

UBIQUINONE CONTENT IN MITOCHONDRIA OF THE ALBINO RAT KIDNEY AFTER UNILATERAL NEPHRECTOMY

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The weight of the residual kidney 72 h after unilateral nephrectomy was increased by 23% and its succinate dehydrogenase activity by 43.2%. The ubiquinone concentration was not significantly changed in the hypertrophied kidney or its mitochondria.

KEY WORDS: hypertrophy; biogenesis of mitochondria; ubiquinone.

A marked increase in the number of mitochondria is observed in the residual kidney 24-72 h after unilateral nephrectomy, and the rate of increase in their number is appreciably greater than the rate of increase of weight of the organs [3, 6].

TABLE 1. Ubiquinone Content and Succinate Dehydrogenase and Succinate-Cytochrome c-Oxidoreductase Activity in Kidney and Its Mitochondria after Unilateral Nephrectomy on Albino Rats (M ± m)

Time of investigation after nephrectomy (in h)	Weight of kidney (mg)		Ubiquinone (in µg)			
	removed	residual	per wet weight of kidney		per mg mitochondrial protein	
			removed	residual	of removed kidney	of residual kidney
24	0,54±0,021 (37)	0,57±0,018 (37)	50,9±5,68 (7)	57,32±6,28 (7)	1,48±0,24 (9)	1,69±0,27 (9)
48	0,56±0,019 (39)	0,59±0,020 (39)	64,9±5,68 (8)	76,7±9,20 (8)	1,29±0,14 (9)	1,59±0,19 (7)
72	0,52±0,018 (34)	0,64±0,028* (33)	49,5±8,99 (7)	48,2±5,58 (7)	1,40±0,20 (8)	1,03±0,19 (7)

Time of investigation after nephrectomy (in h)	Succinate dehydrogenase (in mmoles/min)				Succinate-cytochrome c-oxidoreductase (in mmoles/min) per mg mitochondrial protein	
	per wet weight of kidney		per mg mitochondrial protein		of removed kidney	of residual kidney
	removed	residual	of removed kidney	of residual kidney		
24	3690,5± 643,6 (9)	3893,6± 263,9 (9)	94,8± 24,99 (9)	83,3± 19,98 (9)	200,5± 40,91 (4)	226,7± 70,93 (4)
48	3846,5± 594,86 (9)	4729,5± 487,98 (9)	91,2±15,6 (9)	94,2±13,7 (9)	129,74± 28,74 (6)	169,8± 25,98 (6)
72	3405,9± 398,2 (8)	4876,9± 302,02* (7)	84,1±17,0 (8)	106,5±19,6 (6)	114,7±36,26 (6)	217,5± 37,10* (6)

Legend. Number of animals in parentheses.

*Values differing significantly (P < 0.05) from corresponding values in removed kidney.

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Considering the importance of ubiquinone for electron transport in the mitochondria [10] and also the fact that its biosynthesis takes place in the inner mitochondrial membrane [9], the ubiquinone content in the kidney during the period of increased biogenesis of mitochondria was compared with the activities of succinate dehydrogenase and succinate-cytochrome c-oxidoreductase.

EXPERIMENTAL METHOD

Under superficial ether anesthesia the right kidney was removed from male rats weighing 140-170 g. The animals were decapitated 1, 2, and 3 days after unilateral nephrectomy. Both kidneys were placed in cold (1-2°C) physiological saline, weighed, dried on filter paper, cut up finely with scissors, and homogenized in 3 volumes of 0.25 M sucrose solution in 0.05 M Tris buffer with 0.005 M versene. Part of the homogenate, equivalent to 0.5 g tissue, was used for determination of the total ubiquinone content [2]. Up to 10 volumes of 0.25 M sucrose solution was added to the remainder. This homogenate was used to determine succinate dehydrogenase activity [7] and for isolation of the mitochondria [11]. The protein content [8], activity of succinate-cytochrome c-oxidoreductase [7], the total ubiquinone level [2], and the succinate dehydrogenase activity were determined in the mitochondria. The results were subjected to statistical analysis [1]. The weight of the residual kidney 72 h after unilateral nephrectomy was increased by 23% and its succinate dehydrogenase activity by 43.2% (Table 1). Since succinate dehydrogenase is contained only in the mitochondria and since its relative activity in these organelles was almost unchanged, it can be taken in agreement with data in the literature that mitochondria were formed in the residual kidney faster than the weight of the organ increased. The real increase in the mitochondrial fraction was in fact even faster than was observed in the present experiments, for in normal rats the left kidney always weighs less than the right [5]. An increase in succinate-cytochrome c-oxidoreductase activity in the mitochondria of the residual kidney took place 72 h after nephrectomy.

The ubiquinone concentration, on the other hand, was unchanged both in the whole kidney and in the mitochondria during the 3 days after nephrectomy. In this period not only the biosynthesis of ubiquinone but also its intracellular redistribution was evidently intensified. A similar phenomenon is also found during regeneration of the liver, when intensive formation of new mitochondria takes place [4, 11], but the relative concentration of ubiquinone in them is unchanged [5].

LITERATURE CITED

1. E. V. Montsevichute-Éringene, *Pat. Fiziol.* No. 7, 71 (1964).
2. T. M. Devlin et al., *Arch. Biochem.*, **152**, 521 (1972).
3. A. R. L. Gear, *Biochem. J.*, **95**, 118 (1965).
4. I. W. Halliburton and R. Y. Thomson, *Cancer Res.*, **25**, 1882 (1965).
5. H. A. Johnson and F. Amendola, *Am. J. Path.*, **54**, 35 (1969).
6. M. Levy and R. Toury, *Biochim. Biophys. Acta*, **216**, 318 (1970).
7. O. H. Lowry, N. J. Rosebrough, A. L. Farr, et al., *J. Biol. Chem.*, **193**, 265 (1951).
8. K. Momose and H. Rudney, *J. Biol. Chem.*, **247**, 3930 (1972).
9. R. Morton, *Biol. Rev.*, **46**, 47 (1971).
10. W. C. Schneider, *J. Biol. Chem.*, **176**, 259 (1948).