whose first indication of trouble was an attack of transient aphasia, lost 2 st. in weight in a year, and his blood pressure sank from 200 to 150. He has been better since he has taken a philosophical view of the situation, and his blood pressure has risen to 180.

II.

The second thing is to lessen the intake. We all eat too much, and in no age was the saying more true that "the platter kills more than the sword." Time and again I have been impressed with this as a possible factor in obscure forms of hypertension and arterio-sclerosis in persons otherwise temperate. Largely a matter of habit, the amount of food taken should be just enough to keep the engines going at a steady speed. A diet of low protein content is best, and fairly large quantities of liquid should be taken.

III.

Thirdly, elimination should be promoted in every way, by making the action of the kidneys, bowels, and skin thoroughly efficient.

IV.

Fourthly, of drugs none are entirely satisfactory in chronic hypertension. Nitrites in various forms may be used, and are often of temporary benefit, but I think the general opinion now is that neither the nitrites nor potassium iodide are of permanent benefit; though now and again one meets with an instance in which the prolonged use of potassium iodide is followed by marked lowering of the pressure. A preparation of mistletoe has also been much lauded, but it, too, is very variable in its effects. Be careful in this point—if the patient does not feel so well, and begins to get thin and look badly, stop all drugs, trust to general measures, and let the pressure rise. In the robust man of full habit in the hypertensive crises with headaches, dyspnoea, or angina, a free venesection is indicated, to be followed by mercurial and saline purges.

The clinical picture which I have thus briefly sketched of chronic hypertension with its associations, advantages, and disadvantages, may not have all the outlines or full details which an artist with more pains and greater skill would put on his canvas, but it is a fair presentation of the subject as I have seen it, and you cannot expect more. The colours, necessarily a bit sombre, have been brightened when possible. And I believe Candide to be wrong—life at the best is not a bad bargain. Even the victim of high tension may find it useful and enjoyable if, following the rest of the moral, he will cultivate his garden—weeding the irrigation channels, and keeping free the drainage.

THE CALCULATION OF DRUG DOSAGE FOR CHILDREN.

WITH DESCRIPTION OF A NEW AND SIMPLE METHOD.

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THE calculation of the correct dosage of drugs which are to be administered to children is of considerable importance. The systems at present in use are those of Young, Gabius, and Cowling, all of which are based on the duodecimal system, and are thus not readily applicable to the metric system; Sir Lauder Brunton's method of calculating from the metric system involves perhaps rather more mental calculation than can be expected of the practitioner when prescribing at the bedside, and further, it does not lend itself to the calculation of doses from the imperial system.

These four systems may be stated briefly: Young's formula is the age of the child divided by the age plus 12; according to Gabius, the correct dosage—taking 1 grain as the adult dose—is for a child 1 year old, $\frac{1}{12}$ grain; 2 years old, $\frac{1}{6}$ grain; 3 years old, $\frac{1}{4}$ grain; 4 years old, $\frac{1}{3}$ grain; 7 years old, $\frac{1}{2}$ grain; 14 years old, $\frac{2}{3}$ grain; 20 years old, $\frac{3}{4}$ grain; and above 21 years, the full dosage. Cowling's rule is the division by 24 of the child's age at his next birthday; and Sir Lauder Brunton's plan consists in using the age next birthday as the numerator and 25 as the denominator of the fraction.

Apart from idiosyncrasy, abnormal development, and the excessive susceptibility to certain drugs, such as opium, a rational system for calculating dosage in children should follow the curve of increase in body weight; that is to say, we must supply the child with the same relative dose of the drug in proportion to his bulk as we supply to the adult, or, in other words, the dilution of the drug in the body tissues should be the same in both cases. It is, however, impracticable to weigh each infant before writing its prescription, and we therefore adopt the age as an indication of the development and weight of the average child and its abilities to tolerate drugs. Gabius assumes the adult age to be 21, while Cowling and Sir Lauder Brunton postpone it till 24 and 25 respectively. It may, I think, be assumed that the ages 24 and 25 were selected, not on account of any particular anatomical or physiological reason, but because of the fact that they were numbers easily divisible on the duodecimal and metric systems respectively. If statistical tables of the average weights of males and females be examined it will be noticed that the body weight becomes stationary on an average at from 20 to 22 in males and from 19 to 20 in females. Thus, we find that the average adult age according to the weight is from 20 to 21 years. These figures I have arrived at by averaging the results of statistics by Quételet, Landois, Beneke, and Roberts, the last-named having obtained his data from English-speaking children, who are relatively much heavier than Continental children. Whichever series of weight statistics is adopted, it makes little difference to the final results, since we are concerned with the relation of the child's weight at a certain age to his probable adult weight. The following table—taken, since we are dealing with English children, from Roberts's tables—will illustrate the points to which references have been made:

Average Kilogram Weights of Children at Different Ages and their Proportion to the Average Adult Weight.
(Compiled from Roberts's Tables.)

Age.	Average Kilogram Weights.		Proportions to the Average Adult Weight.		
			Male.		Female.
	Male.	Female.	Adult Age as 21 $\frac{3.22 \times 100}{65.7}$	Adult Age as 24 $\frac{3.22 \times 100}{67}$	Adult Age—21 or 24 $\frac{3.13 \times 100}{55}$
Birth	3.22	3.13	4.90	4.80	5.69
1	10.89	9.12	16.59	16.25	16.58
2	14.75	11.48	22.45	22.01	20.87
3	15.42	14.35	23.47	23.01	26.09
4	16.92	16.39	25.90	25.25	29.80
5	18.14	17.78	27.59	27.07	32.32
6	20.15	19.05	30.66	30.07	34.64
7	22.68	21.55	34.52	33.85	39.18
8	24.95	23.54	37.95	37.24	42.80
9	27.40	25.17	41.70	40.89	45.76
10	30.62	28.12	46.60	45.70	51.13
11	32.66	30.90	49.70	48.74	56.18
12	34.93	34.66	53.16	52.13	63.02
13	37.66	39.55	58.84	56.21	71.99
14	41.73	44.00	63.51	62.28	80.00
15	46.68	48.18	70.83	69.67	87.60
16	53.94	51.31	82.09	80.50	93.29
17	59.38	52.35	90.38	88.62	95.18
18	62.28	54.89	94.79	92.95	99.80
19	63.46	56.21	96.59	94.71	102.20
20	64.96	55.93	98.87	96.95	101.69
21	65.73	55.20	100.00	98.10	100.36
22	67.09	55.93		100.00	101.69
23	67.09	56.25		100.00	102.27
24	67.09	54.85		100.00	99.73

The first two columns of the table show the average kilogram weights of males and females from birth to the age of 24. The third column indicates the percentage of the adult weight which the male child possesses at different ages, taking 21 as the adult age. Column 4 shows the percentage weight of male children taking 24 as the adult age, and it will be observed that the variation of the figures is within narrow limits. The last column gives the female child's percentage weight for both 21 and 24 as adult age, since the weight at both ages is practically

Chart 1.——— Percentage male weights. Percentage female weights.
----- Young's formula. -.-.-.- Gabiuss's formula. -.-.-.- Cowling's formula.

identical. The third, fourth, and fifth columns give, therefore, the absolute average percentages of the adult dose which we should employ at different ages. These may be plotted in a curve as in Chart 1.

In Chart 1, columns 5 and 6 are plotted to show the average percentage increase in the weight of individuals, using 24 as the adult age, and it is evident from the curve that females reach their maximal weight earlier than is the case in males; this is a fortunate circumstance, since it is recognized that females as a general rule require rather smaller doses than males, and, as will be seen, a medium course may be attained. These curves, then, not only exhibit the percentage increase in body weight, but also supply the absolute average dosage at ages below 24 for males and females; thus, for example, for males of 12 years the exact dose, reckoned according to body weight, should be 53 per cent. of the adult dose; at 15 years, 71 per cent., and so on.

For comparison, I have also plotted in this figure the formulas of Young, Gabius, and Cowling, calculated as percentages to show their relationship to the curve of weights. Young's formula, which is probably that most frequently employed at the present time, is decidedly the least satisfactory; the

fraction $\frac{\text{Age}}{\text{Age} \times 12}$ is sufficiently accurate up to the 11th year, after which it diverges from the weights curve since the fraction can never become a unity. Gabius's formula diverges in much the same manner, but Cowling's rule follows the curve fairly closely till the 15th year, after which its dosage is also on the small side.

Chart 2 gives the curves of average percentage weights, using the weight at 21 years as 100. The general type of the curves is that of Chart 1. On Chart 2 is plotted Lauder Brunton's method of calculating dosage with the metric system; this falls from start to finish below the actual dosage calculated from the weight, and the same statement holds good if age 24 be taken as the standard, as may be noted if Brunton's curve be plotted on Chart 1.

What is desirable is a simple rule for the calculation of dosage which shall follow as nearly as possible the curves of percentage body weights. This, I believe, may be most easily attained by using 100 as the denominator and 20 as

the adult age—thus, the formula $\frac{\text{Age} \times 5}{100}$ gives a curve which, as shown in Chart 2, lies for the greater part of its course between the percentage weights of males and females. Such a fraction is extremely easy to calculate when metric weights are in use. Thus, to take Sir Lauder Brunton's example—if 0.33 gram be the adult dose, the dose for a child of 7 is 0.1155 gram, obtained by multiplying 0.33 by 35, and shifting the decimal points two places to the left. On Lauder Brunton's system the dose is $\frac{0.33 \times 8}{25}$ or $\frac{0.33 \times 32}{100} = 0.1056$ gram; and the absolute dose is 0.1138 gram and 0.1293 gram for males and females respectively. This instance is of more than ordinary difficulty for the new system, for, if the child's age were an even number, calculation would of course be simplicity itself. For instance, to use the same dose for a child of 8 years, we obtain 40 as multiplier and the figure 0.133 gram at once; the absolute being for this age in males 0.125 gram and in females 0.141 gram. While 100 as a divisor is especially suitable for the calculation of metric doses, it is not essential for doses stated in terms of the imperial units. Here multiplication of the age by 5 is cumbersome, and the formula

$\frac{\text{Age}}{20}$ gives the same ratio, and affords simplified fractions, easier for calculation than those of any of the other systems employed for the imperial units.

Criticism of the Method.

In order to test the accuracy of the above method for calculating dosage, I have plotted curves showing the average percentage weights from both Continental and

Chart 2.——— Percentage male weights. Percentage female weights.
----- Sir Lauder Brunton's formula. -.-.-.- New formula.

English statistical tables, and also curves showing the values after deducting the weight of the clothes. In all cases, however, I have found that the formula $\frac{\text{Age}}{20}$ or $\frac{\text{Age} \times 5}{100}$ gives the nearest approximation to the actual dosage. Below the age of 6 the formula gives too small a dosage for both males and females, but this is the case with all systems and is, perhaps, no disadvantage, since it is in those early years that especial care must be exercised in the administration of drugs, and particularly of those which influence the nervous system, which is ther

in a stage of rapid development. After the age of 6 the author's method lies almost regularly between the curves of male and female weights. For males, therefore, it gives a slightly higher dose than is necessary; for females a lower dose than is required. This latter feature is of importance, since, as already stated, females are, as a rule, more sensitive to drugs than males, especially at the age of puberty, at which time this formula gives a dosage decidedly lower than that demanded by the weight of the average female.

CONCLUSIONS.

1. Of existing formulae for the calculation of doses in children from imperial measures, those of Young and Gabius are of little value after the 10th year. Cowling's formula is the best of the older methods.

2. Sir Lauder Brunton's formula, for calculating dosage with metric weights, gives figures which are somewhat low at all ages and for both sexes; the calculation is also a little elaborate, and is not readily applicable to the imperial system.

3. The method suggested by the writer for the metric system $\frac{\text{Age} \times 5}{100}$, or for the imperial system $\frac{\text{Age}}{20}$, results in doses which correspond closely with those demanded by the average weights of non-adult individuals of both sexes at different ages; the calculation is simple, and the method can be employed for the metric and also for the imperial weight systems.

SUCCESSFUL REMOVAL OF A TUMOUR IN THE ADRENAL GLAND.

BY

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In the BRITISH MEDICAL JOURNAL, October 12th, 1907, I recorded a case of retroperitoneal haematocoele causing acute intestinal obstruction. The sequel to that case is recorded now.

History.

In July, 1907, I was asked by Dr. F. Pershouse, of Johannesburg, to see in consultation with him a lady, aged 39, who the previous day had shown typical symptoms of acute intestinal obstruction. The history was that three years previously, shortly after confinement, she discovered a lump in the left lumbar region, which caused a certain amount of dull, aching pain in the back. She suffered always from constipation, but could obtain relief by means of cascara. A year ago, while in London, she had symptoms of obstruction, but apparently not of acute character. Under the advice of a surgeon whom she consulted, massage was carried out, with complete relief to the symptoms. From time to time, however, she had left lumbar pain, and always more or less constipation.

Condition before Operation.

The patient had been confined twelve days before I saw her, having a perfectly normal labour. The facial aspect was anxious, vomiting was frequent, the vomited material being greenish-brown and inoffensive. The pulse was 100 and rising steadily. The abdomen was distended, though not greatly so, and in the left lumbar region a hard movable lump could be felt. On bimanual examination it was found to extend into the loin, and was movable antero-posteriorly but not laterally. It was dull on percussion. The impression conveyed was that of a para-renal growth of some kind. There had never at any time been any renal symptoms. The lump extended from the left renal region down to the umbilicus and over to the middle line. The nature of the swelling was quite uncertain, and beyond a vague suggestion that it was a para-renal "something," no diagnosis was made.

First Operation.

The condition of the patient was critical, since no relief had been obtainable by enemata, and the acuteness of the symptoms was hourly increasing. She was therefore removed to a nursing home, with a view to operation. Four hours later, Dr. Pershouse anaesthetizing and Dr. Stanley Heberden assisting, I opened the abdomen in the left linea semilunaris, over the swelling. There was no sign of peritonitis. The descending colon was completely flattened over a large tense swelling, which bulged forward the posterior peritoneum, the colon lying to its outer side. Some large vessels, apparently supplying the colon, ran over its surface. Above, the swelling was apparently continuous with the left kidney, and it extended well over to the middle line. An incision was made parallel with the vessels through the posterior peritoneum, and an attempt made to shell out the swelling. It was, however, completely fixed posteriorly and above, and a fresh layer was attempted in what looked and felt like a tumour capsule. Suddenly the finger slipped into a large cavity, from which rushed some fluid blood and large masses of blood clot, some recent

and some old. The peritoneal cavity had been well packed off, and there was no soiling of the peritoneum. The cyst cavity having been thoroughly emptied and sponged out, the cyst wall was stitched all round to the peritoneum of the anterior abdominal wall and the cavity stuffed with gauze. There had been free oozing from the wall of the cyst, but this ceased on pressure with the gauze packing. None of the cyst wall was removed, since there was none to spare when the cut edges were brought forward.

The subsequent progress of the case was uneventful, the patient leaving the home in a month.

Contents of Cyst.

The material removed from the cyst was submitted to Dr. Pakes, pathologist to Johannesburg Hospital, and his report was that it was old and recent blood clot, with fluid blood.

It seems clear that the origin of the trouble was a retroperitoneal haemorrhage during confinement three years ago—that at the recent labour a fresh haemorrhage occurred, rendering the cyst tense and flattening the colon over it. It is difficult to determine precisely the source of the haemorrhage whether from a mesenteric vessel, a renal branch, or a pancreatic vessel, it is impossible to decide.

Could the nature of the swelling in this case have been diagnosed, there is no doubt that drainage through the loin by an extraperitoneal operation would have been the ideal one. Fortunately, however, all went well by the method adopted.

If this earlier history of the case in 1907 can be considered of real interest, the subsequent events in regard to the same patient are still more worthy of record.

In March, 1912, I was again asked by Dr. Pershouse to see this patient, as she was once more threatened with intestinal obstruction. Since the operation in 1907 she had been remarkably well, only suffering from time to time from constipation and occasional left lumbar pain of quite moderate character. When seen the patient's general condition was good. For about twelve hours there had been some vomiting; she was decidedly thin, but presented no other abnormality in general appearance. There was no discoloration of the skin anywhere.

In the left loin was a densely hard tumour, movable antero-posteriorly, but not vertically, having the colon in front of it. It filled the loin space and extended to the middle line. There were no renal symptoms. A paper by Mr. Alban Doran¹ on cystic tumour of the suprarenal body successfully removed by operation was materially helpful to me in making a diagnosis of suprarenal tumour.

Second Operation.

The patient was removed to Johannesburg Hospital for operation. Dr. F. B. Mudd anaesthetizing and Dr. George Murray assisting, I made the usual oblique incision in the left loin employed for nephrectomy. On opening the loin space I came upon a large dense tumour, having a tough fibrous capsule which extended from the diaphragm downwards to below the iliac crest and over to the middle line. Below it was the left kidney pushed into the iliac fossa, with its upper pole flattened from pressure. The tumour was adherent to the kidney below, the descending colon and peritoneum in front, and the diaphragm above. Its separation from the kidney was clean and easy, from the diaphragm and colon more difficult, and the peritoneum was torn twice and sutured in the usual way. There was no definite pedicle, but vessels were ligatured with catgut as they were encountered. There was no difficulty in controlling haemorrhage, although some of the vessels were of considerable size. The kidney was pulled up into the loin and retained in place by sutures through its perirenal fascia, and a drainage tube inserted down to it. The patient left hospital well on the twenty-eighth day.

The tumour, which was about twice the size of a fetal head, was globular, with one small nodular outgrowth. It had a dense, laminated fibrous capsule, presenting on the inner surface thickenings here and there, which on section showed adrenal tissue. The interior of this fibrous capsule was filled with dense altered blood clot of old standing.

I am indebted to Dr. Watkins-Pitchford, Government Bacteriologist and Pathologist, Johannesburg, for microscopic sections and preservation of the tumour. Dr. Watkins-Pitchford was of opinion that the growth was a hypernephroma. The tumour and sections are now in the Royal College of Surgeons, England.

There can be no doubt that the lumbar route is the method of choice for the removal of growths of this character; it is easier, quicker, and therefore safer than by anterior abdominal section. This is, so far as I can discover, the first case of the kind removed through the