

THE CLEARANCE OF ^{51}Cr EDTA FROM THE EXTRACELLULAR FLUID OF SHEEP

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The similarity of the renal clearance of ^{51}Cr EDTA from the plasma of sheep to that of inulin led Stacy and Thorburn (1966) to suggest its use in studies of renal function. ^{51}Cr EDTA appears to be distributed throughout the extracellular fluid and to be excreted solely by the kidneys. Thus its clearance from the blood can be used to estimate renal clearance as well as distribution volume. Such estimates have often been made by assuming that ^{51}Cr EDTA distributes in one compartment and fitting the equation $y(t)=y(0).\exp(-kt)$ to the concentrations between one and up to 7 hours after a single (pulse) i/v dose. However, concentrations during the first hour deviate from the fitted line, suggesting that ^{51}Cr EDTA distributes through at least 2 compartments.

Two 2-year-old Border Leicester x Merino wethers, 35.5 (A) and 34.2 (B) kg liveweight, given 800 g/d of a pelleted mixture of lucerne and oats (3:2), were given an i/v dose of ^{51}Cr EDTA (3.7 MBq) and 14 blood samples were taken at increasing intervals during the next 7 hours. Plasma was separated and analysed for ^{51}Cr and water content. A 2-pool model, with dosing, sampling and outflow from the primary pool which exchanges with a secondary pool, was fitted to the concentration-time data using the SAAM program (Berman and Weiss 1978) adapted for use on an IBM PC/XT micro-computer. The results are compared with those from the one-pool model in the Table:

	Model : Sheep :	One-pool		Two-pool	
		A	B	A	B
Distribution volume (kg water)	Pool 1	-	-	3.66	4.61
	Pool 2	-	-	2.99	3.09
	TOTAL	8.54	10.96	6.65	7.70
Clearance rate (g plasma/min.)		101.5	120.4	88.2	98.8

Ignoring the information contained in the first hour of the concentration-time curve resulted in the overestimation of renal clearance rate by 15 and 22% and of distribution volume by 28 and 42% for sheep A and B respectively. Thus the one-pool model should not be used when studying these variables by the pulse dose method. The nature of the 2 pools resolved here is not known; pool 1, which includes the plasma, was much larger than the plasma water volume (1.1 and 1.3 l in sheep A and B when determined by injection of $^{51}\text{CrCl}_3$).

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