power (Klopper, 1951) were obtained without having any undue effect. It would appear that the nature of the iron compound and its stability are more important than the amount given. Our results would tend to support the view of Nissim (1954) that reactions following use of saccharated oxide of iron are due to precipitation of an inherently unstable compound.

Summary

The results of treatment with a new intramuscular preparation of iron in 50 cases of anaemia of pregnancy are recorded. All patients were in the antenatal period.

In 14 patients the condition was of mild degree, in 28 it was moderate, and in 8 it was severe. All responded satisfactorily. An average weekly dose equivalent to 500 mg. of elemental iron produced an increase of slightly more than 1 g.—that is, 6% on the Haldane scale. Utilization of the iron was good, the haemoglobin increasing on the average by 0.3 g. for every 100 mg. of elemental iron injected. These results are almost identical with those obtained by the use of intravenous saccharated oxide of iron. As with all forms of iron therapy, response to treatment was sometimes delayed, but by the second week of treatment all patients showed similar haemoglobin increases.

The preparation contains 5% elemental iron compared with 2% in those utilizing the saccharated oxide of iron. With this concentration the number of injections may be reduced considerably. Many cases of mild anaemia require only two 5-ml. ampoules. Very high serum iron readings result from the injection of this highly concentrated solution, but no reactions, either local or general, have so far been encountered.

We would like to thank Benger's Ltd. for generous supplies of inferon for clinical trial.

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The General Board of Cambridge University, in a Notice in the *Reporter* of November 17, state that they consider that former University teaching officers should not be employed to give regular courses of instruction unless it is clear that by so doing they will not block the way to promotion for others. With certain exceptions, continues the Notice, the Board "will therefore not approve the estimates of a Faculty or Department which desires to employ a former University teaching officer unless they have received an assurance that other teachers will not thereby be precluded from appointment to office or from having their fitness for promotion tested. The Board will be prepared to consider the approval of estimates which include provision for the payment at the normal rates of a former University teaching officer to give a regular course of instruction when a University teaching officer falls ill or is away on leave and is therefore unable to carry out his regular teaching duties, and it is found difficult to replace his teaching work without seriously disorganizing the work of other members of the staff. They will also consider the approval of estimates which include provisions for the payment at the normal rates of former University teaching officers to give specialized courses to meet particular needs not forming part of the instruction for a Tripos or Part of a Tripos."

A PREVENTIVE APPROACH TO COMMON DISEASES OF THE LUNG*

BY

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Preventive medicine, together with a rising standard of living and recent therapeutic developments, has led to a marked rise in the expectation of life of children born into our community. Since 1841 this has amounted to 27½ years—but there has been no equivalent increase for those aged 60. In fact, during the same 110 years the expectation of life at this age has risen only one year for men and four years for women (Logan, 1953). The great killing diseases at this time of life are those affecting the cardiovascular system and the lungs. A preventive approach to these should pay handsome dividends. However, despite much research, the problems of cardiovascular disease remain unsolved. The major lung diseases—bronchitis, pneumonia, cancer, and tuberculosis—do not present such baffling problems. Sufficient is known of their aetiology now to make prevention possible in a community alive to the simple facts governing these lesions of the chest. The deaths, mainly in the older age groups, amount probably to 100,000 per year, but death is preceded by months and often years of invalidism in many cases. This is certainly true of the too common condition of bronchitis. In 1950 it was responsible for the loss of 16,500,000 working days amongst our insured population. A high incidence of chronic chest disease is accepted by us—but a careful study will show that most of this is avoidable. This study is essential in a community where healthy ageing is one of the most pressing problems of society.

The industrial revolution brought great wealth to our country, but resulted in a growth of industrial cities where a spectacular rise in morbidity and mortality took place. Between 1831 and 1841 the crude death rate per thousand in Birmingham, Leeds, Bristol, Manchester, and Liverpool rose from 20.6 to 30.8 (Griffith, 1926). Great efforts were made subsequently to deal with intestinal diseases which were responsible for the most spectacular part of the rise. Cholera, typhoid, and dysentery were gradually controlled. This was achieved, after many bitter struggles, by the supply of clean water and the effective clearing of sewage.

Respiratory diseases remained, but the need for attention to the grossly polluted air was apparent to the great reformers Chadwick and Simon—in fact, Chadwick projected a "pure air company" to suck down pure air from specially constructed towers into the dwellings and workshops of city populations. Coal was abundant and cheap. Industrial cities had grown up, consisting of houses, surrounding factories, foundries, and mines. "The towns sprang up at a nightmare rate and of a nightmare character. Fastest of all grew the cotton towns; the iron towns, the woollen towns, the pottery towns followed hardly less swiftly, while all about the coal-fields gaunt mining villages grew side by side with fiery waste heaps in the very shadow of the pitheads, often enough in the pit yards themselves." (Sharp, 1950.) Here the air was and still is heavy with smoke, fumes, oxides of sulphur, and other products of combustion. The urge for hygienic reform spent itself before clean

*Based on a lecture given to the Salford Division of the British Medical Association, May, 1954.

air was obtained. Later the economic depressions left many smokeless chimneys. Now in the industrial areas chimneys belching smoke are almost welcomed by those who live beneath their shadow. They are signals of continuing employment.

It is time, however, that the air we breathe is recognized to be as important as the water we drink. We still treat the air over our large towns as a sewer; into it chimneys belch thousands of tons of harmful grits, solids, and gases each year. Thus we have failed to learn the lesson of the Thames. Last century London poured its sewage into this river and from it, at many levels, water companies drew their supplies. Because of this, typhoid, cholera, and dysentery knew no bounds. Today the same situation faces us in every industrial area in respect of lung disease. When the air we breathe is regarded as seriously as the water we drink, then can we hope to have and retain healthy lungs.

Atmospheric Pollution

Two aspects of atmospheric pollution are very important: general atmospheric pollution, and dust and fumes at work.

Atmospheric pollution results mainly from unburnt carbon and other solids of coal combustion, together with sulphur gases, SO_2 and SO_3 . In appropriate weather conditions these form aerosols which give rise to disastrous consequences. The great fog of December, 1952, killed 4,000 people in fourteen days in London. Some have asserted that it killed somewhat prematurely those who would have died within a short time. There is no justification for so dismissing the effects of the most lethal fog recorded in world history. It is not widely realized, however, that this "smog" was the starting-point of recurrent bronchitis in many thousands of Londoners. These effects were dramatically demonstrated in the country's best cattle, then on show at Earl's Court. Their healthy lungs were overwhelmed by our polluted air. Prize cattle on the ground floor developed acute suffocative symptoms. Five died, some had to be slaughtered, and others were saved only by emergency measures. Post-mortem examinations showed acute bronchiolitis, emphysema, and right heart failure. No better experiment could have been devised, and Londoners were rightly alarmed by this catastrophe. The London Local Medical Committee did well to advise the wearing of masks in any similar fog. Two years later no official advice, guidance, or preventive ideas have come from the Ministry of Health.

Details of this smog are interesting and important. Its centre of density was in Westminster and the central area of London. Since 1931, 1,200,000 people have left the centre of the city—while those remaining live more in flats where gas and electricity rather than coal-fires supply heat. Meanwhile, the great coal-consuming plants—electricity, gas, and transport—have increased disproportionately. Since 1921 there has been an increase of 400% in the coal burned to produce electricity. Our own hospital has four generating stations within a short distance of it. These consume over 500,000 tons of coal annually. No attempt is made to extract the sulphur gases from their effluents, although much less visible smoke is produced than when the same amount of coal is burnt domestically. Future generations will marvel that the nation not only permits this, but that, despite our experiences in 1952, bigger generating stations are being erected within London's built-up areas. Meanwhile attempts are made to deflect attention from these offending consumers to the domestic grate; only 18% of the nation's coal is burned in the home—it is burned inefficiently, but it does not produce the major pollution with oxides of sulphur. It is regrettable, too, that hospital chimneys offend both local by-laws and sanitary sense by pouring black smoke into the atmosphere for hours on end. Just as during last century we failed to appreciate the part played by infected water, so now we neglect the effect of polluted and infected air.

Dust and Fumes at Work

It is by altering conditions at work that we can hope to get the greatest improvement in our morbidity and mortality rates in chronic chest illness. Our industrialization took place much earlier than in many other countries: coal as a source of power was plentiful throughout our island; iron, clay, and other raw materials of basic industry were close at hand. We led the world in many developments at a time when industrial hygiene was almost unknown. Many of the processes remain with us, and hygienic measures have not caught up with those associated with more recently developed industry. Consequently we find such processes as mining, pottery, foundry work, cotton-spinning, quarrying, etc., taking a huge and avoidable toll of our people. Much investigation has been undertaken to show that these and allied industrial processes produce specific effects in the lungs. This undoubtedly does happen in many cases. However, it is essential to emphasize that the first effect of inhaling dust or toxic fumes is to produce cough. Cough is the warning signal that the air we are breathing is contaminated. This cough, of course, may not start at the moment of inhalation, but may be present after some hours, especially in the morning following the previous day's exposure. Satisfactory air conditions at work will have been established when it can be shown that no cough is produced after a minimum exposure of five years. Meanwhile, all of us seeing patients working under adverse conditions should look for the early evidence of continuing chest disease.

The Mines

The attitude suggested above is essential when considering one of our most valuable workers—the miner. The full extent of chest trouble is unknown in these workers, and there seems an unnecessary reluctance to discover the truth. No adequate preventive action will be taken until this happens. The x-ray survey of the mining valley—the Rhondda Fach—showed that approximately 50% of all miners and ex-miners have radiological evidence of dust disease. This indicates fairly gross structural damage which is irreversible and much of which will progress, even though no further mining is undertaken. However, this takes no account of chest symptoms. These are known to the practitioners responsible for the day-to-day treatment. Crude death rates from bronchitis for hewers and getters and their wives compared with farmers and their wives reveal the following figures:

Hewers and getters	..	crude death rate	622	per million
Hewers and getters' wives	..	"	144	"
Farmers	..	"	184	"
Farmers' wives	..	"	77	"

The sex difference, judged by crude death rates, is nearly twice as great in colliers as in farmers, suggesting occupational factors of importance. Of course, figures for pneumoconiosis are not included in the case of colliers, and in none of these four groups are all the cases of chronic bronchitis included, for cor pulmonale and pneumonia are given separately in the Registrar-General's report.

An inquiry into the certified causes of death in one mining practice showed that of 87 miners and ex-miners dying since 1946, 42 had died of chronic chest disease; of these only two had been certified as having pneumoconiosis. These isolated figures suggest a rate of 100% above the average for the general population. Here is a great problem for research and subsequently for remedial measures in the mines. Our aim should be to ensure such a dust-free air that the miner coughs no more than other men working in good conditions.

The combination of dust, particularly silica, with tuberculosis is probably responsible for the most serious chest complaint—progressive massive fibrosis. This is known to be common in South Wales, and is probably commoner than is suspected in other mining areas. It is progressive and quite untreatable. Its prevention is urgent. Tuber-

culosis amongst the miners and their families should be given increasing attention. An annual x-ray examination of all in these families over 15 years of age for the next five years and the immediate treatment of any infectious case would probably do much to eliminate this common and fatal condition.

Other Industrial Hazards

Space does not permit a detailed analysis of other industrial problems; but wherever there is harmful dust, so irreversible lung changes occur. We should attempt to see that steps are taken in each industry to detect an increased incidence of chest symptoms. In the past compensation has been the workman's only solace for the ills that work has inflicted upon him. Compensation is rarely paid for avoidable chest disease until irrecoverable damage has been done. Future activity—while retaining compensation as the last line of defence—should aim at pure air and healthy lungs. Practitioners in industrial areas will know what benefits would result to their patients if this could be achieved. Much effort, often uncoordinated, has gone into the improvement of working conditions, but many men with serious chest disease are still allowed to drift from one unsuitable occupation to another. Two instances seen recently will illustrate this point:

An ex-miner aged 56 with considerable pneumoconiosis—not certified—sought work in London. He eventually settled in a local foundry, cleaning castings coated with sand. He died of congestive heart failure secondary to chronic chest disease five years after taking up such work.

A miner aged 45 with progressive massive fibrosis came to London and obtained work without medical examination in a factory where cases of bagassosis have arisen.

A nation-wide occupational health service is surely needed to establish standards of healthy environment at work, to make certain these are implemented, and meanwhile to see that the partially disabled are not further handicapped by unsuitable working conditions. We pay much lip-service to "preventive medicine." Are we not missing in our own day and in our own country an opportunity which common sense would say is obvious? The price of neglecting to take reasonable preventive measures has to be paid in terms of damaged health, impaired efficiency, time off work, sickness benefit, and medical treatment. Prevention is not only good medicine—it is sound economics.

These factors, together with infections, overcrowding, and a poor standard of living for many town dwellers, have combined to give us a most unenviable reputation for chronic chest disease. Figures quoted by Fry (1954) suggest that we have a much higher incidence of bronchitis than practically any other country where morbidity and mortality figures are kept. As a nation we are now characterized by a chronic and ubiquitous cough, and we attempt to minimize this by laughing it off. The phrase, "my smoker's cough," frequently hides an anxiety and a disease that ought to be investigated. Cough is a serious symptom—it warns of excessive irritation of the bronchi. Thus it resembles vomiting, but we treat it much more lightly. Until the community and the profession regard coughing as seriously as vomiting, so long will much chest disease remain uninvestigated; so long, too, will avoidable vitiated air be breathed and tolerated.

Smoking

Smoking presents us with one of the greatest social problems of our times. The habit is so widespread and the ill-effects are insidious and often long delayed. The pleasurable results are emphasized by direct and indirect advertisement throughout the whole structure of our society. An attempt at dispassionate consideration makes one wonder whether many would smoke if the untoward effects of the initial cigarettes, and the fatal effects of the combined total, were not obliterated in the public mind by ubiquitous propaganda. Whatever the explanation of the country's heavy

smoking, the effects, in terms of cough, bronchitis, emphysema, and cancer of the bronchus, are becoming very obvious. Few people who smoke 15 or more cigarettes daily for 20 years fail to develop a morning cough. This grows worse as the years pass. Infection and other factors mentioned have an added effect. Many who are more sensitive to the irritant effects of smoking will develop a cough and a tendency to bronchial spasm when consuming fewer than 15 daily. Our approach to this problem is clouded by our own reaction to the cigarette. Until recently, tobacco consumption by the profession has equalled that of the general public. Many of us are very heavy smokers; our reactions are thus often emotionally determined. However, the crude ill effects of this habit are now so widespread that we have a duty to attempt a scientific approach to the problem. For patient and doctor, a complete abstinence from cigarettes for three months will usually demonstrate a relationship to coughing, and further scientific proof will not be needed.

Teeth and Sinus Infection

So many patients with severe bronchitis have gross dental infection that it is impossible to dissociate the two conditions. Considerable improvement often follows the removal of this local obvious source of irritation. Much more rarely does chronic sinus infection appear to play an important part. However, where other factors do not seem important, and where x-ray examination yields evidence of pathological change in the sinuses, treatment should be directed to these.

Bronchitis

This is one of our most difficult problems and one to which consultants in hospital practice have given too little attention until recently. In fact, chronic bronchitis has not yet received an adequate definition despite its frequency. It may be defined as a cough causing increasing illness and loss of working capacity, unassociated with any specific abnormality in lung structure and usually unassociated with any specific infecting organism. All too frequently we in hospital have been content both to assure the patient with bronchitis and the practitioner that there is no organic disease and to assume that our responsibility ends there. This attitude can no longer suffice; for, as the more specific acute infections have yielded to therapy, so the extent of bronchitis becomes manifest. It causes 30,000 deaths a year and the loss of 16,500,000 working days. Meanwhile, 20,000 die annually from pneumonia, and many of these have had chronic chest disease. Death from pneumonia, affecting previously healthy lungs, is a rare phenomenon to-day.

Bronchitis is a cumulative disease. Each set-back—such as a severe fog, infection, or excessive exposure to dust—may lead to increased lung damage and a diminished expectation of life. Until a certain stage is reached it is reversible and good health can be restored. Steps must be taken sufficiently early to discover the factors which irritated the bronchi and maintained the cough. Careful history-taking will often reveal a fascinating and formidable group of factors. The important ones can be summarized as follows: (1) Social factors: (a) place of residence: bronchitis is five times as common in some large towns as in the country; (b) social class: it is five times as common among unskilled labourers as among professional men. (2) Infections: (a) in early life, and (b) at 40–50 years of age. (3) Occupational factors. (4) Smoking. (5) Infected teeth and sinuses. (6) Allergy. (7) Gassing in 1914–18 war.

The overcrowded home in poor quarters of the industrial town has been, and is, responsible for much bronchitis in infancy and childhood. This follows particularly the specific infectious fevers. Recurrent bouts of upper respiratory infection pass around the household and thus an almost continuous cycle is maintained. Associated with this home environment, the overcrowded schoolrooms offer excellent opportunities for the constant exchange of

organisms. A little later in life, travel in the rush hours in most cities is a fruitful source of trouble. The smoke-laden atmosphere of bus, tube, or train is likely to irritate and then to infect susceptible bronchi.

Often a febrile illness with respiratory symptoms beginning at 40 years of age or over will initiate a train of events leading to the establishment of chronic bronchitis. Virus infections of an influenzal nature are prone to do this. It is essential that both in the young and in the middle-aged we should attempt to ensure a complete recovery from these illnesses.

The occupational history is often most revealing—and it is very desirable that all of us should have a wide understanding of the working conditions of our patients. Time spent as a student or after qualification in factory, foundry, or mine will enable us to understand why many patients cough. It will make us more insistent upon complete recovery from cough before work is resumed. This is very important in men working in heavy industry, for they are extremely liable to develop emphysema and its most fatal complication, cor pulmonale, as shown by Flint (1954).

The reversible aspect of bronchitis has been stressed. This phase passes as emphysema develops, and it is essential that we should bring all preventive measures to bear on this too common complication. Emphysema is rarely seen in the absence of chronic cough—or, again, in the absence of smoking. Once established to a degree that gives rise to symptoms and unequivocal physical signs, deterioration and death follow after years of invalidism and suffering. Abbott *et al.* (1953), investigating the aetiology of severe emphysema, found smoking more than 20 cigarettes daily to be the common factor. No improvement in symptoms was obtained while this continued.

Effective action at a stage where it can be beneficial lies with the practitioner, for the insidious development of chronic cough and subsequent lung damage can be detected only by those in close and continued contact with the patient. The wife's point of view is often worth attention—for the bronchitic male will often minimize his symptoms because he knows that his own habits contribute to them.

Lung Cancer

The spectacular rise in deaths from lung cancer in this and all other countries where cigarette-smoking has been common for 25 years or more is now established. The relationship between this habit and the incidence of at least 80% of these cancers is no longer doubted by scientific observers. The high rate of mortality is still not appreciated by many of the profession who are not specializing in chest disease. These deaths now exceed the combined total of those due to road accidents and to pulmonary tuberculosis.

FIG. 1.—Deaths from pulmonary tuberculosis (falling curve) contrasted with those from cancer of lung (rising curve).

Fig. 1 shows the way in which this continued rise in mortality has now more than compensated for the spectacular fall in the tuberculosis curve. All available evidence suggests that, unless the community rids itself of its cigarette addiction, this steeply rising curve will continue until at least 1970, when over 25,000 people will die annually in England and Wales. This rise is avoidable. We in the profession can be of the greatest assistance, both by example and precept. There is no magic in a cigarette which can compensate for the harm it does.

Doll and Bradford Hill (1954) show that we doctors are dying in the same way as our patients. Surely intelligent self-preservation, if no other motive, should ensure that we take part in a great campaign of preventive medicine.

Meanwhile, the probability of carcinoma of the lung in any patient over 45 years of age who has smoked for 20 years or more should be always before us. If treatment

is to be of great assistance, earlier diagnosis is essential. Many of the growths start silently in the outer part of the lung. There is no reason why symptoms other than those due to smoking should be manifest until a late stage. Consequently, until some more delicate indicator of cancer is available, there is much to commend annual chest x-ray examination of all who continue to run this risk and who are 45 years of age and older. In fact, Boucot and Sokoloff (1954) advocated six-monthly checks. The slow symptomless growth is illustrated by Figs. 2 and 3 taken from a patient in whom hypertension, generalized bronchitis, and polycythaemia precluded the possibility of operation. These show that for twelve months the growth remained operable, while no symptoms referable to the lesion existed. The insistence on frequent radiological examination will also bring home to the population and the Government the need for preventive action. The scope of beneficial activity by the general practitioner was never wider than in this situation.

FIG. 2.—Radiograph taken on March 31, 1953, showing peripheral carcinoma at apex of left lower lobe.

FIG. 3.—Radiograph in same patient as Fig. 2 taken twelve months later showing growth still apparently operable.

Tuberculosis

Modern therapy, modern diagnostic facilities, and known methods of prevention are altering the whole aspect of tuberculosis. There is a tendency in some quarters to play down the need for continued vigilance and activity in eradicating this disease. The Home Office and other departments have refused to take steps to ensure that people coming from abroad to work amongst us are free from active and infectious disease. This is contrary to the policy of practically every other English-speaking nation. More important, it is contrary to common sense, for it fails to bring home to us all that this is an infectious and therefore a preventable disease. The possible application of B.C.G. vaccination to tuberculin-negative immigrants from Ireland and elsewhere should be explored, as suggested by Hess and Macdonald

(1954). We must aim to give what protection we can to those who are especially susceptible.

The practitioner is in a strong position as regards early diagnosis. Case finding is highest in those people referred for x-ray examination by practitioners. There is no effective substitute for a practitioner who is quick to detect and act upon early suggestive symptoms or signs. As a corollary it should everywhere be an easy matter for a doctor to have his patient x-rayed. Where facilities are still lacking, they should be pressed for insistently until made available; miniature films are inexpensive, are quite efficient, and are useful in this connexion.

Hospital and sanatorium treatment is now much more available in most parts of the country, but some areas lag behind. Long waits for surgery—up to two to six months—are still existent; these, apart from anything else, result in wasteful blockage of beds.

Regional hospital boards and hospital management committees are sensitive to criticism on this matter. If there is delay in effective treatment, pressure by a practitioner will do much to obviate it.

The policy of vaccinating school-leavers with B.C.G. remains in a far too nebulous state. No clear lead has been given. The evidence available should be sifted as soon as possible with a view to establishing a national policy. The full possibilities regarding hostels for continued segregation and sheltered workshops require further study, but this should be undertaken with a view to promoting a suitable scheme of action and not lead to further delay. Evidence is still awaited regarding the most appropriate regime of chemotherapy for the long-term sputum-positive patient, and at what intervals it should be applied.

Summary

It can be asserted that chest disease presents us with a challenge. Much of it is preventable—it is not being prevented. Our community and our profession are dying needlessly. Clean and uninfected air in town and workplace is essential—it can be obtained. Cigarette-smoking has been shown to be more dangerous to health than any other national habit. Unless the irritant and carcinogenic effects can be eliminated, further manufacture and sale should be seriously questioned. No consideration of tax collection should blind us to the need for action.

Last century saw great progress in eradicating intestinal disease. More spectacular progress can now be made in ridding us of diseases of the chest. This challenge is a personal and a national one. Economically, action is essential—humanely, it is imperative.

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Health education was considered mainly from the nursing point of view by a group of doctors and senior nursing personnel at the 1954 Summer School arranged by the Central Council for Health Education at Reichel Hall, Bangor, North Wales. The group rejected the suggestion that specially trained health educators were necessary in hospitals. After the medical staff, the ward sister was the key person in instructing patients and their relatives. But if she were to have time to do this properly it might be necessary to lighten some of her other duties.

INCREASED PLASMA BILIRUBIN IN NEWBORN INFANTS IN RELATION TO BIRTH WEIGHT

BY

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Some degree of jaundice is often shown by newborn babies in whom there is no evidence of haemolytic disease. The extent and duration of jaundice are rather variable (Davidson *et al.*, 1941), but are thought to be more marked among premature infants (Hsia *et al.*, 1953). The condition is generally regarded as an innocuous one; as is implied by the customary description—"physiological jaundice." However, a more serious view is suggested by recent reports (Aidin *et al.*, 1950; Claireaux *et al.*, 1953), which show that prematurity and jaundice may be followed by pigmentation of the brain and death of the infant. This association had led us to re-examine the relation between birth weight and the incidence, degree, and duration of the increased bile-pigment content of the plasma of newborn babies. The nature of the plasma pigment has also been determined, since there is evidence that bilirubin is damaging to the brain.

Methods

The basis of the survey was a series of plasma bile pigment estimations, at approximately daily intervals, on a group of "normal" newborn babies which were selected to provide a wide range of birth weights. In order to determine the highest plasma pigment concentration reached in each baby the study was continued until the amount of bile pigment in the plasma had dropped markedly from the previous day's figure, or had dropped appreciably on two consecutive days.

Birth Weight.—This was drawn from the hospital case records.

Selection of Patients.—The one criterion for including a baby in the survey was its birth weight. During the period of this investigation all babies in certain wards, up to a maximum of nine babies in each weight group, were studied, excepting those babies that were known to have haemolytic disease or some other pathological feature. The plasma pigments of some very small babies were not determined during the first day or two because of their clinical condition. Additional babies, to whom attention was drawn because they were jaundiced or deeply jaundiced, were studied with respect to the type of serum pigment, but are not included in the series.

Bile Pigment Estimations.—Heel-prick blood was collected with heparin or oxalate, and 0.05 to 0.2 ml. of plasma was used for quantitative estimation by van den Bergh's diazo technique (King, 1951). For the most part estimations were made daily, though there were occasional intervals of 48 hours.

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