

LETTERS TO THE EDITORS

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Composition and Function of Colostrum and 'Regression' Milk

WE have been interested for some years in the similarities which exist between the composition of colostrum and 'regression' milk. By the latter term is meant the fluid which can be expressed from the mammary gland during its involution. Our attention was directed to these resemblances by a study of the cholinesterase in bitch's milk¹, and some estimations were accordingly made of the activities of other enzymes. It was not proposed to publish anything on the subject until further investigations had been made; but the appearance of Campbell, Porter and Petersen's communication in *Nature*² describing the accumulations of plasma cells in the bovine gland at the beginning of lactation and at the experimental close of milking, and their probable role in antibody production, has prompted us to place the results of our preliminary investigations on record at the present time in case they may be of value to others working on the subject.

	Protein (gm./100 ml.)		Acid phosphatase (King-Armstrong units per 100 ml.)			Alkaline phosphatase (King-Armstrong units per 100 ml.)		
	Full milk	Re-gression milk	Colostrum	Full milk	Re-gression milk	Colostrum	Full milk	Re-gression milk
Women								
A			35	3		64	3	
B			13	1		10	2	
C			18	2		21	2	
D			116	4		8	5	
E	1.5	2.4		4	19	2	10	
F	0.9	1.9		3	9	5	12	
G	1.3	9.4		6	176	4	47	
Dogs								
A						4	24	
						Cholinesterase (μl. CO ₂ /ml./min.)		
B						2,800	20	750

Representative findings have been summarized in the accompanying table. It is evident that the percentage of protein is higher in both colostrum and regression milk than it is in full milk. This fact was already well known about colostrum³. It is probably a composite result due partly to the presence of less water and partly to a smaller percentage of some of the proteins such as casein, coupled with a considerably greater percentage of others. At all events, the activities of the enzymes and probably, therefore, the concentrations of the specific enzyme proteins, are much greater in colostrum and regression milk than they are in full milk. The activity of the two phosphatases may rise to very different extents in the same regression milk, and in mother G the rise in the acid phosphatase far exceeded that in the alkaline. This excludes the changes being due merely to the removal of water. The mothers E, F and G were being treated with oestrogens, but since this treatment reduces the acid phosphatase in the serum, it can scarcely be the explanation for the greater rise of this enzyme in the regression milk. Specific changes in the secretion of the enzymes themselves must also be involved.

Any complete explanation of the secretions of the mammary gland must clearly take into account the

composition of colostrum and regression milk. There may be a basic secretion from some cells in the ducts or alveoli to which is added, possibly from other cells, the water, casein, fat, lactose and salts characteristic of full milk.

It is usual to think of colostrum as a useful secretion produced in response to a positive humoral stimulus, but it is difficult to regard regression milk in quite the same way. It would be interesting to know which of the many constituents of colostrum have any functional value to the newborn animal, and if their re-absorption, or that of others, was of any benefit to the mother during the involution of the gland. Work now in progress here suggests that although puppies can be reared without being allowed to take colostrum, the high concentration of cholinesterase in it is of functional value to the developing animal. Nothing is known of its role during involution.

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¹ McCance, R. A., Hutchinson, A. O., Dean, R. F. A., and Jones, P. E. H., *Biochem. J.*, **45**, 493 (1949).

² Campbell, B., Porter, R. M., and Petersen, W. E., *Nature*, **166**, 913 (1950).

³ Widdows, S. T., Lowenfeld, M. F., Bond, M., Shiskin, C., and Taylor, E. I., *Biochem. J.*, **29**, 1145 (1935).

Changes in the Amounts of Adrenaline and norAdrenaline in Rat Adrenals stimulated by Various Agents

THE amounts of medullary amines in the adrenals of an animal at any given moment is determined by a balance between synthesis and utilization.

Three drugs (insulin 1 unit, morphine hydrochloride 2 mgm., and tetrahydro-β-naphthylamine carbonate 7.5 mgm. per 100 gm. rat) known to cause a release of adrenal medullary hormone through the mediation of the splanchnic nerves were administered subcutaneously to groups of two to four rats. The rats were killed at varying times after injection simultaneously with equal numbers of uninjected rats serving as controls.

Extracts were made of the adrenals, and the amounts of adrenaline and noradrenaline in each individual's glands estimated by the method of Crawford and Outschoorn¹. This involves the prior separation of the amines by a paper chromatographic technique (phenol being used as the solvent) based on the method of James², their elution from the appropriate portions of the paper and an assay on the rat's blood-pressure. This preparation is fairly insensitive to traces of contaminating chemicals present in the eluates at the end of the chromatographic process and is therefore suitable for estimating small amounts of adrenaline and noradrenaline obtained in this way.

The mean concentrations of the amines (in terms of body-weight of rat) in the injected groups were calculated as percentages of the mean concentrations in the control groups killed in each experiment simultaneously with the injected animals.

Adrenaline. The results obtained show that with prolonged activity of the glands utilization of adrenaline increasingly outpaces synthesis.