when succinate and ascorbate were used as substrates. . . . Cocaine, procaine, metycaine, butacaine, tetracaine and nupercaine inhibit the oxidation of glucose, succinate and ascorbate but do not inhibit the anaerobic glycolysis of glucose by brain homogenates. The oxidation and reduction of cytochrome c is inhibited; the anaerobic reduction of methylene blue in the presence of succinate and homogenate is not inhibited. These results indicate the blockage of the enzymatic chain is occurring at the cytochrome c-cytochrome oxidase level or at some factor necessary for the reduction of cytochrome c.

"There is a wide range in the degree of inhibition by the anesthetics at 0.005 M and over a range of concentrations. Cocaine, procaine and metycaine give the least inhibition; tetracaine and butacaine are next in order; and nupercaine produces the greatest inhibition. There is a correlation between the in vitro and in vivo order of inhibition of these drugs."

A. A.

THOMAS, D. E.: *Use of Oil Anesthetics in Rectal Diseases.* Bull. U. S. Army M. Dept. **9**: 589–592 (July) 1949.

"The use of an oil anesthetic was first reported in 1927 by Yeomans, Gorsch, and Mathesheimer. These workers named their product 'benacol.' . . . Although oil anesthetics are widely used, particularly in rectal surgery, the subject has received little attention in the literature. Their clinical use has been described by various authors. No worth while investigative work appeared until the reports of Duncan, and Duncan and Jarvis. These men noted that practically all articles except that of Steinberg gave the impression that the prolonged anesthesia produced by oil anesthetics resulted from the slow release of procaine by the oil. Histologic investigation by Duncan revealed that the prolonged anesthesia was accompanied by degeneration of nerve fibers in the area involved. This proved that the injection of anesthetic mixtures in oil caused prolonged anesthesia by killing nerve fibers and not by a gradual release of contained medicaments with a consequent depression of functional activity. Duncan and Jarvis carried the experiment further by investigating the components of oil anesthetics in order to determine which ingredient was the effective agent. The method consisted of infiltrating the vicinity of the peripheral motor branches of the facial nerve of the cat with the individual substances in sweet almond oil. The substance was then evaluated by noting its effect on the orbicularis oculi muscle. . . . Pruritus ani is a disease that, when it becomes chronic, is almost intractable. Early in the disease, anesthetic salves and lotions are of value, but these soon become ineffective. . . .

"When first seen the patient cannot be adequately evaluated because of infection secondary to scratching, and, if surgery is indicated, it cannot be intelligently planned in the presence of abnormal tissues. Injection of an oil anesthetic, if properly performed, may be of value because it gives a period of about three weeks in which the vicious cycle is interrupted and the patient, unless his trouble is primarily psychic, does not have to scratch because he does not itch. During this time his perianal area can be returned to as nearly normal as possible by sitz baths, scrupulous cleanliness after bowel movements, powder to control perspiration, and similar measures. After these procedures have had their effect an intelligent appraisal can be made of what must be done surgically, if anything.

"When injecting the solution, it should be remembered that just anterior to the anus, the skin is supplied by the first, laterally by the second,

third, and fourth, and posteriorly by the fifth sacral and the coccygeal nerves. The nerve filaments radiate downward from the sacrum and can be encountered in the posterior quadrants, considering the anus as the hub. Therefore, most of the solution should be injected in the posterior quadrants. The skin should be perforated once on each side with a 20-gage needle, lateral to the anus and just outside the area of involvement. A total of 10 cc. of oil anesthetic should be distributed by fanwise thrusts of the needle in the subcutaneous tissue. Afterward, the area should be massaged to prevent pooling. The appearance of anesthesia will be prompt. Since a slough may occur the patient should be informed of this possibility. This should not cause discouragement because if it happens you have the result that Buie strives for with his injection of 40 per cent alcohol. A slough requires about two months to heal, but is painless and usually results in a cure. Oil anesthetics are used after rectal operations to obtain a reduction in the patient's pain and discomfort. In order to avoid a slough, one must always avoid pooling the oil and must not inject the oil too superficially. Fecal incontinence lasting a few weeks may also result from the application of too much drug to the external sphincter ani muscle. The technique of application consists of injecting 3 to 5 cc. of the anesthetic into the sphincter ani externus in the midline posteriorly and laterally to each side. An additional 3 to 5 cc. of the agent is then injected in a fanwise manner in both posterior quadrants in order to interrupt the nerves to the anal area. The effect of this injection will be noted in a prompt relaxation of the sphincter ani externus. In fact, the injection can be the first step in an operative procedure if exposure is a problem. In this way the sphincter can be dilated without divulsion.

"Although xylocaine had been used routinely as an adjunct to hemorrhoidectomy at this institution, this has been dispensed with. Sufficient cases have not yet accumulated on which to base valid conclusions, but this clinical impression is that a well-performed hemorrhoidectomy with adequate attention being paid to such principles as providing drainage with a wedge-shaped excision of skin at the periphery of the hemorrhoid and the use of a minimum of suture material results in a smooth convalescence, with or without an oil anesthetic. In the last 100 hemorrhoidectomies with oil anesthetics the patients required an average of 0.005 Gm. of morphine sulfate, 0.0054 Gm. of codeine sulfate, hypodermically, and 0.0058 Gm. of codeine sulfate by mouth per patient. The investigations of Kelly indicate that, with the two oil anesthetics used both of which contained 5 per cent benzyl alcohol, anesthesia lasted no longer than three hours. If this is true we will have to explain our excellent results in pruritus ani in some other manner. On the other hand, if no more sedation is required without oil anesthetics in our patients following hemorrhoidectomy, Kelly's conclusions would seem to be justified."

A. A.