

diminution in renal efficiency. If definite but not complete recovery takes place it is my conviction that many of these cases are hopeful and may be brought to a time suitable for an induction of premature labour without jeopardising the patient's future health. After delivery it will be found in cases of eclampsia that the amount of albumin in the urine will diminish very rapidly, and an early disappearance of this abnormal constituent should give rise to a confident hope that complete recovery will take place. The persistence of albumin in slight amount for more than eight weeks should raise a suspicion that the kidney has sustained some permanent damage. A rapid return of blood pressure to within normal limits also suggests a complete recovery from the initial toxæmia.

CONFUSIONAL STATES

A definite proportion of cases of eclampsia develop mental confusional states during the puerperium, and this fact should not be forgotten in framing a prognosis of the course and results of the disease. The incidence of mental derangement bears no relation to the severity of the original eclampsia. I have seen it supervene on clinically slight cases.

Eclamptic patients also show an increased morbidity in the puerperium and this fact must not be forgotten. It is, I think, accepted that an ultimate prognosis must be guarded in proportion to the length of the original illness, and if the patient has shown a toxæmia or eclamptic state which has been prolonged beyond three or four weeks it is very doubtful whether complete recovery ever occurs.

FUTURE PREGNANCIES

The possibility of danger on future pregnancies must always be carefully considered. The known fact that between 30 and 40 per cent. of patients exhibit recurring albuminuria in subsequent pregnancies must be borne in mind and an interval of at least eighteen months should be allowed to elapse before another pregnancy is undertaken. These subsequent pregnancies must always be watched most carefully from the earliest time, and the appearance of toxic symptoms within three months will immediately raise the question as to whether the pregnancy shall or shall not be allowed to continue.

J. BRIGHT BANISTER, M.D., F.R.C.P., F.C.O.G.,
Obstetrical Physician to Charing Cross Hospital.

SPECIAL ARTICLES

VITAMINS IN HUMAN NUTRITION VITAMIN-C RESERVES OF SUBJECTS OF THE VOLUNTARY HOSPITAL CLASS

BY LESLIE J. HARRIS, Sc.D., D.Sc.*

M. A. ABBASY, M.B.

OF THE NUTRITIONAL LABORATORY, MEDICAL RESEARCH
COUNCIL AND UNIVERSITY OF CAMBRIDGE; AND

JOHN YUDKIN, M.A., Ph.D.

OF ADDENBROOKE'S HOSPITAL, CAMBRIDGE

With a note by SIMON KELLY, M.B., B.Sc.,

M.R.C.P. Lond., D.P.H., D.P.M.

PHYSICIAN TO THE MANCHESTER VICTORIA MEMORIAL
JEWISH HOSPITAL

SURVEYS have now been completed of the urinary excretion of vitamin C of a considerable group of subjects. As there may be some delay in the presentation in extenso of the rather numerous results it seems worth while to summarise the main conclusions reached.

The technique employed was the same as that previously described,¹ urine being collected in dark bottles in the presence of acetic acid and examined within 12 hours, the end-point in the titration being reached in less than two minutes.

Control tests.—In order to ensure the statistical significance of the results a further series of control tests has been carried out under rigorously standardised conditions. A group of 6 adult volunteers was first placed on a diet low in vitamin C, followed by a strict scurvy-producing diet—i.e., entirely devoid of all vitamin C—until their "reserves" had fallen to a markedly subnormal level, as indicated by the resulting low urinary output of the vitamin. The reputed "minimal-optimum" daily dose of ascorbic acid (25 mg.†) was then added to this vitamin-C-free

diet. The daily excretion thereupon gradually rose and finally, after about 42–49 days, became steady at 13 to 14.5 mg. (average 13.8 mg.) equivalent of reducing substance per day there being little variation between individual subjects. When this steady state had been reached, a good response on either the first or second day followed the administration of test doses of 700 mg.

This confirms, under more precise conditions, the approximate figures previously given. It appears therefore that if a subject excretes less than 13 mg. per day and fails to respond on the first or second day to a test dose of 700 mg. (per 10 st. body-weight), it is to be presumed that his diet has contained less than the reputed optimum of vitamin C.‡

In a further group of 11 adult subjects it was found that a daily supplement of 40 mg. of ascorbic acid (as orange juice) added to "normal" home diet not rich in fruit or vegetables (vitamin-C content estimated at only 15 mg. per day, making a total intake of 55 mg. per day) led to a daily excretion at equilibrium after 35 days of 25–29 mg. per day (av. 27 mg.). In a previous experiment the addition of a supplement of 90 mg. (estimated total = 105 mg.) led to the excretion of 49–56 mg. per day.

These results indicate that the daily output of vitamin C is governed by the past dietary intake of the subject and that (contrary to some supposition) there is little individual variation between different subjects or between subjects on different "basal" home diets. The detailed quantitative data for urinary responses for intakes lower than the reputed optimum, down to the definitely scurvy-producing "minimum," have still to be determined.

We have also obtained additional data illustrating a diminished excretion of vitamin C during pyrexia and toxæmia, indicating an apparently increased "loss" in the body in these conditions.

Surveys on hospital patients.—A group of 74 adult patients from both surgical and medical wards

* Member of scientific staff, Medical Research Council.

† This optimum dose, 25 mg. of ascorbic acid, is equivalent to about 45 c.c.m. of fresh orange juice—i.e., the greater part of the juice of a moderate-sized orange.

‡ As under ordinary circumstances the response to a test dose is proportional to the resting level, a measurement of the latter alone is sufficient for most routine tests of the kind here described.

were examined at Cambridge, nearly always within a few days after their admission to hospital. For the reason just mentioned, cases with marked pyrexia or toxæmia were excluded. The average excretion for the whole series was found to be as low as 8.9 mg. per day. Of the 74 subjects examined, no fewer than 62, representing 84 per cent. of the total, excreted less than the "minimum standard" (or "optimum") value of 13 mg. per day. Or, excluding a group of 19 subjects who had been on special diets for some time (see below), 43 cases (= 78 per cent. of the remaining 55 cases) excreted less than the "standard" of 13 mg. per day. The average excretion of the 55 cases was 10 mg. per day.

Results obtained with 30 children show a similar high proportion of cases with a "subnormal" excretion of the vitamin, which confirms preliminary conclusions on children reached previously in three other centres (at London and Birmingham) (control tests having shown that children receiving their adequate daily supplements of vitamin C gave "normal" excretions).¹

From the appended note it will be seen that Dr. Kelly, who has carried out measurements by the same method at Manchester, has reached similar conclusions for a group of hospital patients in that city.

These results suggest that the intake of vitamin C of this class of the population is generally below the reputed optimum, as it is also below that of "normal" subjects (generally middle class) who have been examined in earlier tests in this country and in Holland, Germany, U.S.A., &c.² (daily excretion 20-35 mg.). This finding is in keeping with the conclusion of Orr,³ based on a study of diet sheets, that about half the population receive less than their reputed optimum allowance of vitamin C.

Inadequate diets in duodenal and gastric ulcer.—A type of diet frequently prescribed in duodenal and gastric ulcer, containing little or no fruit juice, is deficient in vitamin C. It seems significant that among the lowest excretions of vitamin C observed in our series, a quite disproportionate number were of patients with gastric or duodenal ulcer. Thus included in our total of 74 adult subjects there were 12 cases of gastric or duodenal ulcer, and 7 cases of dyspepsia which had been on a "gastric diet." The 44 lowest excretions are found to embrace all of these 19 "gastric" cases (or the 29 lowest embrace 16 of them). The average daily excretion for the series of "gastric" cases was 5.6 mg. per day, the highest being 8.7 mg. (compared with an average of 10 mg. for the remaining 55 cases). Since in guinea-pigs deficiency of vitamin C may predispose to gastric ulcer,⁴ the possibility of a vicious circle being set up in these conditions should be borne in mind. We would advocate the addition of the strained juice of one orange to the daily ration as a routine applicable for most "gastric" cases.

Possible deficiency in certain hospital diets.—In the course of this inquiry we have examined the various diet sheets of a number of representative hospitals. In several of these an adequate daily dose of orange juice has for some time past been included in the regimen as a routine. In others however it is still customary to give little or no fresh fruit (the patient is sometimes left to rely for fresh fruit on gifts brought in by his friends and relatives), and it is difficult to avoid the conclusion that there is a real danger of the diet containing less than the reputed optimum dose of vitamin C. We strongly urge that this question should receive careful attention from those in charge.

Validity of the accepted figure for "optimum standard."—It will be noticed that throughout we have been referring to the reputed optimum daily dose of vitamin C. The argument depends largely (at any rate in its more strictly quantitative deductions) on the actual validity of this generally accepted value. We hope to discuss this point in a later paper. In the meantime it may be remarked that the value for this "reputed minimal-optimum dose" is based on a variety of considerations, including (1) a knowledge of the amount of lemon juice needed to prevent the slightest symptoms of scurvy in mariners, and (2) the dose needed to restore subnormal capillary resistance caused by vitamin-C deficiency in human subjects to its normal strength. It will be understood that a small margin is allowed for the probable difference between the bare "minimum antiscorbutic dose" and the "minimal optimum dose"—a relation which in the case of guinea-pigs at least has been worked out with considerable accuracy.

Since so many individuals in certain sections of the population are found to be below the reputed optimum standard in their vitamin-C intake and yet may seem little the worse for it—superficially at any rate—critics may perhaps argue that the accepted standard is unnecessarily high. We think however that it would be a mistake to rush to this conclusion too hastily. A comparison may justly be made here with the accepted standard for the intake of iron and with the prevalence of "sub-clinical" nutritional anæmia. Laboratory tests have shown that a large proportion of subjects in poor-class districts may show some degree of nutritional anæmia compared with the accepted standards. Such individuals may exhibit no clear-cut symptoms of illness. Yet when extra iron is provided their general health and fitness improve, as evidenced for example by their diminished morbidity-rate.⁵ A similar state of affairs may well be true for vitamin C, and indeed many suggestions have been made in the clinical literature in the past that a state of latent- or sub-scurvy is not uncommon. In any case, as the consumption of one orange per day is more than adequate to bring the intake up to the level of the reputed optimum—even supposing the diet to contain no other source of the vitamin—it would seem that the standard is sufficiently modest to make it a reasonable aim in practical dietetics.

Our thanks are due to the honorary staff of Addenbrooke's Hospital, in particular to Dr. G. S. Haynes and Dr. Leslie Cole, for their interest and generous help in this work. Messrs. Hoffmann-La Roche kindly provided us with the ascorbic acid used.

Note by DR. KELLY

A survey was made of the urinary excretion of vitamin C in 34 unselected adult patients admitted consecutively to the medical and surgical wards of the Manchester Victoria Memorial Jewish Hospital. The technique employed was that described by Abbasy, Harris, Ray, and Marrack¹ and the vitamin-C excretion was estimated almost each day from the day of admission. The following is a summary of the findings.

Of the 34 subjects examined 14 (41 per cent.) excreted less than the minimum standard of 13 mg. per day. The average excretion of the whole series was 16.7 mg. Four cases of diabetes, however, were included, whose diets were rich in vitamin C with correspondingly high figures (40 mg. or more). Excluding these cases the average excretion of the series was 13 mg. per day. In the series were 8

subjects aged 70 years or above, all of whom had low excretions on admission—an average of 10 mg. per day. The 8 cases of gastric or duodenal ulceration admitted for medical treatment excreted on admission above 13 mg. per day, but all showed a fall below that level after four days, reaching an average of 9 mg. after a week. The series also included 5 cases of pneumonia which on admission excreted above 13 mg. and all fell below that figure during the first week to an average of 6 mg. in spite of liberal drinks of orange juice.

The administration of two Redoxon tablets (100 mg. ascorbic acid) per day in all cases with low excretion figures raised the daily excretion to above 13 mg. in 3-7 days, irrespective of the clinical condition or state of illness. This had no discernible effect on the illness.

Conclusions to Note.—(1) Of 34 patients admitted to hospital, 14 showed evidence of vitamin-C subnormality, and most of the remainder excreted not more than the minimum standard. (2) All those above 70 years of age showed relative deficiency. (3) All those on dietetic treatment for gastric and duodenal ulceration showed deficiency after four days, though not on admission. The diet in use is deficient in vitamin C. (4) All the cases of pneumonia showed reduced excretion of vitamin C after a week, although receiving more than normally adequate amounts. (5) Correction of the vitamin-C deficiency had no obvious effect on the course of the illnesses. (6) Except for pyrexia and toxæmia, the only factor found influencing the amount of vitamin-C excretion was the amount of vitamin-C intake.

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INTERNATIONAL SOCIETY FOR MICROBIOLOGY

THE second international congress of this society will be held in London this year from July 25th to August 1st, Prof. J. C. G. Ledingham, F.R.S., presiding. The headquarters of the congress will be at University College, Gower-street, and all the scientific sections will hold their sittings there. Additional accommodation will be available in the adjacent London School of Hygiene and Tropical Medicine and the Wellcome Research Institute. The congress will be divided into eight sections:—

General Biology of Micro-organisms

Subjects discussed and Openers.—Selective bacteriostasis: inhibitory action on the growth of bacteria and fungi of (1) substances of known constitution, and (2) products of the growth of micro-organisms; importance in the preparation of selective culture media (Prof. A. Fleming, London). Anaerobic bacterial metabolism (Dr. P. Fildes, F.R.S., London). Nutritional factors associated with the growth of micro-organisms (Dr. Lwoff, Paris). Variation: relation of changes in morphological and cultural characters to changes in chemical composition and to alterations in anti-

genic structure; toxin production and pathogenicity (Dr. J. A. Arkwright, F.R.S., London). Preservation of cultures of micro-organisms. Latency: methods of preservation of delicate organisms; preservation of virulence and antigenic structure; changes in the character of bacteria in culture media unfavourable for rapid growth (Dr. O. da Fonseca, Rio de Janeiro). Life-cycles of bacteria: symbiotic associations; filtrable forms (Dr. J. Ørskov, Copenhagen); bacterial photosynthesis (Dr. C. B. van Niel, Pacific Grove, California).

Viruses and Virus Diseases in Animals and Plants

Subjects discussed and Openers.—The general characteristics of viruses, including bacteriophage (Prof. R. Doerr, Basel, and Dr. J. Henderson Smith, Rothamsted). Modes of transmission and paths of infection in virus diseases (Dr. E. Weston Hurst). Evidence concerning the agency of viruses in the ætiology of new growths (Dr. Peyton Rous, New York). Mechanism of immunity in virus diseases and practical applications thereof (Prof. J. C. G. Ledingham, F.R.S., London).

Bacteria and Fungi in Relation to Disease in Man, Animals, and Plants

Subjects discussed and Openers.—The significance of serological and cultural types of bacteria and fungi pathogenic to man, animals, and plants in relation to epidemic, epizootic and epiphytotic outbreaks of disease (Prof. F. Neufeld, Berlin). Pathogenic streptococci: relation to scarlatina, puerperal fever, erysipelas, tonsillitis, acute rheumatism, and infective endocarditis in man, and to mastitis, lymphangitis, and suppurative conditions in animals (Dr. G. J. Hucker, Geneva, U.S.A.). Mycoses in man, animals, and plants; taxonomy; mechanism of pathogenic action; relation to saprophytic species and conditions of saprophytic growth (Mr. J. Ramsbottom, London). Bacteria causing acute inflammation of the alimentary tract and their mechanism of action (Dr. E. O. Jordan, Chicago). Pathogenic anaerobic bacteria (Prof. M. Weinberg, Paris).

Economic Bacteriology, Soil, Dairying, and Industrial Microbiology

Subjects discussed and Openers.—The significance and estimation of the numbers and types of bacteria in milk, including thermophilic and thermophilic organisms; the need for adopting uniform methods (Dr. R. S. Breed, Geneva, U.S.A., and Dr. A. T. R. Mattick, Reading). Factors determining the behaviour of micro-organisms in milk and milk products (Mr. L. J. Meanwell, London). Yeast metabolism (Prof. A. Fernbach, Paris, and Prof. R. H. Hopkins, Birmingham).

The microbiology of water-supplies (Prof. F. E. Fritsch, F.R.S., London). The microbiology of perishable fresh foods, other than milk and milk products and the microbiology of canned foods, other than milk and milk products (Dr. L. H. Lampitt, London). The process of decomposition of plant remains in soil, manure, and compost heaps (Prof. E. Ruschmann, Landsberg a/Warthe). The microbiology of ensilage production (Prof. A. J. Virtanen, Helsingfors). The destruction and protection of woods and cellulosic materials (Dr. A. C. Thaysen, Teddington). Problems of biochemical purification of sewage and of trade effluents (Dr. H. Heukelekian, New Brunswick, U.S.A.). Recent advances in fermentation industries (Prof. T. Chrzaszcz and Dr. J. Janicki, Poznan).

The physiology of nitrogen-fixing organisms and the biochemistry of nitrogen fixation (Dr. C. Stapp, Berlin). The economic importance of the autotrophic and of certain anorganophilic bacteria (Dr. A. C. Thaysen).

Medical, Veterinary and Agricultural Zoology and Parasitology

Subjects discussed and Openers.—The biology of the malarial parasites of man and animals (Lieut.-Colonel J. A. Sinton, I.M.S., Kasauli, India). Chemotherapy: mechanism of drug action and drug resistance (Dr. H. Schlossberger, Berlin). Factors which influence the transmission of infections by arthropod vectors (Prof. E. Brumpt, Paris). The parasitic nematodes of plants (Dr. P. Bovien, Copenhagen). Typhus fever and the rickettsias (Prof. H. Zinsser, Boston, U.S.A.). Immunity against animal parasites (Dr. E. Sargent, Algiers). Coccidia