The Intravenous Diet

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(Continued*)

(3) **Potassium.**

Potassium is the chief ion of the intracellular space and exists in a range of 4.6-5.6 m.Eq./L in the extracellular fluid. It is known that the level of potassium in the extracellular fluid varies only to a limited extent. Any higher value leads to renal excretion or potassium entrance into the cell. This potassium, if cell potassium is normal, passes back out of the cell and is excreted by the kidneys, not only by pure glomerular filtration but also by tubular excretion.

In disease states, undue rise in serum potassium may occur. These rises may result from the following—alone or in combination:

(1) Contraction of the volume of extracellular fluid.
(2) Inability of the cells to pick up potassium.
(3) Transfer of cellular potassium outside the cell.
(4) Inadequate renal excretion.

All of these factors may be operative, for example, in producing the hyperkalemia of untreated adrenal cortical insufficiency. Recent studies have indicated that potassium intoxication occurs only in a minority of patients with urinary suppression.

Here is a group of factors which tend to increase serum potassium:

(1) Increased potassium intake.
(2) Oliguria and anuria.
(3) Dehydration.
(4) Tissue breakdown or anoxia (with every gram of nitrogen liberated, 2.4 gms. of potassium are released.)
(5) Adrenal cortical insufficiency.

With an elevated serum potassium symptoms of the increased concentration may include:

(1) Listlessness and mental confusion.
(2) Numbness and tingling of the extremities.
(3) Cold grey pallor.
(4) Bradycardia and occasionally totally irregular rhythm.
(5) Peripheral vascular collapse with low blood pressure and decreased heart sounds.
(6) A rapidly ascending flaccid paralysis without involvement of the head, trunk or abdomen.

*Part I of this paper outlining the intravenous diet was published last month. It concentrated mainly on water, salt and acid base balance. The fluid compartments of the body were briefly discussed and abnormalities were classified. The mechanisms of production of some common electrolyte disturbances were presented with a view to more exact fluid and mineral replacement therapy. The role of the kidney was stressed as the essential mechanism and several modern theories of renal control were presented.

(7) Cardiac arrest.

(8) E. K. G. changes:

(a) Peaked T. waves.

(b) Increased duration of Q.R.S.

(c) Increased duration of P.R. interval.

(d) Biphasic curve with progressive delay in ventricular conduction.

(e) Total arrythmia progressing to cardiac arrest.

(f) There may be S.T. segment changes.

To date, the poisoning due to increased levels of extracellular potassium appears to be a problem only in patients who are receiving this cation in undue amounts or in a minority with renal failure. The potassium in untreated Addison's Disease usually does not reach the lethal range.

Hypokalemia occurs in many conditions. The lower limit of normal is 3.8 m. Eq./L. Abnormally low levels of extracellular potassium can on theoritical grounds result from:

(1) Dilution of low potassium serum.

(2) Loss of potassium in the urine or other body fluids.

(3) Transfer of potassium into the cell.

All of these may occur in Diabetic Acidosis or Coma in the recovery stage. Such patients usually develop anorexia and vomiting during the early phases of their illness. As a consequence the intake of potassium is reduced essentially to zero. At the same time, considerable amounts of potassium are lost in the gastric secretions and urine. Even though the body stores of this electrolyte are considerably depleted in this way, the serum potassium is often normal or elevated. Potassium free fluids are then given in large amounts and body water stores are restored, and at the same time potassium moves into the cell under the influence of insulin, restoration of carbohydrate metabolism with glycogen deposition, and protein formation. And in the meantime, potassium is lost into the urine and into the cell. Hence hypokalemia develops in almost all cases of the recovery stage of Diabetic Acidosis and Coma.

Up to the present time only one category of potassium disorders has been identified in which the decline of extracellular concentration is entirely or almost entirely explicable by a transfer of potassium into the cell. This is true in Familial Periodic Paralysis in which serum potassium falls abruptly, concomitant with a decreased urinary loss at a time when there is no evidence that extracellular volume has expanded.

The factors tending to decrease serum potassium are:

(1) Decreased potassium intake.

(2) Increased renal excretion.

(a) Diuresis.

(b) Alkalosis.

(c) Adrenalcortical Hyperactivity.

(3) Dilution of extracellular fluid with potassium free fluid.

(4) Vomiting and diarrhoea (40 m.Eq./L.) in gastric juice, 10 m.-Eq./L in normal feces with 10 to 20 times that amount in diarrhoea.)

(5) Glucose uptake by the cells (glucogenesis) carries potassium from the extracellular fluid into the cells of liver or muscle. This is increased by glucose ingestion, insulin and epinephrine.

The symptoms of hypokalemia are:

(1) Weakness and hypotonia progressing to paralysis of the legs and arms first and the respiratory muscles later.
(2) Dyspnoea and gasping respirations.
(3) Cyanosis.
(4) Abdominal distension dependent on atonia of smooth muscle.
(5) Nausea and vomiting.
(6) Cardiolegaly with systolic murmurs.
(7) Increased pulse pvessure with Corrigan's pulse.
(8) Elevated venous pressures and signs of cardiac failure.
(9) E.K.G. changes begin at a concentration below 3m.Eq./L.
    (a) Prolonged QT interval.
    (b) Decreased height or inversion of the T wave.
    (c) Rounded or prolonged T waves.
    (d) Depressed ST segment.
    (e) Possible P wave inversion, extrasystoles and AV block.

Clinically alkalosis is very frequently associated with potassium deficiency and these two are concomitantly observed in the alkalosis of Cushing's disease, during DOCA intoxication, in anorexia nervosa, in subjects with chronic losses of gastric secretion and in acute or chronic diarrhoea. This is understandable because in a number of these, acid secretions are lost, or the alkaline reserve is lowered by loss through the kidneys. But in these conditions potassium is also lost. The various body secretions contain fair quantities of potassium as shown by the following list:

Gastric Juice	30-40 m. Eq./L.
Bile	4.98 "
Pancreatic Juice	4.60 "
Urine	20-40 "

Alkalosis not only accompanies, but may be a cause of the potassium deficiency. In a state of alkalosis, the availability of sodium in the blood to form bicarbonate is increased. With such a state, and with the usual occurence of dehydration and cellular damage, sodium tends to displace potassium in the cell. The potassium enters the blood and is excreted through the kidneys. This alkalosis is very refractile to treatment until the potassium deficit is treated, for, by giving more sodium chloride, it does not completely pass into the urine, some enters the cell and displaces more potassium. Fully one-half of the cellular potassium may be replaced with sodium. Any case of alkalosis or acidosis which fails to respond to therapy should be investigated for potassium deficiency. This is well shown in cases of diabetic coma with acidosis who, when treated, frequently improve greatly but soon slip back into coma and die for previo sly unknown reasons. In starvation, potassium loss may be marked; 2.87 m.Eq. of potassium are lost for each gram of nitrogen lost. This potassium is excreted by the kidneys, for unlike sodium, the kidneys will excrete potassium even in the presence of a deficit of that ion.

Indeed, in dehydration, the kidneys will preferentially excrete potassium rather than sodium.

As an example, if a case of gastric ulcer is considered we may follow the development of a hypokalemia. The patient suffers a tissue trauma with a breakdown of protein (he loses 2.4-2.8 m.Eq./Gm.N_2 loss). He may have a gastric hemorrhage with further potassium loss. He is placed on a restricted dietary regime. He may have vomited periodically. Some months later he goes to surgery and suffers an acute tissue trauma. He may go into a state of shock. He has gastric and duodenal secretions withdrawn by suction. As a result of this withdrawal he may be in a state of alkalosis. He is also given large amounts of potassium-free fluids. Over the whole period of his illness he is excreting potassium in his urine and stool. So, followng gastrectomy, a syndrome may frequently arise of hypochloremic alkalosis and potassium deficiency.

Drugs may be instrumental in producing hypokalemia by intracellular transfer of the ion. The drugs are those which accelerate either carbohydrate or protein synthesis. Thus, insulin, large amounts of dextrose, protein or testosterone will produce this picture.

(4) **Protein Metabolism.**

The most important structural unit in the body is protein, and this protein exists as a tissue protein and as the circulating plasma proteins. The protein factory is in the liver, the raw materials come from the gastro-intestinal tract, and the kidney is the chief exit for waste products. The protein of the body exists in a state of dynamic equilibrium, that is, they are in a continuous state of flux, with peptide bonds opening and protein radicle inter-change taking place. There are no actual reserve protein depots, but there is this condition of relatively free inter-change such that, required protein may be synthesized. Thirteen amino acids only have thus far proved to be essential, that is, they must be supplied, for the body is unable to produce them.

Quantitative studies on protein are carried out mainly by measurement of nitrogen, the breakdown product of all protein substances. 16% by weight is the nitrogen content of protein. Protein nitrogen is first calculated and is then multiplied by 6.25 (16% N_2 is 1/6.25 of the total). Protein in order to form tissue, is bound to four parts of water. It has been experimentally found that for every gram lost in the blood there is thirty times that loss in the body tissues. This 30.1 relationship remains very constant, so that the deficit is far greater on the basis of general body structure than a few points fall in the plasma proteins would tend to indicate. The body protein deficit is the deficit per 100 ml. multiplied by the plasma volume, divided by 100 and multiplied by thirty.

Under ordinary conditions the body requires roughly 1 gm. of protein /Kg. body wt./day. As much as 300 gm./Kg./day has been given without ill effects. and is sometimes indicated in severe deficits.

The mechanisms of protein loss are very important and as yet are incompletely studied. To determine the total loss 30 times the plasma protein loss gives the approximate answer. Here are some mechanisms by which the body loses its protein content:

(1) Physiological normal catabolism—4 gms. N_2/day.

(2) Protein used for calories—as high as 13%.

(3) Toxic destruction—as high as 30 gms. N_2/day.
(4) Disuse atrophy.
(5) Catabolic loss beyond normal—hemorrhage, burns.

Acute protein deficits occur in many surgical conditions, i.e. peritonitis, hemorrhage, burns, intestinal obstruction and after extensive injuries. Acute yellow strophy is another condition where there is an acute deficit of protein. The detection of the condition may be difficult, for, dehydration which certainly is present tends to mask the true degree of hypoproteinemia. There may be a hyperglobulinemia so that values of the plasma proteins must be known and not just the total protein or the A/G ratio. Clinically the patient may reveal: oliguria, abdominal distention and hemeconcentration. Postoperative abdominal distension should be considered as a metabolic upset possibly due to hypoproteinemia.

Chronic protein deficiency is a manifestation of chronic mal-nournishment and/or chronic protein loss. It occurs in many conditions, i.e., ulcer cases, anorexia nervosa, nephritis, heart disease, draining fistula, etc. It is characterized by weight loss, edema, fatiguability, weakness and faulty wound healing.

(5) Summary of Therapy

As has been stated, metabolic upsets are usually multiple and although they will again be discussed individually, they must be considered in terms of a general upset. At times a well nourished patient is observed in the course of his upset and the loss can be predicted. For instance, in hemorrhage blood is lost and only blood need be replaced. In burns only plasma is required. In loss of gastro-intestinal secretions (suction, vomiting, diarrhoea and fistula loss) the fluid lost is isotonic, and must be replaced with saline. In Miner's Cramps, although sweat containing only 0.2% NaCl may be lost in vast quantities, the residual extra-cellular fluid is hypertonic and the kidney excretes the excessive salt. Thus, the loss is actually isotonic NaCl. Similar situations occur in excessive heat and hyperthyroidism. The loss in these conditions may be as high as 3,000 ml. of sweat per day.

Taking water loss or dehydration first, studies show that in extreme dehydration, 6% of body weight is lost. So, since this loss is water, 6% of body weight should be replaced in water over and above the daily fluid requirement of approximately 3,000 ml. This is measured according to the weight in grams. A 70 Kg. man in extreme dehydration requires 4,200 or so ml. of fluid, This volume of fluid should be spaced over 2-3 days so that the circulation can be accommodated, and no excess fluid will be lost in the urine. So, if 4,400 ml. of fluid are given daily for three days, the losses will be overcome.

Up to this point only the amount of fluid required has been discussed, now as to the type of fluid to be given. This involves a knowledge of blood chemistry. The salt requirement is an important factor. To determine the deficit of salt, the serum chloride gives a index of the amount necessary. For each 100 mgms.% the chloride level needs to be raised to reach the normal (560 mgms.%), the patient should be given 0.5 G. of salt/Kg. body weight. This usually corrects the hypochloremia and improves or corrects the hyponatremia. Now, a 70 Kg. man with a chloride blood level of 360 mgms.% needs 0.5 x 2 x 70 =70 gms of NaCl. This can, of course, be given orally or intravenously. If intravenously, he requires approximately 7 liters of isotonic saline.

Now having considered the problem of salt, the remainder of the fluid should be glucose, protein and lactate. At this point it is convenient to discuss glucose and caloric requirement. An average adult requires approximately 2000 cal./day. In fever, hyperthyroidism, severe bodliy exercise etc. the caloric requirement is much greater. 2,500-3,000 cals. are often not too many. The greatest difficulty is to provide the proper number of calories without overloading the circulation with water. One liter of 5% glucose provides 200 cals., thus 10 liters are required to provide normal caloric requirement. A 10% solution provides 400 cals., but even that requires 5 liters and it is a hypertonic solution. The calories provided must be sufficient to prevent expenditure of protein for caloric needs. Recent studies have developed a 10% fat emulsion for intravenous use, and a 5% solution, the latter provides 450 cals., in 500 ml. of solution, and would very easily solve the problem. These at present are not yet widely available, but very soon will be. A second method is available and that is the use of 95% alcohol. It is recommended that 75ml. be placed in a liter of solution. This would provide approximately 500 cals. Thus, to meet the daily requirement, three liters of 5% glucose plus three 75 ml. doses of 95% alcohol provides an adequate caloric intake, 2,100 calories. Three liters of 10% glucose plus two 75 ml. doses of 95% alcohol provide 2,100 class.

The use of intravenous alcohol dates back to 1823. Its chief actions are found to be sedative, analgesic, caloric, vasodilator and antipyretic. It is a cerebral depressant affecting first the cerebrum, then the cord and last respirations. Ninety to ninety-eight percent of the alcohol is completely oxidized. A small percentage is excreted in the urine and a small quantity is excreted through the lungs. The toxic dosage of alcohol is 7.7 cc/Kg., while the dose for production of analgesia varies from 1.5-3.0 cc/Kg. Approximately 15 c.c. of 95% ethyl alcohol can be administered per hour to the average sized adult without producing toxic symptoms. However, until the patient's reaction to alcohol is known, they should be carefully watched.

The restoration of body water and salt will, usually, overcome acidosis or alkalosis. If a satisfactory response is not obtained, and the potassium level is known normal, than 1/6 molar lactate should be used. The number of milliliters of 1/6 M lactate required can be calculated by knowledge of the CO_2 combining power. This is substracted from the normal of 60 volumes %, and multiplied by 1/3 body weight in kilograms. Thus, a man weighing 72Kg. with a CO_2 combining power of 30 vol. % would require—(60 - 30) x 72/3 = 720 ml. of molar lactate solution or 4,320 ml. of 1/6 M. lactate.

Intravenous sodium bicarbonate is recommended by some, but is a very dangerous drug for there is a grave danger of pushing the patient into the opposite condition.

The therapeutic use of potassium is relatively recent and different reports suggest different dosages. The one chosen appears to be a good average.

For prophylaxis, use of 0.1-0. 2% solution of KC1 (1-2 gms./L.), and give no faster than one liter per hour. For serious deficits, give 0.3-1.0% sol. (3-10 gms./L in any type of solution). This should be checked by serial EKG recordings and several serum determinations. This solution is hypertonic and may cause pain in the vein, but no emboli have ever been reported. Potassium can be given by hypodermoclysis in 0.1-0 2% solution without local reaction.

Prophylaxis; 1.8-6.1 gm./day. Average—4.0 grams.

Acute and chronic deficits: The basic 3-6 gms. are given. In acute deficits give three more grams per day. For serious chronic deficiencies give 10-20 KC1/24 hrs. intravenously, or 10 gms. 1V and 10 more orally. As soon as the patient starts to eat there is a much lower requirement.

In cases of diabetic coma undergoing treatment, 12-16 gms. of KC1 should be given during the first twenty-four hours of intensive insulin therapy, 2-4 gms. IV and 10-12 gms. orally.

Serum levels above 5.3 m.Eq./L or renal insufficiency are contra-indications to potassium therapy. If given subcutaneously or intra-muscularly, 150 turbidity reducing units of hyaluronidase may be added to one liter of solution to increase the ease of administration by this route.

Protein deficiency has been divided into two types, acute and chronic. In acute deficiencies the material lost should be the material replaced. In hemorrhage, replace blood, in burns, replace plasma,etc. In these cases, there is no tissue upset, for there has been an acute trauma and no time has elasped to permit removal of tissue protein. So, in acute losses the chief deficit is in the plasma.

In hemorrhage, the only stars to guide us in the treatment are a few lab tests such as the hemoglobin and hematocrit, and also at times visual observation of the loss as might happen at operation. One pint of blood will roughly raise the hemoglobin 6-10%.

In shock, burns and other acute protein deficiencies, the treatment is by choice plasma, for it contains twice as much plasma protein as whole blood. Blood should be given if there is blood loss, but if no blood is immediately available then plasma is very good as a temporary substitute. The amount of protein and fluid loss in shock is difficult to judge, however, a rough but useful index is supplied by the hematocrit. It is suggested that 100 ml. of plasma be given intravenously for every point rise in the hematocrit above the normal of 45.

The treatment of chronic protein deficiency is to eliminate the protein loss and provide a high protein intake. The use of plasma in chronic deficits is discouraged because of expense, availability, and relatively poor results. In several series of cases it has been demonstrated that the proteins injected very rapidly leave the circulation and tracer studies show that 50% is retained to form protoplasm, 5% stays in the plasma and the remainder is excreted in the urine.

The oral route of protein administration should not be overlooked in the therapy of hypo-proteinemia. Large volumes of protein can be given cheaper, simpler, safer, tastier and more efficiently. However, supplementary protein feeding have advanced greatly since the use of intra-venous milk in the 19th century in the treatment of moribund cholera patients.

The object in overcoming deficits is to initiate positive nitrogen balance—that is, more protein nitrogen is given than is lost. If such is the case then the patient is using the excess protein to produce protoplasm, which is the object of the therapy. When the deficiency will be overcome is almost impossible to predict at the onset of therapy, for although the serum protein imbalance may be small, nevertheless the concurrent tissue loss is great, and administered protein is used to replace both. So, at best, the replacement is slow and by no means mathmetical, for a tremendous load of protein will not at an instance replace a chronic loss.

The principle of treatment is to provide protein which can be used for protoplasm synthesis. If this is to be done efficiently, none of the protein should have to be used for caloric purposes. If this be so, then adequate carbohydrate and fat must be provided. Without fat this must be provided by glucose. 4 gms./Kg. of protein can be utilized by man, and none of this protein will be used for caloric needs if 35 cals./Kg. of non-protein foods are supplied. These values are for an afebrile patient at bed rest. Glucose must be given at the same time of the day as protein is given so that there will always be a supply of non-protein energy food available to prevent burning of protein.

The use of intravenous amino-acids have several distinct advantages. Unlike oral proteins, they reach all tissues in high concentration, whereas oral proteins lose much of their amino-acid content to the liver. They also contain a full quota of the essential amnio-acids. When amino acids enter the blood stream, like plasma proteins, they rapidly disappear and only 5% remains after one-half an hour, and about 11% appears in the urine, so that the remainder must enter the tissues and be metabolized.

The most commonly used solution is a 5% Amigen solution containing 5% glucose. It is an enzymatic hydrolysate of casein with added tryptophane. It contains 0.4 % sodium and 0.1% potassium. One liter provides 50 gms. of protein and is relatively non-toxic. On the basis of one gram per Kg. as the daily maintenance dose, it is simple to arrange dosage of this solution.

In conclusion it should be noted that the above therapy should be supplemented with vitamins. The importance of Vitamin C, in Surgery is well established for its effect on wound healing, blood coagulation and relation to the adrenal hormones. It is suggested that for the first two post-operative days, 1000 mgm. of ascorbic acid daily be given; for the remainder of the hospital stay 200-500 mgms. are given daily.

It is also recommended that a combined B. Vitamin preparation, such as Betalin, be given. Vitamin B. deficiencies have been found to occur with unsuspected frequency following gastric operations.

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Summary of the Current Status of Isonicotinic Acid Hydrazide in the Treatment of Tuberculosis

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As is so frequently the case the news-hungry popular press, in its unending quest of the spectacular, has avidly seized upon the advent of this new anti-tuberculosis drug without regard for, or sifting of, experimental evidence. However unfortunate such occurrences may be from the scientific viewpoint, curiosity about IAH is widespread. Solely as an information service, therefore, this resume has been prepared for the readers of this journal. The material has been drawn largely from a release by the Executive Committee of the American Trudeau Society.

IAH is a chemically pure, synthetically produced substance marketed by E. R. Squibb & Sons as "**Nydrazid**" and by Hoffman-LaRoche Inc. as "**Rimifon.**" It is an almost colourless crystal, readily soluble in water. The isopropyl derivative (Hoffmann-LaRoche Inc.—"**Marsilid**") is also being studied for its anti-tuberculous properties. Closely related drugs are pyrazinamide (Lederle Laboratories—"**Aldinamide**") and amithiozone (Schenley Laboratories—"**Tibione**").

IAH has, apparently, a very narrow antibacterial spectrum being ineffective **in vitro** against common gram negative and gram positive pathogens, against certain protozoa and against the influenza virus in mice, although it may possess slight antifungal properties. On the other hand it is bacteriostatic **in vitro** against **M. tuberculosis** H37Rv in concentrations as low as 0.02 to 0.06 mcgm./ml. **In vivo** experiments have shown promising results in arresting the course of disease experimentally produced by infection with virulent human strains of **M. tuberculosis** in mice, guinea pigs, rabbits and monkeys. These experiments have shown that, in the first few months of treatment at least, IAH appears to be approximately the therapeutic equivalent of streptomycin. Observations on the appearance of resistant strains either **in vitro** or **in vivo** are scanty; only time will reveal the extent to which such strains will emerge and what the therapeutic significance of such occurrences will be. However, a definite increase in resistance has been obtained **in vitro** with one strain (BCG).

The toxicity and pharmacology remain to be completely evaluated, but on the basis of available studies, it appears that both IAH and its isopropyl derivative are of relatively low toxicity in dosage ranges which appear to be effective. (Indicated dosage: 3-5 mg./Kg. body weight per day for the average adult in two or three divided doses, orally or parenterally). Excretion is largely in the urine and diffusion appears quide wide, the drug appearing in the blood serum, C.S.F. and pleural fluid one hour following administration. The following toxic manifestations have been observed in man, but of a more or less transient nature even though therapy is maintained:—

1. Constipation
2. Difficulty in starting micturition (males especially)

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3. Increased reflexes
4. Positional hypotension and dizziness
5. Eosinophilia (about 10% of cases)
6. Slight drop in Hb. concentration (0.5-1.0 gm.)
7. Occasional casts, traces of albumen and reducing substances in urine.

Toxic effects on the eighth cranial nerve, impairment of renal or hepatic functions or dermatological manifestations have not been observed to date.

Preliminary observations on the effect of IAH on the course of tuberculosis in man have been limited largely to patients with far-advanced pulmonary disease, extensive tissue destruction, positive sputum and, as a rule, considerable symptomatology, many of whom have failed to respond or would not be expected to respond to other available therapy. In such patients, treated with 3-5 mg./Kg./day for up to five months of therapy (the majority treated for two to three months), the following changes in clinical course have been observed:

1. Reduction in fever, if present, in two to three weeks, in the majority.
2. Reduction in cough, in the volume of sputum, and in the number of tubercle bacilli raised (as determined by smear). No information is available on conversion of the sputum as determined by culture.
3. Gains in appetite, weight, and strength.
4. Some clearing of the reversible component of the pulmonary tuberculous disease by X-ray observation.
5. Initial favorable response has been observed in such non-pulmonary lesions as draining sinuses and fistulae, mucous membrane tuberculosis, and in a very few cases of miliary and meningeal tuberculosis.

At the present time complete information is lacking on many aspects of the therapy of tuberculosis with IAH. Among the unknowns are the following:

1. The mechanism of action of the drug on the tubercle bacillus—whether it is tuberculocidal or tuberculostatic; the effect upon the ensyme chemistry of the tubercle bacillus, etc.
2. The mechanism of action upon the host—basically, the precise toxicity in man.
3. The optimal dosage—the number of milligrams per day; whether it needs to be given every day; the optimal mode of administration.
4. The duration of the therapy—whether its effect is comparable to that of streptomycin and para-aminosalicylic acid (PAS), indicating relatively long courses of treatment, or whether shorter courses may be as effective.
5. The rate of emergence of drug-resistant strains of tubercle bacilli.
6. The effect of the drug upon the bacteriology of the patient—data are lacking on conversion of sputum by culture; the tissue bacteriology after varying amounts of treatment will need to be studied.
7. The question of potential relapse after initial improvement.
8. The question of whether basic systemic therapy of tuberculosis (especially bed rest) can be modified as a result of treatment with IAH.

At present there is no reason to believe that the fundamentals of therapy of tuberculosis should be altered in any way when IAH is employed. Patients receiving the drug should be hospitalized for careful observation. They should be studied in institutions where potential toxic manifestations may be watched for most carefully and where effects upon the course of the underlying tuberculosis may be carefully observed so that suitable alterations of therapy may be initiated when indicated. Routine laboratory precautions should include frequent blood counts and urinalyses, neurologic examinations, and tests for renal and hepatic insufficiency.

The introduction of a new drug in the therapy of tuberculosis is likely to raise more questions for a few years than it will answer. There is no knowledge at the present time that IAH or its isopropyl derivative will accomplish more than has been accomplished with streptomycin and PAS. It may prove to be an additional drug of great value. It may be years before its exact contribution to the therapy of tuberculosis can be assessed accurately. A large reservoir of undetected and untreated cases of active tuberculosis exists, and there is every expectation that, in spite of the more effective chemotherapy of tuberculosis currently available, the need for hospitalization in institutions with qualified personnel and adequate laboratory facilities will increase rather than decrease. There is at present no basis for expecting that IAH, or any other drug available, can safely be counted upon to reduce the duration of hospitalization. Rather, in most instances, at least, it may lead to prolongation of hospital treatment since effective chemotherapy may facilitate desirable forms of therapy not otherwise possible.

Medicine and the Renaissance

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HAD you been in a position to see the saffron glow of the thirteenth century on the horizon after the dreary ages gone before, you would have cheered lustily. All paths of endeavour bustled with new life. A score more universities grew beside Salerno and Bologna. The common people began to think, and first they thought about themselves and their feudal plight. King John of England faced their steel backed arguments, and signed the Magna Charta. The city states of the Mediterranean won their freedom; Venice, Genoa, Pisa became great ports where the man of the street might prosper. Labour guilds were formed. Democracy was taking shape; man was growing independent. He had need of more knowledge. He went to the universities.

Men of medicine were there, too, beginning to question the work of their Arabic teachers who had gotten most of their knowledge second hand through the Latin, from the Greek of Hippocrates and Galen. Might not errors have crept in to distort the writings of the masters? The old manuscripts were sought out.

Many were in the monasteries, carefully preserved but with the dust of ages upon them. New, direct translations were made. Much that Avicenna had added was thrown away. Medicine again felt the scientific urge to observe and investigate. So ingrained was Galen in the minds of his successors that they accepted him before Hippocrates; but here and there, voices inspired with the new freedom of thought cried loudly that even Galen could err.

"Here indeed," you might have cried, "is the new dawn of knowledge, and just in time!" But toward the close of the century Thomas Aquinas died. A few years later Albert Magnus died. Roger Bacon died. They left few disciples. The clamour of voices in medicine faded. Then came the Black Death. Perhaps many of the brave, thinking men stayed at their posts, fought the plague and died. Perhaps the cowards fled, hid, and lived to bear a weakened race. Be that as it may, science lay quiet again for a hundred years.

The true Renaissance, and with it the awakening of medicine, came in the fifteenth century, setting up a great light of art and science that was to grow steadily more brilliant through the years and into our future. Five varied factors brought it into being. One was the plague. Millions had died; working men were scarce. Wages increased and the labour guilds of the thirteenth century took on new power; the workers, new rights. Roger Bacon rediscovered the gun powder of ancient China. Gone at a blast were the feudal walls where the aristocracy gave their vassals protection in exchange for freedom; walls that made for small, cramped towns, full of filth and contagion. In Germany three men, a scribe, a mechanic and a patron, made the printing press. Books became available to all. Reading, once the prerogative of the learned, became everyman's necessity. The Reformation came, and men felt a new freedom of thought, a new urge to individual effort.

And the last factor? Let us call it a spirit that permeated the European air.

Three great figures in medicine arise with the rebirth, an anatomist, a physician and a surgeon.

Andreas Vesalius was born in Brussels, early in the fifteenth century. His father was apothecary to the imperial court. The boy grew up with drugs around him. But he was more interested in their form than their actions, in the people who took them than their effects. A small boy has little place at court. Vesalius spent his time in the fields nearby, studying the plants and how they are made; studying animals, their form and movements, looking inside their dead bodies to discover what made them go. On every living thing he turned his curiosity.

It went without saying that he should study medicine. Paris was the nearest of the great universities. There he met with disappointment. Most important of his early studies was anatomy. He found that while his teachers spoke of human beings, they worked over the bodies of dogs, skipping the passages of Galen they could not understand. He might have gone to Bologna where human bodies had been used since Mundinus; or to Padua, where they were being dissected despite the frequent protests of the citizens. But at Paris was one Sylvius, cold, avaracious, stingy, yet born a teacher. His tombstone tells all who read—

Sylvius lies here, who never gave anything for nothing:
Being dead, he even grieves that you read these lines for nothing.

Mean he may have been but Sylvius began to dissect human bodies, begging them from the many gallows of his day; stealing them if no better way offered. Before long, Vesalius became his dissector. He worked with knife, scissors and pointer while Sylvius expounded from Galen. Let the others sit up on the wooden benches of the amphitheatre, listening, seeing distantly; Vesalius absorbed all with hands and eyes. Galen said the liver had five big lobes. There it was in his hands; he felt it; peered at it. He could count but three large and two very small ones. Perhaps this body was not normal. Could human bodies vary? The next was the same. The heart, the intestines, the muscles—in every part he saw structures that did not jibe with Galen.

A mere student, he voiced his doubts hesitantly and was hushed as one who had committed sacrilege. At twenty-three, professor of anatomy at Padua, doubts became stronger. They tormented him. He could not rest.

A dog's liver had five big lobes. Could it be that Galen had not studied the human body? That he knew only dogs and pigs and cats? Vesalius compared his writing with the anatomy of the lower animals. The truth came to him. Galen had studied animal anatomy—but never man's!

Five feverish years followed. The skeleton he had stolen from the public executioner, he studied till he knew every facet, every irregularity by touch alone. He dissected bodies avidly, seeing, feeling the truth at last. When he had learned enough he wrote his great work, "Of the Structure of the Human Body."

This should have brought him fame, and peace to continue his studies. It brought instead, storms of abuse. Sylvius, his old teacher, attacked him bitterly. Most of his pupils turned against him; his confreres derided him.

That anyone should dare to question Galen! For a time he fought back, but with a sore heart. He had satisfied himself. If they wished to continue in their ignorance, be it their own misfortune. A position offered as court physician to Charles of Spain. Remembering the happy days of his boyhood, he went back to court life.

But there was to be no more peace for Vesalius. Criticisms followed him, torturing blows. His opponents seized on his errors—no man could cover so vast a field without them. He tried to fight back, but a palace is a poor laboratory. Sadly he went on with his care of the sick. The story is told of a young nobleman who died of an obscure malady. Vesalius got permission to open the body. He could learn more of the disease, and his beloved anatomy. He made wide dissections. He came to the chest, opened it—the heart was still beating! He had killed a man.

The Inquisition freed him of manslaughter and he fled to the Holy Land, to do penance. In his meditations a letter reached him. It was from Padua, inviting him back to the scene of his great labours. The nature that shrank from fighting argued with the nature that loved the truth, and lost. "Once more," he thought, "I shall be able to study that true bible of the human body and the nature of man." With a new resolve he turned westward.

Over the Ionian sea came a storm. Vesalius' ship tossed, creaked, struggled and succumbed. The man who was going back to his world reached the desolate island of Zante. There, alone, he died of exposure.*

To his few faithful pupils fell the work of carrying on his struggle, and years later men wrote, "Vesalius, who's Vesalius? This Fallopius it is who dragged the Galen-idol down."

Because Galen did fall before the onslaught of truth seekers. And foremost amongst them was Fallopius, a student at Padua who found not heresy but wisdom in the words of Vesalius. Nor could the schools of medicine take to themselves all the credit.

There was an artist who thought little of drugs or the suffering of humanity. He lived before Vesalius. His name was Leonardo da Vinci and he loved beauty. For his sketching, painting, and sculpturing he sought it everywhere, in the heavens, in the forests, in the human body.

Leonardo rediscovered the Greek appreciation of the human form. He realized that to model the body in its perfect proportions he must study it. He dissected bodies. No ancient medical text was his guide. His were questions to be answered only by direct observation. What muscle made the roundness of the shoulder? How did the curve of the breast, the fullness of the thigh, the tapering of the ankle come to be?

Leonardo was scientist and inventor too. He invented guns that did not shoot well, aeroplanes that did not fly. He could not pause on the outer thresholds of a wonder house as rich as the human body. He moved deeper than muscles, into the abdomen and chest. He did not have the mental anguish of Vesalius trying to reconcile his work with the past. What cared Leonardo for Galen? He was an artist. He simply told the truth of what he saw, told it accurately in a new language.

*In that year was born in England a man who wrote, "Throw physic to the dogs; I'll none of it." This was William Shakespeare.

This was the art of illustration. Men had made pictures before, but never used them seriously, accurately, the way Leonardo did, to teach the fine details of anatomy. He made good music; as a statesman he made good laws; he built canals; he painted the Last Supper and the Mona Lisa. He was the most versatile man who ever lived.

Columbus had returned from America proud of discovering what he thought was a new route to the Indies, when the great physician of the Renaissance was born. This was in a valley among the Alps of Switzerland. Near his home, through a deep channel in the rocks, a river roared, echoing against the lofty hills around. Through his vigour and personality as much as his ability, his voice was to echo over the whole of Europe.

His father was a doctor, Wilhelm Bombast von Hohenheim, who served the simple Alpine peasants. The son was christened after Theophrastus who, you may remember, was a great botanist back in the Grecian days, and whose works had just been rediscovered. When he Latinized his name, as did all who studied at the universities, he became Phillipus Aureolus Theophrastus Bombastus Paracelsus.

Paracelsus and Vesalius were as different as any two men could be, more different than the early court home of the anatomist and the simple country life of the physician. Paracelsus, too, sought the lore of nature in the mountains about him, and in the simple cures and magic of the country people who were always to be his friends. He, too, had a great curiosity. He lacked the scientific spirit of Vesalius, was more interested in results than causes. If the crushed bloom of a poppy plant, growing near his home, was used by an old neighbour to relieve his aching head, Paracelsus did not pause to wonder why. It worked, that was enough. He ran to tell his father.

Father Hohenheim moved to a new village, near a mine. The boy found fresh interests. He learned of the different metals, how they could be fused to form new substances. He absorbed chemistry and engineering. Workers delved into alchemy, hoping to change irons and bronzes into gold. Paracelsus watched, spellbound, confident that some day the discovery would be made. It was said, too, that somewhere was a universal panacea, a medicine to cure all ills. He would discover that, when he was a doctor.

He went south to Italy, where medicine and all learning shone brightest, to the university of Ferrara. His teacher, Leoniceno, had described a new disease, a "love-pestilence", it was called. Its victims suffered pain, deformity, insanity, and death. It was said to have been brought from across the sea by sailors of Columbus.

Paracelsus studied faithfully and took his doctor's degree. But as he pored over the tomes of the masters, doubts kept bobbing into his mind, clouding the pages, turning his thoughts away. A fine manuscript full of well turned phrases, but had anyone ever been cured by it? Was it based on as sane, practical observations as the peasant remedies of his mountain home? He wondered, and returned to the page with a new resolution. From these books he must win his degree. But after that . . . .

The whole world would be his postgraduate school. All over Europe and even far into the East he travelled. He lived with all sorts of people, not a visitor but a companion. He drank with them in the taverns; treated them when they were ill, employed their own medicines and tested them against his knowledge of chemistry and the arts. He knew gypsies, barbers, midwives, farmers, miners, builders. They all admired him, his generosity to the sick, his loud talk, his quick temper, his open attacks on all he could not understand, in a day when to speak against authority might mean death. In exchange for his companionship they gave him their secrets, superstitions and truths together; and, as best he could, Paracelsus separated wheat and chaff.

After ten years of wanderings, gathering experiences, he felt a growing urge to spread his new doctrines. Back to his loved mountains he came, to the university city of Basel. Already his fame had preceded him, and he was appointed city physician. Here was opportunity. Publicly he set a great bonfire. "Here is Galen!" he cried; and "Here is Avicenna!" And he hurled their books into the flames.

Throughout the country pamphlets appeared. "The art of medicine," they proclaimed, "has decayed . . . Who does not know that most doctors today make terrible mistakes, greatly to the harm of their patients? Who does not know that this is because they cling too anxiously to the teachings of Hippocrates, Galen, Avicenna, and others? . . . Day after day I publicly elucidate for two hours with great industry and to the great advantage of my hearers books on practical and theoretical medicine, internal medicine, and surgery, books written by myself. I did not, like other medical writers, compile these books out of extracts from Hippocrates or Galen, but in ceaseless toil I created them anew, upon the foundation of experience, the supreme teacher of all things . . . Come with a good will to study our attempt to reform medicine. Basel, June 5th, 1527." It was signed by Paracelsus.

This was a declaragion of war! The professors of the University fought with every verbal and political weapon they could find against this charlatan, vendor of peasant lore, this medical gypsy who dared to attack their teachings and their idols. As fighters they were no match for Paracelsus; and, if he did not win a complete victory still the world was richer for his wounds.

For the many ancient theories he discarded, Paracelsus drew up new ones, equally bad. He wrote imaginatively of mysterious forces that govern man. He attacked the stargazers, all the while teaching the influence of the heavenly bodies. He derided witchcraft, but believed in gnomes and elves. He was groping desperately for a new creed. Having worked out one that could not have been altogether to his satisfaction, he hung it from a mast and did not let it interfere too much with the practical business of getting results.

Surgery, he said, was an integral part of medicine. He worked to lift the art above the mountebanks and barbers. He taught that nature healed wounds—not oils, balsams and meddling. Thus, without understanding it, he proclaimed the germ-free doctrine of Lister, because if interfering, bacteria-laden fingers are kept away from wounds often otherwise clean, the natural powers of repair in the tissues will bring healing. He told of opium to relieve pain, of mercury to heal the love-pestilence, of lead, sulphur, iron, arsenic, copper sulphate—all drugs active in the medicine of today.

His lectures were not in classical Latin but in the German of his people. Everyone might listen and understand. This horrified his university opponents almost as much as what he said. If scientific words were lacking, he created them. He thundered and the mountains reverberated with his wisdom. His stay at Basel was brief. He could fight the university, but a quarrel with civic officials over a fee turned all authority against him. He returned to his wanderings, this time teaching as well as learning.

He was in a tavern, holding forth on the merits of a new cure. Opinions of his listeners differed. Voices grew louder, turned to blows, and Paracelsus died, fighting with both fists for medicine.

At the same time Fracastoro, poet, astronomer, physician, sat on the verandah of his Italian villa, sipped wine, peered at the stars—he had an upturned nose, it was said, from studying the heavens—and basked in the admiration of his followers. He studied and wrote about fevers; showed the many fine differences between them, and how they might be distinguished. Typhus, with its regular, deadly toil, he described so that it could be recognized and perhaps controlled.

He wrote an imaginative story of the love-pestilence, giving it a mythological origin, but telling accurately its signs and symptoms. Like his classical forebears, he wrote in verse. He called the disease, after the hero of his piece, syphilis. To the north, he had heard of a coarse, noisy fellow, with many new ideas on medicine. He wondered, mildly, that any man could bring himself to fight over a subject on so high a plain as this great art. Life, wine and medicine were sweet to Fracastoro.

Ambrose Paré was a barber surgeon. He had been a barber's apprentice in the provinces before he came to Paris to study surgery. France was at war, an occupation that engaged her attention and that of her neighbours much of the time. The frank, earnest face, the wise eyes of the young surgeon appealed to the French Marshall Montejan. Paré received a commission.

Gunpowder had brought sad changes in war. Gone were the clean wounds of the swordsmen. In their stead bullets tore great ragged holes. Tattered tissue, with damaged blood supply, meant dying tissue, a rich food for germs. Infection was commonplace. The theory of "laudable pus" won new followers.

Paré tells of an early war experience, of finding three men, wounded beyond hope, in a barn. "Beholding them with pity," he writes, "there came an old soldier who asked me if there was any way of curing them. I told him no. At once he approached them and cut their throats gently and without anger. Seeing this great cruelty, I said to him that he was an evil man. He answered me that he prayed God that when he should be in such a plight, he might find someone who would do the same for him."

The young surgeon thought of this many times as he dressed the wounds of his soldiers with boiling oil. This was the prescription of the Italian surgeon Vigo, who taught that all gunshot wounds were poisoned wounds; that boiling oil, poured into the open flesh was the one means of saving life. Perhaps the old soldier had been not far wrong.

One day when fighting had been fierce, casualties heavy, the supply of oil ran out. Paré fretted and dressed the wounds with a salve he chanced to have. At least he had spared the men tortue. But he worried sorely.

"Last night" he says, "I could hardly sleep for continually thinking about the wounded men whose hurts I had not been able to cauterize. I expected to find them all dead next morning. With this in view, I rose early to visit them. Greatly to my surprise, I found that those whom I had treated with the salve had very little pain in their wounds, no inflammation, no swelling, and they had passed a comfortable night. The others, those whose wounds had been treated with boiling elser oil, were in high fever, while their wounds were inflamed, swollen, and acutely painful. I determined therefor, that I would no longer cauterize the unfortunate wounded in so cruel a manner."

Gunshot wounds were not necessarily infected! Another error had been righted. Soldiers all over Europe came to bless Ambrose Paré.

He lacked the education of Vesalius or Paracelsus. He knew no Latin and could read Galen and the masters only in rough translations. It would be presumption, he thought, to criticize what he could not understand. But if the classics did not bear the test of practice, he need not follow them. His sound judgment told him that.

It guided him when he treated the man with the burned face. Use soothing balms, said the classics. Chopped onions and salt are better, said an old French grandmother. Paré dressed the right side of the blistered face with oil; the left with onions and salt. It was the experimental method, cropping up again. The left side healed first, and Paré discarded the balm for the onion.

But he could find good in Greek surgery, too. The medieval cautery for stopping bleeding was almost as cruel a therapy as the boiling oil had been. What was more important, it did not always work. Sometimes, through the stench of burning flesh and the screams of the patient, blood still poured out, and life with it. Pare put away the cautery and tied the bleeding vessels with the ligatures of the Greek surgeons.

As an obstetrician he saved lives with simple cleanliness and care. He devised podalic version for the delivery of the infant in difficult cases.

In surgery he was gifted with skilled hands. He devised new operations and improved the old, basing his work on the fresh anatomical developments of Vesalius. But of plastic surgery he disapproved. God intended noses to be left as they were, he thought, hooked or flat. Perhaps it was partly through his influence that the body of plastic surgeon Tagliacozzi was exhumed and removed to unconsecrated ground.

The war that drove Vesalius from Paris brought fame to the barber surgeon. He became surgeon to the king. The haughty College of Saint-Come made him master surgeon, and men came to feel that barber surgeons should be given better opportunities for study, when such as Paré was of their ranks. War came again, and he was off with the troops.

At Hesdin he was taken prisoner. Had the enemies' casualties not been so heavy Paré might have died in his cell. But they needed a surgeon. They must have peered at the great man through the bars, at the kindly face with the wide eyes, heavy nose and pointed beard, wondering if he could be trusted to stand over his foe with a knife. He looked so sincere . . .

From patient to patient Paré moved. He operated. His skill was beyond anything the enemy had yet seen. In the end, regretful but thankful, they gave him back to France. He had cut his way to freedom with a scalpel.

To the end of his long life Ambrose Paré persisted gently but with scientific force that the wound left alone and clean would unite. "I dressed his wounds," he would explain, "God healed him."

Two of the greatest men of this epoch were physicians who added to the art without prescribing a drug or even attaining mediocrity in medicine. They were Copernicus and Galileo.

Copernicus' thoughts sped beyond the ills of our planet, out into the heavens. The age-old, egotistical idea that the earth was the centre of the universe, with sun and planets turning round it, he thought was wrong. The earth moved around the sun, he thought, as did the other planets. Then he put his thoughts to work and proved it.

If the stars were really earth-like planets, or distant suns, how could they influence man's actions as the astrologers taught? Men began to ask questions, and medicine shook free a bit more of its superstitions.

Galileo studied medicine to please his father, while heart and mind were full of nature's more basic laws of matter. You remember his experiments on the leaning tower of Pisa? He laid down many of the fundamental laws of physics. He developed the work of Copernicus and added more proofs. With others, he brought Roger Bacon's great efforts back to life. He played a part in the invention of the telescope, bringing distant worlds nearer.

If planets and stars could be brought close by these bits of glass, might not small things be made bigger? The microscope followed the telescope, so that with man's growing curiosity the minute germ world might be opened to him.

Medicine had need of such workers as Galileo and Copernicus. As in the medieval ages, superstitions and quackery held sway. Vesalius, Fracastoro, Linacre, the great English physician, Leonicenus and a few others alone were scientists. The others, who would have been your doctor and mine, still confused sound clinical observations with signs from the heavens; still mixed magic with their pills.

Wandering surgeons and magicians inflicted their ignorance and rascality on the public. University trained "surgeons of the long robe" wasted the time they might have spent in study by bickerings with the lowly, short-robed, barber surgeons.

With the Reformation came religious prejudices. Servetius demonstrated the circulation of blood through the lungs, became involved in a religious squabble and was martyred by Calvin. Galileo was brought to Rome, imprisoned and forced to recant his observations on the universe.

Cities had yet to spread much beyond their walls. They were dirtier than two centuries ago.

Motherhood and the care of the new born seems to have been beneath the dignity of the profession since the times of the Greek Soranus. Obstetrics was usually left to the midwives. If all went smoothly, very well. If complications set in, mother or baby, often both, perished. The birth rate of Europe was at least as high as at any time in its history; but so many infants died, so frequent and deadly were the plagues, that for two hundred years the population stood still.

The doctrines of Vesalius, Paracelsus and Paré grew lustier amongst their followers, spread slowly, surely, down the ranks. The world was yet to reap the benefits of their greatness.

Reminiscences

BERTHA OGILVIE ARCHIBALD

Pharmacist (Retired)

TRANSITION—the past, present, and what is to come! That sounds like a discourse on Homiletics, but this article is far from that.

As I was walking down Morris St. (known now as University Avenue) I thought of the happy hours I had spent in the Old Forrest Building—Professor Moore and his wonderful lectures in Biology! In those days the building had a very imposing tower, but now it looks as if it had been decapitated. Its dignity has departed. In front of the building, as I walked by, I noticed here and there little white parking signs with the names of the various professors neatly printed thereon. Dr. Bell, Hayes, Saunders. Parking places! I smiled to myself as I recalled the parking lots in front of the old Victoria General Hospital. On each side of the main entrance were parking signs in the form of rather sturdy whitewashed hitching posts, chewed and mutilated by the horses. There was no need of printed signs here, as each horse knew his post. There they would stand attached to their carriages, in sunshine or in rain, waiting for their masters. Some pawed the ground with impatience—others dozed, and some even quarrelled.

Dr. Montague Albert B. Smith of Dartmouth drove rather a large horse and a high-topped buggy, and in attendance would be a coloured boy, who kept horse and buggy in excellent condition. Dr. George Campbell also had a high-topped buggy, and drove a red horse. Then there was Dr. Murdoch Chisholm and Dr. Norman MacKay, who both drove rather smaller horses, dark in colour, and open carriages somewhat similar, except that Dr. MacKay being a very large man, had to have his carriage made to order. How it would sag to one side as he drove along, like the listing of a ship. These two men were rather intimate in their earlier years, having at one time roomed together, but as years passed the bond of affection weakened. One day one of the internes changed horses at the hitching posts. Now Dr. Chisholm was a most astute man and one of the cleverest surgeons of his day, but at times was a little absent-minded. He stepped out of the hospital into what he thought was his own rig, and drove down to the Infirmary, which was then on Barrington Street. Dr. MacKay came out soon after and perceived what had happened. No doubt if that interne is still living he will remember the scene that followed! I may say that Dr. MacKay also was a great surgeon, and was among the first in the Province to perform the operation of Thyroidectomy.

There were also in those days hitching posts at the old North St. Railroad Station. Dr. Chisholm would tell how one day he fastened his horse to one of these posts and absent-mindedly boarded the train, having received an out-of-town call. As all the trainmen knew his rig, one of them went to the rescue of the horse. Then came the cars! There was Dr. Fred Lessel with his little Ford, Dr. J. G. MacDougall with his blue Packard, Dr. H. K. MacDonald with his palatial Chev., Dr. Edward Hogan, and many others. Not least was Dr. M. A. B. Smith with his Franklyn, and its three musical horns. One day just as Dr. Evatt Mathers drove past the Dispensary window one of the internes remarked: "Look, Miss Archibald, that car cost $5,000.00, just the price of our old farm down home." Soon all the doctors had cars, and the last horse-drawn vehicles were those of Mr. W. W. Kenney, the Superintendent, and the Ambulance.

The Ambulance was a rather large express wagon with a high covered-in top, which was painted yellow with a large cross on it and in huge letters the words "The Victoria General Hospital Ambulance." The best description of this contrivance, and I have heard many, was that given to me by the late Dr. Frank Chute of Canning. Words fail me to repeat it, but his habit of Biblical quotations even entered into his description of transporting patients to the hospital therein.

Every morning George Horne the Ambulance driver would drive either Dr. Puttner the old Pharmacist or Mr. Kenney, (and sometimes both as the carriage had a 'dickey seat') into town. One day Mr. Kenney said to me "I seem to be the only person in town driving a rig. Do you know I feel rather self-conscious about it."—The rig did not appear quite so often after that. Perhaps he took a taxi.

Shortly after this the last hitching post was removed from in front of the Dispensary.

I have somewhat drifted from my text, but I hope that I will live long enough to see every one of our young doctors with their helicopters, and that cars in front of the new Victoria General Hospital will be as much of a curio as the old horse and buggy of long ago.

Announcement

POST-GRADUATE COURSE IN TUBERCULOSIS

Toronto Hospital for Tuberculosis, Weston, Ontario.

October 21, 22, 23, 24; 1952

The National Sanitarium Association is arranging a four-day post-graduate course in tuberculosis for physicians and surgeons to be held for 3 days at the Toronto Hospital for Tuberculosis, Weston, with an additional day to include the programme for the Annual Meeting of the Ontario Laennec Society to be held at the Royal York Hotel, Toronto. Members of the Faculty of Medicine at the University of Toronto as well as other physicians who are authorities in tuberculosis, will participate in the papers to be delivered as well as in the discussions.

Subjects to be considered will include advanced knowledge of the bacteriology and pathology of tuberculosis, epidemiology, differential diagnosis of pulmonary and other forms of tuberculosis, the medical and surgical treatment of the usual forms of tuberculosis encountered by physicians and surgeons engaged in sanatorium practice, private practice in internal medicine, thoracic, orthopaedic, and genito-urinary surgery as well as in public health and allied fields.

Registration Fee for the Course will be $40. payable to the National Sanitarium Association. That amount will include attendance at all sessions at Weston and in Toronto, transportation between Toronto and Weston, 3 luncheons and 1 dinner. This fee should accompany each application.

Each person attending should arrange and reserve living accommodation as required, in Toronto. Minimum of 20 and maximum of 50 applications will be accepted. Early application is desirable.

PROVISIONAL LIST OF SUBJECTS

POST-GRADUATE COURSE IN TUBERCULOSIS

Toronto Hospital for Tuberculosis, Weston, Ontario

October 21, 22, 23, 24; 1952.

1. Epidemiology of tuberculosis.
2. Bacteriology of chronic pulmonary diseases.
3. Pathology of tuberculosis.
4. Allergy, Immunity and B.C.G. in tuberculosis.
5. Screening of groups for pulmonary tuberculosis.
6. Body section radiography.
7. Differential diagnosis of pulmonary tuberculosis.
8. Pleurisy with effusion.
9. Sarcoidosis.
10. Pneumoconioses.
11. Pulmonary Function tests.
12. Bronchoscopy and bronchography.
13. Diagnostic classification in tuberculosis.

14. Artificial pneumothorax.
15. Artificial pneumoperitoneum.
16. Chemotherapy in tuberculosis.
17. Tuberculosis meningitis.
18. Differential diagnosis and management of rounded intrathoracic lesions.
19. Phrenic paralysis.
20. Thoracoplasty.
21. Pulmonary resection.
22. Pulmonary decortication.
23. Genito-Urinary tuberculosis.
24. Pathogenesis of tuberculosis of spine.
25. Tuberculosis of spine.
26. Tuberculosis of hip.
27. Chemotherapy in the treatment of bone and joint tuberculosis.
28. Tuberculous adenitis.
29. Rehabilitation of the tuberculous patient.
30. Clinical-pathological demonstrations.
31. Undergraduate and post-graduate teaching of tuberculosis.
32. Symposium—"What would you do for this patient?"

Afternoon programme of Ontario Laennec Society Meeting.
Evening programme of Ontario Laennec Society Meeting.

NOTE—Following each presentation or group of presentations there will be a period for discussion.

Mrs. William Johnstone, 1764-1848

KENNETH A. MACKENZIE, M.D.

MY interest in this family began while I was collecting information on the older physicians of Nova Scotia. I was amazed to find the names of eighteen physicians on one family tree Two others died while studying medicine and three others were brought in by marriage. Of the group, fifteen were born in Nova Scotia and thirteen practised in the Province. This record has not been equalled by any other family. It may be noted here that in the same family there were many who became prominent in law, politics, church, education, business and military life. It seems fitting that my narrative should pay special attention to the lady who, without doubt, was the ancestor of more distinguished citizens of this province than any other person. This lady, born in Georgia, lost her mother when she was ten years of age, married at fifteen and a half, was the mother of ten children at thirty and a widow at forty-three. She came to Nova Scotia in 1810 and for thirty eight years—half of her adult life—shared the joys and sorrows of her numerous progeny in her adopted country. She is buried in Camp Hill Cemetery.

Elizabeth Lightenstone was born on May 28th, 1764 at a place called Little Ogeechee, near Savannah, Georgia. Her grandfather, a clergyman, was born in England of German stock. The original name was Lichenstein, later anglicised to Lightenstone. He conducted a school in Russia and the father of Elizabeth was born at Cronstadt, Russia. Later he migrated to Georgia. Elizabeth, then known as little Betsy, was brought up in comfortable circumstances and had a good education. After the death of her mother, she was looked after by her father and aunt. Her early peaceful and pleasant years were ended when the Revolutionary War, starting in Boston spread to the Southern States. For some years she was obliged to move frequently to escape the fury of the rebels. The male members of the family of military age were drafted into service and her father and husband-to-be narrowly escaped capture in1776. They were conveyed in a British ship to Halifax and later returned to New York where Mr. Lightenstone was given a commission in the Quarter-Master General's department and Mr. Johnstone became a Captain in the New York volunteers. In 1779 Miss Lightenstone secured passage to New York and was a guest at the Johnstone home. It was here that she met Mr. Johnstone, described as a dashing, handsome and brave cavalry officer. After a short courtship, they were married, the bride not yet sixteen years of age and her husband ten years older. During the next few years, she braved the perils of war, was exposed to shot and shell and had to make several forced moves, in turn to Savannah, Charleston and St. Augustine. At each of these places a child was born. When the war was over, the family had a choice of going to any British possession and selected Edinburgh. In 1784 Mrs. Johnstone sailed for Edinburgh in a small leaky ship which was so damaged by storms that it was delayed for a week in Cork before proceeding to Edinburgh via Greenock. Mr. Johnstone travelled by another ship and in the next few years he completed his medical education.

Some reference may be made here to Dr. William Martin Johnstone who never practised in Nova Scotia. His father was Dr. Lewis Johnstone, President of His Majesty's Council in Georgia and a Governor and Superintendent of Police. His grandfather was a Dr. James Jonstone, R.N., a descendant of the distinguished Annandale family which claimed that they could trace their genealogy back to the time of William the Conqueror. William Martin commenced his medical studies under Dr. Benjamin Rush, one of the signers of the "Declaration of Independence." His studies were interrupted by the war and it was not possible for a loyalist to resume his studies in the New Republic, hence his move to Edinburgh. After graduation he had a chance to enter the Indian Medical Service but preferred to return to Jamaica where he established a good practice. His family had increased to ten. Conditions on the island were not healthy, yellow fever was prevalent and educational facilities were poor. In 1794 Mrs. Johnstone and her family sailed for Edinburgh intending to be away for a year, but it was five years before she returned. In the meantime, her husband became ill and had to give up practice. In 1801, Mrs. Johnstone first visited Nova Scotia with her father and three daughters, one of whom married Thomas Ritchie of Annapolis. In 1807, she was summoned to Kingston on account of her husband's serious illness. He died before her arrival. The next three years were spent in Kingston settling her husband's affairs. She then came to Nova Scotia where she spent the remaining years of her life.

Mrs. Johnstone had ten children. Three died in childhood and three died in early adult life. The four who came to Nova Scotia and were the progenitors of many distinguished Nova Scotians are Dr. Lewis Johnstone, Sr., Mrs. Thomas Ritchie, Mrs. W. B. Almon and Hon. J. W. Johnstone. This paper deals only with the medical members of the group.

Descendants of Dr. and Mrs. William Martin Johnstone in the Medical profession:

SON		
Dr. Lewis Johnstone, Halifax & Wolfville	1784-1867	Edin. 1810
GRANDSONS		
Dr. W. J. Almon, Senator, Halifax	1816-1901	Edin. 1838
Dr. Lewis Johnstone, Jr., Stellarton	1821-1899	Penn. 1845
Dr. Lewis Johnstone, Sydney Mines	1826-1887	Edin. 1850
GREAT GRANDSONS		
Dr. W. B. Almon (II) Confederate Army	1838-1865	UNY
Dr. Thomas R. Almon, Halifax	1943-1901	P. & S. 1867
Dr. E. J. Johnstone, Sydney	1958-1932	Bell. 1875
Dr. Lewis Johnstone, Sydney Mines	1960-1932	Bell. 1886
Dr. Lewis J. Lovitt, Bear River	1966-1942	UNY 1891
Dr. Lewis G. Hunt, London	1870-1928	Edin. 1901
Dr. Philip Weatherbe, Halifax	1875-1950	Edin. 1901
Dr. Lewis J. Weatherbe, London	1865-1944	Edin. 1892
Dr. John Ritchie, South Africa		
GREAT*GREAT GRANDSONS		
Dr. W. B. Almon (III), Halifax	1875-1940	Dal. 1899
Dr. S. R. Johnstone, Halifax	1888-	Dal. 1909
Dr. Jas. Ritchie Robertson, Glace Bay	1900-1936	McGill 1925
Dr. John Ritchie, South Africa		
Dr. James Ritchie, South Africa		

Two medical students may be added: Andrew Lichenstone Johnstone, son of Dr. & Mrs. W. W. Johnstone; James Johnstone Parker, son of Dr. D. McN. Parker and a great grand son of Dr. & Mrs. Johnstone.

The following medical men married into the Johnstone family. Dr. D. McN. Parker married Miss Elizabeth Johnstone, daughter of Hon. J. W. Johnstone.

Dr. W. B. Almon, M.L.C. married Laleah Peyton, daughter of Dr. and Mrs. W. M. Johnstone. The Almon family has been published in the Bulletin, Feb. 1951.

Dr. Arthur S. Kendall, M.P. of Sydney married a Miss Crawley, granddaughter of Dr. Johnstone, Sr. of Wolfville.

Biographical Notes on the Above

Dr. Lewis Johnstone, Sr. brother of Hon. J. W. Johnstone was born at St. Augustine, Florida, whither his mother and two small children fled to escape the fury of the rebels. He received some of his early education at Queen's Ferry, in Scotland. In 1801, he came to Jamacia with his parents and engaged in business for about five years. Having decided to study medicine, he proceeded to Edinburgh where he completed his medical training in 1810. For a few years, he practised in Jamaica. In 1822, he came to Nova Scotia and settled in Halifax. While here, he lived on Dresden Row and his home was called "Annandale" after the ancestral home of the family in Scotland. From this, Annandale Street received its name. While in Halifax, he played a conspicious part in an epidemic of smallpox and typhus which caused the death of eight hundred people in a population of eleven thousand. This was considered meritorious service and he received the special thanks of the Legislature. In 1823, he accompanied his mother to England, where she had a cataract operation by Dr. Lawrence, a distinguished London Ophthalmologist. In 1839, he moved to Wolfville where he practised as long as his health permitted. He was married twice and had eighteen children and through them became the ancestor of many prominent citizens in the Province of Nova Scotia.

Dr. Lewis Johnstone, Jr., son of the above, after graduating from Univ. Penn. in 1845 practised for over fifty years in the town of Stellarton. He enjoyed the confidence of a large number of patients and took an active part in community affairs. He was a prominent Mason.

Dr. Lewis Johnstone, son of Hon. J. W. Johnstone, the distinguished Nova Scotian politician, practised in Sydney Mines during his active life. His two sons became physicians. They are Dr. E. J. Johnstone, Sydney, who practised in Sydney for over fifty years and Dr. Lewis W. Johnstone, Sydney Mines, who for many years was a valuable member of the Dominion Parliament.

The Almon members of this group have been recently the subject of a paper in the Bulletin, Feb. 1951.

Dr. Lewis J. Lovitt, of Bear River, practised for over fifty years and was for many years a member of the Dominion Parliament.

Dr. Lewis Hunt, born in Nova Scotia, spent all his professional life in England; at first in Sheffield and later in Richmond a suburb of London where for many years he was Mayor. In 1896 he contributed a paper to the Maritime Medical News.

Dr. Philip Weatherbe and Dr. Lewis J. Weatherbe were sons of Sir Robert Weatherbe who married a daughter of Dr. Johnstone of Wolfville. Dr. Phillip died in Halifax in 1950 and his brother practised in England.

Dr. James Ritchie Robertson practised in Amherst and Glace Bay. He was related to the Johnstones on both his father's and his mother's side, both descendants of a Lewis Johnstone, Sr.

The Ritchies are not well known in Nova Scotia. Dr. John Ritchie was born in Nova Scotia, served in the British army and settled in South Africa. His two sons, both physicians, are in South Africa.

Dr. Stephen R. Johnstone, well known radiologist in Halifax is a great grandson of Hon. J. W. Johnstone and is the sole representative of this medical group still living in Nova Scotia.

X-Ray Hazards And The General Practitioner

H. R. Corbett, M.D.

THIRTY years ago Carmen, of the Mayo Clinic pronounced these words of caution: "That the practice of radiology entails certain hazards to health and life was forcibly impressed on its practitioners many years ago, but not until a large number of radiologists had suffered or died from radiodermatitis and cancer . . . was it learned that this danger could be averted by the ordinary precautions which are now habitually employed. So effective are these methods in the prevention of skin lesions that the radiologist has apparently been lulled into a false sense of security from all harm. His serenity is not due to ignorance, but to an unwarranted optimism in the face of his abundant knowledge. He is fully aware that intact skin may cover a multitude of internal changes wrought by irradiation. These changes are the expected result of radiotherapy; they are found at the necropsy table, are substantiated by experiments on animals, and are demonstrated conclusively by the microscope and the test tube."

The increasing use of diagnostic radiology in hospitals, clinics and physicians' offices warrants repeated warnings of the inherent dangers. The ill effects of fluoroscopy to the operator have been long known and publicized but too often attention has been given only to direct radiation, while the damage from secondary radiation has been commonly overlooked.

The nature of x-radiation damage is such that constant caution is justifiable for the following reasons:—

(1) The physician feels he is doing no harm because he sees no damage to his patient, nor immediate danger to himself.

(2) Radiation damage is so insidious and does its harm so stealthily that it is necessary to carry on educational programs constantly.

(3) The final outcome of those known cases wherein accidental overexposure has occurred is so serious that it is necessary to have a repetition of the warnings.

The scope of this article is limited primarily to the general practitioners' use of x-ray apparatus equipped for fluoroscopy and its aim is to show the dangers of indiscriminate x-radiation. Those who would attempt to use x-ray apparatus owe it to themselves, their patients and technicians to have an understanding of the basic biological principles involved. Without such knowledge there is a grave possibility of the operator acquiring the habit of poor technique or other faulty practice that could result in disaster. As already stated, radiologists who should be fully aware of these basic principles must be on constant guard as familiarity often breeds contempt.

The dose in roentgen units which may be administered to a human without significant ill effects has been estimated at successively lower levels within recent years. Ten or fifteen years ago it was thought that the safe level for entire body radiation would be 1.0 roentgens per week, now that amount has been decreased to .3 roentgens per week, a value generally accepted. The issue is no longer how much radiation can usually be received without apparent ill effects, but how little may be administered without the production of definite changes either immediately or remotely. A discussion of the nature of radiation hazards is necessary, because in the past few years there has been a gradual change in the concept of what ionizing radiation will or will not do.

Direct exposure to the rays during fluoroscopy exceeding the limits of safety will obviously affect the patient as well as the operator. If the patient has been subject to previous examination within the immediate past, the danger will be infinitely greater due to cumulative dosage.

Overexposure to direct radiation will be characterized by a localized erythema within 24 or 48 hours followed by teleangiectasis and subsequent ulceration of the part.

The effects of repeated exposures over the years are usually localized to the hands which develop a radiation dermatitis with brittle and cracked nails, and subsequent necrosis of the terminal phalanges which may necessitate surgical amputation eventually. Statistics have shown that the mortality among radiologists and radiotherapists due to leukaemia is disproportionately high.

The use of the fluoroscope by the medical profession is not without danger to the patient and operator especially in the reduction of fractures with manipulation of the fragments exposed to the direct rays. Watson-Jones has advocated the checking of results with radiographs in view of the attendant dangers associated with fluoroscopy.

Removal of opaque foreign bodies under flouroscopic observation is another source of danger. The operator's attention is concentrated on endeavouring to secure the object and he does not realize that the time limits of safety have expired. With repeated attempts and fluoroscopic checks both doctor and patient may easily go beyond the alloted quota of "R" units.

There have been numerous safety codes established by authorities in order to protect technical personnel and patients from the dangers of x-rays. As early as 1913 the German Radiological Society published a pamphlet on protective measures. Today we have the International Radiological Committee on safety standards and specific recommendations have been adopted by hospitals, radiologists and manufacturers and they cannot afford to be ignored.

To summarize, the purpose of this article is to point out the hazards which may exist when the personnel involved are not aware of or ignore the consequences of overexposure to the x-ray beam and scattered radiation. There may be damage to the patient and operator and the biological effects which result are somewhat cumulative in nature, very resistant to healing.

Adherence to certain general rules should reduce the danger elements to a minimum and these regulations can be formulated as follows:

1. The operator should remain out of the direct path of the x-ray beam.

2. Leaded rubber apron and standard protective gloves should be worn at all times.

3. Radiographs rather than flouroscopic examinations should be used where possible in order to obtain the desired information.

4. The use of the fluoroscope should be under the direct supervision of a qualified radiologist. When it is impossible for him to be present and when the case is considered an emergency these rules should be enforced by the chief x-ray technician.

DEPARTMENT OF PUBLIC HEALTH COMMUNICATION

Dr. Margaret Gosse,
8 Birchdale Avenue,
Halifax, Nova Scotia

Dear Dr. Gosse,

With reference to our conversation this morning on the telephone, I am enclosing herewith a copy of our Release regarding the Relationship between Inoculations and Poliomyelitis.

It is very good of you to arrange for the publication of this in the Nova Scotia Medical Bulletin. Thank you very much.

Yours very truly,

G. Graham Simms, M.D ., D.P.H.
Asst. Deputy Minister of Health

During the last several years there has been considerable discussion and no little misunderstanding regarding the relationship between Poliomyelitis and Inoculations. This has tended to impair the immunization program in the Province which is of prime importance.

The enclosed paper, which was published in the Journal of the American Medical Association, gives a concise and authoritative summary of present thinking on this important subject. It also reflects the attitude of the Department of Public Health which is that Immunization Clinics should proceed as usual unless there is a definite increased incidence of Poliomyelitis in the area. Where there is an unusual number of cases in the vicinity, then school and other large group clinics should be postponed, but the inoculation of children under six months should continue as usual.

As pointed out in the enclosed paper, in the face of immediate danger from Diphtheria, Whooping Cough or Tetanus, the necessary inoculations should be given regardless of the age of the individual, and the incidence of Poliomyelitis in the area.

Halifax, Nova Scotia
June 19th, 1952

Relationship Between Inoculations and Poliomyelitis

The state and Territorial Health Officers Association requested the U. S. Public Health Service to sponsor a study and issue a clarifying statement on the possible relation between various types of inoculation and poliomyelitis. Subsequently, the Public Health Service, on March 14, 1952, sponsored a meeting of 42 poliomyelitis investigators, epidemiologists, pediatricians, allergists, and health officers. The National Foundation for Infantile Paralysis participated in the conference and helped in planning it.

The conference voted unanimously in favor of the conclusions contained in the following statement, which has been accepted by the Public Health Service and is being transmitted to official health agencies, to the medical profession and to the public.

"There is no definite evidence that an increase in the number of cases of poliomyelitis has occured as a result of injections of vaccines, drugs, and other medicinal agents. There is evidence that injections for the prevention of diphtheria, whooping cough and possibly tetanus, when given during an epidemic of poliomyelitis, may, on rare occasion, localize the paralysis in the inoculated arm or leg. There is no satisfactory evidence that other types of injections have any effect on the localization, frequency or severity of poliomyelitic paralysis. In the small number of persons with localization of paralysis in the inoculated limb, the injections for the most part, were given about 7 to 21 days prior to onset, which corresponds to the usual incubation period of poliomyelitis. This has raised the question as to whether or not inoculated persons have a greater chance of contracting poliomyelitis during an epidemic.

"There is as yet no final answer to this question, but it is a fact, that, even if there should be an increased chance, it is extremely small. Many thousands of poliomyelitis cases occur every year among children who have not had any injections during the preceding few months, and thousands of children have received injections for whooping cough, diphtheria and tetanus during poliomyelitis epidemics and have not developed the disease.

"Diphtheria, tetanus and whooping cough are serious diseases, which can be prevented by immunization. Unchecked, these diseases present a far greater hazard than poliomyelitis. The benefits derived from immunization against these diseases far outweigh the questionably small increased chance of contracting poliomyelitis. However, even this questionable risk can be avoided by carrying out these immunizations when poliomyelitis is not epidemic in the community. There appears to be no good reason for withholding these immunizations during the summer months in communities that are not having an epidemic of poliomyelitis.

"Furthermore, poliomyelitis is at all times so rare in infants under 6 months of age, and the danger from other infectious diseases, particularly whooping cough, is so great, that it is advisable to continue the immunization procedures for this age group even during a poliomyelitis epidemic. In adults also, poliomyelitis is relatively so infrequent, that when there is a need for immunizing or therapeutic injections, such injections should not be withheld.

"Certainly no parent should object and no physician should hesitate to administer a needed antibiotic, drug or other injection for treatment of disease at any time. When there is immediate danger from diphtheria, whooping cough or tetanus, the preventive inoculations should be given to all threatened age groups even during a poliomyelitis epidemic. In the final analysis the decision as to when an immunizing or therapeutic injection shall be given to an individual patient must rest with the physician."

THE ANNUAL MEETING
OF THE
MEDICAL SOCIETY OF NOVA SCOTIA
Will Be Held At Lakeside Inn, Yarmouth, September 3rd, 4th, 5th and the Morning of the 6th.

An excellent scientific programme has been arranged including—

Doctor H. G. Brugsch, Surgeon in Charge of the Arthritic Clinic of the Pratt Diagnostic Clinic of Boston, Massachusetts, who will speak on the important topic of Rheumatoid Arthritis.

Doctor T. A. Lebbetter, one of the heart consultants at the Winnipeg Clinic of Winnipeg, Manitoba, whose topic will be "The Diagnosis and Treatment of Coronary Insufficiency."

Doctor Wallace M. Roy, formerly associated as radiologist with several hospitals in Sacramento, California, whose topic will be "The Role of the Radiologist in Intra-abdominal Disease."

Doctor Roger W. Reed, Professor of Bacteriology, Dalhousie University, whose paper will be "An Outbreak of Acute Nephritis."

Doctor B. F. Miller, Assistant Professor of Surgery (Orthopaedics), Dalhousie University, whose topic will be on some important orthopaedic subject.

Our visitors from the Canadian Medical Association will include the President, Doctor Harold Orr, and Mrs. Orr of Edmonton, Alberta, Doctor and Mrs. T. C. Routley and Doctor and Mrs. A. D. Kelly. Doctor Orr has promised us a paper on some dermatological topic, probably "Lupus Erythematosis."

Doctor D. R. Wilson of the University of Alberta will be attending and will speak on either "The Treatment of Macrocytic Anaemias" or "Metabolic Disorders of Bone."

The Canadian Medical Association team will also include an outstanding surgeon but he has not yet been chosen.

A very elaborate programme of entertainment has been arranged. There will be the usual reception on September 5th, by Doctor L. M. Morton, the President of The Medical Society of Nova Scotia, and Mrs. Morton, and Dr. Phillip LeBlanc, the President of the Western Nova Scotia Medical Society, and Mrs. LeBlanc. This will be followed by the Annual Dinner, and the special speaker will be Mr. William Bird of Halifax. Many of us have had the pleasure of hearing Mr. Bird speak before and we are indeed fortunate that he will be with us as our dinner speaker. Following the dinner there will be the usual dance, and also this year there has been arranged a bridge tournament for those who do not care to dance, and prizes will be awarded to the ladies and gentlemen.

The ladies will be well taken care of, for already a committee of the doctors' wives of Yarmouth, under the capable direction of Mrs. L. M. Morton, have made elaborate plans.

The golf tournament will be held as usual and those who plan to compete will find the course at Yarmouth in excellent shape.

One special feature which is not scheduled, but which we feel will be enjoyed by many, is the tuna fishing. There is the best tuna fishing in the world at Wedgeport, about ten miles from Yarmouth, and those who care to try their hand will be given the opportunity.

The registration already is heavy, and we would advise all those who plan to come to write immediately to—

Doctor D. F. Macdonald,
Yarmouth, Nova Scotia

CAPE BRETON MEDICAL SOCIETY

The Annual Meeting of the Cape Breton Medical Society was held in the Isle Royale Hotel, Sydney, on June 13th, when thirty-five members were in attendance.

The nominating committee presented the following slate of officers for 1952-53:

President—Doctor S. Arthur Green, Glace Bay,
Vice-President—Doctor H. J. Martin, Sydney Mines,
Secretary—Doctor H. R. Corbett, Sydney re-elected
Assistant Secretary—Doctor C. A. D'Intino, Sydney
New appointees to the Executive of The Medical Society of Nova Scotia:
Doctor H. R. Ross, Sydney,
Doctor J. S. Munro, North Sydney.
Cape Breton Executive: Doctor J. R. Macneil, Dominion,
Doctor K. A. Fraser, Sydney Mines,
Doctor G. W. Sodero, Sydney.

Doctor W. I. Morse, Haematologist, of Halifax, was the guest speaker, under the auspices of the Dalhousie Post-Graduate Committee, and presented a very interesting and instructive paper entitled "The Clinical Management of the Anaemias."

H. R. Corbett, M.D.

THE NOVA SCOTIA SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

A joint meeting of the New Brunswick and Nova Scotia Societies of Eye, Ear, Nose and Throat was held on Wednesday, May 7th, 1952 at the Saint John General Hospital, Saint John, N. B.

Dr. C. K. Fuller, the President of the Nova Scotia Society was in the chair and the morning session opened with clinical presentations by the Saint John men and Dr. R. W. Wright and Dr. J. Likely of Fredericton, N. B.

Dr. R. T. Hayes of Saint John presented a series of cases of enucleation, some with exposed implants and some completely covered or buried implants, most of the cases with exposed implants had wet sockets and varying amount of discharge while those with completely buried implants were dry and had no discharge.

A case of massive choroiditis in a female; under observation since 1925 she recently had a sudden loss of vision 20/200 OD—20/80 OS; treated with histamine and there has been an improvement in vision 20/25 OD—20/30 OS. There is a family history of the mother having the same condition but in this case the macular regions showed more involvement and the right eye did not improve under treatment.

Also a case of atrophic rhinitis which had been very chronic and resisted all usual forms of treatment; however since using nicotinic acid and priscoline by mouth the patient is quite comfortable and kept under control.

A case of pemphigus was shown. It had been treated with cortisone and nupercaine ointment and this seemed to help for awhile. The question of x-ray treatment was being considered to try and relieve the pain.

A case of convergent strabismus with ptosis in a child was shown and discussed.

Dr. R. W. Wright presented a very interesting and instructive patient with post-operative carcinoma of the larynx who had been taught to speak by using his oesophagus; the patient gave a very good demonstration.

Dr. J. Likely showed a case of embolism of the retinal artery which was seen and treated within a few minutes of onset; the vision was improving and there is clearing of the macular region. The blood pressure was found to be normal.

A short business meeting was held. The report of the joint committee which met with Mr. F. H. Flinn of the C.N.I.B. was presented by the chairman Dr. H. W. Schwartz; the report was accepted and passed by the meeting with the following amendment: that the regular schedule of fees be charged for services rendered. The committee was asked to meet with Mr. Flinn and bring back a report at the next joint meeting. A letter has been sent to Mr. Flinn to this effect.

Dr. Schwartz then presented a further memorandum from the C.N.I.B. with regard to classification and registration and other particulars recently announced.

There was considerable discussion by Drs. Wright, Fuller, Likely, Hayes, Kirkpatrick, and Glenister, on the various items in the memorandum and also on the joint report.

A communication was read from Dr. W. L. Benedict, Rochester, Minnesota, U. S. A., announcing that the XVII International Congress of Ophthalmology would be held in New York in September, 1954 and that more detailed information would be sent out to the various Societies and particulars so that as large an attendance as possible could be arranged.

The meeting adjourned for luncheon at the Union Club.

Dr. H. W. Kirkpatrick presided at the afternoon session. Dr. H. W. Schwartz presented a paper, "Is Cancer A Virus Disease". This paper presented a new phase of thought on the cause of cancer and the speaker presented some very interesting facts and inferences made by observers and workers from investigations and work with virus in animals.

Dr. Caskey, Saint John, N. B. presented a paper, "Radiation Therapy of Cancer of the Upper Respiratory Tract"; his findings and experience, supported by other workers, was that Radiation therapy held better prospects for patients with involvement of the oral cavity and about the face and neck than did surgery.

There was considerable discussion by Drs. Likely, Pullen, Hand, Wright, Kirkpatrick and Hayes.

Dr. Glenister then presented a resume of some of the highlights of the University of Toronto Graduate Course of Ophthalmology. Dr. Kirby of New York on "Cataract Surgery", Mr. Keith Lyle of London, G. B. on "Muscle Surgery", Dr. Hodgson on "Surgical results during the past year at the Glaucoma Clinic in Toronto."

The meeting terminated with a very enjoyable social hour, tea and refreshments, at the residence of Dr. and Mrs. R. T. Hayes, Saint John, N. B. This was a most enjoyable termination to a very satisfactory meeting.

The next joint meeting will probably be held in Halifax, in November, 1952.

The annual meeting of the Nova Scotia Society of Ophthalmology and Otolaryngology will be held in Yarmouth, N. S. at Lakeside Inn, Thursday, September 4th, 1952 at twelve noon.

Details of the next joint meeting will be discussed at that time.

E. I. Glenister, M.D.
Secretary-Treasurer

COMMITTEE ON TRAUMA

AMERICAN COLLEGE OF SURGEONS

Rehabilitation Of The Quadriceps*

"BUT, doctor, my knees feel so weak." That is the most common complaint after illness. The weakness is not, of course, "in the knees" but of the quadriceps muscle. It may be said that physical rehabilitation begins with the quadriceps. The purpose of this bulletin is to review the anatomy and function of this important mechanism in such a manner that it may serve for the instruction of medical personnel and patients.

The upright position of the body is maintained by the tonus of the antigravity muscles, essentially the gluteus maximus, quadriceps and gastrocnemius-soleus, without which the lower extremities tend to collapse. The most important and most common site of instability is the knee joint. This joint is essentially a hinge which can collapse in only one direction, namely flexion, since lateral motion and extension are limited by the contour of the bones and the stability of the ligaments. Except for unusual factors such as hyperextension deformity or fibrous ankylosis, only the quadriceps muscle keeps the knee from giving away in flexion. In addition to maintaining the erect position the quadriceps has the more active function of extending the knee in walking and of lifting the body weight in arising or climbing steps.

The quadriceps, as its name implies, is a composite muscle of four origins and a common insertion. Only the rectus femoris arises from the pelvis where it is attached by two heads in front of and above the acetabulum. The other three muscles, vastus lateralis, intermedius and medialis, arise from the lateral, anterior and medial aspects of the femur. The four muscles merge to form the quadriceps tendon, which contains the patella, and then continue on as the patellar tendon which inserts into the tibial tubercle. Except for the hip flexion produced by the rectus femoris, the action of the quadriceps is solely that of extending the knee; or, as indicated above, of keeping the knee in extension under load while the individual stands. With the knee in full extension the minimum effort is required for standing; therefore it is important that the angle of full extension be jealously guarded in all conditions where muscle power or joint motion might be lost. The nerve supply of the quadriceps is the femoral nerve, fortunately seldom subjected to injury, but unfortunately its cells of origin are often involved in diseases, particularly poliomyelitis.

Any illness or operation which confines a patient to bed leads to rapid atrophy, loss of tone, or deconditioning of the quadriceps. When walking is resumed there is, therefore, a lack of confidence and security best expressed as "weak in the knees." Ascending, and particularly, descending stairs require

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*Note: This is the second in a series of articles on rehabilitation and is the first on a specific problem. This material was prepared by Leonard T. Petersen, M.D., F.A.C.S., Washington, D.C., who is a member of the Subcommittee on Rehabilitation, of which A. William Reggio, M.D., F.A.C.S., Medfield, Massachusetts, is Chairman. It is distributed by the Committee on Trauma, American College of Surgeons, through its Regional Committees on Trauma.

care or assistance. Elderly people may find it difficult to regain this lost strength and are prone to fall, and incur serious injuries. A few brief periods of daily exercise or reconditioning prevent this atrophy and provide a valuable safeguard. Exercises which are productive or competitive are more interesting but the patient soon grasps the importance of these less interesting static "muscle setting" or active exercises. At the same time other muscles must participate and benefit by the exercises. Finally the benefit to circulation and general nutrition should not be underestimated.

The strength of the quadriceps has direct relation to trauma or disease involving the knee joint. After severe trauma or surgery about the knee, the quadriceps suffers almost a complete temporary paralysis due to some reflex mechanism. Re-education and redevelopment of the muscle are the single most important part of rehabilitation after injury or surgery. Diseases such as arthritis cause atrophy of the quadriceps and frequently lead to flexion deformity because of this weakness as the flexors exert stronger pull than the quadriceps or extensor. The synovitis which follows an injury or disease often persists until the muscle has regained its strength. Unless active rehabilitation measures are taken the disability becomes chronic and even permanent.

What then can be done to preserve or regain the power of the quadriceps muscle? While physical rehabilitation has many other aspects, this subject is one of the most important and serves as a good starting point. Quadriceps training requires no special apparatus or skill. Let us itemize a few essential details.

1. The attending physican must bring rehabilitation to the bedside. He must be aware of its importance and be willing to devote a minute or two during his daily visit to the instruction of the patient.

2. The patient should be told that *he alone* can exercise his muscles. Massage or mechanical devices *cannot* develop strength. The impulse starts in his brain and follows the nerve pathway to the muscles. Strength is attained only by active exercise. Periods of instruction or clinic treatment are only training for the work the *patient* must perform between visits.

3. Factors limiting the intensity of exercise are essentially (a) pain and (b) fatigue. The patient seldom exercises beyond the limit of either and he may safely exercise if he experiences neither excessive pain nor fatigue.

4. The knee should be in extension during most of the time while at rest. Especially after trauma or surgery involving the knee is this important. The patient who lies for even a day or two with his knee flexed over several pillows will have to spend considerable time and effort regaining extension.

5. Exercise should be started as soon as possible after the patient is confined to bed and within 24 hours after surgery or trauma.

6. Exercises may be classified as (a) static, (b) passive, (c) assistive, (d) active, and (e) resistive.

(a) Static exercise means contraction in situ, isometric contraction, or contraction without joint motion. It is performed with the knee *in extension* by (1) pulling the patella up (2) by pressing the knee down or (3) by simulating the motion of lifting the heel off the bed.

(b) Passive exercise, which is motion carried out by the therapist, is not true exercise and is usually not indicated as there is no voluntary muscle contraction.

(c) Assistive exercise is active plus passive exercise, and is helpful in the early stages of rehabilitation.

(d) Active exercise is entirely voluntary contraction, usually against gravity only.

(e) Resistive exercise is voluntary contraction against manual or weight resistance.

Exercises—static, active, and resistive—are progressive in that order A type of exercise which does not attain full knee extension is ordinarily too advanced and should not be used. For example, if the patient cannot hold the leg fully extended against the force of gravity, he should not attempt to lift the leg but should be limited to static exercise. If he cannot lift weights and fully extend the knee, he should be limited to active exercise with only the weight of the leg.

Exercise to be effective must be strong, intermittent, and interrupted by a brief period of relaxation so that the muscle may recover by receiving nutrition and oxygen and by eliminating waste products. A muscle held in a prolonged state of contraction tends to fatigue and atrophy. The best method of relaxing a muscle is to contract the antagonist muscles or, in the case of the knee, to flex the knee slightly between each exercise. The patient is advised to perform a complete cycle "contract—hold—relax—rest" about eight times a minute. Thus in five minutes he can perform 40 complete cycles—a good goal *for every hour* while in bed or sitting up so as to get ready for walking.

After the patient can straighten the knee and hold the leg against the force of gravity, active exercise is indicated. He may lift the leg actively from the bed or, while sitting, actively flex and extend the knee over the edge of the bed or table—always to full extension. Finally, increasing resistance is added by weights attached to the foot. While repeated exercises develop endurance, strength is developed by a few exercises daily with the maximum weight which can be lifted effectively. Particular emphasis should be placed on development of the vastus medialis which contributes most to the last few degrees of knee extension.

In walking, with or without crutches, the knee should not be held stiffly in extension lest the muscle fatigue and atrophy. Walking with a passive pendulum motion at the knee does not develop muscle strength. As the leg is moved forward the knee should flex slightly in order to relax the quadriceps. As the heel strikes the ground the quadriceps should contract in order to extend the knee fully and give the individual a secure gait. If the surgeon holds his hand on the patient's thigh during a few practice steps, he will readily detect the quality of the muscular action and be able to prescribe corrective measures. Steps should be symmetrical in length and timing, A good motto for the convalescent patient undergoing quadriceps rehabilitation is "Every Step an Exercise."

Obituary

WILLIAM FRANCIS MACKINNON, M.D.

In Appreciation

BY DR. GEORGE H. MURPHY

Dr. Will MacKinnon died at his home, Antigonish, on May 26th. Antigonish was his home town in a very real and intimate sense. In the early, and leaner days of his professional life, when more lucrative prospects of practice beckoned him elsewhere, he brushed them aside, preferring to develop and practise his life's work among the people he knew and loved, and who loved him in return. A strong character, of sound and discerning mind, one that hated sham and insincerity, he was well equipped for mapping out any worthy course he desired to follow. And so he settled in his home town and county, his passing coming a month after he had completed fifty years in the profession.

Fifty years back, the horse and buggy, bad roads, no nearby hospital, few or no trained nurses, largely rural practice in scattered country-side—such was the picture the average young docter, fresh from the schools, faced in those days. Depressing perhaps to some; to others an inspiration, rich in the abundance of opportunity for worthy service; presenting the new practitioner a field where his years of study and the guidance of his teachers in Medicine and Surgery would be tried out, experience in combatting disease enriched; and enhanced by blending the doctor's own personal responsibility in doing the best available for his patient. Character and the soul of our profession find their place here.

Many times through the years have I sat with him discussing clinical problems, sometimes in general conversation, sometimes as a consultant. It happened that I was of some assistance to him in his earlier years, when he started developing his undoubted surgical talent; and our contacts here remain among my most cherished recollections. Once a suggested visit with me to Mayo Clinic was eagerly accepted, and during our stay there, and the famous John B. Murphy Clinic, Chicago, he just devoured what he saw and heard. Their surgical teaching and operative techniques made a lasting impression. He took back too an inspiration, and a purpose never to slacken his efforts for further improvement. His attendance during the years at refresher courses and medical societies was ample evidence of this.

Meanwhile, St. Martha's Hospital had come into being, under the control of the Sisters of St. Martha. A remodelled private residence became the forerunner of what today is the second, or third, largest general hospital in the province. Dr. MacKinnon's life and work became interwoven with the development and progress of the hospital, and the opportunities presented for the patient's good and the doctor's higher efficiency. That he took full advantage of the hospital's educational assets was evident by the skill and techniques he displayed through the years both in general practice and in the department of surgery. Until smitten by severe illness in the last three years of his life, he remained the wise, dependable member of St. Martha's Hospital medical staff; and it is not over praise to say that he contributed his full share to the fine reputation and standing of that institution today.

Tributes appearing in the press, where he was best known, showed that in this somewhat perverse world there is still place for him who tries to do his best. In her column in the Casket, Eileen Cameron Henry wrote of him as a neighbor in those graceful and understanding terms characteristic of this lady's writings, whether in prose or poetry. For myself, I may but join with the many in mutual sympathy to his bereaved wife, the daughter of the late Sir Joseph Chisholm, and to the sons and daughters of their fine family.

Dr. McKinnon was a man of quiet habits and with a sound philosophy of life. He took good fortune and bad in his stride, refusing to be puffed up by the one, or cast down by the other, "Do the best you can", he said, in reference to a serious case, "and then go home and sleep soundly". Osler could give no better advice. He and I shared the same room during our four years in medical college, from which came a friendship that stood the test of fifty years, and finds me tonight with pen in hand trying, amid a host of thoughts, to tell of him as I knew him in days gone by.

Across the void that lies between us I want to say: "Hello Will! God bless you!"