The treatment of the above two classes of cases is not identical. In continued fever, when the powers of the heart are thus impaired, sustained stimulation may be useful, but certainly not always so; for, frequently, notwithstanding the prevailing reliance on stimulants in these cases, they are not only uncongenial to the patient, but evidently foment the disease by adding to an injurious irritability. Milk, light animal drinks, etc., are more often suitable. Still some use of stimulants is, for the most part, required. In the cases of idiopathic asthenic inflammation of the heart, and in metastasis from gout and other diseases, stimulants are not well borne, in fact their exhibition, more often than otherwise, both induces repetition of the paroxysms and an increase in the severity of the symptoms that characterise them. Sedatives, alkalis, with light drinks, appear the more appropriate remedies.

[*To be continued.*]

ON THE NUTRITION OF MUSCULAR AND PULMONARY TISSUE IN HEALTH AND IN PHTHISIS.*

By WILLIAM MARCET, M.D., F.R.S.,
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On the Nutrition of Muscular Tissue in Phthisis.

On considering the state of emaciation, and consequently the deficient nutrition, constantly met with in advanced phthisis, I had been prepared for a result, from the analysis of the flesh of consumptive subjects, very different from that obtained from the investigation of the healthy tissue. Such, however, was not the case; and, although there was some difference found in the absolute composition of the two kinds of muscular tissue, still the numerical relations were very much alike, the phosphoric acid and potash effete in flesh after death from consumption bearing the same relative proportion as they do in pyrophosphate of potash.

The following is a tabular statement of one of my analyses of human muscular tissue after death from phthisis. Two other analyses have yielded similar results.

On 200 Grammes Human Muscular Tissue, after Death from Phthisis.

	Class I. Muscular Tissue proper.	Class II. Nutritive Material.	Class III. Effete Material.
Albumen	20.520	4.770	2.700
Phosphoric acid	0.160	0.037	0.318 }
Potash	0.135	0.008	0.418 }
Soda	(0.021)	(0.005)	0.389—total.

On 200 *grammes* Flesh.		Found.	Theory.
Water	166.5	Phosphoric acid	43.2 .... 43 } Pyroph. of
Fat	3.64	Potash	56.8 .... 57 } potash.

It will be observed in this table, that the amount of phosphoric acid and potash of the effete material again occurs in the proportions necessary for the formation of a pyrophosphate, although the absolute quantity of these substances present is less than in the case of healthy flesh. There is also less albumen, phosphoric acid, and potash, in the tissue proper and nutritive material, than in the corresponding classes of constituents of healthy muscle; the difference for 200 *grammes* of flesh being made up by an increase of water, chlorine, and soda, or chloride of sodium. The excess of water, however, is but slight, amounting only to 6 per cent. of the tissue. With respect to the state of the water in muscles after death from consumption, I have observed that, as a rule, they show a certain degree of dampness, and are sometimes quite wet, instead of exhibiting the dry appearance of healthy muscular tissue; and from this circumstance it appears to me as if the water of the muscles of consumptive subjects had lost to a certain extent its colloid attraction for the solid portion of the tissue. The increase of chloride of sodium might partly account for this, as I have observed that, should a solution of this substance, of a certain strength, be added to a jelly of isinglass, it causes the jelly to soften down and become nearly quite fluid. The mean quantity of chloride of sodium in 200 *grammes* of muscular tissue (from eleven analyses) of consumptive subjects amounted to 0.634 *gramme;* the whole of the chlorine being considered as combined with sodium (which is a probable assumption); while the mean quantity of chloride of sodium in 200 *grammes* of muscular tissue from healthy flesh (from eleven analyses) amounted only to 0.275 *gramme* (one analysis of human flesh yielded 0.300 *gramme* of chloride of sodium)—showing that muscular tissue after death from phthisis contains more than twice the proportion of salt with which it is supplied in health.* This fact is remarkable, appearing to show that the force which in health retains chloride of sodium in blood, or checks its passage into flesh, is weakened in phthisis; and therefore, in accordance with the high degree of diffusibility of common salt, it finds its way from blood into flesh apparently in virtue of a physical property kept in abeyance during health.

Taking into account the whole result of the analysis of muscular tissue in health and after death from consumption, we find its colloid condition to be lessened in several respects in the present disease; and this appears to account to a certain extent for its deficient nutrition. A somewhat similar conclusion was obtained respecting pulmonary tissue.

Composition and Nutrition of Tubercular Pulmonary Tissue (consolidated and softening).

On considering a portion of a tubercular lung partly consolidated and partly undergoing the process of softening, it appears at first sight impossible to obtain for this mass of diseased tissue anything like a fixed chemical composition. However, by means of the method of analysis which I had applied to the investigation of the constitution and composition of muscle and healthy pulmonary tissue, I succeeded in obtaining what may be considered as the true chemical constitution of tubercular lungs in the above condition. The results have been entered into the following table, which shows the mean composition of three different samples of material analysed, taken from three different subjects.

Mean Composition of Consolidated (Cheesy) and Softening Tubercular Pulmonary Tissue (mean of three Analyses) on 200 grammes.

	Class I. Material (insoluble and colloid.)	Class II. Nutritive Material.	Class III. Effete Material.
Albumen	15.720	7.060	2.388
Phosphoric acid	0.289	0.130	0.276
Potash	0.027	0.012	0.302
Chlorine	——	——	0.452
Soda	(0.052)	(0.023)	0.544—total.

Water	On 200 *grammes*,	165 *grammes*.	
Fat	,,	,,	3.91 ,,

The proportions for the phosphoric acid and potash effete were per cent.:

	I.	II.	III.	Mean.	Theory.
Phosphoric acid	44.7	46.8	50.8	47.7	43 } Pyroph. of
Potash	55.3	53.2	49.2	52.3	57 } potash.
	100.0	100.0	100.0	100.0	100

Hence, in tubercular pulmonary tissue, the proportions of phosphoric acid and potash *effete* are not far from those which a pyrophosphate would require; and it may be concluded that a process of nutrition does indeed take place in tubercular matter; or, in other words, that tubercular matter is undergoing waste and renewal. This accounts for the fact that tubercular lungs are seldom or never found to emit a smell of putrefaction when examined soon enough after death. The composition of this material points to a deficient colloid condition, from a slight increase in the proportion of water, and from a low proportion of the colloid constituents—albumen, phosphoric acid, and potash; while that of the crystalloids chlorine and sodium remains much the same as in health. The most obvious indication, however, of a loss of colloid state, is the physical condition of the mass, which, on being minced, becomes transformed into a wet paste, wanting in consistence, and in which the water has clearly very little colloid attraction for the solid material; and it is interesting to observe that this wet paste contains but very little more water (3.5 per cent.) than healthy tissue.

Death from consumption, except when caused by direct asphyxia, which is seldom the case, is therefore apparently the result of a diseased state of the nutrition of the muscles and lungs, and probably also of the other tissues, which is due to a gradual loss of their colloid condition.

This change in the properties of tissues in consumption may be con-

* Concluded from page 152 of number for February 10th.
This communication may be considered as the abstract of two papers. One of them was read to the Royal Society last April; and the other, at the meeting of the British Association at Edinburgh in August of last year.

* There is more soda present in muscular tissue than is required for the formation of chloride of sodium with the chlorine. The determinations yielded on 200 *grammes*.

	Mean in health.	Mean in phthisis.
Chlorine	0.167	0.385
Soda	0.239	0.446

sidered as a gradual return to the physical state. Organic matter, whether animal or vegetable, when undergoing decomposition, is being gradually transformed from colloids into crystalloids; ammonia, carbonic acid, and mineral carbonates and phosphates, being the main final crystalloid products, which diffuse away readily through the agency of water. They are taken up by plants, and again converted into colloids, thus establishing an interesting rotation in nature. The wet state of muscular tissue in phthisis which I have frequently observed, especially when there is much emaciation, appears to me to be due to the same cause as that which makes a piece of meat become damp and tender from spontaneous decomposition some time before it emits any smell. Now this *post mortem* phenomenon of the separation of the water from the solid constituents of tissues is due to a loss of the property possessed by living tissues, by means of which they hold in a colloid (gelatinous) condition the water which they contain; and it is this *post mortem* change which, I believe, commences before death in consumption. A similar remark applies to the pulmonary tissue; although in that case the loss of this remarkable relation between water and solids leads ultimately to a greater alteration than the mere moistening of the tissue. Might not the fine crepitation attended with the first shade of dulness at the apices of the lungs be due to a diminished colloid attraction of the water for the solids of the tissue during its process of nutrition? And might not that peculiar harshness, frequently heard at the back of the chest of those who are in a weak state of health, be equally due to a state of malassimilation?

The results which I have obtained, and which have been embodied in the present communication, may be summed up as follows.

1. Blood and tissue must be considered as colloids.

2. Animal tissues are formed by three classes of constituents. The first has been called the *tissue proper;* it is insoluble in water. The second has been called the *nutritive material;* it is soluble, and consists of a mass of colloid substances—the composition of this nutritive material being the same as that of the tissue proper. The third has been called *effete material*, and consists of crystalloid substances which, it is concluded, are on their way out by diffusion.

3. Muscular and pulmonary tissues consist of albumen, phosphoric acid, and potash, in the colloid and crystalloid forms, together with a small proportion of magnesia; and a fact not stated in this paper is, that I have succeeded in obtaining, artificially, phosphoric acid and potash, in the colloid condition, by dialysing a mixture of chloride of potassium and phosphate of soda. I have no doubt that magnesia may also be obtained colloid, by some similar means: it is certainly colloid in the tissue proper of flesh, and in its nutritive material.

4. The phosphoric acid and potash in the effete material of muscular tissue occur precisely in the necessary proportions to form a *crystalloid pyrophosphate of potash*, or a crystalloid tribasic phosphate of potash with two equivalents of fixed base. This is, of all the results which I have obtained, the most interesting, as proving the correctness of the method of investigation which I have adopted, and placing beyond doubt, it appears to me, the truth of my view as to the constitution of animal tissues.

5. In pulmonary tissue, the effete material contains much more potash than is necessary to form a pyrophosphate—the excess being, in all probability, eliminated as a crystalloid carbonate.

6. In muscular tissue *in phthisis*, the water has a tendency to separate from the solid tissue; or that peculiar relation between the water and solid constituents, which preserved the dry state and normal consistence of the tissue, undergoes a gradual alteration, apparently because of an incipient loss of colloid condition, due to a physical change. The pulpy state of tubercular lungs undergoing softening appears to be due to a loss of the colloid attraction of water for the cheesy material which had been exerted before the softening commenced.

7. Muscular tissue in phthisis is nourished according to the same process as in health, although its rate of nutrition is slower.

8. Pulmonary tissue, in the state of cheesy consolidation and softening, undergoes nutrition, which, however, is slower, and not of the same nature as it is in health. Lungs thus affected are found to be nourished much in the same way as muscular tissue—the phosphoric acid and potash effete occurring nearly in the necessary proportions to form a pyrophosphate.

9. Finally, death from phthisis is apparently due in a great measure to the physical forces residing in the constituents of the tissues, encroaching upon and getting the better of the vital phenomena, so that the ebb of life in phthisis may be considered but a gradual return to the physical state of matter.

I gladly avail myself of this opportunity of acknowleding the valuable aid of Messrs. F. A. Manning, H. Bassett, and M. J. Salter, in the analytical portion of these inquiries.

ON A FORM OF CONCEALED HÆMORRHAGE BEFORE THE EXPULSION OF THE PLACENTA, RARELY NOTICED.

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DR. BLUNDELL, in his lectures on the treatment of twins, says the following: "Foot-traps, however, are set for us here as usual, and hence in managing these investigations caution becomes necessary. Thus when a child is away, its membranes may fall over the os uteri, and then blood collecting in clots behind the membranes, which push forth into the vagina, something like the bag of a second fœtus may be felt; so that, if guided by internal examination, you neglected to examine externally also, you might persuade yourselves that there was a plurality of children, when in fact there was not. Cases of this kind are not very infrequent: one occurred to Dr. Haighton, and one very remarkable case fell under my own eyes. By rupturing the membranes, these cases can easily be unmasked, for then the blood comes gushing forth, and, on examining, you find that the womb is very completely contracted, so that for a second fœtus there is no room." Three such cases having occurred to me; and having failed to find in other works on midwifery any allusion to this form, I have thought it worthy of a short notice, in order that attention may be more directed to a hæmorrhage which might be attended by fatal results before its nature might be made out.

CASE.—I had been called in consultation to a primiparous labour, which had been both tedious and laborious in consequence of a masculine-typed pelvis and a large-headed fœtus. The forceps had been required to deliver; the uterus had ceased to contract rhythmically, but had contracted after the birth of the child naturally around the placenta, and was left supported by the hands of the nurse, while attention was directed to the infant with a view to restore animation. After about ten minutes I observed the mother to be altered in appearance; her aspect having, from a swollen and congested state—common after long and hard labours—changed to a pale livid kind. I instantly put my hand on the uterus, and found it to have become distended to the height of the umbilicus. I examined the diapers, but found no hæmorrhage. I explored the vagina, and found a bag of membranes similar to that which occurs in twin cases after the delivery of the first fœtus, projecting nearly to the vulva. Being confident that the uterus had been of the proper size after delivery, I saw at once that hæmorrhage had taken place internally. I ruptured the bag of membranes; a large quantity of blood escaped; and, grasping the uterus externally, I immediately removed the placenta. The uterus contracted well, the flooding ceased, and no further trouble arose. In removing the placenta, I found how the condition arose. The membranes were adherent all round the inner surface of the lower part of the uterus; the placenta, in part, and membranes attached to the interior of the uterus, had been detached by the blood which had been poured out between. The detached portion had gradually been inverted into the vagina, into which it was bulging full of blood.

About a year afterwards I met with another case, and about two years after a third. These were so like the one above described, that it is not necessary to detail them. It is not improbable that many of those cases of sudden gush before the expulsion of the placenta result from this state of affairs. The capacity of the cavity of the uterus, *plus* the capacity of the bag of membranes protruding into the vagina, is variable; but it is easy to see that sufficient loss to cause a fatal result may occur without any external sign—an additional reason in favour of the rule that, so long as the placenta is undelivered, we should not leave the uterus without support, nor without close examination.

I need scarcely allude to the treatment, following as it does the general rules laid down in modern midwifery. Compress externally the uterus; at the same time rupture the membranes, or detach them. The blood of course escapes, and, whilst it is flowing, remove the placenta by the hand passed within it; follow down and grasp the uterus with the external hand, and employ the usual means to insure its contraction. In the cases which I have seen, I found no difficulty in regard to this latter point.

The explanation given by Dr. Blundell in the above quotation is, I think, scarcely the correct one. As I understand his expression, I should conclude he thinks the membranes free from the inner surface of the uterus before the effusion; whereas, as far as I have observed, the membranes remain attached to the lower part of the uterus, while the part of them towards the fundus becomes, along with a portion of the placenta, separated by the effusion of blood, which gradually pushes it down towards and through the os uteri.