are more likely to occur in the presence of some active infection—of which Vincent's angina constitutes an example.

Conclusions

Vincent's infection sometimes develops in patients undergoing antisyphilitic treatment with intravenous arsenicals.

The use of intravenous arsenicals in the treatment of Vincent's infection is unsound, both on theoretical and on clinical grounds, particularly since the condition responds readily to other less expensive and less dangerous drugs.

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REFERENCES

- Donson, S. D. (1933). *Dental Cosmos*, **75**, 893.
 Ehrlich, P. (1910). *Münch. med. Wschr.*, **57**, 2268.
 Farrell, G. W., and McNichols, W. A. (1937). *J. Amer. med. Ass.*, **108**, 630.
 Goodridge, D. L. (1942). *Brit. dental J.*, **62**, 12.
 Halcrow, J. P. A. (1943). *British Medical Journal*, **1**, 663.
 Hillsman, J. A., and Driscoll, T. L. (1925). *Va. med. Monthly*, **52**, 312.
 Hirschfeld, I. (1942). *J. Amer. dental Ass.*, **29**, 1150.
 King, J. D. (1943). *Brit. dental J.*, **74**, 169.
 Nelson, R. B., McGibbon, C., and Glyn-Hughes, F. (1943). *British Medical Journal*, **1**, 661.
 Reichmann, F. J. (1926). *J. Amer. dental Ass.*, **13**, 1665.
 Rosebury, T., and Foley, G. (1939). *Ibid.*, **26**, 1798.
 Smith, D. C., and Newbill, H. P. (1939). *Southern med. J.*, **32**, 381.
 Sutton, I. C. (1924). *J. Amer. med. Ass.*, **83**, 1919.
 Williams, G. A. (1929). *Arch. Derm. Syph.*, Chicago, **20**, 322.

A PHYSIOLOGICAL FACTOR IN HAEMOGLOBINOMETRY

BY

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The recent Report to the Traumatic Shock Committee of the Medical Research Council on haemoglobin estimation (1943) fulfils its purpose admirably as a survey of methods including an analysis of technical limitations and suggestions for improvement. There is, however, a physiological factor in haemoglobinometry—namely, the diurnal variation—which merits the consideration of the physician. The blood haemoglobin may vary from increase or decrease of the total blood volume due to interchange of water with the tissues or to the withdrawal or addition of erythrocytes. Dreyer, Bazett, and Pierce (1920), on the basis of hourly or bi-hourly colorimetric haemoglobin estimations, assert that the haemoglobin may vary as much as 20 to 30% of the average throughout the day. Short (1934-5), using a colorimetric method, reported a variation of 17%. Price-Jones (1931) made 100 observations with a Haldane haemoglobinometer on blood obtained from his finger in the mornings and afternoons of successive days, and stated that there was no significant difference between afternoon and evening values. Rabinowitch (1923-4) used the oxygen-capacity method on 20 subjects, and reported a maximum variation of 26%. Photometric methods may be affected by the variation of substances in the blood other than haemoglobin, such as lipids, and the gasometric apparatus used by Rabinowitch was an early and not very accurate type.

Diurnal Variations in Hb Concentration

Some years ago, in an attempt to settle this question, I took part with Dr. van Slyke (1939) in an investigation of the diurnal variation in the blood of 18 normal men. Blood was obtained by venepuncture, with precautions to avoid stasis, at intervals of from two to three-hours during the day. Haemoglobin was estimated by the CO-capacity method of van Slyke and Hiller (1928), which is superior to the oxygen-capacity measurement for reasons stated in the Medical Research Council report (1943). The mean difference between duplicate analyses of our samples was 0.06 vol. %, or 0.3% on the Haldane scale. The greatest range between highest and lowest values in an individual in the day was 2.3 vols. % CO (or O₂) capacity—i.e., about 12% on the Haldane scale. The average range was 1.3 vols. %, or 7% on the Haldane scale. Observations were repeated on each of five subjects on two separate days about a week apart, and there seemed to be a tendency for the blood of each subject to follow a course characteristic for that individual. It is difficult to make any generalization concerning the direction of the change apart from the statement

that there seems to be a tendency for the haemoglobin concentration to diminish during the day; but a subject who showed this change on one day gave the opposite result on another.

I have no reason to doubt that these findings represent real changes in the haemoglobin concentration of the blood. It seems that data of similar accuracy are not available for the alterations in women and children. The diurnal variations recorded in health may be greater in abnormal conditions. Moreover, the fact that the variations recorded by most of the earlier workers on blood samples obtained by pricking the skin are higher than those obtained by us inclines one to the belief that this difference may be due to local alterations in the concentration of haemoglobin, to the interference of lipids or other substances with the photometric technique, or, more simply, to sampling errors. Price-Jones (1931) found excellent agreement between gasometric measurements and colorimetric Haldane estimations in the blood of 20 subjects. It is not clear, however, from his paper whether the colorimetric estimations were made on separate samples obtained by skin puncture or on the same samples used for gas analysis which were obtained by venepuncture.

Conclusions

Haemoglobin in the blood of normal men is subject to a diurnal variation which is less than that described by Rabinowitch and other workers but higher than that reported by Price-Jones. The average range is 7% in terms of the Haldane haemoglobinometer scale. The range of any diurnal variation which may occur in the haemoglobin of normal women and children appears to merit careful investigation.

REFERENCES

- Dreyer, G., Bazett, H. C., and Pierce, H. F. (1920). *Lancet*, **2**, 588.
 McCarthy, E. F., and van Slyke, D. D. (1939). *J. biol. Chem.*, **128**, 567.
 Price-Jones, C. (1931). *J. Path. Bact.*, **34**, 779.
 Rabinowitch, I. M. (1923-4). *J. lab. clin. Med.*, **9**, 120.
 Report to Traumatic Shock Committee of the M.R.C. on Haemoglobinometry (1943). *British Medical Journal*, **1**, 209.
 Short, J. J. (1934-5). *J. lab. clin. Med.*, **20**, 708.
 van Slyke, D. D., and Hiller, A. (1928). *J. biol. Chem.*, **78**, 807.

Medical Memoranda

Arteriosclerotic Aneurysm of Abdominal Aorta with Perforation into Upper Jejunum

In contrast to aneurysm of the thoracic aorta, aneurysm of the abdominal aorta is comparatively rare, and its diagnosis might easily be missed for years, as in the case reported below. A few days before admission the patient was seen by a consultant, who thought of a growth in the sigmoid, but after the negative x-ray evidence, considered that a small polyp in the colon might explain the rectal haemorrhages. The long-standing rectal and vaginal pain was very likely due to the aneurysm. Very often in cases of abdominal aneurysm there is pain in the upper abdomen due to pressure on the coeliac plexus. Here there was a history of "fibrositis" of the upper abdomen, but her main and more permanent complaint was of the rectal and vaginal pain. The explanation of the difference from the more usual upper abdominal pain may be that the situation of an aneurysm of the abdominal aorta is usually subdiaphragmatic, whereas in this case it extended down to the bifurcation. It might therefore be expected to exert pressure on the inferior mesenteric ganglion and so cause the pain referred to rectum and vulva. While the usual cause of thoracic aneurysm is syphilitic disease of the aorta, aneurysms of the abdominal aorta, at least in this country, are mostly due to arteriosclerosis, as it was in this case.

CLINICAL CASE RECORD

On Jan. 20, 1943, a lady aged 79 was admitted to the County Hospital, Otley. She had a long history of suffering. Seven years ago she was in bed for 6 months, and some form of heart disease was diagnosed. While in bed she developed a thrombophlebitis, followed by neuralgic pains in the vulva and rectum. Nothing local was found that would explain this latter condition and no discharge or haemorrhage of any kind. A diagnosis of "vulvitis and rectal neuralgia" was made. These pains had persisted and increased up to the time of admission, and finally invalided her to such an extent that she had to spend the last two years in bed. The pains were very severe and were only relieved by morphine. Four years ago she had had a short attack of "fibrositis" in the upper half of the abdomen and in the lumbar region. Fourteen days before admission she had an unheralded rectal haemorrhage. At first she passed blood mixed with faeces and then pure blood-clots. She lost a fair

amount of blood. These haemorrhagic motions numbered six or eight daily, and continued up to the day before admission.

The patient was mentally alert but physically in poor shape; the slightest movement exhausted her. She was very pale and emaciated. Her peripheral arteries showed an extraordinary degree of arteriosclerosis even for her age. Pulse, respiration, temperature, and reflexes were normal. The heart showed signs of enlargement towards the left, and a systolic murmur was audible over the aortic valve.

In the upper part of the abdomen, just to the left of the midline, a tumour was palpable, approximately the size of a fist, showing expansile pulsation. It was easily possible to grasp this tumour in the examining hand, and its mobility was strictly limited to a slight lateral movement. A systolic murmur was audible on auscultation. The rest of the examination showed no abnormality. The blood pressure was 160/60 mm. Hg. The Wassermann reaction was negative.

A barium meal and enema had been given outside a few days before her admission to hospital, but failed to show any abnormality. After six days in this hospital she had a haematemesis early in the morning and died a few minutes later. The clinical diagnosis was aneurysm of the abdominal aorta, with rupture into the small intestine. Permission for an abdominal necropsy was granted, and the findings were as follows.

POST-MORTEM EXAMINATION

Advanced atheroma and arteriosclerosis. Kidneys rather smaller than normal and arteriosclerotic. A large sacular aneurysm protruded from the anterior and left aspect of the abdominal aorta immediately deep to the pancreas, which was stretched over its anterior surface. The aneurysmal dilatation measured about 4 in. by 2 in. by 2 in. A portion of jejunum was firmly adherent to the anterior surface towards its right side, and it was evident from blood in the intestine that a communication existed between the two. The aneurysm was not adherent to any other viscus. It was obviously of very long standing. The other abdominal organs were normal. A specimen consisting of the aneurysmal sac, with immediately adjacent pancreas and the adherent portion of jejunum, was sent to the County Laboratory, Wakefield, from which source the following report was received:

"On the lower portion of the abdominal aorta, and on the anterior wall, there is a large sacular aneurysm. The mouth of the sac is oval and large, and involves two-thirds of the entire circumference of the aorta. The mouth of the sac measures 7 cm. in length and 5 cm. in width, and the lower edge is situated 1 cm. above the bifurcation. The sac contains much laminated thrombus, which is fairly firmly adherent to the wall. On removing this thrombus the true shape of the sac is observed. The greatest depth is 4 cm. from the mouth, and the base shows minor sacculations. The deepest (most anterior) is on the left side in an antero-lateral direction. At this point the wall is thinned over an area roughly oval (2 by 1.8 cm.) and covered by more recent softer thrombus. There is a communication between the upper part of this sacculi and the overlying adherent jejunum. The communicating aperture is small and probably measured less than 5 mm. during life. The jejunum itself is normal and is adherent to the outer aspect of the sac, to which it forms an adventitious coat. The aorta shows atheromatous changes generally and the aneurysm is essentially of the atherosclerotic type—partially dissecting at the point of rupture."

My thanks are due to the medical superintendent, Dr. J. Norman Hill, for doing the necropsy, and for permission to publish this case; and to Dr. P. L. Sutherland, county pathologist, and Dr. R. M. Heggie of the Public Health Laboratory, Wakefield, for examination of the specimen and advice to publish.

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The Medical Division of the Office of Civilian Defence in Washington has recently (July 10, 1943) issued new regulations on the treatment of burns and wound infections in air-raid casualties. When abdominal viscera are perforated the revised pamphlet recommends sodium sulphadiazine as the drug of choice for parenteral administration, this being considered preferable to oral therapy during the first 48 hours. Attention is drawn to the danger of giving sulphonamide drugs to a patient who is not excreting over 1,000 c.cm. of urine a day. If output of urine is inadequate and sulphonamide therapy is required, the urine should be examined for evidence of renal damage and the dose of the drug so adjusted that the blood concentration, determined daily, does not exceed 10 mg. per 100 c.cm. If urinary output continues to fall administration of the drug should be stopped, and fluid should be forced orally or given intravenously. If anuria results, owing to bilateral obstruction of the ureters, ureteral catheterization and lavage of the renal pelves may be required. The revised O.C.D. pamphlet no longer recommends the use of ointments or jellies containing tannic acid in the first-aid treatment of burns. If expert treatment cannot be carried out within two hours it is advised that the patient should be given sufficient morphine to relieve pain, and that the burned surface should be covered with sterile boric acid ointment or petrolatum, over which one or two layers of gauze of fine mesh is to be smoothly applied. Over this is placed a dressing of thick sterile gauze or sterile cotton-waste, and the whole dressing is to be bandaged firmly but not tightly. As an alternative, a jelly containing 5% sulphathiazole in water-soluble base is permissible.

Reviews

OCCUPATIONAL DISEASES

Outlines of Industrial Medicine, Legislation, and Hygiene. By James Burnet, M.D., F.R.C.P.Ed. (Pp. 87. 7s. 6d.) Bristol: John Wright and Sons; London: Simpkin Marshall.

This small book attempts within the compass of 83 short pages to deal with three interrelated subjects, and, although in his preface the author makes no greater claim for it than that it should serve as an introduction, the title is an ambitious one. The book deals mainly with occupational diseases, the subject of hygiene being relegated to the last six pages. Chapters VI to X form the second part of the book and deal in some 22 pages with such subjects as the history of factory legislation, Workmen's Compensation Acts, the Truck Acts, the Factories Act, 1937, and incapacity for work, but these chapters are in the form of short annotations rather than of attempts at careful elucidation.

It is generally agreed that the study of occupational disease can best be made against a background of industrial hygiene, and the purpose of this publication would have been better served if the first part had been devoted to those factors of hygiene which have a special significance in industrial life. Few authorities will agree with the unqualified statement in the preface that "hygiene in factories differs very little from the hygiene of ordinary premises." The principles of hygiene may be the same, but there is a more detailed application of these principles in industry, and the directions of such application might with advantage have been stressed.

Nearly three-quarters of this manual are devoted to occupational diseases, and of this section more than one-half to poisons. The 28 pages dealing with industrial poisons are probably the best of the book, and the author, who was formerly an examiner in materia medica and therapeutics of Aberdeen University, can speak authoritatively. The chapters dealing with medical diseases contain all-too-brief references to the pneumoconioses, while in regard to silicosis the author takes no cognizance of the work of W. R. Jones, who, working in the Rand, demonstrated the importance of the fibrous silicates like sericite in the production of the disease quite apart from silicosis due to free silica.

There is a striking absence in the book of reference to such important questions as the psychoses and neuroses of industry, except in regard to occupational cramps, and the description of miner's nystagmus omits any reference to the psychoneurotic element in the later stages of the disease. Throughout the book there is no mention of the existence of accident-proneness or other factors in the production of accidents—subjects which to-day are so important. If the main intention of the book is to provide the general practitioner who occasionally sees a case of occupational disease with a handy book of reference the intention may have succeeded, more especially as it sets out in annotated form the main provisions of factory legislation which would be useful to him. When the next edition is prepared, which no doubt it will be in the near future, we suggest that the author might increase its size and incidentally its value.

ELECTROCARDIOGRAPHY

Electrocardiograms. An Elementary Atlas for Students and Practitioners. By H. Wallace Jones, M.D., M.Sc., F.R.C.P., and E. Noble Chamberlain, M.D., M.Sc., F.R.C.P. Second edition. (Pp. 56; illustrated. 5s.) Bristol: John Wright and Sons; London: Simpkin Marshall. 1943.

The Electrocardiogram and X-ray Configuration of the Heart. By Arthur M. Master, B.S., M.D., F.A.C.P. Second edition, enlarged and thoroughly revised. (Pp. 404; illustrated. 36s.) London: Henry Kimpton.

The first of these two books gives a valuable grounding for students in the interpretation of the electrocardiogram. The explanation of the mechanism of the machine is simple and to the point. The significance of the various normal complexes is clearly described. Technically the illustrations are excellent and well marked. The modern physician uses the cardiograph very largely in the diagnosis of myocardial disease, and for every tracing taken for an arrhythmia at least a dozen are taken when the rhythm is normal and only the condition of the myocardium is in question. It is perhaps surprising that