Effect of Age and Sex on Enzyme Activities in Rat Liver

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When studying the effect of prolonged ethanol treatment on certain enzyme activities in the rat we sometimes obtained a scattering of the control figures which could not depend on method errors. However, dividing the figures in special groups as to sex and age of the experimental animals strongly indicates an age dependent sex difference in certain enzyme activities investigated.

Experimental. Wistar rats from this laboratory's stock were used. By means of biopsy small pieces of liver were removed under ether narcosis, chilled in 0.9 % NaCl, quickly weighed, homogenized in isotonic NaCl + EDTA and centrifuged at 0°C for 20 min at 17 000 *g*. Enzyme activities were determined according to Schmidt and Schmidt [1] and protein as described by Cleland and Slater.[2] Enzymes and substrates were from Sigma Chem.Comp., St. Louis, except glycerophosphate dehydrogenase/triose isomerase which was a preparation from Boehringer and Soehne, Mannheim.

Results. The activity of the following enzymes have been studied: Isocitric dehydrogenase (IDH), lactic dehydrogenase (LDH), aldolase (Ald), malic dehydrogenase (MDH) and glycerophosphate dehydrogenase (GDH). Two age groups were selected, *viz.* rats 50–100 days old and rats 200–300 days old. In each age group the enzyme activities from the male and female rats were compared by means of t-test. The results are seen in Table 1. As to three of the enzymes, Ald, MDH and GDH, the activity is significantly higher in the young males than in the females of the same age. In the adult animals (200–300 days) no statistically significant difference was any longer present, mainly depending on a rise with age of the female enzyme activity and, as in the case of GDH, on a simultaneous decrease of the male activity.

Discussion. Observations on enzymes with different activities in males and fe-

Table 1.

Enzyme	Age (days)	Enzyme activity expressed as μmole co-enzyme transferred/min/mg protein. Mean values ± standard deviation. (Number of experiments)		t(♀–♂)	p
		♀	♂		
IDH	50–100	0.235±0.197 (23)	0.195±0.0107 (8)	0.98	0.3 –0.4
	200–300	0.260±0.0779 (30)	0.304±0.0933 (13)	1.50	0.1 –0.2
LDH	50–100	1.541±0.618 (23)	0.425±0.521 (11)	0.57	0.5 –0.6
	200–300	1.350±0.536 (30)	1.534±0.635 (11)	0.85	0.4
Ald	50–100	0.0838±0.0584 (26)	0.0673±0.0526 (11)	2.67	0.01–0.02
	200–300	0.1007±0.0763 (24)	0.0777±0.0316 (12)	0.68	0.5
MDH	50–100	1.926±1.523 (29)	1.073±0.309 (10)	2.85	0.01–0.001
	100–200	2.288±1.491 (33)	2.321±1.456 (14)	0.07	>0.9
GDH	50–100	1.121±1.239 (28)	0.301±0.166 (10)	3.42	0.01–0.001
	100–200	0.678±0.432 (32)	0.803±0.601 (15)	0.72	0.4 –0.5

males have been sporadically reported, and consist of studies on various tissues.[3-6] Freedland *et al.*[7] have recently shown a sex difference in liver phenylalanine hydroxylase activity in the rat. This difference is also age dependent, that is, the female activity decreases more rapidly than that of the male after an activity peak at 40–50 days. In our report we only take into consideration two rather long periods of life: 50–100 and 200–300 days age. The enzymes studied have no plain connection with sex functions. All the same three of the five enzymes studied shown significant differences in activity in males compared with females during the earlier period but not during the later. In accord with earlier reports by others this observation strongly indicates that sex differences as to enzyme activity may be a rather common phenomenon at least during certain stages of life.

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Silver Alkylmercaptides

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In previous papers[1] the author has reported some monovalent copper, silver, gold, and thallium N,N-dialkyldithio- and N,N-dialkylthiocarbamates. All these compounds have proved to be polymeric and most of them preferably dimeric, tetrameric, and hexameric.

In order to throw further light on these properties, the investigation has been extended to include mercaptides as well.

Table 1 shows a summary of data describing the silver salts of some alkylthiols.

The salts of the tertiary alkylthiols seem to be octameric. An X-ray investigation in progress by Hesse[2] supports these results. Thus the number of molecules in the unit cell of one of these compounds is sixteen.

Of the silver salts of the secondary alkylthiols, two seem to be dodecameric. Some, however, still under investigation, are indicated to possess a higher polymerity, others a lower one.

It seems reasonable to postulate that the structure of the silver alkyl mercaptides is partly depending on the arrangement of the alkyl groups around the silver atom.

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Table 1. Silver salts of alkylthiols $(RSAg)_n$

Alkylthiols	m.p. °C	n	Ag calc.	Ag found
2-Methyl-2-propanethiol	267(decomp.)		55.02	54.92
2-Methyl-2-butanethiol	203–205	8[a]	51.14	51.05
2-Methyl-2-pentanethiol	67–69	8[a,b]	47.92	47.60
3-Methyl-3-pentanethiol	147–148	8[a,b]	,,	47.87
2,3-Dimethyl-2-butanethiol	196–197	8[a]	,,	48.07
2-Hexanethiol	64–65	12[a,b]	,,	47.85
4-Methyl-2-pentanethiol	114–116	12[a]	,,	47.81

The molecular weight determinations are made ebullioscopically (*a*) and cryoscopically (*b*) in benzene.