

**On the use of ether and etherised cod-liver oil in the treatment of phthisis /
by Balthazar W. Foster, M.D.**

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ON THE USE OF ETHER AND ETHERISED
COD-LIVER OIL IN THE TREATMENT OF
PHTHISIS.*

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MODERN research is daily making it more certain that, under the term Phthisis, we have hitherto grouped together a number of pathological conditions which differ essentially in their finer features. But, although the microscope and the scalpel have, for some time past, been busy in defining the distinctive characters of these different pathological conditions, the work is as yet so far unfinished, that, for convenience sake, we still include under the term Phthisis many cases which the more accurate pathology and the more exact diagnosis of the future will enable us to differentiate. In this wide sense I use the term Phthisis in this paper; and I have the less scruple in so using it, because I believe the diseases comprehended under this term have, as one of their earliest conditions—almost, I might say, as their essential primary phenomenon—a perverted nutrition, from which, as the *fons et origo mali*, all the later phenomena proceed. Errors of nutrition form the starting point in so many diseases, that it is not improbable we shall have to investigate the earlier phases of these nutritive disorders with more penetrating scrutiny, before we discover the subtle causes which determine the varied results of inflammatory cell-growth—to cite an extreme instance, to learn why in one case cancer and in another tubercle is produced.

The disorders of digestion, associated with pulmonary consumption, have long been known to the profession, but it is only of late years that they have attracted special attention. Numerous independent inquiries have all ended by pointing to the difficulty of assimilating fat as the constant characteristic of the dyspepsia of Phthisis; and statistical observations tell that, in at least 75 per cent. of consumptive patients, this defective assimilation occurs. Adding this fact to others, such as the early and rapid disappearance of the fat stored in the tissues, the development of the inability to digest fat, antecedent to the local lesions, and the marked improvement observed in patients when the digestion of fatty matter is restored, we have, I think, evidence strong enough, in the absence of any more precise indications, to demand that our first efforts should be directed to improve this state of defective assimilating power. Some years ago, Mr. Jonathan Hutchinson, writing on this subject said, "Exceptions undoubtedly do occur, but, as a general rule, it might probably be safely laid down that the severity of the tubercular dyscrasia is measured by the difficulty with which cod-liver oil is borne.

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The need for that remedy is mostly in exactly inverse ratio to the facility with which it is digested."

The greatest step made for many years in the treatment of consumptive patients was the introduction of cod-liver oil; and Dr. Hughes Bennett, to whom we owe this great boon, expressly states "that the great obstacles the practitioner has to contend with are the dyspeptic symptoms." In cod-liver oil was found a form of fat which could, in many cases, be digested even by the impaired organs of consumptives; but the next step, viz., the search after some means of augmenting the secretions which are specially devoted to the digestion of fatty matters, has been hitherto neglected or unsuccessful. To pour oil into a patient's stomach, without at the same time taking measures to ensure its digestion, has always appeared to me a crude kind of therapeutics. Its simplicity has, it would seem, recommended it to the routinist; for there is probably no single remedy used in any disease with so little preliminary inquiry into the conditions favourable to its action. Experimental physiology has taught us that the only fluids in the body which have the power of acting upon fat, so as to render it fit for absorption, are the secretions of the pancreas and the duodenal glands. To these secretions therefore, we must look for assistance in the treatment of phthisical patients by cod-liver oil, for on the action of these glands must the assimilation of the remedy depend. And such healthy action can scarcely be supposed to co-exist with the inability to digest fat, which is so frequent in the disease under notice. As Bernard has shewn, the chief of these glands (the pancreas) is most sensitive to nervous influences, ceasing to form a healthy secretion from very slight irritation, and even from emotional influences. This fact, taken together with our knowledge of the peculiar character of the dyspepsia of Phthisis, justifies the assumption that the pancreatic secretion is disturbed. Not long since, Dr. Dobell, holding these views, made some experiments with pancreatic emulsions of fat and pancreatine, which supported this interpretation of the phenomena, and shewed that fat when emulsified is more readily digested than in any other form. In this paper I have, however, to propose a mode of treatment which should, I think, in all cases precede the use of such remedies as pancreatic emulsion, because it aims at remedying the disorder, not by artificially complementing the defective secretion, but by stimulating the glands to renew their healthy action. Instead of throwing into the system a substance which may be yet formed in physiological quantities, it endeavours to promote the normal flow of pancreatic juice.

The drug which gives us this power is *Ether*, and I now propose to lay before the meeting the evidence of its physiological action, and afterwards to speak of its therapeutical effects. I had long sought, and sought in vain, for some means of acting on the pancreas in the treatment of Phthisis, till one day, two or three years ago, when reading Claude Bernard's elaborate investigations on the properties of pancreatic juice, I found the long looked for clue; stated, indeed, so simply, and brought out in successive observations and experiments so clearly, that it has ever since been a matter of surprise to me that no previous reader should have seen the importance of the facts to practical medicine. In the following extracts, I lay before you the evidence of our greatest living physiologist on the mode of stimulating the secretions of the pancreas. The first passage which arrested my attention was the following, which occurs in Bernard's *Leçons de Physiologie Expérimentale appliquée à la Médecine*, tome ii, p. 226. "The nervous influences which directly excite the secretion of the pancreas are much more difficult to determine than those which act on the salivary glands.

In a dog, with a tube fixed in the pancreatic duct, I have galvanised the solar ganglion of the great sympathetic without a result, clearly shewing any modification of this secretion. *But I have seen Ether introduced into the stomach determine soon afterwards a considerable flow of pancreatic juice.*" This statement was so clear and unmistakable, that I at once proceeded to search in Bernard's other works for its confirmation. From his *Leçons sur les Effets des Substances Toxiques et Médicamenteuses*, Leçon 29, p. 426, I extract the following: "I would remind you only of the influence of ether on the intestinal secretions. Ether is reduced to a vapour when introduced into the stomach, and may rupture it.* When, however, this accident does not occur, there may be noticed a vascular congestion of all the digestive tracts, but this congestion never attains to inflammation. At the same time, the secretions are rendered active and the rapidity of absorption is notably augmented. These last effects suffice to establish the non-inflammatory character of the congestion of the mucous membrane, for it is known that on an inflamed surface the secretions are dried up and absorption becomes more difficult. The turgescence of the mucous membrane of the intestine, as well as the liquids secreted, present the same characters when produced by ether as when they are caused by their normal excitant—food. In comparing the pancreas of an animal, opened fasting, with that of an animal opened during the process of digestion, a great difference of colour, due to the difference of vascularity, is observed. After the administration of ether the pancreas becomes red and turgescient, as it is during digestion, and its secretory function is proportionally increased by the afflux of blood. I have accordingly been able to avail myself of this procedure to obtain pancreatic juice. Normally, this fluid discharges by drops more or less infrequent, but when a little ether is given to an animal having a pancreatic fistula, this discharge is seen to become more abundant, without the secreted liquid having lost any of its physico-chemical characters." Demonstrating these facts to his class, the Professor continues: "Here is a rabbit, upon which we will show you the increased secretion under the influence of ether. The pancreatic duct is laid bare, and into it there is introduced a small silver tube. The intestines of the animal are red and very vascular, and contain ether in vapour. The tube introduced into the pancreatic duct plainly gives passage to a very active flow of pancreatic juice, while under ordinary conditions the liquid only flows out drop by drop with an activity much less." In another place (p. 422) summing up the results of his experiments, and alluding first to the effects of ether in promoting absorption of fatty matters, he says:—"Finally, in our experiments, the injection of the lacteals is due to the abundance of the pancreatic secretion, and to the extremely fine state of division of the fatty matters which occurs in the intestine. It is due, also, to the *absorbing power, having been augmented by the ether.* This activity of absorption has been observed in the case of several poisons. We have already mentioned that the combination of ether with poisonous doses of strychnia and nicotine produced death more rapidly in the animals on which we experimented. The action of ether introduced into the digestive organs is, therefore:—1. To stimulate all the intestinal surface. 2. To stimulate the secretions which are poured into the intestine. 3. To modify and decidedly increase the absorbing power." In a short passage (page 428), at the end of the experiments referred to above, the following passage occurs:—"Ether increases the absorption

* This can only occur in those lower animals which have not the power of regurgitation.

of fatty matter, which it places at once in a state of fine division, and in contact with a more abundant secretion of pancreatic juice. In this way it produces a very marked white injection of the lacteals."

If necessary, I might multiply these extracts still more, but enough has, I think, already been quoted from the works of our greatest modern experimental physiologist to teach us the physiological action of Ether. This action is twofold: (1) it stimulates the pancreas and glands of duodenum to pour out their secretions freely, and (2), at the same time, it facilitates the absorption of those very substances which these secretions are designed to digest. In other words, ether not only obtains for us the secretions required to digest fats, but promotes the absorption of these fats when digested. Can any physiological action be more clear, or any experimental proof be more satisfactory for the end we have in view?

I now come to the second part of my task; namely, the therapeutical application of the foregoing facts. Having found, as I considered, sufficient evidence of the special action of Ether on the pancreas, I determined to test the value of the discovery by administering Ether in all cases characterised by inability to digest fat. In the out-patient departments of our hospitals, many such cases occur, which are generally classed as dyspepsia. Many cases of neuralgia are also to be met with in which a most decided improvement follows the increased power of absorbing fatty food. To both classes of patients I gave Ether sometimes in combination with cod-liver oil, sometimes alone before meals. The results were most satisfactory; the oil was digested more easily and the nutrition of the patients greatly improved. Of these cases I shall speak more fully on a future occasion. I next ordered Ether in mixture to all my phthisical patients at the General Dispensary, selecting the Dispensary for my investigations, rather than the Queen's Hospital, because all the patients were out-patients, and consequently exposed to no new and favourable conditions while the experiment was being tried. The patients being also of a somewhat better class than those attending the hospital, were not, as is so often the case in our large towns, struggling to combat a mortal disease while suffering from the effects of disease's chief ally—improper and insufficient food. For some months I pursued the treatment, seeing a very large number of consumptive cases, to all of whom Ether either alone or in conjunction with cod-liver oil was administered; and the good effects were so decided, that I determined to investigate the subject more methodically, and to keep a careful record of each case. The good results observed in this preliminary inquiry were a return of the power of taking oil and fatty food, which had been previously distasteful or had even excited sickness: increased appetite, improved general nutrition and increase of weight, diminution of cough and expectoration, and cessation of night sweats. The general impression produced in my mind was so favourable, that I began my more exact inquiries with much confidence. In my first cases, the Ether had been given in water with hydrocyanic acid and bicarbonate of potash, twenty-minim doses of Ether to each ounce of the mixture. The Ether was afterwards added to cod-liver oil, the *Æther Purus* of the *Pharmacopœia* being used, and about ten minims (9.259 m.) added to every two drachms of oil at first, afterwards fifteen and twenty minims were occasionally given in the same quantity of oil.* In some cases the Ether was administered in water alone, and taken a short time before the oil. The effects were similar in all cases; but for convenience sake, and on account of its power of masking the unpleasant properties of the

* Mr. Peter Moller, of Oxford Street, has prepared for me some Etherised Cod-liver oil of excellent quality.

oil, I now, generally, give Ether mixed with cod-liver oil, in the proportions mentioned. In my second and systematic inquiry, I treated fifty cases taken as they presented themselves at the Dispensary, each patient being carefully examined on admission and at least once every fifteen days during treatment. A brief record was kept of the progress of each case; but, from former experience, I determined in this inquiry not to accept the statement of the patients themselves as evidence of improvement, but only to consider those patients better in whom the result of a physical exploration of the chest, in addition to *decided increase in weight*, confirmed the statements made. I therefore weighed every patient once a week. As it would be impossible to give a record of each case in a communication such as the present, I must confine myself to a brief statement of the results obtained in the fifty cases.

Sixteen were admitted in the first stage of the disease; *nineteen* in the second stage; and *fifteen* in the third stage.

Of the *Sixteen* in the first stage (or stage of deposition), seven improved in general symptoms and in physical signs, gaining on an average over $7\frac{1}{2}$ lbs. each; five remained stationary, all gaining weight slightly; and only four became worse.

Of the *Nineteen* cases in the second stage, six improved in all respects, gaining, on an average, about 8 lbs. each, two cases gaining $14\frac{1}{2}$ lbs. and 10 lbs. respectively; six remained stationary; and seven became worse.

Of the *Fifteen* cases in the third stage, seven improved, gaining, on an average, about 5 lbs. each; five remained stationary; and three became worse.

Of the total *Fifty* cases, *Twenty* improved, *Sixteen* remained stationary, and *Fourteen* became worse.

Six of the cases treated, in no instance for a less time than three months, and observed over a period of many months, retained their weight; were troubled by no symptoms, and maintained the improvement in their physical signs. Only one of these was observed over a less period than fifteen months, three over two years, and two over eighteen months. These cases may be considered, I think, as examples of the arrest of the disease, for the patients have returned to their ordinary avocations, and are able to earn their livelihood untroubled by their former disease. The only other remedies used in those cases were croton ointment, as a counter-irritant, Dover's powder occasionally to relieve the cough, and, in a few cases, a little linctus morphiæ. But, as cod-liver oil was administered as well as Ether, the objection may very naturally be made that the improvement was due to the use of the oil. For my own part this objection has not much value, for I had long used oil largely without obtaining any results at all equal to those stated. In order, however, to meet this objection the Ether was stopped in ten instances and the oil continued; six times there was a fall in weight during the following three weeks. In one case the patient, who had taken Ether for some two months, continued to gain weight. In the three other cases the gain ceased, but was again observed in these patients, as it was in all, when ether was again administered.

These results are not only instructive, as showing the effect of Ether in increasing weight, but also as showing that the digestion of fatty food is restored to its normal state, in many cases, after a long course of Ether. In the cases which have done best under treatment, that is, the cases which I think we may consider instances of arrested Phthisis, the power of taking fats, which was at one time much impaired, has returned, and the gain in weight has been maintained over a period of many months.

I may here also add that, in all the fifty cases there had been marked wasting before my treatment was adopted, in at least half the cases, cod-liver oil notwithstanding. Many of my patients have over and over again expressed their preference for the Etherised oil; and many who have been unable to retain ordinary oil when taken, have been able to use Etherised oil, not only without disagreeable symptoms, but almost with pleasure: "to drink it from the bottle", as some have expressed it. In advocating a new method of treatment, it is most satisfactory to be able to appeal to confirmatory evidence. It gives me great pleasure, in the present instance, to be able to call as a witness, in behalf of my views, the Secretary of this Section, Dr. E. L. Fox, to whom I mentioned the advantage of prescribing Ether in Phthisis in April 1867. I had the benefit of discussing the subject with Dr. Fox at that time; and he has since been so good as to send me the results which he obtained. In the early part of this year, he wrote to me as follows: "I fear I have kept no precise records of the oil and ether question; but since you mentioned it to me, I have used it very fairly. I give it in two sets of cases: 1, those who are tired of taking cod-liver oil; and, 2, those who have been taking it without gaining weight. In the first cases, I find it useful, as the ether, half an hour after the oil, seems to settle the stomach; and, I believe, induces the digestion of the oil. The nausea felt by so many patients is, I think, merely evidence of the oil not being digested. In one hospital case, the man took oil for fourteen days without any benefit; indeed, lost flesh. I continued the same dose of oil, and added the ether, and he began to gain three pounds a-week, and went on at the same ratio as long as he was in the wards. I think I have given it to about thirty patients since our talk in April, mostly in private patients of chronic phthisis, and in one case of great debility, in which I believed the pancreatic secretion was too little. In this case, the young lady had a great horror of all fat things, but took the oil with ether after it fairly well, and gained on it. It seems a plan generally liked by patients, and I am convinced of its utility." Such is the testimony of Dr. Fox, and I need hardly say how gratified I am to have the support of so able an observer. I might quote the testimony of others who have used the ether at my suggestion, were it necessary.

I may here remark, that I have used Ether in the treatment of Phthisis, not hoping to find a specific, for we have in these days ceased to search after specifics, but simply expecting to discover a rational means of combating one of the most serious symptoms of the malady, and restoring to its healthy state that perverted nutrition which forms so characteristic a feature in the great majority of consumptive cases. The peculiar character of this disorder of the digestive organs has been dwelt on, and the facts are, I think, sufficiently strong to show that in ether we have the best remedy for renewing the power of assimilating fat, whenever that power is diminished or lost.

Such, briefly told, are the results of my inquiry. I submit them to this meeting, in the hope that others may assist me in testing the truth of the facts advanced. Throughout, I have endeavoured to investigate the question with scrupulous care; the drug was selected only after a laborious search, and when the evidence of its physiological action appeared to me conclusive. Starting from physiological facts, I have used the more simple science, physiology, to assist me in adding a new fact to the more complex subject—therapeutics; for it is in this way only that I believe medicine, a compound of sciences, can be advanced. First, must we learn the laws which regulate the normal before we can successfully analyse the laws which regulate the abnormal. In the selection of cases for experiment, I have also endeavoured to eliminate, as far as

possible, all sources of fallacy, by selecting patients in the same condition of life, exposed very much to the same influences; and I have refused to accept any statement, as regards improvement, which has not been confirmed by the best test of all, in my opinion, the improvement of general nutrition. The cases, also, were, as far as could be determined, suffering from the same pathological conditions; they were all cases which may be termed chronic Phthisis. In short, in all respects I have endeavoured to shut out from my inquiry all the accessory circumstances which might be sources of error; and I trust I have in this way avoided mistaking coincidence for the relation of cause and effect. The difficulties of avoiding all such sources of fallacy in a therapeutical inquiry are immense, and hence the slow progress which this part of medical science makes towards scientific form. If, in the present instance, my inquiry has been conducted with sufficient care to make it appear that I have indicated a new direction of fruitful research, my object will be accomplished, and I must leave it to the experience of the profession to decide on the value of Ether in the combating one of the most subtle and certain approaches of our great enemy—death.



