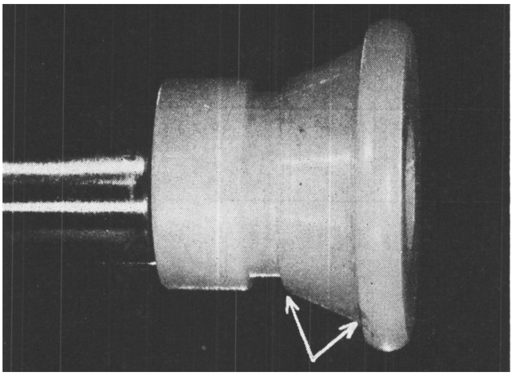

FIG. 2. Silastic ring *in situ*, position marked by arrows.

the pouch thus providing a leak-proof junction. When collection is finished, the cannula tends to slip back a fraction into the pouch, and the orifice of the pouch like any fistulous tract, closes around the smallest diameter of the cannula.

Examination of the cannula at autopsies has revealed no apparent deterioration of the Silastic rubber shoulder, even after many months' usage.

Summary. A simple addition, consisting of sloped "Silastic shoulders," to the gastric pouch cannula has been designed, and found to prevent the development of troublesome leakage around gastric pouch cannulas.

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Concentration of Magnesium in Tissues of the Dog.* (29910)

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Because of the difficulties with chemical methods for determination of magnesium in tissues, biologic data on magnesium are scarce and inaccurate. The recent description of a simple and accurate flamephotometric method by MacIntyre(1) for determination of magnesium in tissues has rectified these difficulties. This report provides data, previously unavailable, of the magnesium content of 73 different tissues and body fluids of the dog obtained flamephotometrically comparing with those obtained by chemical methods. Acid digestion of the tissues for flamephotometric measurement of magnesium is also introduced.

Method. The method used for determination of magnesium by flamephotometry (Zeiss PMQII, double monochromator) was that described by MacIntyre(1) except that acid digestion was used for the tissues instead of dry ashing. Thirteen dogs were rapidly killed by clamping the great vessels near the heart. Samples of fresh tissue, lightly blotted, were placed into volumetric flasks: 50 ml flasks for samples of 0.3-0.6 g; 25 ml flasks for samples of 0.1-0.3 g; 10 ml flasks for samples less than 0.1 g. After weighing, the samples were placed in an oven at 105°C for 48 hours, and were then reweighed. The samples were digested over an open flame. HNO_3 (0.5 ml), H_2SO_4 (0.2 ml), and $HClO_4$ (0.5 ml) were used for samples of 0.3-0.6 g and proportionally less of each acid for smaller samples. Initial addition of HNO_3 accomplished most of the digestion, but there was usually a residue of visible fat which required H_2SO_4 for digestion. Finally, the addition of $HClO_4$ resulted in a clear, colorless solution. The digestant was brought up to volume in

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TABLE I. Recovery of Magnesium Following Acid Digestion.

Tissue	No. of samples*	Amt added to each sample (meq)	Amt recovered (meq) Mean	Range	% of recovery
Liver	6	5	5.06	4 88- 5.28	101
Heart	6	5	5.06	4.76- 5.34	101
Bone	5	25	25.4	22.6 -27.4	102

* Each sample contained about 5-25 meq of mg^{24}.

TABLE II. Concentration of Magnesium in Tissues of the Dog.

Tissues	No.	Fresh samples Mean (meq/kg)	SD	No.	Dried samples Mean (meq/kg)	SD	Reported† values for fresh tissues (meq/kg)
Lt. atrium	10	14.0	2.5	13	54.1	24.1	
Rt. "	8	14.1	1.6	10	57.6	19.1	
Lt. vent.	11	19.1	2.5	13	84.7	8.4	*18.4 (3)
Rt. "	11	19.9	2.3	14	86.0	11.7	
Epicardial myocardium	7	22.0	3.0	12	91.6	11.7	
Interventricular septum	8	21.05	3.4	10	91.1	8.6	
Papillary mm.	12	21.5	2.10	14	87.7	8.8	
Pericardium	9	8.0	3.3	10	16.3	7.9	
Pericardial fluid	1	1.6					
Heart valve	2	5.6	2.8	3	27.5	16.7	
Aorta	20	8.3	2.3	23	23.5	7.5	
Pul. artery	9	10.8	8.1	11	26.4	9.40	
Pul. vein	6	24.5	16.3	6	47.9	37.8	
Sup. vena cava	10	15.4	9.8	10	35.6	21.0	
Inf. " "	10	11.4	5.8	13	26.2	14.3	
Portal vein	9	19.9	8.6	10	65.2	47.2	
Submaxillary gland	2	15.5	1.6	3	65.0	5.1	
Parotid "	4	15.6	.5	4	76.8	12.9	
Tongue	10	11.5	.7	12	51.0	10.0	
Esophagus	12	15.9	2.0	13	64.5	10.1	
Stomach	14	17.0	4.6	15	71.2	18.8	
Small int.	11	15.6	1.1	14	72.9	10.1	
Large int.	10	17.2	3.6	13	70.8	20.3	
Liver	12	15.0	1.8	14	53.9	7.2	11.5 (4)
Gall bladder	11	10.7	2.13	12	33.4	10.1	
Pancreas	13	24.1	4.7	14	93.3	23.0	
Peritoneum	7	10.7	5.4		19.1	6.9	
Bile	11	11.0	5.7				
Cerebrum	9	16.3	3.2	10	72.7	23.6	11.3 (5)
Cerebral cortex	3	12.7	1.93	3	56.9	10.3	
Cerebellum	11	12.7	1.4	13	74.9	47.3	10.8 (5)
Medulla	10	14.4	2.6	12	67.0	66.2	
Pons	9	12.4	1.6	13	53.1	30.5	
Dura	8	13.0	4.3	10	33.4	10.6	
Spinal cord	8	13.8	1.7	12	37.8	2.8	
Optic N	5	19.5	6.4	6	31.6	8.6	
Vagus N	7	12.8	7.1	8	20.9	8.6	
Phrenic N	7	13.3	3.0	8	19.8	9.5	
Spinal fluid	4	1.9	.7				
Ovary	7	10.9	3.5	9	39.8	11.8	
Uterus	8	9.5	1.6	10	41.7	8.2	
Testes	4	13.1	1.3	5	86.5	6.5	
Epididymis	3	19.6	6.9	3	68.4	15.4	
Spermatic cord	3	16.1	4.20	3	54.9	12.9	
Prostatic gland	5	11.3	2.0	5	58.4	11.7	

TABLE II. Concentration of Magnesium in Tissues of the Dog (Continued).

Tissues	No.	Fresh samples Mean (meq/kg)	SD	No.	Dried samples Mean (meq/kg)	SD	Reported† values for fresh tissues (meq/kg)
Renal cortex	14	15.9	3.3	15	63.4	11.0	11.2 (6)
Renal medulla	13	13.4	4.2	16	69.3	16.3	
Bladder	9	11.41	1.90	12	4.64	7.9	
Ureter	10	14.7	9.0	11	26.8	12.7	
Trachea	13	16.6	5.9	13	42.4	16.2	
Lung	10	11.9	1.7	14	52.0	7.9	
Pleura	8	23.1	13.0	8	39.1	18.5	
Thyroid	1	15.2		1	70.8		
Thymus	1	30.6		1	65.9		
Pituitary	1	95.1		1	47.5		
Adrenal	10	17.9	3.0	11	37.7	6.4	
Lymph nodes	4	17.0	3.0	5	64.8	7.9	
Spleen	12	15.6	1.3	14	70.4	10.0	
Tooth	10	511.8	11.4				
Skull	1	190					
Cortical bone	6	235	19.4				135.8 (3)
Bone marrow	9	34.6	22.0	10	55.2	34.8	
Cancellous bone	7	198.2	44.3				
Costal cartilage	10	49.2	24.5	12	95.6	46.3	
Tendon	2	3.9	1.9	2	9.0	6.3	
Ligament	8	5.3	2.3	10	10.8	3.0	
Diaphragmatic m.	12	21.5	5.8	14	66.7	8.2	
Intercostal m.	10	19.4	1.5	14	68.0	6.5	
Skeletal m.	12	20.0	2.3	13	78.0	7.9	14.4 (4) 19.7 (7) 36.7 (3)
Skin	9	6.6	2.8	11	16.4	6.5	4.6 (8)
Vitreous humor	1	1.4					
Cornea	5	41.9	28.4	5	175.4	148.4	
Choroid & retina	9	11.2	4.2	10	22.7	8.1	

* Ventricle—not specified as to right or left.

† These values were obtained by chemical methods.

the flask with the appropriate diluting solution as described by MacIntyre(1). Four ml of H_2SO_4 were added to 1000 ml of the standards.

Results. It was shown that the amount of interference with the emission of magnesium produced by the acid digestion was negligible. The reproducibility was over 90% among different aliquots of the same piece of tissue. The accuracy of recoveries of magnesium added to samples of different tissues is summarized in Table I.

Mean values and standard deviations for all the tissues analyzed are shown in Table II. Also included for comparison are values from the literature. If the values reported were not given in meq/kg of fresh tissues, they were corrected using either the respective investigator's own data or using reported average values for fat and water content of tissue.

Discussion. The soft tissues containing the highest concentration of magnesium were cardiac muscle, skeletal muscle, adrenal gland, thymus, pancreas, veins, epididymis and cornea. The only sample of pituitary gland analyzed had an extremely high concentration of magnesium. The concentration of magnesium in the bones was higher than that in soft tissue. The reason for the variations in magnesium content in various organs need investigation.

Magnesium concentration of the tissues varied considerably from dog to dog. Muscle tissues, either from heart, skeletal muscle, or gastrointestinal tract had the most constant concentration, standard deviations being less than 5-20% of the means among different dogs. Brain and glandular organs of the gastrointestinal tract had about the same degree of variations in magnesium concentration. This magnitude of variation was also observed in plasma concentration among human beings(2). The magnitude of the variations was not decreased when the values were expressed in dry weight thus indicating that they were not the result of differences in water content of the tissues. Those tissues containing a large proportion of collagenous material or connective tissue varied much more in magnesium concentration among the dogs. The reason is not known. The greatest variation observed in bone marrow and cartilage might be due to varying degrees of calcification as bony structures contain disproportionally larger amounts of magnesium.

The concentrations of magnesium in tissues obtained in this study were generally higher than those reported by chemical methods (Table II). Since reproducibility and recovery were both quite satisfactory with this method, the data reported in the present study were considered more accurate.

Summary. The content of magnesium in 73 different tissues and body fluids of the dog was determined by flame photometry. The heart, skeletal muscle, glands, veins, epididymis, and cornea had the highest concentrations of magnesium among the soft tissue. Bone had the highest concentration of magnesium among all tissues examined. Collagenous tissue manifested the greatest variations among the dogs. The values obtained by this method were higher than those previously reported for chemical methods. The procedure of acid digestion is satisfactory for flame-photometric determination of magnesium in tissue and the flamephotometric method is sufficiently simple and accurate for general application.

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Effect of Thymectomy on Hamsters.* (29911)

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Neonatal thymectomy in several animal species produces a generalized impairment of immunological responses that is manifested by a depression both of circulating antibody levels after antigenic stimulation and of cell mediated hypersensitivities(1,2,3,4). Correspondingly, there is a decrease of circulating lymphocytes and atrophy of lymphoid follicles in the spleen and lymph nodes. In addition, several laboratories have reported the occurrence of a fatal wasting disease in newborn thymectomized animals. The incidence of this disease varies considerably, depending

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