3. With arms held straight, swing forward slowly so that the weight of your body is gradually brought to bear upon the patient. The shoulder should be directly over the heel of the hand at the end of the forward swing (see Fig. 2). Do not bend your elbows. This operation should take about two seconds.

4. Now immediately swing backward so as to completely remove the pressure (see Fig. 3).

5. After two seconds swing forward again. Thus repeat deliberately twelve to fifteen times a minute the double movement of compression and release, a complete respiration in four or five seconds.

6. Continue artificial respiration without interruption until natural breathing is restored, if necessary, four hours or longer, or until a physician declares the patient is dead.

7. As soon as this artificial respiration has been started, and while it is being continued, an assistant should loosen any tight clothing about the patient's neck, chest or waist. KEEP THE PATIENT WARM. Do not give any liquids whatever by mouth until the patient is fully conscious.

8. To avoid strain on the heart when the patient revives he should be kept lying down and not allowed to stand or sit up. If the doctor has not arrived by the time the patient has revived he should be given some stimulant, such as one teaspoonful of aromatic spirits of ammonia in a small glass of water or a hot drink of coffee or tea, etc. The patient should be kept warm.

9. Resuscitation should be carried on at the nearest possible point to where the patient received his injuries. *He should not be moved from this point until he is breathing normally of his own volition*, and then moved only in a lying position. Should it be necessary, due to extreme weather conditions, etc., to move the patient before he is breathing normally, resuscitation should be carried on during the time that he is being moved.

10. A brief return of natural respiration is not a certain indication for stopping the resuscitation. Not infrequently the patient after a temporary recovery of respiration stops breathing again. The patient must be watched and if natural breathing stops artificial respiration should be resumed at once.

11. In carrying out resuscitation, it may be necessary to change the operator. This change must be made without losing the rhythm of respiration. By this procedure no confusion results at the time of change of operator and a regular rhythm is kept up.

If alone with the victim, do not neglect immediate and continued resuscitation in order to call a doctor. Start at once—the first few minutes are valuable. If other persons are present, send one of them for a doctor without a moment's delay.

The ordinary and general tests for death should not be accepted and any doctor should make several very careful and final examinations and be sure specific evidence is present before pronouncing the patient dead.

In view of the careful study and extensive experiments carried out under the late Professor MacLeod's direction this statement from him is extremely important.

"Paralysis of the nerve centre which controls breathing is the cause of death in many cases of electrocution and, provided the heart has not been directly affected by the current, natural breathing can often be restored by artificial respiration. This allows the still circulating blood to be aerated in the lungs. The only method to employ is Schafer's Prone Pressure Method and a pulmotor or any other form of apparatus should never be used. Since the paralysis of the breathing may last for some time it is necessary to continue artificial respiration sometimes for hours and it should never be discontinued until it is absolutely certain that the heart has ceased beating. As far as can be judged by observations on electrocuted animals, no advantage is gained by using oxygen or carbon dioxide during the artificial respiration, or by administering heart stimulants. It is important to see that the body is kept warm. After natural breathing returns the patient must be kept lying down and he must be carefully watched for several hours to see that the paralysis of breathing does not return. If it does so, artificial respiration must be reapplied."

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THE PERCUTANEOUS TUBERCULIN REACTION*

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THE only certain way of combating tuberculosis, with our present knowledge of the disease, is by early detection and careful supervision. Early detection implies discovery in childhood. The usual method of screening groups is by intradermal tuberculin testing (Mantoux). This test when properly performed by graded dosage is 100 per cent efficient.

Quite apart from the fact that some knowledge of technique is required for doing the intradermal test, this causes a slight amount of pain to the recipient. To an adult the intradermal test suggests no difficulty but to the oft-pricked, pain-protected modern child with over-solicitous parents the thought of another injection is often sufficient to lose for the physician the chance of discovering an early case of tuberculosis. Add to this (*a*) the nuisance of sterilizing needles and syringes and obtaining standard dilutions of old tuberculin or purified protein derivative (P.P.D.) and (*b*) the well-recognized fact that early cases must often be detected by the general practitioner or public health nurse. Although these objections to the intradermal test may appear to be unimportant they are far from being so in practice and actually they have a serious detrimental result. It is obvious that tuberculin testing is not carried out with nearly sufficient frequency today.

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Arvid Wallgren[1], of Göteborg, Sweden, has accurately described "Initial fever in tuberculosis". He has found that, as a general rule, allergy is well marked when the fever is caused by the primary tuberculosis. For this reason he has encouraged the use of Hamburger's percutaneous ointment and over a period of years has enabled Swedish physicians and nurses to find many early cases of tuberculosis, with a subsequent and natural reduction of the disease.

In 1907 Moro and Doganoff[2] first described an inunction method for the diagnosis of tuberculosis. This ointment consisted of old tuberculin in a base of anhydrous wool fat. Hamburger[3] introduced the so-called perkutan ointment, which consisted of old tuberculin evaporated to a constant weight. Lowenstein,[4] Malmberg and Fromm,[5] Wolff and Hurwitz,[6] and others have also prepared slightly modified ointments.

During a visit to Sweden in the autumn of 1937, one of us obtained some of Hamburger's ointment, and on return to Canada commenced to test this ointment on known tuberculous children. The results were so encouraging that we decided to prepare an ointment and test it against graded intradermal reactions in known cases of tuberculosis.

TABLE I.

NATURE OF TUBERCULOUS LESION IN 44 CASES. (Ages 23 months to 13 years).

	Percentage
Parenchymal lesion	9.0
Combined parenchymal and tracheobronchial lymph node lesion	52.3
(*a*) With calcification	6.8
(*b*) With bronchiectasis	4.6
(*c*) With tuberculous osteomyelitis	2.3
(d) With tuberculous pneumonia	2.3
Tuberculous pleurisy with effusion	13.7
No demonstrable infiltration or calcification. Positive Mantoux	9.0

The group that was studied intensively consisted of 44 cases. The patients ranged in age from 23 months to 13 years. The majority had either parenchymal or combined parenchymal and tracheobronchial lymph node lesions; there were also cases of tuberculous pleurisy and others who showed no demonstrable lesion but were positive tuberculin reactors. The approximate percentage composition of the group is shown in Table I.

All children in the group studied reacted positively to the intradermal injection of 1/10 mg. (1/10 c.c. of 1-1,000 solution) of old tuberculin. There were variations in their response to the injection of weaker solutions of the old tuberculin which are shown on an approximate percentage basis in Table II.

TABLE II.

MANTOUX REACTIONS. SERIES OF 44 CASES.

Old tuberculin intradermal	*Positive reactions percentage*
1–1,000	100
1–10,000	90
1–50,000	43
1–100,000	20
1–200,000	2

The ointment used in testing these patients was made by absorbing old tuberculin with Fuller's earth and then adding enough lanolin to make an ointment. On a quantitative basis, 1 c.c. of old tuberculin required 1 gram of Fuller's earth and 2.25 grams of lanolin. When 1 c.c. of old tuberculin was taken up with lanolin alone, 7.8 grams of lanolin were required. The ointment made with Fuller's earth was used for the testing, not that we know of any objection to an ointment with a plain lanolin base but merely because, being of a stronger concentration, it was presumed that it might act more effectively. No attempt was made in the course of this study to compare the relative efficiency of different strengths of ointment.

Prior to application of the ointment the skin of the selected site on the chest over the sternum was cleansed with ether, then a small portion of ointment (about the size of half a dry pea), was rubbed into an area about the size of a fifty cent piece. Holding a small bakelite ring on the skin with the other hand will aid in restricting the area of action if the rubbing is done inside it, but this is not at all necessary. As the amount of rubbing doubtless affects the result, sixty revolutions with the finger were taken as an arbitrary standard. A rubber finger cot was worn on the finger.

Within twelve hours, 73 per cent of the tuberculous cases showed pale or pinkish papules, either alone or with surrounding zones of erythema and the skin induration on the site of ointment application. After twenty-four hours there was a distinct reaction in 94 per cent and after forty-eight hours 100 per cent of the cases had reacted positively. Fig. 1 shows the percentage reaction after various lengths of time. It is interesting to note that 79 per cent of the cases still showed a reaction after one

week. In a few cases the skin reaction was discernible after seventeen days, when both papules and intervening skin had assumed a slightly brownish hue.

The papules, which are a distinctive feature of the skin reaction, varied in number from ten or twelve to more than one hundred in different cases. They are easily seen and felt. They did not appear to cause the patients any discomfort whatsoever.

In a general way, those patients who were known to be most allergic from their intradermal tests gave the most marked percutaneous reactions but there were enough exceptions to render tuberculin was also used on all the patients tested in the general medical wards, to investigate the possibility of false positive reactions based on idiosyncrasy. Two patients with negative Mantoux reactions showed small areas of slight erythema on both test and control sites. These disappeared after 36 hours. No papules which seem to be the distinctive feature of the positive reaction were present. This transitory erythema without papules is presumed to have been a friction effect.

In conclusion the statement seems warranted that in a small series of carefully studied cases, results with our ointment have been consistently

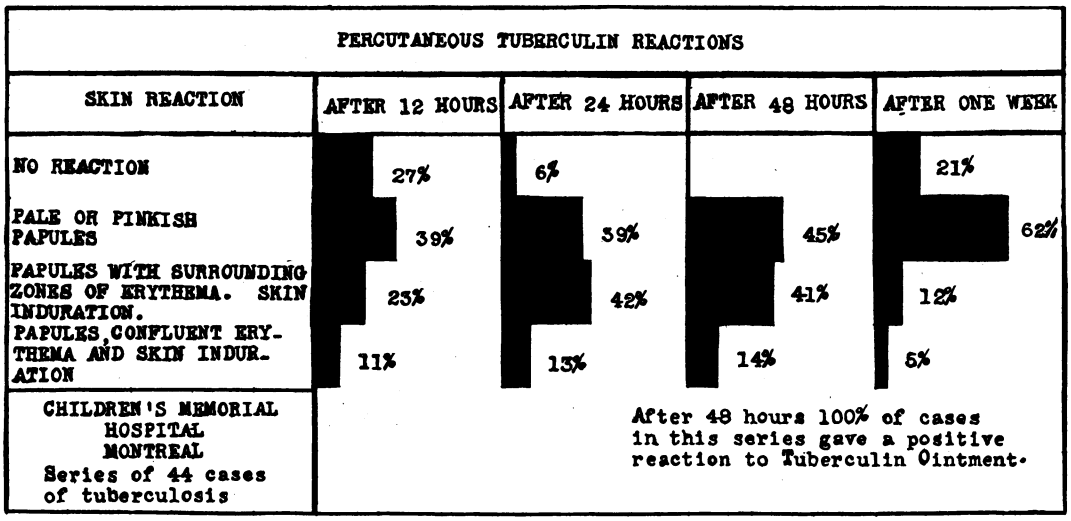

Fig. 1

this impression tentative only. The really important finding was a definite papular reaction in all patients who reacted positively to the intradermal test with 1/10 mg. of old tuberculin.

After completing this somewhat intensive study on the patients in one of the tuberculosis wards, it was thought advisable to check the percutaneous test in the general medical wards. All patients there receive a Mantoux test as part of their routine investigation. A positive percutaneous reaction was obtained in the case of only three patients, which coincided exactly with the findings on routine intradermal injection of 1/10 mg. of old tuberculin. A total of 57 patients was examined in this manner. In age the patients varied from 2 years to 11 years. They were about equally divided as to sex, and suffered from a variety of diseases which are not pertinent to our study.

A control ointment containing the same amount of Fuller's earth and lanolin but no old

satisfactory. The cheapness of ointment testing, together with its stability, warrants more intensive application of the percutaneous test by physicians and others interested in detecting early cases of tuberculosis in childhood.

In our hands, and with the cases tested, the percutaneous test has been as reliable as the intradermal injection of 1/10 mg. of old tuberculin. It is not suggested however, that this ointment should take the place of the various dilutions of old tuberculin or purified protein derivative used in hospital practice. It is *as a case-finder outside hospitals* that we believe that tuberculin ointment has a definite field of usefulness. It should enable us to discover many more cases of childhood tuberculosis than are brought to light at the present time. Carried in one's bag, tuberculin ointment is instantly available and readily applicable in many situations where a syringe and needle are not, or where the environmental situation militates

against their use. Whenever possible the intradermal test is the method of choice but in the numerous situations in which it is not being applied today, for one reason or another, we feel that the percutaneous test has much to recommend it in the interests of public health.

SUMMARY

An ointment which may be used as a skin test in tuberculosis case-finding is described. It was compared with the intradermal tuberculin test in 44 cases of tuberculosis and 57 general medical cases with very favourable results. The usefulness of this ointment for the detection of early cases of tuberculosis on a wider scale is discussed.

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CARDIAC LESIONS IN ADRENAL INSUFFICIENCY

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FOR several years one of the authors (C.[1]) has been conducting studies* on experimental adrenal insufficiency in relation to Addison's disease, with particular reference to the preparation of extracts of adrenal cortex and the assay of cortical extract on various species of experimental animals (Cleghorn *et al.*[2, 3]). More recently this author and his collaborators have reported on the vascular failure in adrenal insufficiency (Armstrong *et al*[4]) and submitted evidence that this is due at least in part to the inability of sympathetic nerves to elicit their usual effect. It was suggested that this might be due to depletion of the so-called "ad-substance", the adrenalin-like mediator of sympathetic nerve impulses. The other author (H.) became interested in the present problem from another angle—that of producing an imbalance of the autonomic nervous system.

The original hypothesis of Hall and Banting (1930), which postulated that organic effects of physiological dysfunction occur in one or more local areas as a result of an autonomic imbalance produced by persistent overaction of the parasympathetic has received substantial support from the experiments of several other workers. Informal discussions between the authors of the present paper eventually resulted in the decision to collaborate in the further investigation of the field involving autonomic imbalance by the suppression of sympathetic effects by adrenalectomy.

It has been recorded by Banting and Gairns[6] and others that duodenal and gastric ulcerations with hæmatemesis, melæna, etc., commonly occur in adrenalectomized dogs. In view of the sympathetic failure in adrenal insufficiency described first by Elliott,[7] and more recently investigated by Cleghorn and his collaborators, this might be considered a parasympathetic effect, resembling as it does so closely the lesions observed by Hall, Ettinger and Banting.[8] If this were so it might be expected that cardiac changes as found by these authors might be met in animals dying of adrenal insufficiency. No reference has been found, however, describing the occurrence, or even intimating the possibility, of cardiac lesions, and few referring to cardiac dysfunction in experimental adrenal insufficiency. The present paper deals with this phase of the problem.

Although many publications have appeared and much experimental work has been presented on the clinical behaviour of dogs in acute and chronic adrenal insufficiency and their response to cortical extract and high salt diets, etc., only a very few of these have included, even in their protocols, any reference to the cardiovascular system. Rogoff and

* The extract used in these experiments was made under the direction of Dr. E. W. McHenry in the Connaught Laboratories (Cleghorn, McHenry, McVicar and Overund[5]) and obtained through the kindness of Prof. C. H. Best and Dr. McHenry.