rabbits previously immunized with pneumococcus Type I. This nonspecific anamnestic rise lasted only about 12 hours and did not occur at all in animals whose previous antibody response had been relatively weak. Hence it appears that increased adrenal cortical activity may exert a transitory influence upon the distribution of preexisting antibodies. However, it is clear from the data presented above that adrenal cortical activity has no prolonged effect upon the production or release of antibodies and gamma globulin.

Summary. Identical concentrations of serum antibodies and gamma globulin were found in adrenalectomized rats repeatedly injected during immunization with ACE and in similar animals not receiving ACE. It is concluded that adrenal cortical activity is not essential for the fabrication or release of antibodies and gamma globulin.

15943 P

Evaluation of Vagotomy in Chronic, Non-Specific Ulcerative Colitis.*

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Two previous papers by one of us[1,2] bear out the conclusion of Elsom and Ferguson[3] that surgical management of chronic, nonspecific, ulcerative colitis is safer and productive of better health than prolonged conservative treatment. The surgical management is beset with many pitfalls, however, and disastrous complications still occur.

In search of a simpler method of handling the problem, consideration has been given to division of the vagus nerves, with the thought in mind that decrease in general intestinal muscular activity might result and might ease the symptoms of the disease, as Dragstedt[4] has found to be the case in duodenal and gastric ulcers.

We were plunged into the problem by a patient who had had all her colon and ¾ of her small intestine resected for colitis and ascending ulcerative ileitis. Recurrent ileitis demanded some active therapy after all known conservative measures had failed. Vagotomy was suggested by Dr. C. J. Watson of the Department of Medicine, and resulted in marked improvement, the patient having thereafter the first solid stools she had had in 4 years. Unfortunately the improvement was temporary.

A plan was formulated to employ transthoracic vagotomy in a group of cases to determine the possible value of the procedure. Moore[5] had had a very poor result from vagotomy in one fairly severe case, and we therefore confined ourselves to minimally involved cases.

In the 4 cases in which vagotomy was the only surgical therapy, studies were performed before operation, in the 2 weeks afterward, and 6 weeks to 3 months after vagotomy. Observations include number and character of stools, general health, presence of blood, pus, mucus in the stools, proctoscopic and barium enema findings, transit time of material through the intestine by X-ray and charcoal, electrocardiograms, triple histamine (Lannin) gastric analyses, 12-hour night collection of gastric juice, and insulin gastric analyses with blood glucose checks.

As indicated in Table I, lasting good re-

* Supported by a Research Grant from the Graduate School of the University of Minnesota.

1 Dennis, Clarence, *Surgery*, 1945, **18**, 435.

2 Dennis, Clarence, *Minnesota Med.*, 1945, **28**, 228.

3 Elsom, K. A., and Ferguson, L. K., *Am. J. Med. Sci.*, 1941, **202**, 59.

4 Dragstedt, L. R., *Surgery*, 1945, **17**, 742.

5 Moore, F. D., *Bull. New Eng. Med. Center*, 1945, **7**, 52.

TABLE I.
Vagotomy in Chronic Ulcerative Colitis.

Case No.	Age	Duration, yrs	Complic.	Completeness of vagotomy	Results		
					Sympt.	Procto	X-ray
726638	20	7	6 ft. intest.	Incomplete	Temporarily excellent	——	——
647070	57	10	—	Complete	Excellent	Healed	Imp.
771995	14	2	Poliomyelitis	"	"	"	"
620076	57	13	——	"	Imp.	"	Neg. before
703015	44	5	D.U.	Incomplete	Equivocal	Neg. before	" "

sults have been obtained in those cases in which the insulin gastric analysis indicated that section of the vagus had been complete.

In the first case a severe tachycardia followed operation and persisted 2 weeks with electrocardiographic changes suggesting pericarditis. Electrocardiograms were therefore done before and after surgery to determine whether vagal section 4 to 5 cm above the diaphragm consistently cause electrocardiographic alterations. None were found except that one case has a sinus bradycardia (58 as against 70 preoperatively).

Stool examinations indicate that the pus, uniformly present in the stool preoperatively, disappeared postoperatively in 2 of those cases in which section was proved to be complete. In the third, pus was only occasionally present 3 months after operation, but some blood was consistently present.

Of particular interest is the transit time of material through the gut. No significant difference was observed except in the patient who had had 2 to 7 stools a day before surgery; in her case the transit time was 6 hours at that time. Four months after vagotomy it was 26 hours and she had dropped to one stool a day, formed.

Conclusion. Preliminary investigation indicates that vagotomy offers sufficient promise in chronic, nonspecific, ulcerative colitis to justify further investigation.

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Demonstration of a Positive Relationship Between Cardiac Output and Oxygen Consumption.*

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The purpose of this paper is to demonstrate a positive relationship between oxygen consumption and cardiac output. In order to accomplish this, a method of measuring cardiac output was needed in which the calculation of the cardiac output did not include the factor of oxygen consumption. For this reason the ballistocardiograph was selected, and Starr's[1] "height" formula was used on the tracings obtained on a high frequency table. The oxygen consumption was measured on the tracings obtained from a Benedict-Roth metabolism apparatus and all data was divided by the individual surface area.

Medical students, laboratory workers, and resident physicians were subjects of this study, and all were purposely studied under nonbasal conditions. Measurements of the

* This work was carried out under a contract between the Office of Naval Research and the University of Rochester School of Medicine and Dentistry.

1 Starr, I., and Schroeder, H. A., *J. Clin. Invest.*, 1940, **19**, 437.