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Brief Communication

METABOLISM OF IMMUNOGLOBULIN-G IN THE HORSE

The metabolism of immunoglobulin classes has been closely examined in several animal species. Although the horse has received much attention in experimental and applied immunology there seems to be little information available on immunoglobulin kinetics in this species. The present report describes the metabolism of equine IgG in 4 healthy, normoimmunoglobulinaemic horses, in 1 horse with hyperimmunoglobulinaemia and in 1 horse with relatively low immunoglobulin levels.

According to procedures described previously (*Nansen* 1970) the most electropositive portion of the IgG continuum was isolated in a pure form from normal serum by anion-exchange chromatography on DEAE-Sephadex columns, subsequently labelled with radioiodine (I^{131}) and injected intravenously. The thyroid gland was saturated by oral administration of sodium-iodine. The plasma radioactivity disappearance curve was followed during a period of 3 weeks and analyzed by the method of *Nosslin* (1966). All animals were assumed to be in a metabolic steady state during the experiment. The animal with low immunoglobulin levels (J. no. 327) was admitted to the clinic with a history of unthriftiness and recurrent upper respiratory infections. This animal was studied in 2 experiments with an interval of 4 months. The raised immunoglobulin levels in J. no. 325 were presumably secondary to an endocarditis of infectious origin.

The experimental results are listed in Table 1. It appears that IgG in the healthy, normoimmunoglobulinaemic horses was catabolized at a rate corresponding to 7—8 % of the plasma pool per day, which is comparable with values usually reported for IgG in man and larger animals. It should be noted that these turnover rates were somewhat lower than those previously found by *Mattheeuws et al.* (1966) in horses studied with a salt precipitated "gamma globulin". This difference could be explained by an admixture of the more rapidly catabolized IgM in the "gamma globulin" preparation used by Mattheeuws and coworkers. The transcapillary escape rates (total exchange rates) varied considerably as it appears from the table. The distribu-

Table 1.

	Animal J. no.	Breed	Age	Weight (kg)	Serum immunoglobulin (g/100 ml)*	Plasma volume (ml/kg)	Vascular IgG-pool (mg/kg)*	Fractional catabolic rate (%/day)	Half-life time (days)	IgG-degradation (mg/kg/day)*	Transcapillary escape rate (%/day)	Distribution of IgG (% intravascular)
Healthy animals	299	Half-bred	15 years	459	0.96	34.6	332	7.5	16.4	25	114.2	56.8
	496**	„	6 „	379	1.50	34.9	524	8.1	12.4	42	26.6	69.2
	A.1	„	3 „	299	1.09	47.8	521	7.8	14.7	40	53.1	60.2
	526	Norwegian pony	12 „	424	1.87	36.1	675	8.1	13.8	55	32.4	62.1
Patients	325	Half-bred	8 months	258	2.10	49.9	1,050	10.0	11.6	105	67.9	59.9
	327	„	7 „	188	0.49	57.4	281	3.4	32.1	10	36.5	62.7
		„	11 „	237	0.63	72.0	454	3.8	32.3	17	44.7	56.2

* Based upon paperelectrophoretic gammaglobulin. IgG values are therefore presumably somewhat over-estimated.

** Convalescent after adenitis equorum.

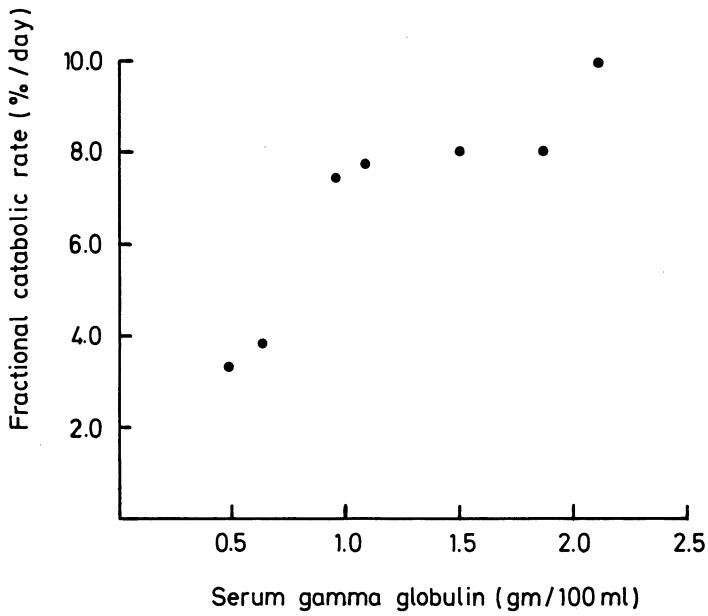
J. nos. 299, A.1, 325 and 327 (7 months) were studied separately with one immunoglobulin preparation.

J. nos. 496, 526 and 327 (11 months) were studied with another preparation 4 months later.

tion ratios, i.e. the proportions of IgG localized intravascularly were comparable with those of other animal species.

It was indirectly demonstrated that the low immunoglobulin level in horse J. no. 327 was due to a markedly reduced synthesis since the fractional catabolic rate of IgG was significantly lowered. Presumably this low synthetic rate had been a feature since birth, and even during the 4 months which passed from the first to the second experiment the animal was incapable of increasing the production of IgG. The experiment on J. no. 325 revealed that the hyperimmunoglobulinaemia was solely explained by an increased synthesis of IgG. In fact the fractional catabolic rate was high compared with that of the normoimmunoglobulinaemic animals.

The present few experiments indicate that the metabolic behaviour of IgG in the horse broadly follows the pattern established for IgG in other animal species. This pattern includes



a catabolic regulatory mechanism specific for this immunoglobulin class. Thus, in a series of mammalian species the fractional catabolic rate of IgG varies in direct proportion to the serum level of this protein (cf. *Waldmann & Strober* 1969). A similar relationship in the horse is indicated by the present study as it will appear from Fig. 1.

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