tion and consequent toxicity. This is in accord with chronic toxicity experiments in dogs (10) where nialamide had no functional, gross anatomical, or histological effects on the liver.

Summary. Nialamide was a potent monoamine oxidase inhibitor by both *in vitro* and *in vivo* test. Its potency relative to that of iproniazid varies from 3:1 to 12:1 depending on test and species used. Nialamide was also shown to be qualitatively different from other MAO inhibitors in some of its pharmacological actions, factors which may explain absence of both liver toxicity in dog and postural hypotension in man.

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Experimental Detection of Left-to-Right Circulatory Shunts with Injections of Krypton^{85}. (25113)

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Improved methods for detection of circulatory shunts have evolved in recent years. Dye-dilution curves and inhaled foreign gas technics(1,2,3) have both proved superior to oximetry in detection and localization of left-to-right shunts. Our experience has demonstrated the usefulness of solutions of radioactive krypton gas (Kr^{85}) in detection and localization of right-to-left shunts. By continuously monitoring the expired air with a Geiger-Müller tube, appearance time and concentrations of krypton^{85} in expired gases can be determined. When Kr^{85} is injected into the right side of heart or pulmonary artery, it appears immediately and in high concentrations but when injected into the left side of heart the appearance time is long and initial concentration is low. This observation suggested that the early appearance of Kr^{85} in expired air after its injection into the left side of heart would be indicative of a left-to-right shunt.

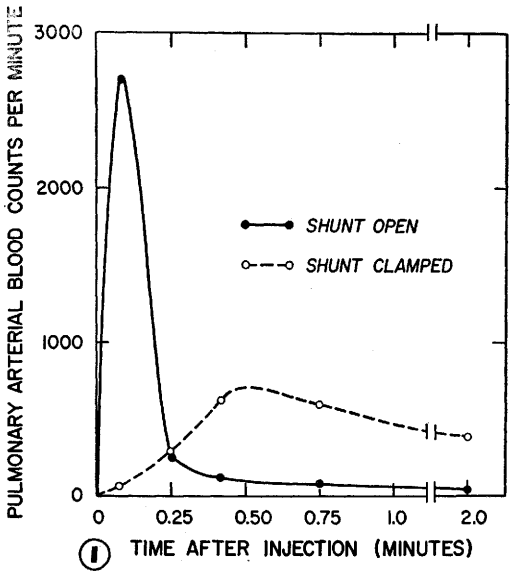
Materials and methods. Left-to-right shunts were constructed in 8 mongrel dogs by anastomosis of the left subclavian artery to the left pulmonary artery. Anesthesia was induced with sodium pentobarbital, a cuffed-endotracheal tube was inserted and positive pressure respiration was maintained at a rate of 20/min by a demand respirator. Seven dogs were studied in acute experiments and one was catheterized 2 weeks after operation. A #6 Cournand catheter was inserted *via* femoral artery to the root of the aorta. Injections of krypton^{85} in saline solution were made at the aortic valve with the shunt open and after it was occluded. Patency of anastomosis was

proved in every instance by presence of a continuous thrill in the pulmonary artery and by postmortem examination. Aortic root injections were also performed in 2 control animals without shunts. Radioactivity of expired air was recorded from a Geiger-Müller tube inserted into the airway between the endotracheal tube and respirator. Integrated counts of expired air were made at 10 second intervals for the first 60 seconds after injection and at one minute intervals for the next 3 minutes. The background count over a 10 second interval was determined immediately before each injection. In 2 animals integrated samples of pulmonary arterial blood were also drawn at 10 second intervals for the first 2 minutes after injection. These samples were counted as whole blood in a continuous gas-flow G-M tube. In another animal, radioactivity of expired air was recorded continuously with a count-rate-meter and direct-writing oscillograph. The krypton^{85} solution was prepared by injecting 3.1 mc of Kr^{85} into a 30 ml vial containing equal amounts of normal saline and air. Three to 5 ml of resulting solution, containing approximately 30 μc of Kr^{85} were used for each injection and the volume of saline replaced.

Results. Forty-four Kr^{85} injections were made in 10 dogs without functioning shunts. The integrated count of radioactivity in expired air for the first 10 seconds after injection never exceeded 75 counts above background. Fifty-four injections were made in 8 dogs with patent subclavian-pulmonary anastomoses. The count in this group for the same interval ranged from 136 to 624 counts above background. In subsequent time intervals no clear separation of the 2 groups was present.

When the shunt was open, Kr^{85} appeared immediately in pulmonary arterial blood and its concentration was maximal in the first 10 seconds (Fig. 1). When the shunt was occluded, the gas appeared in low concentration during the first 10 seconds, and reached its peak concentration at 40-50 second interval. The relationship between time-concentration curves of Kr^{85} in pulmonary arterial blood and expired air is shown in Fig. 2.

Continuous recordings of radioactivity in expired air are shown in Fig. 3. When the shunt was occluded appearance time after aortic root injection was 12 seconds and build-up time was 20 seconds. When the shunt was patent, however, appearance time was 4 seconds and build-up time only 11 seconds.



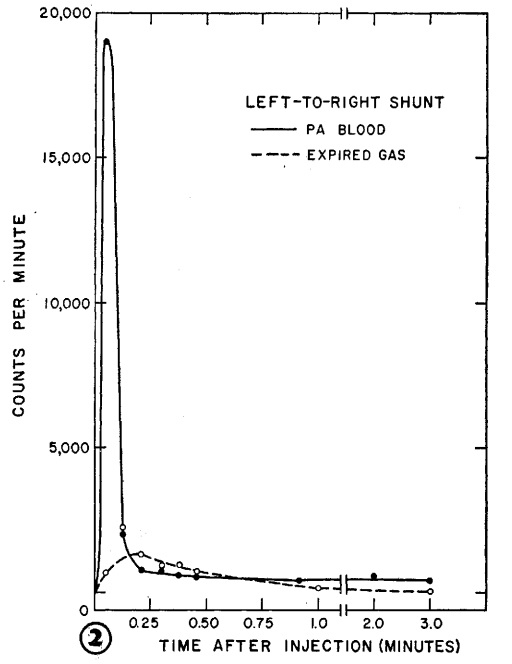


FIG. 1. Krypton^{85} levels in pulmonary arterial blood after aortic root inj.

FIG. 2. Comparison of expired air and pulmonary arterial levels of Kr^{85} after aortic inj. proximal to a patent shunt.

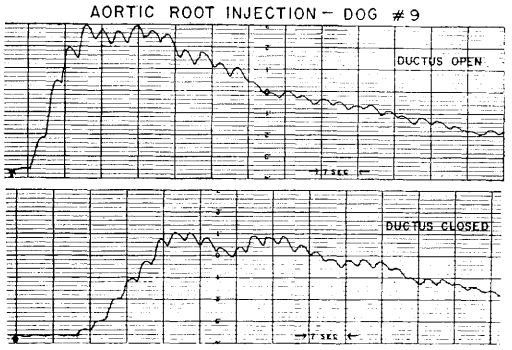


FIG. 3. Direct recordings of radioactivity of expired gas after inj. of Kr^{85} at aortic root.

Discussion. When Kr^{85} in solution is introduced directly into the pulmonary artery, it appears in expired air within 2 seconds. Thus, expired air closely reflects presence of the isotope in pulmonary arterial blood and obviates the need for sampling blood from the pulmonary artery. Detection of a left-to-right shunt by this method depends upon appearance time in expired air. An accurate estimate of this time is best obtained by continuous recording of radioactivity in expired air (Fig. 3).

When Kr^{85} is injected into the left heart or aorta of a normal animal, appearance time is 10 seconds or more; when a left-to-right shunt is present the gas reaches the pulmonary artery almost immediately and appearance time is 5 seconds or less. A basis is thus established for detecting the presence of a shunt. By selective injection at various locations in the left heart and aorta, the site of the shunt may be determined.

Preliminary clinical experience with this method in patients with congenital heart disease indicates that it may offer distinct advantages over present methods of detecting left-to-right shunts.

Summary. Left-to-right shunts were constructed in 8 mongrel dogs by anastomosis of left subclavian artery to left pulmonary artery. When solutions of krypton^{85} were injected into the root of the aorta proximal to a functioning shunt, the krypton gas could be detected in the airway by a Geiger-Müller tube in less than 5 seconds. When similar injections were made in the absence of a shunt, the appearance time was usually 10 seconds or more. Thus, by monitoring expired gas it is possible to detect the presence of a shunt resulting in early appearance of Kr^{85} in pulmonary arterial blood following injection into the left side of heart or the aorta.

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Localization of Myosin in the Conduction Bundle of Beef Heart. (25114)

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Although the characteristic striated fibrillar structure of cells of the conduction bundle of mammalian heart suggests that these fibrils contain protein similar to those of other muscle tissue, the identity of the contractile substance in this area has not been investigated. By means of Coons fluorescent antibody technic Finck, Holtzer and Marshall(1) and Klatzo, Horvath and Emmart(2) have shown that myosin is localized in the A band of striated muscle fibers of both skeletal and heart muscle. Using this immunological technic rabbit antimyosin globulin conjugated to fluorescein has been applied to sections of the conduction bundle of beef heart to determine presence of this contractile protein in the fibrils. The chemical isolation and identity of muscle proteins of the conduction bundle will be reported elsewhere.

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