produces the gas oxygen, which acts favourably on its growth for a time; but when sufficient oxygen has been set free to benefit and make the "soil" more suitable for rapid growth the organism sets free oxygen in excess, which has been shown to be very detrimental to growth, so much so that the cocci die. There is a limit to the utility of oxygen, for beyond a certain strength it defeats the object for which the organism apparently produced it. When this point is reached in pneumonia the crisis is reached, and the temperature rapidly drops to normal or subnormal; in this way Nature provides its own cure. In experimental investigations the usual laboratory methods were used for the collection of the gas produced by these organisms, and without exception the gas was proved to be oxygen.

Method of Administering Oxygen in Pneumonia.

There is a very small point which is of great importance in the use of oxygen in pneumonia, and is the secret of the success which has followed my treatment of all pneumonia cases: the oxygen should be used warmed. In the past the use of oxygen has been the cause of more deaths in pneumonia than one cares to contemplate, simply because it was administered cold and not warmed to the required temperature; hence the lungs were chilled and the patient could not stand the shock. The oxygen should be heated by passing the gas through coiled Littre's tubes immersed in a water-bath kept at a temperature of about 120° F., the gas being passed through the tube at a slow rate, which is gauged by the comfort of the patient, who breathes quietly and does not complain of the "choking" feeling which occurs when the gas is administered too quickly. By keeping a thermometer in the tube it was found that the gas passing through at this very slow rate was about 99° F. when the water-bath registered 120° F. One thing to watch is the risk of sudden collapse when the crisis occurs; this can fortunately be avoided by the daily administration of pituitrin, 1/2 c.cm. being administered hypodermically morning and night, the heart action being safeguarded by the old-time proven remedy of digitalis administered from the onset of the disease; the omission of this has been responsible for the loss of many a case of pneumonia. Every clinician can verify the fact for himself that oxygen rapidly cures these cases, and every bacteriologist can satisfy himself that the pneumococcus alone among micro-organisms can produce the particular green coloration to which reference has been made.

That the foregoing method of administering oxygen is effective in the treatment of pneumonia is evident from the clinical observations recorded below. Among the Chinese the disease is more common in males than in females. As medical officer in charge of H.M. prisons in Hong-Kong and Li Chi Kok I have still to report my first female pneumonia patient, although it is quite a common disease among the male prisoners. My statistics show noticeable epidemics, when house after house was infected in Canton, and then would come a spell when for months not a single case of pneumonia would occur. The epidemics were most prevalent in May, June, and September. Persons such as police and coolies, who are exposed to weather changes, showed a marked preponderance of cases. Most patients had a previous history of similar attacks having occurred one, two, or three years before, which is a point of great interest. Most attacks occurred after the moist heat (humidity of over 95) so characteristic of South China; the majority of the patients were whisky drinkers.

Clinical Observations.

A rigor was the initial symptom in 65 per cent. of the cases, and 25 per cent. had a noticeable malar flush, often simulating typhoid fever; this latter disease was eliminated by laboratory methods and clinical findings.

Headache was a prominent feature in 29 per cent. of cases. Pain in the right side was complained of by 27 per cent., and pain on the left side by one patient.

In 84 per cent. of the cases the respirations at the first visit ranged between 40 and 47; in 16 per cent. of cases 27 to 34. Within six hours of commencing treatment in over 50 per cent. of cases the respirations had come down to somewhere in the region of 27. Within two days of treatment the respirations ranged between 16 and 20, and the patient was apparently well on the third day.

With three exceptions the temperature recorded when the patient was first seen was between 103° and 104° F. In one of

the three exceptions the temperature did not rise above 99° F., although the physical signs and symptoms were definitely those of lobar pneumonia; this patient had also a marked pleural effusion on the left side. In all cases in which oxygen was administered the same day for a quarter of an hour, every hour, passing the gas through a Littre's tube, the patient's temperature reached the normal within three days.

The following case, selected at random from over one hundred cases, is typical of all patients so treated:

A man, aged 48, when first seen had a temperature of 103.8° F.; the respirations were 40, the pulse 109, and the malar flush was marked. There was frontal headache, and pain on the right side of the chest which was said to be much increased by deep breathing. He wanted to cough, but was prevented by the pain. The urine was very dark, with a trace of albumin; the faeces were well formed, but had an offensive odour. He complained of slight thirst, but when water was given he refused it.

Oxygen was administered as previously described. Six hours later the temperature was 102° F., the respirations were 25, the pulse 85, and the headache had almost gone. The pain in the chest was much relieved; he was able to cough, but there was no sputum. The urine was not so dark, but contained albumin. The patient had not had any further rigors, though there had been some previously. Although breathing was still not as free and easy as normal, nevertheless the patient had a good sleep.

The next day at 10 a.m. the temperature was 102° F., the respirations 24, and the pulse 68. There was no pain in the chest, and no headache. The sputum was free and thick, but only suggestive of the "rusty" colour. The urine contained no albumin. He had passed faeces which were well formed and normal in colour. The typical physical signs of lobar pneumonia were disappearing, and fine crepitations were heard at the base.

On the third day at 4 p.m. the temperature was 98° F., the respirations 15, and the pulse 70. The sputum was diminishing, the urine was dark, but contained no albumin, and the patient had passed a normal motion.

Recovery was rapid and complete, the disease being apparently cured within three days, the patient getting up on the fourth day, and out on the sixth day. When last seen he was enjoying a swim.

The crisis appeared in most cases to occur during the night, when the patient was asleep. None of these patients felt weak or complained of any disability whatsoever, and they breathed rather freely all the time.

Oxygen does more than merely increase metabolism: it destroys disease.

DANGER OF INTRAVENOUS CALCIUM THERAPY.

BY

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INTRODUCTION.

CALCIUM has been given intravenously in the treatment of lead poisoning, infantile tetany, tuberculosis, Bright's disease, haemorrhage, heart disease, and in the pre-operative preparation of jaundiced patients. Cushny (1924) stated that calcium injected directly into the blood stream acted much like digitalis in that it accelerated and strengthened the heart beat in small doses, but in large doses it seemed to be poisonous, tending to bring the heart to a standstill. Brown, MacLachlan, and Simpson (1920) observed that doses of 1.25 grams of calcium lactate, given intravenously to infants suffering from tetany, resulted in drowsiness, dyspnoea, cyanosis, and sometimes collapse. Neumann (1920) reported favourable results in cases of haemorrhage and of acute and chronic diarrhoea from the intravenous injection of 5 to 10 c.cm. of a 10 per cent. solution of calcium chloride. Grove and Vines (1921) pointed out the value of the intramuscular injection of 100 minims of a 1 per cent. solution of calcium chloride in cases of haemorrhage. Walters (1921) reported the use of calcium chloride in 10 per cent. solution intravenously in the pre-operative preparation of jaundiced patients. The treatment was efficacious in producing a shortening of the blood-clotting time. This author stated that calcium in small doses, as 10 c.cm. of a 10 per cent. solution, might be given intravenously without harm.

In a further study of the action of calcium chloride given intravenously Walters and Bowler (1924) found that approximately twice the amount of the salt was required to raise the blood calcium of jaundiced dogs to the same level as that of normal dogs, and this in spite of the fact that the blood calcium content was practically the same in the jaundiced and normal dogs before and after

injection of a lethal dose, which suggested a calcium deficiency in the jaundiced animals that was not apparent. They noted that when the drug was administered intravenously to patients there resulted a quickening of the pulse rate and a sensation of heat over the entire body. They observed that this was the effect to which Herschsolm and Maendl gave the name of "dynamic effect" of intravenous administration. The same phenomenon was seen by these latter authors to follow the injection of quinine, dextrose, hexamethylenetetramine, and urea; it proved transitory. At the same time, Walters and Bowler made comprehensive studies of the effects of intravenous injections of calcium chloride on the electro-cardiograms of dogs. A 10 per cent. aqueous solution of the salt was used and injected at the rate of 1 c.cm. per minute. The injection of toxic doses into the blood streams of dogs brought about various alterations in rate, disturbances of conduction, ectopic origins of impulse, and, when carried to a still further point of toxicity, disturbances of the fundamental co-ordination of the heart, and ventricular fibrillation, which was followed by death. Moderate doses caused only an alteration of the pulse rate; this occurred consistently at an early point in the injection, but was produced by smaller amounts of the solution in the normal than in the jaundiced dogs. After the maximal acceleration was reached there was a marked variation in rate, following which the initial maximum was rarely exceeded. Conduction disturbances appeared, marked by short recurring periods of heart-block, and notched Q.R.S. complexes, which made their appearance more frequently as the continued injection assumed a more toxic effect. There next occurred an increase in the amplitude of the T wave with a gradual encroachment on the Q.R.S. complex, ventricular fibrillation, and death. The ectopic origin of impulses was demonstrated by the appearance of inverted T waves and periods of nodal rhythm. The rate at which the injection was given was of some importance because the concentration of calcium in the blood stream seemed to be a factor in the toxicity of any dose. In two instances following a rapid injection the calcium content of the blood taken from the heart immediately after death was twice that of the blood taken from the external jugular vein. The investigators ascribed the death following large doses of calcium to the occurrence of ventricular fibrillation rather than to a calcium rigor.

Singer (1921) reported the use of calcium intravenously (1 c.cm. of a 10 per cent. solution) associated with the administration of digitalis by the mouth in the treatment of cardiac diseases with oedema. The calcium increased the tone of the ventricles, effecting a slight rise of blood pressure, slowing the pulse, and causing an occasional diuresis. Calcium he believed to be "the whip and the rein" for digitalis.

Popescu-Inotesti (1925) was able to induce phenomena of sympathetic excitation—namely, tachycardia, hypertension, mydriasis, hyperglycaemia, and sometimes tachypnoea—by the intravenous injection of small doses of calcium (0.1 to 1 gram); the use of larger doses (1.5 to 4 grams) caused excitation of the parasympathetic with bradycardia, miosis, and bradypnoea. The hypertension in the first instance he believed to be due to direct stimulation of the muscular fibres of the vascular wall.

Seelig (1925), calling attention to the possible ill effects upon the heart and subcutaneous tissues of the intravenous injection of the 10 per cent. solution of calcium chloride, recommended in its stead a dose of 50 c.cm. of a 1 per cent. solution, which would not cause subcutaneous sloughing, and which, particularly when injected slowly, had little if any deleterious effect upon the heart.

During the course of some experiments in our laboratory electro-cardiographic records were taken of the heart of man during and following calcium administration intravenously. The technique and results of these experiments are described below.

EXPERIMENTAL TECHNIQUE.

The solutions used for intravenous administration were 1 per cent. and 10 per cent. solutions of calcium chloride. These solutions were accurately prepared with chemically pure anhydrous calcium chloride and distilled water; they were sterilized by autoclaving. The skin of the subject's right arm in the region of the antecubital space was sterilized in each case with alcohol, and the injections were made into the median cubital vein. Needles and syringes were sterilized by boiling on each occasion, a 50 c.cm. syringe

being employed in the first experiment, when 50 c.cm. of a 1 per cent. solution of calcium chloride was injected, and a 10 c.cm. syringe in the second experiment, when 4 c.cm. of a 10 per cent. solution of calcium chloride was administered. The injections were given slowly. The author, a 135 lb. man, acted as the subject of the experiment in each instance.

During both experiments electro-cardiographic tracings were taken of the normal period, the period of injection, and, in the first experiment, the period after the injection, the leads of the electro-cardiograph being in each case the right arm and left leg.

Electro-cardiogram (Lead 2) of the author's case, showing sino-auricular block occurring during intravenous calcium administration.

OBSERVATIONS.

In the first experiment, when 50 c.cm. of a 1 per cent. solution of calcium chloride was injected intravenously, an electro-cardiogram before, during, and for eight minutes after injection was taken. No subjective or objective symptoms beyond the normal were observed in the subject of experiment. The electro-cardiogram showed no changes from the normal during and following the injection other than a slight increase in the heart rate during the period in which the needle penetrated the skin.

The second experiment, in which 4 c.cm. of a 10 per cent. calcium chloride solution were injected intravenously, was more productive of results. When 2 c.cm. of the solution had been injected the subject experienced a sensation of warmth over the entire body, accompanied by slight headache and a feeling of fullness in the head. It was decided to continue the injection. Dizziness occurred during the period of injection of the second 2 c.cm., and this was closely followed in the course of the next three seconds by syncope, respiratory failure, upward deviation of the eyes, dilatation of the pupils, rigor of the masseters, and asphyxial extensor spasm and rigidity. The string of the electro-cardiograph at this time was seen to be standing still. The subject was taken away from the electrodes, placed in a supine position upon the floor, and artificial respiration instituted. An attempt was made to massage the heart through the abdominal wall and diaphragm at the

left costal margin. In the course of four or five minutes voluntary respiration was again established, the pupils contracted, and consciousness was regained. No residual effects were noted.

The examination of the electro-cardiogram during this period showed the normal cardiogram to be replaced by one in which the rate of the heart was reduced to one-half. No changes were to be seen in the P.Q.R. complex at the time of this change in the frequency. Each wave possessed its normal order, time relationship, and character. After this bradycardia had lasted for ten seconds it was replaced by a series of small waves, which were suggestive of vibration of the string. There is no evidence in the cardiogram that the ventricle was beating during this period. At the end of the curve, when the subject was removed from the electrodes, these small fibrillary waves were less frequent but of greater amplitude. There was as yet no evidence of the R wave of ventricular contraction. The tracing was that of a prolonged sino-auricular block.

COMMENT.

From these few observations it is not possible to reach any conclusions as to the effect of calcium upon the normal electro-cardiogram.

Whether the effects noted in the second experiment are evidences of vagal stimulation or a direct action upon the genetic nervous system of the heart independently of any extrinsic nervous supply it is impossible to state. The nature of the results obtained rendered it inadvisable to repeat the experiment following atropinization.

The disturbances of conduction noted are somewhat in accordance with those obtained by Walters and Bowler in the dog. I simply desire to call attention to the occurrence of cardiac disturbances of conduction as a result of intravenous calcium administration in a dosage that has been commonly used.

SUMMARY.

The intravenous use of 4 c.cm. of a 10 per cent. solution of calcium chloride is dangerous. The electro-cardiogram shows what we believe to be a sino-auricular heart-block.

To my chief, Professor J. W. Crane, and to Drs. Waud, Gordon, Kitchen, and Vine, I wish to acknowledge my gratitude for their help in the performance of this study.

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A MIXED TUMOUR OF THE NASOPHARYNX.

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With a Pathological Report by

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It is recorded by Sir StClair Thomson that "neither simple nor malignant neoplasms are found, except rarely, in the post-nasal space. The innocent growths are so uncommon that every new formation in this region should be looked on with suspicion." On the other hand, Sir William Milligan, opening a discussion on nasopharyngeal growths at the Laryngological and Otological Sections of the Royal Society of Medicine, stated that growths in the post-nasal space are not uncommon, but that their presence is frequently overlooked; and further, that the principal

varieties of new growths in this region are nasopharyngeal fibromata, angiomatica, endotheliomata, carcinomata, and chondrosarcomata.

The report of the following case is therefore considered of interest because of the lack of references to similar cases in the English textbooks.

A boy, aged 7 years, was sent to St. Helens Hospital for the removal of adenoids; he suffered from frequent colds and nasal obstruction. On examination by anterior rhinoscopy nothing abnormal was found; posterior rhinoscopy was difficult, but the lower pole of a smooth greyish-pink tumour was seen partially filling the left nasopharynx; this mass did not bulge the soft palate of that side. By digital examination a firm sessile tumour, about the size of a small nut, was palpable, occupying the left side of the post-nasal space. The tumour did not bleed during examination, and appeared to spring from the lateral wall of the nasopharynx, between the left choana and the Eustachian orifice. There was no history of epistaxis or pain, and no evidence of involvement of the middle ear or of the neighbouring lymph glands.

A diagnosis of nasopharyngeal fibroma was made, and subsequently the tumour was removed with post-nasal forceps without undue haemorrhage. The child was examined three months later, when the nasopharynx appeared clear.

Professor Beattie kindly examined the specimen and made the following report:

This tissue consists of an area of irregular cartilage, an area of adenomatous tissue, the acini being lined by a high columnar epithelium (similar to the lining in the gland spaces of the ovary), and a cellular area mainly with round mononuclear cells. The section suggests a tumour of congenital origin from some abnormal structure.

Brown Kelly has classified a group of tumours occurring in the pharynx as follows: (1) teratomata, (2) teratoids, and (3) mixed tumours—"arising from cells at the junction of two types of epithelium. Some may assume mildly malignant characters." The tumour reported above belongs to the last class, and is more correctly called a blasto-teratoma; it is similar to tumours arising in the parotid, submaxillary region, lip, palate, orbit, and, as recently described, in the molar glands.

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A METHOD OF TREATING FRACTURES OF THE CLAVICLE WITH DISPLACEMENT.

BY

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PROBABLY the most commonly used method of treating simple fractures of the clavicle with displacement is either that originally described by Sayre, or the bandage devised by Douglas. One great disadvantage of the former method of fixation is the fact that the strapping used to support the elbow so often slips over the point of the olecranon process, allowing the arm to drop, with recurrence of the original displacement.

In an endeavour to avoid this difficulty the plaster is sometimes applied with the adhesive side next to the skin. This certainly prevents any slipping, but it does not allow of accurate adjustment, and also gives rise to much discomfort, often amounting to actual pain, particularly around the point of the elbow. This pain seems to be equally severe whether a slit for the olecranon process is made in the plaster or not. If, on the other hand, Douglas's method of bandaging is employed, the original disadvantage is again evident. The bandage as a whole tends to become loose, and the final turns round the elbow and over the opposite shoulder slip off the elbow and allow the arm to drop. The bandage may remain in good position during the day, but when the patient is in bed, and particularly if he is somewhat restless, as these patients usually are, the bandage will soon work loose. It is a common experience to find a patient with a fractured clavicle, which has been reduced and firmly bandaged on one day, returning next morning with the bandage loose and the deformity renewed.