posure, and the magnitude of the threshold stimulus(4). It has been pointed out that this value is more pertinent to the pain threshold, as determined by thermal stimuli, than radiation intensity or other measured quantity.

The values for male and female subjects have been included in the average as there was no significant difference in the measurements.

Comment. The pain threshold is approximately uniform over the body surface, as measured by the thermal radiation method. However, the heel of the foot has a significantly higher threshold due to the thick corneal layer of skin, but on the palm of the hand over a callus no significant elevation was observed. The finger pad threshold, on the other hand, exceeded the average for the body as a whole. Thresholds on the lower back, buttocks, and anterior and posterior aspects of the thighs were significantly lower than those on the forehead. This may be due to a thinner layer of stratum corneum overlying the pain endings in the back, although definite information on this point is lacking.

Summary. Using the thermal radiation method measurements on 7 subjects, the highest pain threshold values (390mc/sec/cm^2) were obtained on the heel of the foot. The lowest values of pain threshold (166-170 mc/sec/cm^2) were found on the lower back regions, buttocks, and thighs. Pain thresholds on all other body areas were approximately the same as that on the forehead.

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Localizing Properties of Anti-Rat-Aorta Antibodies.*† (19645)

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In order to investigate the localizing properties of antibodies prepared against a blood vessel which is not contained in any specific organ, we have studied antibodies prepared against rat aorta and are reporting the results here. Our interest in the *in vivo* localization of anti-blood-vessel sera stems from the evidence we presented that the localization of anti-kidney, -lung, and -liver antibodies in the liver, kidney and lung, as demonstrated by the use of radiolabeled antisera, takes place on the vascular bed of the organ(1,2). Antigenic differences have been found in the liver, kidney and lung with respect to their ability to localize antibodies, since the *in vivo* purification of anti-tissue sera yields antibodies of increased specificity for individual organs(1,2). Superimposed on these differences are antigenic similarities, because antibodies prepared against any one organ can localize in the others. Our present communications show that aorta also gives rise to antibodies capable of localizing in the liver, kidneys and lungs.

Experimental. Anti-rat-aorta sera were prepared as follows: aortas were excised from Sherman albino rats, scraped free of adherent tissue, washed and homogenized. Two rabbits received eleven injections each of 0.5 to 2 ml of a 10% aorta suspension on alternate days and were bled one week after the last injection. The sera were anti-RA452 and anti-RA457. Normal serum was obtained (NS 457) from rabbit 457 before immunization. The separation of the globulin fraction of the serum, the iodination thereof, the assay procedure and the details of the *in vivo* puri-

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TABLE I. Localization of Radioactivity in Various Tissues from I^{131} G-anti-RA. Rats were inj. with ½ ml solution containing about 1 mg protein.

Material inj.	Radioactivity inj., cpm × 10^{-6}	Rat wt, g	Radioactivity in tissue*: %/g/100 g rat: Blood	Liver	Kidney	Lung	Aorta	%/whole organ: Blood†	Liver	Kidney	Lung
I^{131} GNS-457	1.8	167	1.40	.16	.13	.23	.28	8.8	.61	.12	.11
		167	1.36	.10	.07	.21	.17	8.6	.47	.07	.11
		132	1.52	.11	.07	.37	.23	9.6	.53	.07	.16
I^{131} G-anti-RA457	1.2	161	1.84	.19	.19	.53	.45	11.6	.79	.18	.34
		177	2	.19	.24	.55	.38	12.6	1.20	.22	.29
		163	1.9	.18	.20	.50	.49	12	.74	.18	.34
I^{131} G-anti-RA452	1.7	160	1.50	.33	.24	.43	.29	9.5	2.2	.26	.21
		131	1.52	.25	.19	.43	.32	9.5	1	.24	.23
		165	1.80	.20	.24	.41	.40	11.3	.92	.20	.19

* Values are averages of duplicate samples.
† Calculated on basis of a blood volume of 6.3% (6).

fication method were described previously (1-5).‡

Results. The localization of anti-rat-aorta antibodies. The localization of radioactivity in the rats injected with I^{131} G-anti-RA and I^{131} GNS§ and sacrificed 3 days later is shown in Table I. The results are given on a concentration basis as the percent of radioactivity, injected per 100 g rat, which localized per gram of wet perfused tissue; and on a total basis as the amount localized per whole organ.

It can be seen that there is an increased localization of radioactivity in the liver, kidneys and lungs of the animals receiving the two different anti-aorta sera as compared with the localization in those receiving the normal serum preparations. The increased localization of the antisera prepared against aorta is therefore similar to that of antisera prepared against the other tissues we have studied, namely, liver, kidney and lung (2,5,7). However, the two anti-aorta sera differ between themselves indicating differences in the antibody responses of the two rabbits toward the various antigens present in the injected tissue.

Thus, on a whole organ basis, serum 457 has less liver and kidney localizing activities but more lung localizing activity than serum 452. Such individual responses of different rabbits were also observed during the study of antisera formed against rat-liver-blood-vessel preparations (2).

Even though it appears that there is some localization in aorta from the anti-aorta preparations, we do not feel that these data are conclusive on this point.

Localization of in vivo purified anti-rat-aorta antibodies. Anti-rat-aorta antibodies were purified *in vivo* by the following procedure: rats were injected with I^{131} G-anti-RA, and were sacrificed and perfused 3 days later. The liver, kidneys and lungs were removed, homogenized and the insoluble sediments washed with saline. The *in vivo* localized antibody was eluted from the saline suspended sediments by adding sodium hydroxide to pH 10-11. The supernate was neutralized and injected into rats. The results are shown in Table II. The localization pattern of the *in vivo* purified material was determined by the organ of initial localization. Thus, the material eluted from liver localized to a greater extent in liver than that eluted from kidney or lung; the material eluted from kidney localized to a greater extent in the kidney than that eluted from the liver and lung; and the material eluted from the lung localized to the greatest extent in the lung.

Even with these increased specificities, cross reactions persist as follows: a) Liver eluted material localized to the same concentration in kidney as in liver.‖ b) Kidney eluted material localized in liver but to a much lower concentration than in kidney. c)

‡ Carrier free radioiodine (I^{131}) was obtained from the U. S. Atomic Energy Commission, Oak Ridge Operations, Isotopes Division, Oak Ridge, Tenn.

§ I^{131}G-anti-RA, and I^{131}GNS refer to the radioiodinated globulin fractions of anti-rat-aorta serum and normal serum respectively.

‖ A larger total amount localizes in liver than in kidney due to the larger size of the liver.

TABLE II. Localization of *In vivo* Purified Anti-RA. Rats were inj. with 1 ml of solution.

Material inj.‡	Radioactivity inj., cpm × 10^{-3}	Rat wt, g	Radioactivity in tissue*: %/g/100 g rat — Blood	Liver	Kidney	Lung	%/whole organ — Blood†	Liver	Kidney	Lung
G-anti-RA457										
ALi	9.35	103	1.51	2.6	2.7	.76	9.5	13.9	2.8	.63
AK	12.1	104	.74	[1.2]	17	1.4	4.7	[6.1]	15.6	.91
		84	.62	1.7	11	1.6	3.9	10	12.3	.98
ALu	2.6	87	(1.7)	(.6)	(1.1)	2.4		(3)	(1.2)	1.6
		91	(2.3)	(.7)	(1.3)	2.4		(4.2)	(1.6)	1.8
G-anti-RA452										
ALi	9.7	106		2.5	2.4	.8		13.8	2.1	.43
		96		2.7	2.3	(.4)		13.9	2.1	(.3)
AK	8.5	94		1.6	11.7	(.6)		7.4	12.9	(.4)
		87		1.8	12.2	(.8)		7.5	10.8	(.5)
ALu	5.2	110		(1.1)	2	3.9		(6.1)	1.9	2.76
Normal serum controls, avg of values of Table III, ref. 2										
NSLi				1.5	1.7			7	1.7	
NSK				1.2	5.1	2.3		6.4	5.2	1.4
NSLu					1	1.6				1.02

* Values are averages of duplicate samples except for those in brackets which are for one sample only. Values in parentheses are based on counts of 25/min or less above a background of 25/min and are not considered accurate.

† Calculated on the basis of a blood volume of 6.3% (6).

‡ The eluates are abbreviated to designate the antiserum originally inj. as the first symbol, and the organ from which elution was made as the second symbol. Thus, ALu is the eluate from the lung of an animal receiving anti-rat-aorta.

Lung eluted material localized in the kidney and liver but to a lower concentration than in lung. These results are similar to those reported previously for *in vivo* purified antibodies from other anti-tissue sera (1,2).

Discussion. Localizing antibodies are formed when rat aorta is injected into rabbits. When these antibodies are injected into rats, they localize in the liver, kidneys and lungs, demonstrating the presence in aorta of substances which can elicit the formation of antibodies capable of localizing in the kidney, liver and lung. The antibodies fixed in a particular organ are different from those localizing in other organs in that the localization patterns of *in vivo* purified antibodies isolated from various organs differ from each other.

Summary. Antisera prepared in rabbits against rat aorta contain antibodies capable of localizing in the liver, kidney and lung of the rat when injected intravenously. The antisera can be fractionated by *in vivo* purification to yield antibodies capable of localizing preferentially in liver, kidney or lung. This is interpreted as showing that the aorta has antigens in common with the vascular beds of these organs.

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