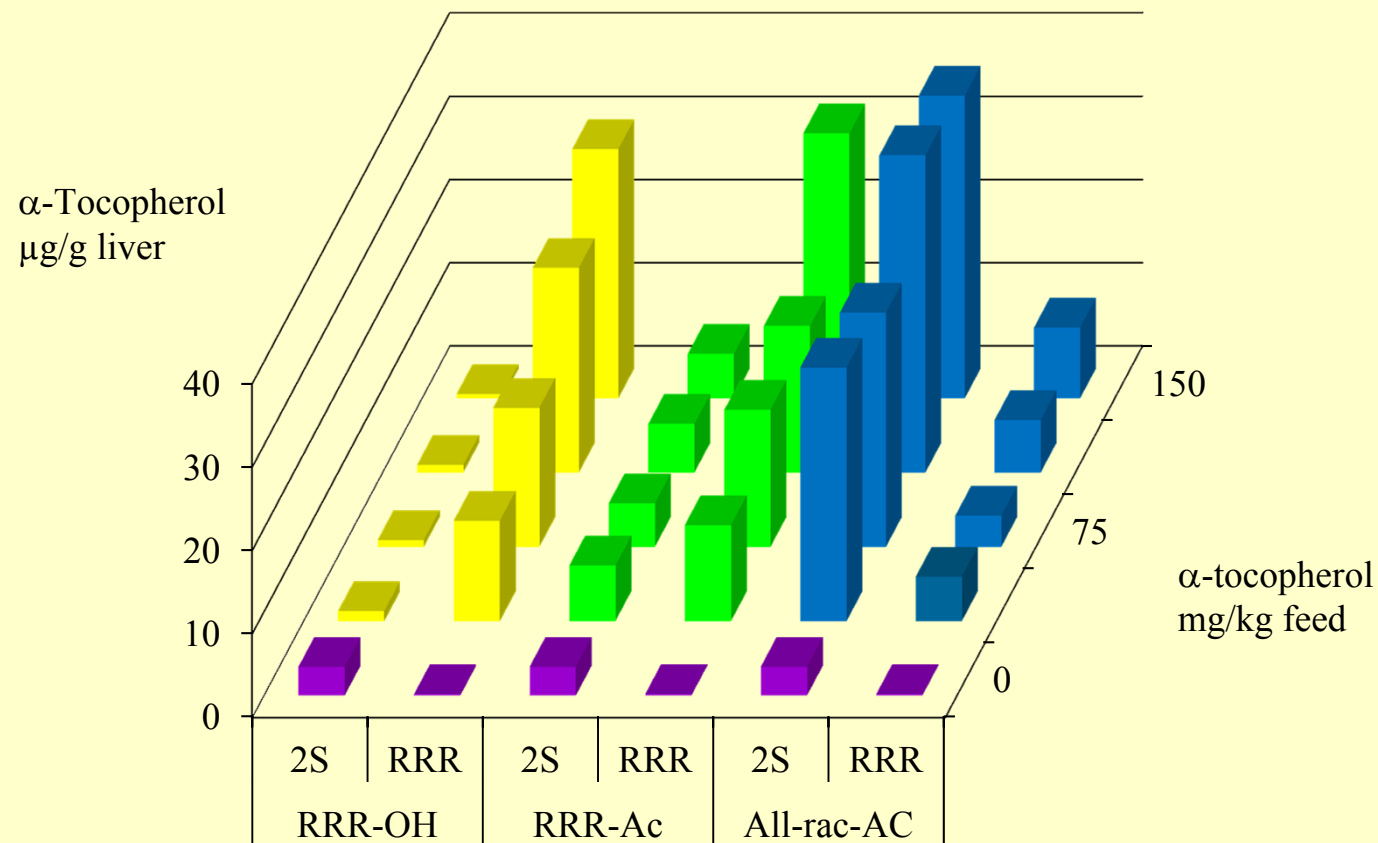
Results – liver



Total α -tocopherol content in liver, $\mu\text{g/g}$ liver after 6 wk supplementation



2S and RRR- α -tocopherol in liver $\mu\text{g/g}$ liver after 6 wk supplementation



Conclusions

- RRR- α -tocopherol is taken up in the blood stream at the highest rate and maintained in the highest concentration
- The liver is the major site for biological discrimination of non-natural stereoisomers
- At low concentration in the feed natural acetate is utilized as good as the natural alcohol
- At high concentration the alcohol form is superior to the acetate form.