

ment of chenopodium expelled 1,304 hookworms. The result of the third chenopodium treatment, unfortunately, was not received. The fourth treatment, consisting of thymol, expelled thirty-five uncinariae. The fifth treatment of thymol gave a negative result. (Hemoglobin at this time was 27 per cent.) The sixth treatment of thymol expelled two uncinariae. The seventh treatment of thymol expelled two uncinariae. After this there were six negative specimens, followed by a negative chenopodium treatment. (Hemoglobin now had risen to 61 per cent., and the patient's entire appearance was wonderfully improved.) This total of 2,722 hookworms in one patient is the heaviest infection we have ever encountered, with the possible exception of the case cited above which we examined at necropsy.

Such resistant cases, however, are rather the exception than the rule, and in many instances a rapid and permanent cure was obtained. The following cases illustrate some of the gratifying results which attend the successful treatment of hookworm disease with chenopodium:

CASES 16-18.—The patients were a mother, aged 33, with two children, aged 3 and 6, respectively. The hemoglobin was: mother, 32 per cent.; younger child, 50 per cent.; older child, 48 per cent. The stools of all were positive for uncinaria ova, and all received chenopodium treatment, after which the mother expelled 201 hookworms and one roundworm; the younger child expelled sixty hookworms, and the older child expelled twenty-two hookworms. A second treatment with chenopodium gave the following results: The mother expelled twenty-five uncinariae; the younger child expelled ten uncinariae, and the older child expelled nineteen uncinariae. A third chenopodium treatment gave negative results in all three cases. The hemoglobin tests at this time were as follows: the mother, 55 per cent.; the younger child, 80 per cent.; the older child, 68 per cent. Six weeks later, two separate stool specimens were examined from each, and all of these were negative. The hemoglobin tests at this time were as follows: the mother, 74 per cent.; the younger child, 102 per cent.; the older child, 100 per cent.

In all of our hemoglobin tests, the same instrument (a Dare hemoglobinometer) was used.

SUMMARY

1. The method of administration of chenopodium is simple, and is attended with less inconvenience and discomfort to the patient than with thymol. This would give the drug an important place in the field work in uncinariasis.

2. Chenopodium can be given at shorter intervals than can thymol, and a cure can thereby be more quickly established, which gives it a greater economic value.

3. Chenopodium is nontoxic in therapeutic doses.

4. Chenopodium is a more efficient vermifuge than thymol in the treatment of uncinariasis.

Equality Not Biological.—"All men are born free and equal," it is asserted, but such equality is political only. It can not be biological. In every race are certain strains having capacities not attainable by the mass. There should be equality of start, equality before the law, but there will always be differences of attainment. The gifts of potentiality, unit characters of the germ-plasm, are not shared by all people of the same race. The average status of one may be below that of another, and the highest possibilities of one type may be greater than that of another. In general, the highest range of possibilities in every field has been reached by the "blonde races" of Europe. Groups of less individual or of less aggregate achievement may properly be regarded as "lower."—David Starr Jordan in *Popular Science Monthly*.

CREATIN AND CREATININ EXCRETION DURING THE PUERPERIUM AND THEIR RELATION TO THE INVOLUTION OF THE UTERUS*

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The retrogressive changes which follow pregnancy restore the mother's body approximately to the condition which existed before conception took place. The restorative process, as it affects the uterus, includes an autolytic phenomenon known as involution, which rapidly reduces the weight of the organ from about a kilogram to 50 or 60 gm. Histologically, the decrease in mass depends on the atrophy of the muscle cells forming the walls of the uterus, and the metabolic end-products which thus arise are eliminated in the urine.

Since it is generally admitted that following labor catabolic changes predominate in the metabolism of the uterine muscle cells, it seemed reasonable to suppose that this fact explained the presence of creatin and of a relatively large amount of creatinin in the urine of puerperal women. Indeed, the anatomic and physiologic facts regarding the involution of the uterus accorded so satisfactorily with the urine findings that for a long time no one challenged the hypothesis which held that the one was the cause of the other. Lately, however, Mellanby¹ has questioned this doctrine and declares as his opinion that activity of the breasts is fundamentally concerned with the excretion of creatin. It was this uncertainty regarding the part played by the involution process which led us to accept the opportunity to study several patients whose metabolism promised to throw additional light on the problem.

Our conclusions are based on the observations of four types of cases, namely, (1) a normal labor; (2) a conservative cesarean section at the end of normal pregnancy; (3) a conservative cesarean section in a case of pre-eclamptic toxemia, and (4) two cases of cesarean section with removal of the uterus. A material so varied has enabled us to learn in the first place that the creatin and creatinin metabolism is practically identical after normal labor and after cesarean section, provided the uterus is not removed, and the pregnancy has not been complicated by a toxemia. And, in the second place, we have been able to compare the excretion of these substances in cases in which the uterus was undergoing involution with others in which the uterus had been extirpated.

With two exceptions all the patients were the subjects of metabolic observations during pregnancy, but the results to be reported in this communication relate exclusively to the puerperium. The observations were continued without interruption for a period of two weeks or more after the delivery. The diet was creatinin and creatin-free. The urine was obtained by catheterization as long as there was risk of contamination from the vaginal discharge. It was collected over twenty-four-hour periods, was preserved with

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¹ Read before the Section on Pathology and Physiology at the Sixty-Sixth Annual Session of the American Medical Association, San Francisco, June, 1915.

1. Mellanby: The Metabolism of Lactating Women, Proc. Royal Soc., London, Series B, 1913, lxxxvi, 88.

chloroform and analyzed daily. All determinations were made in duplicate. The total nitrogen was estimated by the Kjeldahl method; the creatinin and creatin by the Folin method.

The results of the Kjeldahl determinations indicate a notably smaller output of nitrogen in case hysterectomy was performed. This phenomenon has been previously observed by Slemens,² who demonstrated that during acute puerperal involution the average daily nitrogen excretion attributable to uterine autolysis varied between 2 and 3 gm.

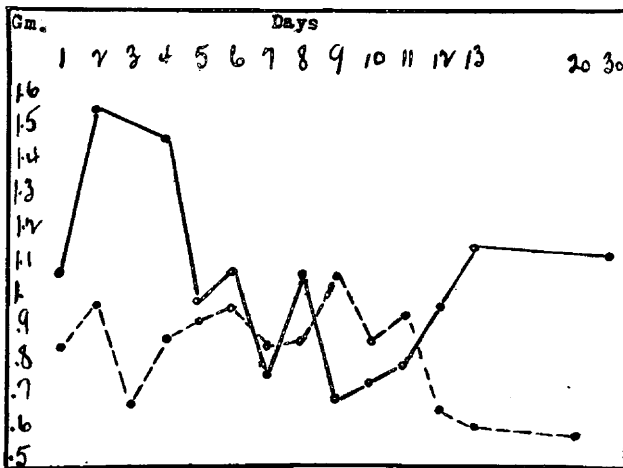


Chart 1.—Contrasting the preformed creatinin of the urine after conservative cesarean section and after the Porro operation. Solid line represents the excretion in the case in which the uterus was not removed; broken line that of the case in which it was removed.

In its behavior the creatinin elimination resembles that of total nitrogen; larger amounts are excreted in case the uterus is undergoing involution. In Chart 1 the creatinin excretion of two patients is illustrated. In both cesarean section had been performed, but in one the uterus was removed and in the other not. During the first thirteen days of the puerperium the mean average daily output of creatinin was found to be 1.09 gm., in two cases in which the uterus was undergoing involution, and .897 in two cases in which the uterus had been removed. Therefore, during this period it appears that approximately 2 gm. less of creatinin is excreted by a puerperal patient, if hysterectomy has been performed. Later in the puerperium the excretion of creatinin has always been lower than during the first two weeks.

An increase in the excretion of creatinin during the puerperium has frequently been demonstrated and has generally been attributed to the involution process, but Heynemann³ thought additional causes for the phenomenon existed in the muscular effort incident to childbirth and in the restricted diet generally employed thereafter. It would seem, however, that these factors are not essential, for we have observed the phenomenon though the patient was delivered by operation, before the onset of labor, and though she received from the third postoperative day a diet the caloric value of which was quite adequate for the individual.

After bleeding animals, Patterson⁴ found the creatinin excretion was increased. If this factor played

a rôle in our cases we are unable to estimate it, but in spite of such an influence a lower excretion was invariably found in case the uterus was removed. We are convinced, therefore, that an increased output of creatinin during the period of convalescence following cesarean section without hysterectomy, and also during the normal puerperium, is largely, if not entirely, due to the involution of the uterus.

Soon after Folin⁵ devised a satisfactory clinical method for the estimation of creatinin and creatin, the presence of the latter in the urine was sought in a great many different pathologic conditions. Not infrequently during the course of disease creatin was found, but in health it was learned that the urine contained no creatin, or amounts too small for measurement. In the case of women during the period of convalescence from childbirth, however—a borderland between sickness and health—creatin was demonstrated to be a regular constituent of the urine. This observation made in 1908 by Schaffer⁶ has been amply verified; but the hypothesis he offered, which attributed the creatinuria to the involution of the uterus as we have said, has been called into question. In these circumstances it is instructive to compare the excretion of creatin in four cases of cesarean section, in two of which the uterus was removed and consequently the involution of this organ could play no part in the metabolism of creatin.

In all the four cases the urine contained a large amount of creatin during the early part of the puerperium. For the first thirteen days of this period the average daily excretion was .207 gm. and .167 gm., respectively, in the two cases in which the uterus was in situ; the corresponding figures for the cases of hysterectomy were .285 and .329 gm. Thus it appears that the removal of the uterus did not modify the creatinuria. As a matter of fact, in the cases in which the involution of the uterus was in progress, smaller

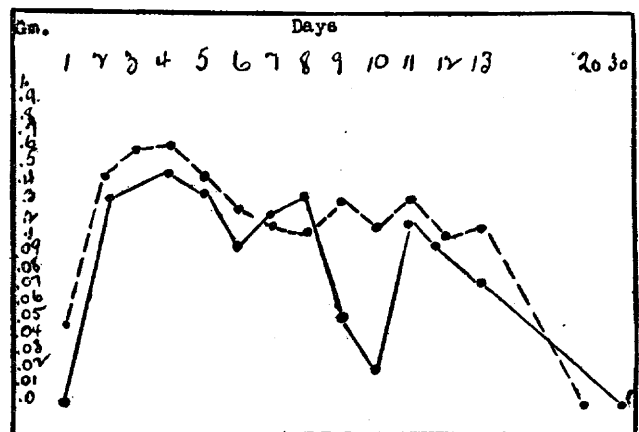


Chart 2.—Contrasting the creatin of the urine after conservative cesarean section and after the Porro operation. Solid line represents the excretion in the case in which the uterus was not removed; broken line that of the case in which it was removed.

amounts of creatin were present than in the cases in which the organ was removed irrespective of the surgical procedure.

The curve representing the daily excretion has generally been of the plateau type. On the day following

2. Slemens: The Involution of the Uterus and Its Effect upon the Nitrogen Output of the Urine, *Bull. Johns Hopkins Hosp.*, 1914, xxv, 195.

3. Heynemann: Zur Frage des Leberinsuffizienz und des Kreatinstoffwechsels während der Schwangerschaft und bei den Schwangerschaftstoxikosen, *Ztschr. f. Geburtsh. u. Gynäk.*, 1912, lxii, 110.

4. Patterson: A Study of the Influence of External Hemorrhage on the Partition of Urinary Nitrogen, *Biochem. Bull.*, 1913, ii, 555.

5. Folin: Beitrag zur Chemie des Kreatinins und Kreatins im Harn, *Ztschr. f. physiol. Chem.*, 1904, xli, 223; *The Chemistry and Biochemistry of Kreatin and Kreatinin*, Festschrift für O. Hammarsten III, Upsala, 1906.

6. Schaffer: The Excretion of Creatinin and Creatin in Health and Disease, *Am. Jour. Physiol.*, 1908, xxii, 1.

the operative delivery there begins a notable rise in the output, the maximum is reached about the fourth day, and except for an occasional irregular drop the curve remains high for approximately two weeks. The urine was free of creatin in the cases of hysterectomy on the twelfth and twentieth days, respectively. In one of the cases in which the uterus was not removed, creatin was present on the fifteenth day, when observations were interrupted, but was not found subsequently from the thirtieth to the thirty-fifth days. In the other case of a conservative cesarean convalescent from a toxemia of pregnancy, creatin was still present on the twenty-third day postpartum (.057 gm.). For the first thirteen days of the puerperium the total excretion of creatin in the four cases was as follows: The uterus in situ and involuting, 2.17 and 2.48 gm.; the cases in which the uterus was removed, 3.71 and 4.27 gm. Such results clearly indicate that the creatinuria which always occurs during the period following childbirth is not dependent on the involution of the uterus.

The facts learned regarding the excretion of creatinin and creatin in these patients have a significant bearing on the question in general of the metabolism of these substances. On the one hand, the quantity of creatinin eliminated depends on the involution of the uterus; on the other hand, there is no relation between this process and the elimination of creatin. And it is also true in these cases that the excretion of the one substance bears no direct or reciprocal relation to the excretion of the other. For these reasons it appears that at least during the puerperium the metabolism of the two substances is independent—a fact which accords with the recently announced views of Folin⁷ and of Klercker.⁸

The explanation for the creatinuria of the puerperium is doubtful. Our observations not only make untenable the involution hypothesis of Schaffer and of Murlin,⁹ but they also fail to support Mellanby's hypothesis attributing the phenomenon to a failure of excretion of the creatin through the milk. Our cases showed marked creatinuria even though the breasts were functioning normally.

To recapitulate: From observations made on four cases in which cesarean section was performed, in two instances without removal of the uterus, and in two instances with hysterectomy, the following conclusions may be drawn.

1. A lower total nitrogen output is observed in case hysterectomy is performed, and the higher output of nitrogen observed when the uterus is left in situ is explained by the involution process.

2. A lower creatinin output occurs in case hysterectomy and at least 2 gm. of this substance excreted during the puerperium arise from the involution of the uterus.

3. Creatin in large amounts regularly appears in the urine following childbirth. The creatinuria is independent of the involution of the uterus, and it is also independent of the creatinin metabolism.

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7. Folin and Denis: An Interpretation of Creatin and Creatinin in Relation to Animal Metabolism, *Jour. Biol. Chem.*, 1914, xvii, 493.

8. Klercker: Beitrag zur Kenntnis des Kreatins und Kreatinins im Stoffwechsel des Menschen. *Biochem. Ztschr.*, 1907, iii, 45; Ueber Ausscheidung von Kreatin und Kreatinin in fieberhaften Erkrankungen, *Ztschr. f. klin. Med.*, 1909, lxxviii, 22.

9. Murlin: Protein Metabolism of Normal Pregnancy, *Surg., Gynec. and Obst.*, 1913, xvi, 43. Murlin and Bailey: Further Observations on the Protein Metabolism of Normal Pregnancy, *Arch. Int. Med.*, September, 1913, p. 288.

ELEMENTARY BUT VITAL FACTORS IN THE EFFICIENCY OF SMALLER HOSPITALS *

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To add to my personal knowledge of the hospital situation, I sent a rather exhaustive questionnaire to the leading medical men of one of our western states, hereinafter known as "Mid West." The response was most generous. No effort is made to classify the answers, but it is a fair assumption that they represent the general situation, especially in hospitals of from forty to 150 or 200 beds, and they are conclusive evidence that the medical profession is not satisfied with existing conditions, and is fully alive to the pressing need for improvement. Not only is the medical profession fully and painfully cognizant of the many shortcomings in hospital management and service, but the public, already skeptical in regard to the medical profession, is rapidly learning that many hospitals are not as efficient as they might be, and that a palatial operating room does not always mean careful diagnoses, good beds, well-trained nurses, and faithful bedside attention. The public is learning to discriminate between the good and the indifferent. It is only by putting the house in order that the latter all too common type of hospital can escape severe but well-merited criticism. The hospitals that are first to read and heed the signs of the times will spare themselves the rude but belated and unpleasant awakening to the fact that very desirable and financially able patients are seeking better managed and more efficient institutions.

I am, further, convinced that the present efficiency of many of these open hospitals can be doubled, increasing their annual budget, and with much more satisfactory results in every department.

The great majority of the hospitals in "Mid West" are "open." Every physician or surgeon bringing a patient is admitted without question. One of these hospitals has fifty beds and 100 members on the staff. My informant seriously assured me that this was a "closed" hospital, although he was unable to mention the name of a single practitioner of medicine within a reasonable distance who is not freely and probably gladly admitted. He compromised by insisting that the hospital is "not wide open."

THE ATTENDING STAFF

In not more than 5 per cent. of the hospitals in "Mid West" is there anything but a nominal staff; usually there is no staff. When a so-called staff really exists, it "does not meet at all," or it "meets once or twice a year," or "once in a decade," or it "meets when a fight is on," or "everything is hit or miss." Compare this warping, withering, dwarfing, disintegrating situation with the stimulating and invigorating practice in vogue in the oldest and one of the most progressive hospitals in America, located in a great metropolitan city. In this hospital the attending staff meets one afternoon each week, to study and discuss interesting cases; it has one business meeting each month, held just before the monthly meeting of the hospital management; and once each quarter the staff

* Read before the Section on Hospitals at the Sixty-Sixth Annual Session of the American Medical Association, San Francisco, June, 1915.