Further observations on the use of pancreatic emulsion and pancreatine in consumption, marasmus, tables mesenterica, and other wasting diseases of children and adults / by Dr. Dobell.

With the Author's Compliments.

FURTHER OBSERVATIONS

ON THE USE OF

PANCREATIC EMULSION AND PANCREATINE,

IN

CONSUMPTION, MARASMUS, TABES MESENTERICA,

AND OTHER WASTING DISEASES OF CHILDREN AND ADULTS.

By Dr. DOBELL,

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The paper on the use of Pancreatic Emulsion in the Wasting Diseases of Children, which follows these introductory remarks, appeared in "The Practitioner" for October, 1872; and as it has excited considerable interest among the readers of that valuable journal, I have been persuaded to give it a wider circulation by publishing it in a separate form.

I have been surprised to find that, notwithstanding the numerous advertisements from contending manufacturers which have appeared during the last eight years, and the very large quantities of Pancreatic Emulsion and Pancreatine now prescribed in this and other countries, many medical practitioners have written to me since the appearance of my paper in "The Practitioner," to inquire where these preparations can be obtained, and to ask for the formulæ for their manufacture.

To these inquiries I have replied that the formulæ are published:—1. In my paper to the Royal Society, "On the Action of Pancreatic Juice upon Fat and Starch" (Proceedings of the Royal Society, 1868, No. 97). 2. In "The Pharmacopœia of the Royal Hospital for Diseases of the Chest" (Churchill, 1869). 3. In Squire's "Pharmacopœias of the London Hospitals," (2nd Ed.). 4. In Squire's "Companion to the British Pharmacopœia," (7th Ed.). 5. In the Appendix to the 5th Edition of my work "On Diet and Regimen in Sickness and Health." (Lewis); besides other places.*

* To prevent disappointment it must be observed with reference to the published formula, that the Pancreatic Emulsion of Messrs. Savory and Moore is a much more palatable preparation than can be produced by the process given. This result is

All the Emulsion used at the Royal Hospital for Diseases of the Chest is made by Messrs. Savory and Moore, the process of manufacture being too complicated to be conveniently carried on in the dispensing department of the hospital. In this respect the Royal Hospital has enjoyed a special advantage, for when I first gave the instructions for making the Emulsion to Messrs. Savory and Moore, I obtained from them the promise that the Royal Hospital, as the birthplace of the remedy, should always be supplied at as nearly cost price as possible, so that we might be able to give our poor patients the benefit of the Emulsion, without being deterred by considerations of cost. This promise has been faithfully kept; and I have great hopes that I may shortly succeed in persuading Messrs. Savory and Moore to make a similar concession to all public hospitals.

I am not unmindful that my former recommendation of Messrs. Savory and Moore's preparation led some unscrupulous persons to circulate a report that I did so from interested motives, a slander which must have had its origin in some mind *not "sibi conscia recti"* as regards its own professional dealings, and incapable of believing in the rectitude of others. Certainly, no one who had the slightest acquaintance with the principles which have always guided my professional career could have the least excuse for suggesting such a mean suspicion, for I have always maintained, both in private intercourse and in my public speeches, that so long as a medical man practises his profession, he should have *no self-interest* in anything that he prescribes or orders for his patients; and although I have, during the last twenty-five years, invented a variety of medical appliances, I have always done, as I did in the case of Pancreatic Emulsion, viz., given my inventions freely to the profession and the public, without either seeking or accepting any other personal advantage than such scientific credit as they may happen to entail.*

I repeat, then, regardless of what false construction my enemies may please to put upon my statements, that in justice to Messrs.

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obtained by a variety of minor pharmaceutical details, of similar nature to those adopted by all leading Chemists in the manufacture of certain Pharmacopœia and other preparations, for which they thus obtain a notoriety. As these minor details of the manufacturer do not affect the active properties of the remedies, they are always regarded as "trade secrets," which each Chemist has a right to keep to himself; and I have not thought it any business of mine to urge Messrs. Savory and Moore to publish a statement of their "trade secret" as regards their mode of making Pancreatic Emulsion *more palatable* than that of other houses. It is sufficient that I know the *essential process of manufacture* to be such as I have directed for the production of an efficient preparation, and that this is published for the benefit of all.

* See letter in "The Medical Times and Gazette," September 21, 1867.

The following statement by Messrs. Savory and Moore is extracted from page 2 of a pamphlet entitled "The Experience and Opinions of Medical Men on the Value of Pancreatic Emulsion and Pancreatine as Remedies in Wasting Diseases, by Savory and Moore." (Churchill):—"Pancreatic Emulsion was originated by Dr. Dobell after a long series of experiments, and first administered by him to patients suffering from consumption and wasting diseases, at the Royal Hospital for Diseases of the Chest. Having satisfied himself of its important remedial properties, he made the remedy public for the benefit of the profession and of the sick, *refusing to accept or to reserve to himself*

Savory and Moore, I am bound to state that their Pancreatic Emulsion and Pancreatine are the only perfectly reliable preparations of Pancreatic juice I have seen up to the present time. There is no reason why some other manufacturer, with the advantages of the published formula and the present preparation for a model, should not produce a Pancreatic Emulsion *as good* as that of Messrs. Savory and Moore; but with all their experience in the matter, it is very improbable that any one will be able to excel them; and so long as there is no preparation *better* than theirs, I shall feel it only just and right to give them my special recommendation, as a reward, to which they are honourably entitled, for the way in which they have devoted themselves, without regard to expense, and through many difficulties, honestly to carry out my wishes and instructions for the production of a true Pancreatic Emulsion of solid fat, of reliable and equal strength, agreeable to the taste, capable of bearing any climate, and of keeping good for an indefinite length of time.

Having thus disposed of this matter in passing, I think it may be interesting to those who are now trying the Pancreatic Emulsion in the wasting diseases of children, as suggested by my article in "The Practitioner," and to that very numerous body of medical men, at home and abroad, who have prescribed Pancreatic Emulsion in consumption since my papers in "The Lancet," "On the Assimilation of Fat in Consumption," (1864-5), if I say a few words with regard to my own experience of the remedy since my last publication on the subject, "Report of the Experience of Medical Men who have used Pancreatic Emulsion of Solid Fat" (1867).*

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the slightest benefit from the discovery beyond the scientific credit which might attach to it."

The following editorial note appeared in the "Lancet," Nov. 17, 1866:—

"The Dietetic Value of Pancreatised Fats.—It would be interesting to know to what extent the experience of those medical men who have used the 'pancreatic emulsion' of fat accords with that which Dr. Dobell has now recorded in our columns in about two hundred cases of consumption. Several thousand pounds weight of this new medical agent have, we believe, been supplied by the makers to the order of medical men in this and other countries; and we think, therefore, that the time has arrived when some perfectly impartial evidence should be added to that of the ingenious author of this treatment. *The remedy has been placed fairly before the profession, the author reserving to himself no pecuniary interest or advantage whatever*, and if the utility of the remedy bears any proportion to the large demand which has arisen for it, we ought to know this clearly, and to understand and appreciate our obligations."

* *Review of "Report" from the* "Gazette Hebdomadaire de Médicine et de Chirurgie." Deuxième Série, Tome V., 1868, Paris.

"Dr. Dobell has continued with great energy his researches on the utility of fatty emulsions, obtained by the aid of the pancreatic juice, in all cases where nutrition is seriously impeded, and more particularly in pulmonary consumption. After a series of papers on the subject published in the 'Lancet,' it occurred to him to collect the experiences of those English medical men who had made use of his formula, and the replies received form the instructive document which has just been published and is now before us. A schedule of questions was submitted by him, so that the answers, whether favourable or unfavourable, may be seen at once. The questions put were these:—

"1.—In how many cases of consumption have you prescribed the Pancreatic Emulsion prepared by Savory and Moore?

Since that time I have prescribed the Emulsion in all suitable cases of consumption or of wasting from defective assimilation of fat that have come under my care, both at the Royal Chest Hospital and in private practice, and I have had numerous opportunities of witnessing its effects, when prescribed by my colleagues at the Hospital, and by other medical men, who have communicated to me their opinions on the subject or sought my assistance in consultation.

At the Royal Hospital alone I have prescribed the Emulsion in more than 6,000 cases since its first introduction in 1863.

The general results of my thus extended experience are confirmatory of the following (p. 5) statement of my opinion, extracted from the report already referred to, which I published in 1867.

To this I may now add, that while there are certainly a few persons who cannot possibly take or assimilate the Emulsion, although able to take cod liver oil, they are but very few indeed now that the Emulsion has been made so perfect a preparation; whereas the number

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"2.—In what doses, at what intervals after food, and for how long a time did you administer it in each case?

"3.—What is your opinion of its effects upon—1. Digestion? 2. Nutrition? 3. Weight of Patient?

"4.—Have you found that patients can take the Emulsion when they cannot take cod-liver oil?

"5.—What is your opinion of the effects of the Emulsion in—1. The true first stage of consumption (pre-tubercular)? 2. The stage of tuberculisation? 3. The stage of softening? 4. The stage of excavation?

"Thirty-two medical men replied to these questions, and in a manner generally favourable. One of them, indeed, styles this treatment 'a splendid invention'; but the testimony of others, though less enthusiastic, shows not less clearly that they have found in the 'Pancreatic Emulsion' an efficacious means of restoring impaired digestion and nutrition. The author himself has made use of it in the hospitals, in many thousand cases. He gives the emulsion in doses of from one to four teaspoonfuls one or two hours after the principal meal, and for a continuance of at least two months. It is taken in either milk or water, and he sometimes adds a small quantity of brandy or rum. He attributes to this emulsion the property of digesting fatty matters and starch, and of stimulating the stomach. It supplies at the same time fatty matters for combustion and for histogenesis. Lastly, it maintains the normal weight of the patient, or increases it if diminished. He has proved that the emulsion is well taken in most cases where it has been impossible to administer cod-liver oil, but as far as possible he combines these two remedies. He thinks that during the stage of threatened disease these means will have a lasting efficacy. In 45 individuals who had arrived at the stage of tubercular deposits, he had proved in 44 an amendment of general symptoms; in 33 the physical signs were improved, 13 had remained stationary, and in one case they were aggravated. Out of 69 patients at the stage of softening, in 59 there had been a visible progress in the general health, and in 52 equally visible improvement in the physical signs. Lastly, out of 78 cases where there was a cavity in the lung, in 55 nutrition was restored, and in 35 the improvement was proved by percussion and by the ear.

"Notwithstanding these results, Dr. Dobell wisely repels the idea that Pancreatic Emulsion is a *specific* for phthisis. He is entirely justified in saying that to repair the ravages of want of nutrition is to give every favourable opportunity to nature, and to prolong the life of the patients. To sum up, I hold that this remedy should be tried by us. To prevent consumptive patients from growing thin is the end the therapeutist should always have in view, and there are not too many means of effecting his object. I will conclude by noticing a case of tumour of the epigastric region, attributable to a disease of the pancreas, with stools charged with undigested fatty matters, and which has been cured under treatment by this emulsion. The tumour remained enlarged, but the functions of the stomach were regulated, and the patient regained his flesh."

"Fonssagrives."

EXTRACT FROM REPORT TABULATED FROM SCHEDULES, 1867.

QUESTIONS.	1.—In how many cases of Consumption have you prescribed the Pancreatic Emulsion, prepared by SAVORY and MOORE?	2.—In what doses, at what interval after food, and for how long a time, did you administer it in each case?	3.—What is your opinion of its effects upon:—1. Digestion? 2. Nutrition? 3. Weight of the patient?	4.—Have you found that patients can take the Emulsion when they cannot take Cod-liver Oil?	5.—What is your opinion of the effects of the Emulsion in:—1. The true first stage of Consumption (Pre-tubercular)? 2. The stage of Tuberculisation? 3. The stage of Softening? 4. The stage of Excavation?	GENERAL REMARKS.
ANSWERS.	I have prescribed it in about 2,500 hospital cases, with results which, I think, may be fairly represented by those obtained in the 187 cases of which careful notes were taken, and which have been published in the *Lancet*.	From one to four teaspoonfuls once or twice a day, from one to two hours after the principal meals, for periods of not less than eight weeks at a time, in milk, water, or ginger wine and water; a little brandy or rum usually being added.	1. Assists greatly in the digestion of fat and starch, and improves digestion generally. But it is necessary to use common sense in correcting any special derangements of digestion, which may be present, by other remedies. 2. Supplies fat for oxidation, and for histogenesis. 3. Maintains or increases weight according to the amount of weight previously lost, the power of taking food, and the quantity of Emulsion administered.	Yes; in 187 published cases, Emulsion agreed in 180; disagreed in seven. Cod-liver Oil agreed in seventy-five, disagreed in ninety-eight; was not tried in fourteen. In the 187 cases of which I have published results, no Cod-liver Oil was given during treatment with Emulsion, so as not to confuse the effects of the two remedies. But in daily practice, I recommend both Oil and Emulsion to be taken, if the stomach will bear them. The proportion of cases in which Emulsion agrees will not be as large as here stated, unless care is taken to correct obvious defects in digestion by other remedies.	1. That it materially contributes towards effecting a radical cure, as explained by me in my work "On the True First Stage of Consumption." 2. In forty-five cases, results measured by general symptoms, forty-four improved, one stationary; measured by physical signs, thirty-one improved, thirteen stationary, one worse. 3. In sixty-nine cases, results measured by general symptoms, fifty-nine improved, five stationary, three worse, two not noted; measured by physical signs, fifty-two improved, eleven stationary, four worse, two not noted. 4. In seventy-three cases, measured by general symptoms, fifty-five improved, three stationary, fourteen worse; measured by physical signs, thirty-five improved, twenty-two stationary, thirteen worse, three not noted.	In the True First Stage, my experience is derived principally from private practice, such cases not often appearing at hospitals. Of the 2,500 hospital cases who have taken the Emulsion, many have been in an extremely advanced stage of disease; and in some of these the Emulsion has appeared to prolong life in a remarkable manner, being retained on the stomach long after all other kinds of food had ceased to be tolerated. Whereas oleinous fats, and especially Cod-liver Oil, are absorbed into the blood through the portal system, and serve an important purpose by rapidly presenting themselves for combustion and histogenesis; they do not, and cannot, take the place of the solid fats—rich in margarin and stearin, fusible at higher temperatures than olein, and less easily oxidisable—which can only be absorbed by the lacteal system after pancreatisation. This accounts for the remarkable stability of the improvement which accompanies and follows the administration of Pancreatic Emulsion, after Cod-liver Oil has been given without success, or with very evanescent success.

of persons who can take and assimilate Emulsion, but not cod liver oil, is very large. In either case—the rejection of cod oil or the rejection of Emulsion—it is necessary not to be too easily persuaded by our patients to desist from prescribing the remedy.

I frequently find that patients, who assert that they cannot possibly, and never could, keep down the oil, will manage to do so when informed that it is the only thing that will stay the progress of their disease, and when assisted by being instructed in the variety of ways in which the oil may be disguised, and its assimilation facilitated. I may here point out that the addition of a dose of Pancreatine to each dose of oil will, in a large number of cases, at once get over the difficulty in keeping it down—when that difficulty is that it eructates for some time after it is taken and is then rejected, not that it comes up directly. Many persons who have long taken quantities of oil without difficulty, but with scarcely any good effect, will gain flesh, and obtain all the advantages which assimilated cod liver oil can give, if they add the Pancreatine to their dose.*

With the Emulsion—patients, who after a first trial say they cannot take it, will nearly always find out that they can, when it is explained to them that there is nothing but pancreatic emulsion and cod liver oil which can really stay the progress of their wasting; and when they are assisted by being shown the best ways of taking the remedy and by having any faults in their primary digestive functions set right.

* *Extract from "The British Medical Journal," February* 8, 1868.—"In July, 1866, I was consulted by a gentleman, aged twenty-one, whose rapid decline in health was causing the greatest concern among his friends. He had the general symptoms of advancing tuberculosis, softening of the upper part of the left lung, partial consolidation of the right; weight 119 pounds. With the assistance of cod-liver oil, pancreatic emulsion, good diet, and a winter at Bournemouth, where I placed him under the care of Mr. Allis Smith, he got on very well, and returned to the country in March, 1867. September, 1867, he wrote me: 'Cough and expectoration increase. I feel weak in body, occasionally having heavy perspirations; unable to get pancreatic emulsion for some time, but expect some to-day.' November 19, 1867, he had considerably improved since his note in September, and I again sent him to Bournemouth, under Mr. Allis Smith's care. Weight 121 pounds 4 ounces. January 3, 1868, he wrote as follows: 'For the past six weeks I have been regularly trying Pancreatine. The effect it has had on my digestion is most extraordinary; and during that time I have taken about two table-spoonfuls per day of cod-liver oil (following them immediately with ten grains of pancreatine) without the smallest feeling of indigestion; this I could never do before. I have, in the same time gained ten pounds in weight. My friend Dr. Coates has, in the last month, given it to two patients (the second one only lately); the first who is suffering from tubercular disease of the lungs, and was unable to take cod-liver oil, and was a martyr to indigestion, says that since she has taken the Pancreatine she has been able (like myself) to take the oil, and still not feel indigestion. Dr. Coates desires me to tell you that when he has more data he will write you fully."

"Writing again, January 12, he says: 'My bodily health seems better in every way; I have no indigestion whatever since I began the present treatment; weight to-day 134 pounds, making a total increase of 12 pounds 12 ounces since November 19.' It will be observed that, although in July, 1866, he was in the softening stage of tuberculosis, he weighs at the present time 15 pounds more than he did then. But the particular interest of the case lies in the circumstance that after having been kept up in weight by good diet, cod-liver oil, and pancreatic emulsion, he made a leap of 12 pounds 12 ounces when Pancreatine was added to his treatment, and that the difficulty which he had always felt in digesting cod-liver oil disappeared. I have seen similar effects in other cases, though perhaps not quite so sudden.'

The usual defect in primary digestion with such patients, is the combination of an excess of acidity with a feeble stomach, and this should be corrected by an effervescing draught of potass and soda, with citric acid, quinine and strychnia; or, where there is much flatulent distension as well as epigastric pain soon after food, by a stomachic powder of bicarbonate of soda, bicarbonate of potass, powdered ginger, and powdered calumba, in half a tumbler of water, a quarter of an hour before the meal.

At the same time it is frequently necessary to unload the bowels, and to relieve the portal system, which has often been long overloaded with cod oil olein, absorbed by the veins. It is to be remembered, as I pointed out in 1867,* that whereas olein is, in some measure at least, taken up by venous absorption; the solid fats have to pass by the lacteal route; and thus, when substituted for oil, in the form of pancreatic emulsion, they relieve the tax upon the choked-up venous system.

Then, the period after a meal at which the emulsion is taken may be varied, to meet the differences in the rapidity with which different stomachs dispose of their contents. Many who cannot keep the emulsion comfortably down when taken two hours after food, can do so if they take it from half an hour to an hour after. This particularly applies to young children. They generally manage it best within half an hour of a meal; and when their diet consists of farinaceous foods and milk it is best to mix it with a portion of the food.

With regard to menstruum :—milk is certainly the nicest and best, where milk agrees with the stomach and taste; but many persons have an old-standing aversion to milk, or have long ceased to be able to digest it comfortably. In such cases it is absurd to insist on the emulsion being taken in milk. The best substitute, and indeed one of the best menstrua for Pancreatic Emulsion, is thin water-arrow-root. The emulsion mixes well with it, and by converting the starch into glucose, gives it a pleasant, nutty sweetness. Many persons, however, prefer the emulsion mixed in water to about the consistence of new milk and then flavoured with wine, especially Tokay, ginger wine, or orange wine. In whatever menstruum it is mixed, it should not be made much thicker than new milk, and I advise a sufficient quantity of wine, brandy, rum, orange-brandy, ginger-brandy, or clove-brandy, to be added, to give it a decidedly cordial character, both to the palate and to the stomach.

One of the most important points in getting the emulsion well taken, is to have it *smoothly* mixed in the menstruum; this is easily done by putting the emulsion first into the cup, or glass, and then adding the menstruum little by little, and beating together with a spoon, till the whole is made of about the consistence of oil, or of good cream; after which, any quantity of fluid may be mixed by simple stirring; but if the emulsion is put in a lump into the menstruum, it may be difficult

* "On the True First Stage of Consumption. Lectures delivered at the Royal Hospital for Diseases of the Chest."—CHURCHILL.

afterwards to get it smoothly mixed, especially in cold weather. The mixing may be facilitated by having the cup or glass made warm or the chill taken off the menstruum, but it is not well to make it decidedly hot.

Some patients have asked to be allowed to take the emulsion "as it is" with some brown sugar over it, and declare that they like it in that form. This is better than not taking it at all, but I prefer its being mixed into a more fluid state. A good many mothers have told me that their children take it spread on bread, instead of butter, and sugared. This is not a bad way of giving it, because in masticating it with the bread it gets well mixed with the food and saliva; I may mention also, that treacle-posset, after it has cooled, is a very good menstruum, and pleases children when they are fond of sweets.

One more detail is worth alluding to, viz., to order a biscuit or a piece of bread to be eaten after the dose, so as completely to clear the palate of its taste and influence.

It is of the utmost importance to impress upon patients that cod liver oil and Pancreatic Emulsion are *not to be regarded as medicines, but as articles of diet, without which they, in their state of health, will as surely starve as persons in health would do if deprived of the most nutritive part of their food.* They should be ordered to be weighed whenever they leave off either the oil or the Emulsion, and to weigh again every week, to see if they lose or gain. So long as they do not lose any weight they may desist from their dose, but must at once return to it if there is the slightest diminution in weight. I always order patients on leaving off either oil or emulsion, to make an equivalent increase in the quantity of fat they eat, and to see whether by this means their weight can now be maintained, and thus to learn whether the power of digesting and assimilating a sufficiency of fat *without artificial assistance* has been restored.

A point of great interest and of vital importance in treating all wasting diseases is to ascertain what was the normal average weight of the patient before any wasting set in. It requires considerable care and circumspection to avoid being deceived on this matter by the patients themselves, who almost always date their wasting from a period considerably later than that at which it actually commenced. They attach no importance to the loss of weight till it begins to tell upon their personal appearance, either in face or figure. Yet, in tolerably plump persons many pounds may be lost before the change is obvious. In cases which do not start from a definite acute illness, but simply depend upon failing digestion and assimilation, the first few pounds are generally lost very gradually. The best plan is, if possible, to ascertain what is the heaviest weight ever reached in the patient's previous lifetime, or when this cannot be done, to catechise the patient very closely with regard to the year or two preceding the date at which they fix the beginning of loss of flesh. Supposing the patients say that loss of flesh began twelve months ago, they should be asked, "Were you just as fat and just as firm in flesh at that time as you were six months before that?" The answer will generally be, "No,

not quite;" and then they should be carried back another and another six months, until a time is reached at which they have not the least doubt, either from actual weighing or general impression, that they were at their full weight and full firmness. It must be remembered that loss of firmness, which is, chiefly, loss of solid fat replaced by olein, often precedes actual wasting by a considerable period. This is a change which careful and watchful mothers will observe in children as the first sign of degrading health, and those who are judicious enough to take warning by it, will often, by change of air and of diet, save their children from any further mischief. Increase of fat with loss of firmness in the fat is a certain sign of improper feeding or of impaired assimilation, and such fat will disappear, like snow before the sun, on the occurrence of the first attack of even a trifling acute disease.

Having ascertained as clearly as practicable about the average weight of the patient when in normal health, the next thing is to endeavour by every possible means to recover that weight completely. Where the loss has been considerable, this may prove a most difficult task, and when the loss has gone beyond a certain point, it may be quite impossible to recover the original weight. In very extreme cases of exhaustion and emaciation, with stomachs so irritable that nothing can be kept down, I have been able to put the first stop to the downward progress by mixing Pancreatic Emulsion with nutritive enemata, and it has been administered in this way till sufficient restoration of strength and of digestive power has been gained to allow of food and medicine being given by the mouth. And in cases where the stomach tolerates food and medicine, but in which the loss of weight has been very great, it is well to supplement the treatment by the stomach by extra doses of emulsion given in enemata; and thus to get a larger daily supply of fat into the system than the stomach could possibly take.* In this endeavour to restore the normal weight,

* According to the careful estimate of Dr. Lyon Playfair ("The Food of Man in Relation to his Useful Work," 1865), the quantity of fat required by an adult in twenty-four hours, to keep up healthy nutrition, is from 1 oz. to 2·5 oz.; and according to the estimates made from very numerous and carefully-selected data by Mr. Farrants and myself ("On Diet and Regimen in Sickness and Health." Fifth edition. Lewis, Gower Street), the quantity is from 2 oz. to 3·5 oz. We may fairly assume, then, that not less than two ounces of fat per day, on an average, is required to keep up healthy nutrition in an adult. We have next to bear in mind, that before a case of consumption ordinarily attracts attention, and begins to be treated as such, many pounds weight, principally consisting of fat, have been gradually removed from the body. In this condition—1, a deficiency of fat throughout the organism; 2, a loss of the power to assimilate ordinary fats; 3, a constant demand for two ounces per day to maintain healthy nutrition,—we administer cod-liver oil, in the belief that this form of fat will assimilate when other forms will not. Supposing that it agrees, and that some or all of it is utilised, a rapid improvement takes place in the patient, from the supply of some of that for want of which life was steadily fading—very much as a cut flower that has drooped for want of its supply of sap, rallies and recovers freshness for a time when put into water. But there are very few persons who can take more than from half an ounce to one ounce of oil per day—few who can take even this steadily from week to week without intermissions. But supposing an ounce or an ounce and a half per day to be taken regularly, how is this to supply, not only the two ounces per day required for healthy nutrition, but all the extra ounces of arrears that were lost before the treatment was begun? But assuming the possibility of two ounces per day of oil for nutri-

the influence of exercise and of temperature must always be kept before the mind; a certain amount of exercise and a certain coldness of temperature may be essential to keeping up the appetite and digestion, without which no progress can be made with the feeding and fattening process; but all exercise involves waste, and all cold involves waste; therefore, so long as the weight of the patient is in any degree below the normal average, exercise and cold must be kept at the lowest point consistent with maintaining appetite and digestion.* A little over-fatigue every day may entirely frustrate all attempts to recover weight, and a little excess of demand for heat-producing materials to maintain the temperature of the body may just consume all the little surplus we are sending into the blood. Here lie our great difficulties in the restoration of weight, the rocks upon which so many promising cases are "wrecked in port."

ON THE USE OF PANCREATIC EMULSION IN THE WASTING DISEASES OF CHILDREN.

(*From the "Practitioner," October,* 1872.)

THE very interesting article by Dr. Prospero Sonsino, of Pisa, in the September number of the "Practitioner," "On the Physiological Dyspepsia for Starchy Food in Infancy," revives an intention, from which I have been diverted by other occupations, of publishing a few words on an allied subject. In the annual announcements of the medical journals for 1871, my name was put down for an article "On the Use of Pancreatic Emulsion in Tabes Mesenterica," and, had I

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tion, and another two ounces for arrears, being taken and utilised, even then the *whole thing may be unstable and may break down*, from the fact that we are supplying oil and *not solid fat*—a body rich in olein and poor in stearin and margarin, in the place of bodies rich in stearin and margarin and poor in olein, such as the fats taken in normal food.

The practical conclusion from these considerations appears to be, that if we are to give a fair chance of recovery to a patient deprived of the natural powers of digesting and assimilating fats, we must, by one means or another, secure that two ounces of fat of average solidity are utilised every day for the purposes of nutrition, and an additional ounce or two to make up for arrears.

To obtain this end four principal means are now at our command:—

1st. The administration of as much oil and fat, either as medicine or food, as the digestive and assimilative powers are still competent to utilise.

2nd. The introduction of fat and oil into the system by rubbing them into the skin of the body and limbs.

3rd. The supply of saccharine and amylaceous articles of food in sufficient quantity to insure that no call shall be made upon the hydro-carbons for elements which can be as well supplied by the carbo-hydrates.

4th. The introduction of pancreatic emulsion and pancreatine, in sufficient quantities to enable the digestive and assimilative organs to utilise the necessary amount of fat ("On Tuberculosis, its Nature, Cause, and Treatment." P. 81. Second edition. Churchill).

* See an Article on "Food, Heat, and Motion" in Dr. Dobell's Reports on the Progress of Practical and Scientific Medicine in different parts of the world. Vol. I. 1869. LONGMANS.

selected a less questionable term than Tabes Mesenterica, I should have fulfilled my intention of writing the article at that time; but when looking up my cases for the purpose, I found it so difficult to prove in those that had recovered that the mesenteric glands were the seat of disease, that I thought it better to postpone the article till I had a new series of cases in which the diagnostics of that point had been more minutely recorded.

In this paper I propose to drop the question of disease of the mesenteric glands, and simply to speak of the class of cases constituting that wretched form of "atrophy and debility" and "marasmus" in children, in which every part of the body wastes away except the abdomen; the state described by Dr. Druitt, in the last edition of his "Vade Mecum," in the following few and graphic words:—"Emaciation and voracity; the belly swelled and hard; the skin dry and harsh; the eyes red; the tongue strawberry-coloured; the breath foul; the stools clay-coloured and offensive, sometimes costive, sometimes extremely relaxed; the patient usually dies hectic" (p. 75).

I wish to bring prominently forward the fact that this state, provided there is no advanced lung-disease, *is rapidly cured by Pancreatic Emulsion given in doses of a teaspoonful every four hours, and regularly persisted in till fat and flesh are restored.* It is, of course, necessary that a proper diet should be insisted on at the same time; but proper diet without the Pancreatic Emulsion will not do. This I have found over and over again in cases where everything judicious in the way of feeding and cod liver oil had been carefully and perseveringly tried without avail, but which, on the addition of the Emulsion to the previous diet, began at once to improve.

This fact has been familiar to me for a long time; and considering how largely Pancreatic Emulsion is now used in the wasting diseases of adults, I am surprised to find that it is not even referred to in the latest works on the diseases of children. Looking through these works and examining their indexes, one is led to the conclusion that their authors are not aware that there is such an organ as the pancreas, or that pancreatic juice has ever been used in any form in the treatment of disease.* Yet scarcely a week now passes but some general practitioner relates to me cases of the successful use in his own practice of Pancreatic Emulsion in the wasting of delicate children.

Dr. Prospero Sonsino's paper will, I hope, excite more general attention to this important subject. He, however, has laid all the stress of his observations upon the influence of the salivary and pancreatic juices on the digestion of *starch.* This is unquestionably a point of the greatest importance in the case of very young children brought up by hand, as showing the absurdity of attempting to nourish them upon starchy food, not artificially digested, before the period of life at which the saliva and pancreatic juice attain their functional activity. And even then, as Dr. Sonsino afterwards re-

* The word "pancreas" does not occur in the indexes of the last editions of West, Tanner, Vogel, Meigs and Pepper, Eustace Smith, Churchill, on Diseases of Children.

marks, "good reasons make us now believe that really it is not proper to feed infants with copious starchy matters, however these may be rendered digestible." The principal results of Dr. Sonsino's investigations are summed up in the two following conclusions, which, however, are not new:—1. "Pancreatic juice in dogs, cats, and rabbits, in the first week of life—perhaps for some days more—is devoid of any digestive action on starch." 2. "In the early life of man, probably till the beginning of dentition, infants offer a true physiological dyspepsia for starchy aliments, caused by the inactivity of one at least—possibly of all—the humours that concur in the digestion of those aliments" (saliva, gastric juice, pancreatic juice, enteric juice).

No doubt, when wasting occurs in these early periods of life, it is very often due to foolish attempts to nourish children upon farinaceous foods, by which dyspepsia and diarrhœa add to the exhaustion of partial assimilative-starvation. But, as a matter of fact, farinaceous food is seldom depended upon without some addition of cow's milk or some assistance from lactation; and we see children suffer from wasting who are fed entirely upon cow's milk or nursed by their mothers, and in such cases the "physiological dyspepsia for starchy food" will not account for their decline. Therefore we must not forget, that although normal saliva only acts upon starch, normal pancreatic juice acts also upon fats; and it is probable that these two functions of the pancreas are sufficiently independent of each other that they may exist separately. This I pointed out in my paper to the Royal Society in 1868, "On the Special Action of the Pancreas on Fat and Starch" (Proc. Royal Soc. No. 97). It is there stated as the results of my experiments, that "in addition to the influence of the pancreas upon fat, it has the power of converting starch into glucose by simple mixture. This property remains to a certain extent *after the pancreas has exhausted its property of acting upon fat.* The quantity of pancreas which before mixture with fat will convert about eight parts of starch into glucose, after saturation with fat will still convert about two parts of starch into glucose." It is possible, therefore, that in different states of depraved health one or other of these properties of the pancreatic juice—that for the digestion of starch, or that for the digestion of fat—may be deficient. And thus the depraved nutrition due to such deficiency will not be limited to the period of life anterior to that at which, under normal conditions, the proper functions of the pancreas should be developed. It is evident that when the power of digesting fat fails to be developed at its proper time, the defect must tell with double force upon children already suffering from deficient digestion of starch.

The children who become the subjects of the kind of wasting of which I am now treating are especially: (1) those who are suckled by mothers whose milk, though abundant in quantity, is extremely deficient in nutritive properties; (2) those who are brought up by hand; and (3) those who, at a later period of childhood, have been subjected to similar chronic defects in diet. Now, it is especially when the

mother's milk is poor in fat and lactin that the child becomes "dissatisfied" and "craving," and in the majority of cases it is this which leads to the introduction of farinaceous food, under the popular nursery belief that it is "*satisfying* ;" and, as Dr. Sonsino states, if this is given before the power of digesting starch is established, of course nothing but mischief can result.

But organs, like individuals, do not rise to the full performance of their duties unless called upon by the necessity for their activity; and, as I pointed out in 1866 ("On Tuberculosis," p. 40, second edition), "As the mother is deprived of fat-elements by lactation, so is the child deprived of them by a persistence in a diet deficient in milk. In the case of the child thus deprived of fat, a double injury is done, first, by cutting off the supply of fat-elements necessary for the protection of the tissues; and secondly, *by paralysing the function of the pancreas by prolonged inactivity.*" I venture to think that this is a point deserving far more attention than it has yet received.* It accounts in a great measure for the impossibility of restoring these ill-nourished wasted children by any kind of *natural* diet after they have been allowed to remain in a chronic state of defective nutrition. A child that has been long fed upon diet deficient in fat fails to develop the fat-digesting properties of the pancreatic secretion, and thus, when proper food is at last presented, cannot make use of it for nutrition.

It is probable, therefore, that it is due to this conjunction of circumstances that these wretched cases of fatal infantile wasting occur : the food deficient in fat not only fails to nourish the child, but fails to develop the function of the pancreas for the digestion of fat at a later period of life; the craving of the child due to the deficiency of assimilated fat is met by starchy food, which it has not the power to digest, and which, if digested, cannot supply the place of fat. Thus it is literally starved from first to last of those elements of nutrition especially essential in early life. We cannot, therefore, be surprised that such cases have proved obstinately fatal, neither is it anything but what one might expect, *a priori*, that they get rapidly well when Pancreatic Emulsion of fat is added to their diet, for by this means they are enabled to assimilate both fat and starch.

Certainly, of all the satisfactory remedial effects of Pancreatic Emulsion, none equal the almost magical recoveries of some of these miserable wasted children. The cases in which I have seen it administered within the last eight years are too numerous to relate, and I will only briefly mention three of those which first especially excited my attention.

1. A poor woman came to the Royal Hospital for Diseases of the Chest with a child presenting the most exaggerated features of emaciation of every part, except the abdomen which was large and hard. She was very excited at having succeeded in gaining admission, and

* See some excellent papers by Dr. D. J. Brakenridge, "On the Influence of a Digestive Habit, &c." Medical Times and Gazette, June, 1868.

explained in great haste that "all she wanted was some Pancreatic Emulsion, which she had learned could be obtained at the Royal Hospital." She said the child had been even worse than I saw it, that everybody told her it was a hopeless case, and that she had carried it to her mother's home in the West of England, where it appeared to be slowly dying, when a charitable visitor came in and gave her a bottle of emulsion, saying that he had seen just such a case cured by it. She gave the emulsion, and the child began to improve so wonderfully that she was able to bring it back to London, where it continued to mend till her bottle of emulsion was finished, when it rapidly fell back, and became nearly as bad as ever, before she could find out where to procure more of the remedy. This she had just done, and hurried off to the hospital. The child had diarrhœa, but she said she knew that would stop if I gave her emulsion, as it had done so before. I did as she asked—let her have as much emulsion as she wished, and the child got absolutely well. I have seen it this year, a well-grown, plump, hearty little girl. This woman has since had two other children, each of whom has in turn shown signs of marasmus like its elder sister; in one, when brought to me, the lungs presented small crepitation from end to end; but both of these children were put upon emulsion at an early stage of their wasting, and made easy recoveries.

2. Soon after these cases occurred, Dr. Dingley, of Argyll Square, consulted me about a little patient of his in Soho, who was wasting in the same way; and as all the usual remedies, both in medicine and diet, including cod oil, had quite failed to arrest the downward progress of the case, we agreed to try the Pancreatic Emulsion. I did not see the case again, but Dr. Dingley has since informed me that from the time of commencing the Emulsion the child began to improve, and steadily progressed till it got perfectly well; and it remains well to the present day. Dr. Dingley was so impressed with the success of the remedy in this apparently hopeless case, that he tells me he has since resorted to the same treatment in all similar cases with equally satisfactory results.

3. At the Oxford meeting of the British Medical Association, Dr. Langdon Down told me of a case that had made a great impression upon him, and it is especially important as coming from a man of his large and intimate experience in all that relates to the affections of childhood. The following note just received graphically indicates the outline of the case:—

"39, Welbeck Street,
"*Sept.* 14, 1872.

"Dear Dr. Dobell,

"The patient at Reigate was seen by me in consultation with Mr. Steele, in the spring of 1867. She was in the most attenuated condition I ever remember seeing. It appeared to be the extreme marasmus of mesenteric disease. The lungs were healthy. The treatment had been most judicious and exhaustive. As some-

thing which had not been tried, I suggested the Pancreatic Emulsion. The improvement was coincident with the altered treatment, and was very progressive. Five months after I was asked to see her by her father, to test whether I could recognise her. She was playing croquet, and I could hardly believe that the one pointed out to me was our patient, the change was so great. She has ever since had excellent health.

"Yours sincerely,

"J. Langdon Down."

These cases, which are well known to many persons besides myself, may appear somewhat "sensational," but they are only samples of numerous others which have occurred in my own practice. The fact is, that when these cases are properly selected for the treatment, they are all "sensational;" for the rapidity with which it takes effect, and the completeness of the restoration to health of children who appeared to be hopelessly dying, is simply startling.

I have proved over and over again that, whether in children or adults, no amount of milk or cream, however good, will do instead of Pancreatic Emulsion, and I have tried to discover why this should be. Milk, so far as this part of its composition is concerned, is simply an emulsion of fat; and pancreatic emulsion, as I have shown in the paper to the Royal Society already referred to, is not, as formerly supposed, a chemical combination, but a true emulsion. Why, then, does not milk answer as well? I believe the explanation to be very simple, and that it turns upon the following points:—

1. The fineness of the particles of fat, and the absence of albuminous envelope.
2. The permanent character of the molecular mixture of fat and water.
3. The proportion of fats having high melting points.

(*a*) In my first paper on Pancreatic Emulsion ("Lancet," September 10, 1864), I gave the measurements (made by the late Mr. Farrants, President of the Microscopical Society) of the particles of fat in cod-oil and beef-fat emulsions, as then prepared for me; showing that the majority of the particles in the cod-oil emulsion ranged from the 16,000th to the 1,200th of an inch in diameter, and those in the beef-fat emulsion from the 10,000th to the 2,500 of an inch; and, according to Bowman ("Practical Handbook of Medical Chemistry," p. 174), "The size of the globules in healthy milk varies from a mere point to about the 2,000th of an inch.'

Since I published Mr. Farrants' measurements, pancreatic emulsion has been made by a much more equal and satisfactory process than at that time, and I have just examined a chance specimen procured from Messrs. Savory and Moore, in which the large majority of the particles of fat range from the 21,600th to the 14,400th of an inch in diameter, the prevailing size being the 18,000th of an inch; while in a specimen of good new milk (cold), which I have also just examined, the large majority of the particles of fat range from the 7,200th to the 3,600th of an inch in diameter, the smallest being the 10,800th.

(*b*) The permanent character of the Pancreatic Emulsion is very remarkable, far exceeding that of milk. It "differs entirely from all other kinds of emulsion of fatty matter, whether chemical or mechanical. All other emulsions of fat are destroyed by ether, the fat being restored at once to its original condition. The influence exerted by the pancreas upon fats, therefore, appears to operate by breaking up the aggregation of the crystals of the fat. It alters the molecular condition of the fat, mingling it with water in such a way, that even ether cannot separate the fat from the water. *A permanent emulsion* is thus formed, ready to mix with a larger quantity of water whenever it may be added." ("Proceedings of the Royal Society," already referred to.)

(*c*) In the "Chemical News," September 4, 1868, I have stated my reasons for believing in the importance of fats of high melting points, such as stearine, margarine, and palmatine, over those of low melting points, such as olein, as elements of food and medicine; although further experiments and investigations are still needed on this interesting subject.

Pancreatic Emulsion of solid fat, consisting principally of stearine, margarine, and palmatine, is therefore quite a different thing from milk, the fat of which is principally olein.

Now, the nearest approach to a pancreatic emulsion is what may be called *nascent milk*, by which I mean milk just secreted—milk that flows from the mammary gland as it is formed, or, as mothers term it, "as the draught comes in." In this the emulsification is finest and most perfect, but every minute that elapses after the milk is secreted deteriorates this perfection of emulsification, until, as we know, whether retained in the lactiferous ducts or in an artificial vessel, but especially in the latter, and when allowed to cool, the cream separates from the water of the milk, never again to be susceptible of the same emulsification with water in which it first existed, *except under the influence of pancreatic juice.*

I submit that this is the secret of the superiority of lactation, and especially of lactation at the time "the draught comes in," over every other kind of infant-feeding, whether in man or in the lower animals. It forms an important distinction between milk-diet, supplied by the natural process of suckling, and milk-diet administered artificially, and affords some reasonable colour to the old-standing belief in the efficacy of "new milk warm from the cow" for delicate children, and to the remarkable recoveries recorded in ancient times of old persons nourished by lactation when everything else had failed.

*** The Author will be much obliged to any of his readers who will favour him with their clinical experience on the subject of this paper.

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