

Selective Bronchial Catheterization for the Study of Experimental Lung Damage in the Rabbit¹ (37624)

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(Introduced by W. E. Connor)

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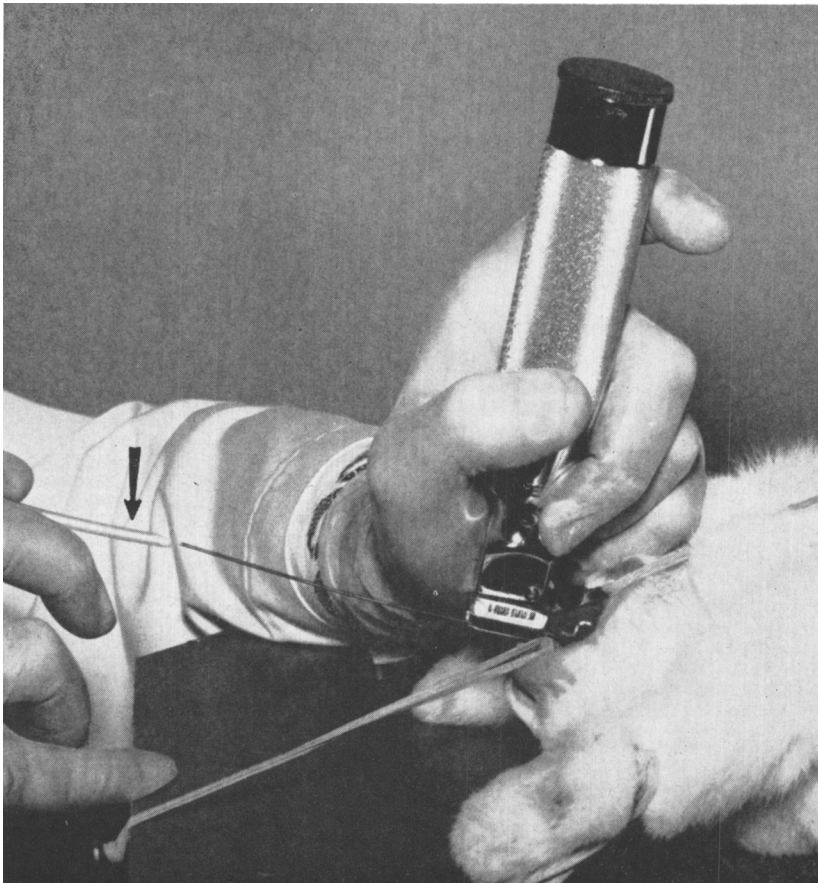


FIG. 1. Arrow points to the plastic tube which is about to be passed over the previously inserted guide wire into the trachea.

A number of different methods have been used to study the lungs as a target organ in

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animals. Opie (1) injected horse serum through the thoracic wall into the lungs of immunized rabbits. Fried (2) and Cannon *et al.* (3) challenged sensitized rabbits intratracheally with horse serum and egg albumin, respectively. Read (4), Nagaya (5), Haga-

dorn (6), Willoughby (7) and coworkers employed intratracheal or intravenous routes of challenge to study the effects of rabbit anti-rat-lung antibodies. Bensch *et al.* (8) instilled ^{131}I -labeled protein into the trachea of dogs and observed the absorption of intact protein molecules across the pulmonary air-tissue barrier into the circulation. Hirao and his colleagues (9) inserted polyvinyl tubing through a specially equipped bronchoscope into the right lower bronchus of ether anesthetized rabbits. By this method they achieved direct infusion of suspended chemical carcinogens into the right lower lobe, but gave no information regarding the construction and availability of the tiny bronchoscope. Recently Richerson *et al.* (10) used

aerosolized ovalbumin in sensitized rabbits. To date, none of the animal models have utilized a nonsurgical technique to deliver the solution directly into a selected peripheral segment of the lung without highly sophisticated equipment, inhalation anesthesia, tracheostomy, intratracheal instillation, or transthoracic puncture.

The purpose of this report is to describe a rabbit model which uses selective bronchial catheterization through an endotracheal tube. The tremendous advantage of this simple technique is that material can be delivered peripherally into a selected pulmonary segment, thereby providing the remainder of the lung for comparison. Thus, an animal may serve as its own control, or more than one



FIG. 2. The tiny radio-opaque catheter is shown positioned in the rabbit's right lower lobe.

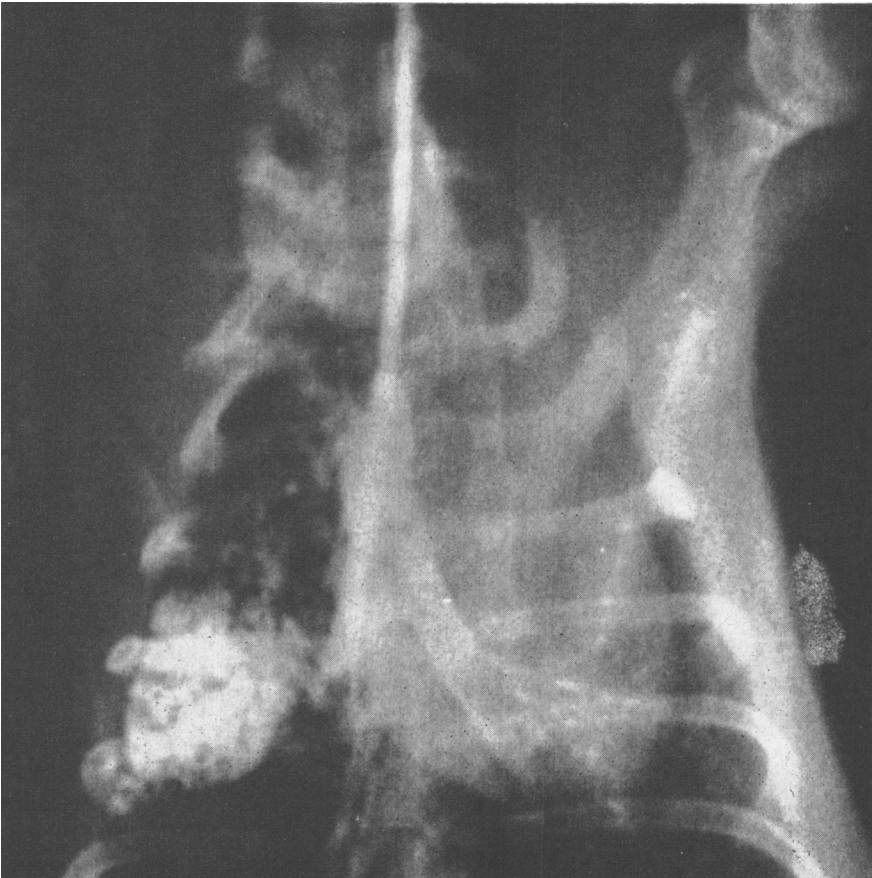


FIG. 3. Bronchogram of the rabbit's right middle lobe with some spillage of the oily Dionosil into the left side.

reaction may be initiated at separate sites and studied at the same time.

Materials and Methods. Male and female New Zealand white rabbits, weighing 2.3–3.6 kg, were used. Prior to laryngoscopy the rabbit is prepared by an im injection of 0.5 ml of Innovar-Vet.³ Within 15 min the animal is completely relaxed and may be secured on a peg board by its four legs in a supine position. Without adequate anesthesia, it would be impossible to maintain the animal in this position. Laryngospasm is prevented by spraying the oropharynx and larynx with 4% lidocaine solution in a No. 15 DeVilbiss nebulizer. A pediatric laryngoscope with a No. 1 blade is used. Under direct vision a flexible,

steel guide wire⁴ is inserted through the vocal cords and a small plastic tube,⁵ slightly beveled at the end, is passed over the guide wire into the trachea (Fig. 1). The wire is removed leaving the endotracheal tube in position. Selective bronchial catheterization is carried out by inserting a tiny polyethylene radio-opaque catheter through the tracheal tube and guiding it under fluoroscopic control to the desired location in the lungs (Fig. 2). The catheters are cut beforehand into 25-cm lengths from roles of polyethylene tubing (0.045 in. \times 0.065 in.). A mild curve enables the operator to direct the tip easily into either lower lobe. Performing the catheter tip in hot and then ice water is usually not necessary.

³ Innovar-Vet (1 ml) = 0.4 mg fentanyl + 20 mg droperidol. Pitman-Moore, Washington Crossing, New Jersey 08560.

⁴ USCI stainless steel spring guide, size .035 in.

⁵ OD 4 mm \times 15 cm length.

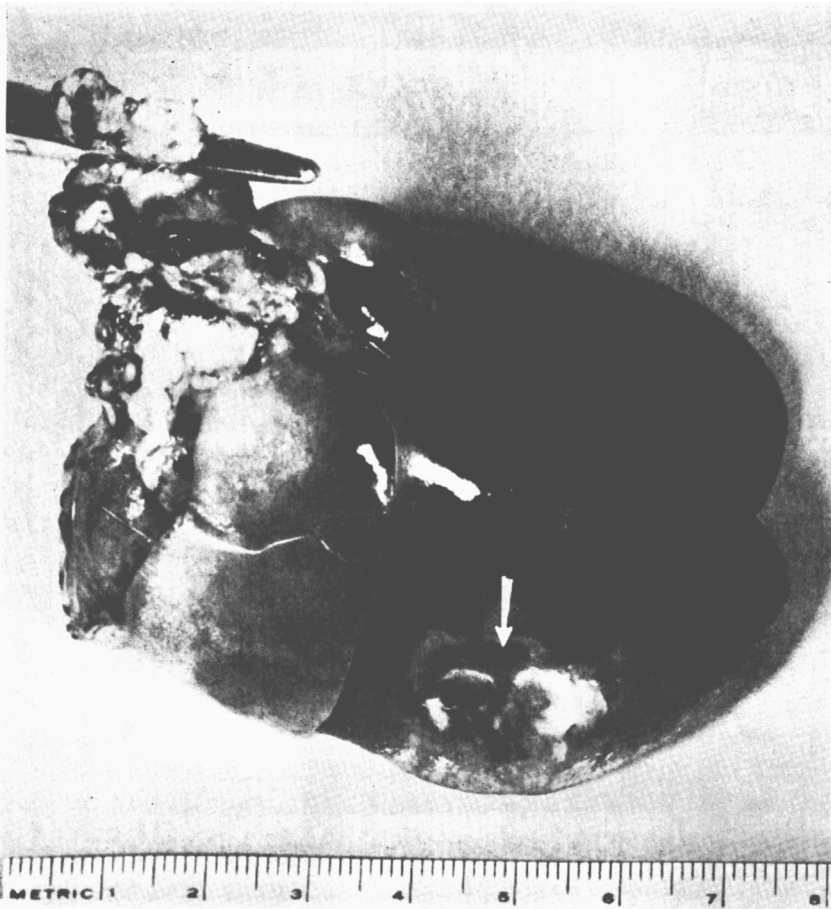


FIG. 4. Arrow points to a localized area of pulmonary immune damage in the rabbit. The antigen was delivered by bronchial catheterization.

Results. To date we have successfully performed selective bronchial catheterization in 41 rabbits. Figure 3 illustrates a right middle lobe bronchogram of a rabbit which was administered 1 ml of propylidone oily suspension (Dionosil) by the Zavala-Rhodes technique. Figure 4 shows the gross results of pulmonary immune damage in a 72-hr post-challenge rabbit which was sensitized to bovine IgG and subsequently challenged with the antigen intrabronchially by the same non-invasive technique just described.

Summary. A nonsurgical rabbit model is described for study of selected lung segments. The technique is easily learned and does not require unusual dexterity. The method utilizes intrabronchial catheterization through a plastic endotracheal tube. The remainder of

the lung may serve then as a control.

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