TREATMENT OF UREMIA

Use and Indications for High Caloric Low Protein Diet, Dialyzing Methods and Replacement Transfusion

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IN the presence of acute anuric uremia and in chronic uremia, regardless of the cause, several principles should guide treatment. These are: 1. maintenance of body fluid and a certain electrolyte balance, 2. maximal suppression of protein metabolism, 3. avoidance of infection and 4. elimination of retention products ordinarily removed by the kidneys.

1. Control of Fluids and Electrolytes

Unfortunately many patients with oliguria and acute uremia are overtreated with water and saline in the hope that diuresis will occur, but no amount of fluid will induce urine formation if the uremia is due to parenchymal renal disease. Conversely, if given to patients in whom urine formation does not occur, salt and water will lead to the development of edema greatly endangering the ultimate prognosis. To avoid such unnecessary complications during periods of urinary suppression the daily intake of fluid should be rigidly limited to 750 cc., while fluid lost with vomiting and diarrhea may be counterbalanced.

Correct control of electrolytes can be accomplished only if their concentration in the blood and body fluids is known, hence frequent measurements of CO_2 combining power, sodium chloride and potassium levels in the blood plasma are part of the management of acute uremia. Moderate depression of sodium chloride may be an advantage since it reduces the blood pressure, and diminishes the risk of convulsions and congestive heart failure. Vomiting and diarrhea however can cause excessive sodium and chloride loss. Such states will further depress urine formation and lead to more severe azotemia.

Careful replacement of these ions orally, if possible, or by intravenous administration of 3 or 5 per cent sodium chloride may be indicated.

Acidosis can be, in part, controlled by a high caloric intake. However, should CO_2 combining power fall below 25 volumes per cent, sodium bicarbonate may be given orally or intravenously. Six to 10 Gm. per day should rarely be exceeded.

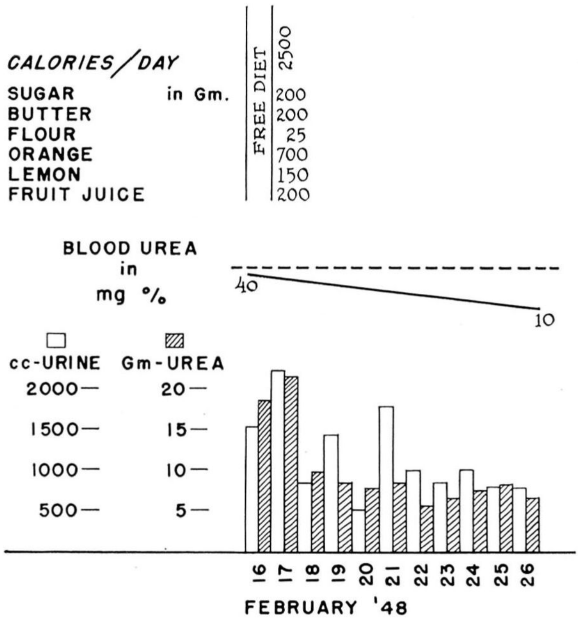
Potassium deficiency is not uncommon in chronic uremia but it is relatively rare in acute anuric uremia where hyperpotassemia is a frequent cause of death.[8] Hyperpotassemia may be corrected by the oral administration of exchange resins (potassium free amberlite) which fixes potassium in the bowel, by the forced feeding of large amounts of carbohydrates or by one of the dialyzing procedures[8] to be mentioned later.

Should calcium levels become low enough to cause tetany or nocturnal cramps, replacement by means of calcium gluconate or chloride is indicated.

It is said that hyperphosphatemia can be corrected toward normal by aluminum hydroxide given by mouth. This drug precipitates phosphates in the bowel so that they are eliminated in the stool. I have had no personal experience with this method.

2. Supression of Protein Metabolism

Suppression of protein metabolism by high caloric, protein-free feedings has been shown favorably to influence uremia in laboratory animals (Masson, Corcoran and Page[10]). The protein-sparing effect of a high caloric diet was shown distinctively by Borst;[2] the essentially new point in his treatment is the forced consumption of quantities of carbohydrate and fat adequate to cover the patient's caloric needs. If caloric intake is high enough, urea excretion may be reduced to as little as 2 to 5 Gm. per 24 hours. Graph 1 follows the course of a healthy student who was given 2500 calories but a minimal amount of proteins. Within 5 days his urea excretion (and production) was reduced to 5 Gm. per day. Should this man have become completely anuric with continuation of the diet he would have lived 25 days before his blood urea would



GRAPH 1. Normal student with healthy kidneys on forced high caloric nonprotein diet. His daily urea excretion is reduced from 22 to 5 Gm. per 24 hours on 2500 calories per day. The blood urea having been only 18 mg. per hundred ml. urea production could not have been much more than 5 Gm. per day.

have reached a level of 350 mg. per hundred ml. Moreover, excessive accumulation of urea and other products of protein catabolism can be avoided in patients with minimal renal function.

Patients with uremia usually are nauseated and, unless much care is used in preparation, the diet may not be ingested in adequate amounts. With persuasion and explanation of the importance of dietary measures, most patients will undertake the effort. When a sense of well-being is experienced—they become cooperative and manage in some way to consume 2000 calories per day. The mixture of butter and sugar, suggested by Borst, is probably most effective for a sick patient. As improvement occurs the diet can be expanded to include 20 Gm. of protein per day plus the amount lost in the urine, with generous quantities of carbohydrate and fat. Kempner and others have shown that 20 Gm. of protein will (or almost will) maintain patients in nitrogen balance for several years, but only as long as caloric intake is adequate.

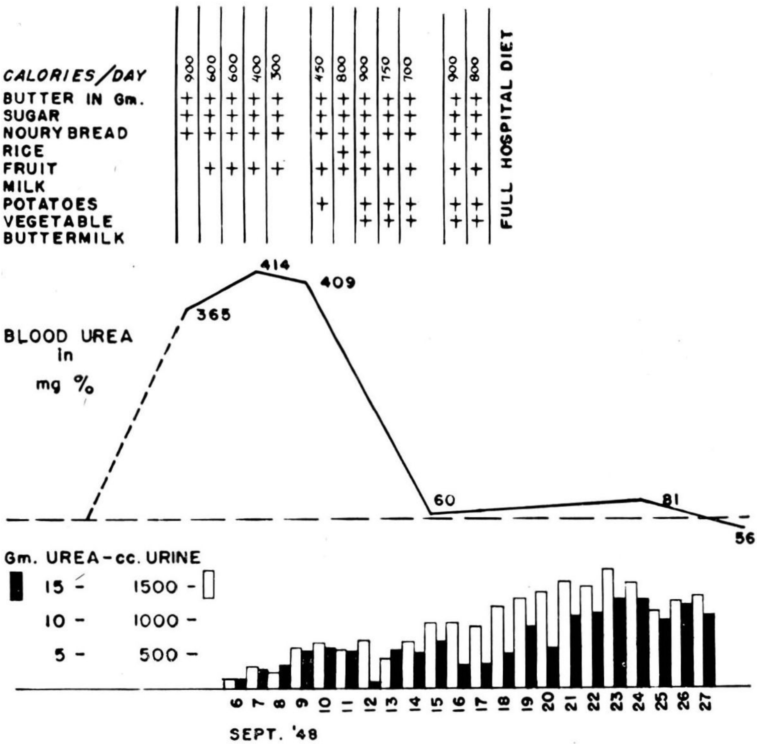
During acute uremia some patients are unable to ingest or retain the butter and sugar mixture. For these patients adequate calories can be provided by dripping an emulsion of peanut oil and glucose (Bull, Joekes and Lowe[3]), or LipoMul-Oral* through a nasal tube leading into the stomach or small intestine. In critical cases with intractable vomiting or diarrhea, even this method may fail. In such desperate cases we have resorted to a slow continuous drip of 40 per cent glucose through a small plastic cardiac catheter in the right auricle. One liter per 24 hours furnishes 1600 calories. Thus fluid intake is kept low and thrombophlebitis caused by hypertonic glucose is avoided. Heparin, ±150 mg., per 24 hours mixed with the infusion will prevent clot formation on the outside of the catheter, while antibacterial drugs discourage infection. Observing these precautions, catheters have been left in place 20 days without undesirable results. At the conclusion of this article Marjorie Curry and June E. Thompson describe Borst's and Bull's mixture and the preparation of various high caloric low protein diets.

Graph 2 shows the course of a 6-year-old girl, anuric for probably 14 days, who was forced to take the high caloric diet. It should be noted how rapidly the blood urea fell with the recovery of kidney function even when only 5 to 6 Gm. of urea was excreted per 24 hours.

3. Avoidance of Infection

People with uremia are liable to infection which promotes protein breakdown and increases the uremia. For prevention and treatment of such complications, antibacterial drugs should be used. Because of depressed renal function sulfonamides are to be avoided and for the same reason penicillin and aureomycin may be given in smaller amounts at less frequent intervals.

*A fat emulsion for oral nutrition developed by Shoshkes, Van Itallie, Geyer and Stare (J. Am. Dietet. A., Volume 27, March 1951) and manufactured by the Upjohn Company under the trade name of LipoMul-Oral seems to provide the most satisfactory solution to the problem. We have only recently utilized this emulsion.



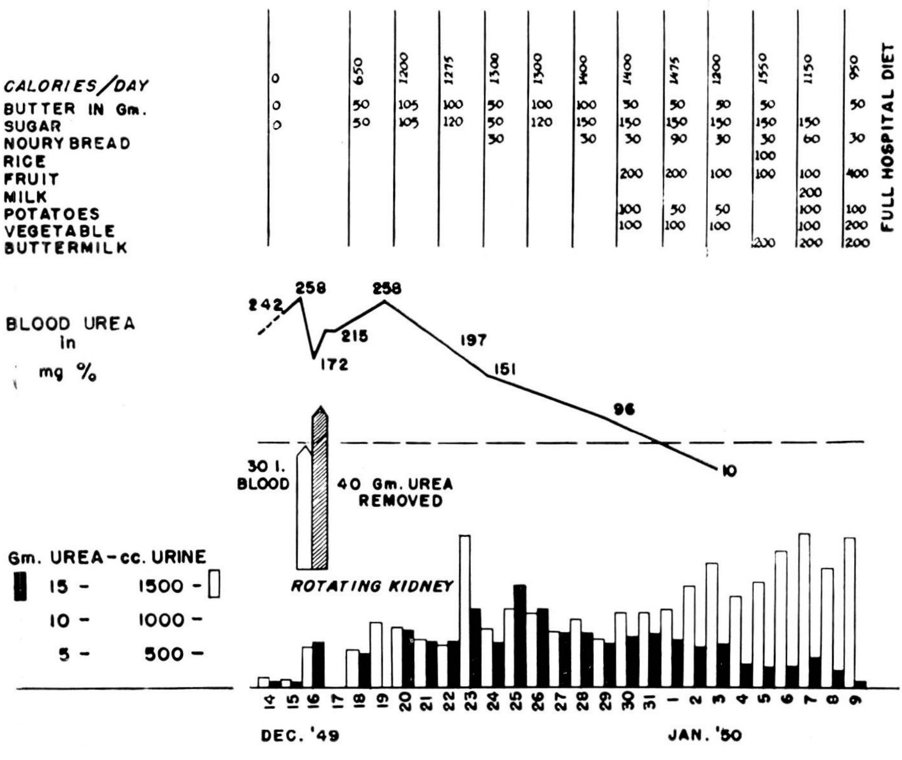
GRAPH 2. Six-year-old girl with acute glomerular nephritis; probably anuric for approximately 14 days. While forced to take 900 or 600 calories a day the blood urea rose from 365 to 414; it then began to fall notwithstanding small urea output. Note increase of urea excretion when patient was allowed full hospital diet.

4. Elimination of Retention Products

A. Artificial Kidney. If the measures recorded previously are applied vigorously at the onset, most patients with acute anuria resulting from recoverable lesions will diurese before dialyzing methods are necessary. However, if such measures have not been observed, or if burns, crushing injuries or infection have caused excessive protein breakdown, treatment by some form of dialysis may be necessary. One of these is the artificial kidney described in the October 1950 *Cleveland Clinic Quarterly*.[6,7] Use of the artificial kidney presents little danger in experienced hands and, in patients seriously ill with acute anuria, a single treatment may restore well-being to the extent that dietary measures may be applied.

An illustrative case is shown in graph 3. This 49-year-old woman gave a vague history of acute glomerulonephritis. She was anuric and suffered from congestive heart failure and pulmonary edema made worse, if not precipitated, by excessive treatment with saline solution. Because of her ominous state she was immediately treated with the artificial kidney. Thereafter she was able to ingest a high caloric diet in increasing amounts and made a satisfactory recovery.

Although the artificial kidney is most useful in acute uremia due to renal lesions from which one may recover, it occasionally is applicable in instances of chronic uremia due to glomerulonephritis or polycystic kidney disease. Among this group of patients acute exacerbations of nephritis, infections, nausea and vomiting and associated symptoms may impel a patient with compensated renal insufficiency into terminal uremia. The artificial kidney is often extremely valuable in such periods of crisis. Some patients who are ill with uremia and an unknown primary disease can be kept alive by this form of dialysis until a definite diagnosis is established. In short the artificial kidney may be applied in any case of uremia where life is in jeopardy, and where the uremia is thought to be the cause of the immediate danger.



Graph 3. Forty-nine-year-old woman with acute glomerular nephritis, congestive heart failure and pulmonary edema. In single treatment with artificial kidney 40 Gm. of urea was removed and signs of pulmonary edema disappeared when fluid was withdrawn by hypertonic glucose solution in rinsing bath of the artificial kidney. One day after treatment patient was able to take 650 calories and shortly thereafter the diet was extended. Note low urea output (3 Gm.) on January 4, 5 and 6 while blood urea was low, demonstrating low urea production.

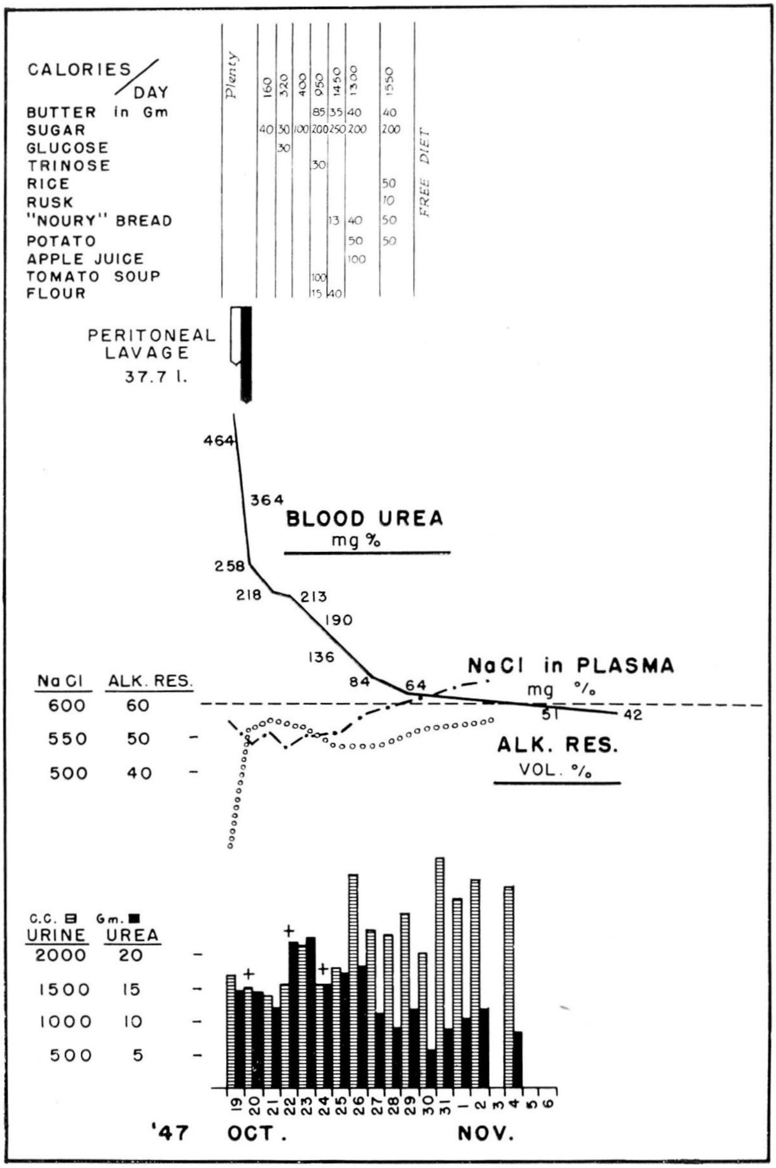
The artificial kidney will: (1) remove retention products (it is now well established that such treatment will prolong the lives of patients having anuria, and of nephrectomized animals); (2) correct electrolyte imbalance; (3) relieve edema, particularly pulmonary edema, and (4) furnish large amounts of glucose by dialysis which, while not essential, may be useful.

B. Peritoneal Lavage. Frank, Seligman and Fine[4] revived peritoneal lavage as a treatment for uremia in 1946. Until 1948 there were 34 reported patients treated in this manner, of which 9 recovered. However, there were many failures due to maladjustment of the composition of the rinsing fluid and to peritonitis. In 1948 Kop[9] reviewed his own and Kolff's[7] experiences with peritoneal dialysis performed 35 times on 21 patients; 7 of these patients recovered. Nine who had chronic glomerulonephritis or malignant hypertension died. However, even in this group there was temporary subjective and objective improvement. The method has been tried in many centers and generally abandoned (1) because of mechanical difficulties which sometimes prevent adequate drainage of the peritoneum, (2) because of the difficulties encountered in controlling water and electrolyte balance in such cases, and (3) because of the development of fatal peritonitis. The latter complication is explained by the work of Schweinburg, Seligman and Fine[12] who demonstrated that radioactive B. coli could pass through the intestine into the peritoneum. In our group, peritonitis was not a problem, possibly because dialysis never lasted longer than 72 hours and usually no more than 24 hours. In one day retention products are reduced adequately enough to relieve immediate danger so that dietary measures may be effective.

Our technics have been described elsewhere (Kolff,[7] Kop[9]). Briefly, small rubber or plastic tubes are introduced into the peritoneum through trocars. One is connected to a special tank containing 28 L. of electrolyte containing fluid to be delivered at the rate of 1 L. per hour. Inflow and outflow can be interchanged by changing clamps and without opening tubes. Antibiotics and heparin are added to this rinsing fluid.

A 38-year-old woman (graph 4) developed fever and abdominal pain during the seventh month of pregnancy. She was treated with sulfadiazine but suffered a retroplacental hemorrhage and was delivered of a dead child. In retrospect it was established that oliguria began at this time but the degree and exact duration could not be determined. On the seventh postpartum day, she experienced abdominal cramps and diarrhea and was given sulfaguanidine. On the fifteenth day postpartum she was transferred to our service in a comatose state. Blood pressure was 150/80; breathing was of the Kussmaul type; the blood urea was 464 mg. per hundred cc. Twenty-four hours of peritoneal dialysis removed 57 Gm. of urea and reduced the blood level to 258 mg. per hundred ml. The alkali reserve was restored to normal while the chlorides remained unchanged. Diuresis began during dialysis and recovery was complete.

Indications for peritoneal lavage are the same as those for the artificial kidney. Peritoneal dialysis is a much simpler and less elaborate procedure; however underestimation of the difficulties of the procedure may prove disastrous in inexperienced hands. Some patients find the therapy extremely unpleasant and even painful. Furthermore, one can never be certain about the return flow of peritoneal fluid. This is also true if the method of periodical



Graph 4. Thirty-eight-year-old woman. Serious condition relieved within 24 hours with one peritoneal lavage. A high caloric diet was prescribed but as the kidneys had obviously opened up and her abdomen was painful after the peritoneal lavage, it was not emphasized. (Noury bread is a low protein bread made in Holland by Nourypharma Deventer.)

installation and withdrawal is used as recently advocated by Grollman and others.[5] If the outflow is inadequate, patients can become dangerously overloaded with electrolytes and water. In the presence of ascites it is usually simple to dialyze through the peritoneum while, if the intestine is distended, the procedure is difficult. If patients are overhydrated or there is evidence of pulmonary edema, the artificial kidney is a much safer process; if the patient is dehydrated lavage may help to correct it. In patients who have recently been operated upon, or who have infection or skin lesions, peritoneal dialysis should be avoided.

Merrill and his associates have given heparin to a patient with a peptic ulcer shortly after a gastric hemorrhage and have treated him with the artificial kidney without consequent harm, and we have observed the cessation of epistaxis during this treatment; however, if bleeding tendencies exist, peritoneal dialysis generally takes precedence over the artificial kidney.

C. Intestinal Dialysis. It has been established that lavage of the colon and stomach are of no value for the removal of retained urinary products. E. E. Twiss has recently published (1950) a monograph of the work done with this method in Kolff's Clinic in Kampen, Holland.[13]

Large amounts of urea and other retention products can be removed by intestinal dialysis and there is no doubt that uremia can be relieved sufficiently by this method. Using a cellophane membrane or a peritoneal membrane (as described previously), there is no cellular activity in the membrane and it is not difficult to balance the electrolytes on both sides of the membrane. In using the intestinal mucosa, however, absorption takes place, which must be compensated by the osmotic pressure and the particular composition of the rinsing fluid.

Apart from accepting the principle that neither strongly hypertonic nor hypotonic solutions should be used to avoid damage to the intestinal epithelium, we could draw the following conclusions from the dog experiments:

1. To prevent fluid absorption the solutions must be made moderately hypertonic. This can be done by adding sucrose (with or without glucose) or glucose-ureide, by adding magnesium or sodium sulfate, or a combination of these substances to the solution. If sugars are added to the solution its osmotic activity should be higher than when sulfates are added, as these salts are absorbed more slowly than the sugars.

2. If the solution contains sodium: 24 mEq/L, bicarbonate 24 mEq/L, potassium 5 to 6 mEq/L, calcium 5 mEq/L and chloride 10 mEq/L* electrolyte equilibrium usually exists between the intestinal lumen and the blood, with an occasional slight chloride loss. The bicarbonate ion possibly is exchanged partly for the chloride ion, indicated by the lowering of the pH of the solution; this will contribute to the correction of uremic acidosis in patients.

No more than 100 mg. per hundred ml. of sodium chloride should be added to the solution, unless absorption of sodium chloride is desired. Any loss of sodium chloride during intestinal perfusion can be restored easily.

**These concentrations are obtained by adding to the solution per 100 ml.: sodium bicarbonate 200 mg., potassium chloride 40 mg. and calcium chloride (the pure salt) 28 mg.*

3. The addition of sucrose, with or without glucose, to the solution is advantageous in that a considerable part of the sugars will be absorbed (as hexoses) and increase the caloric intake of the uremic patient.

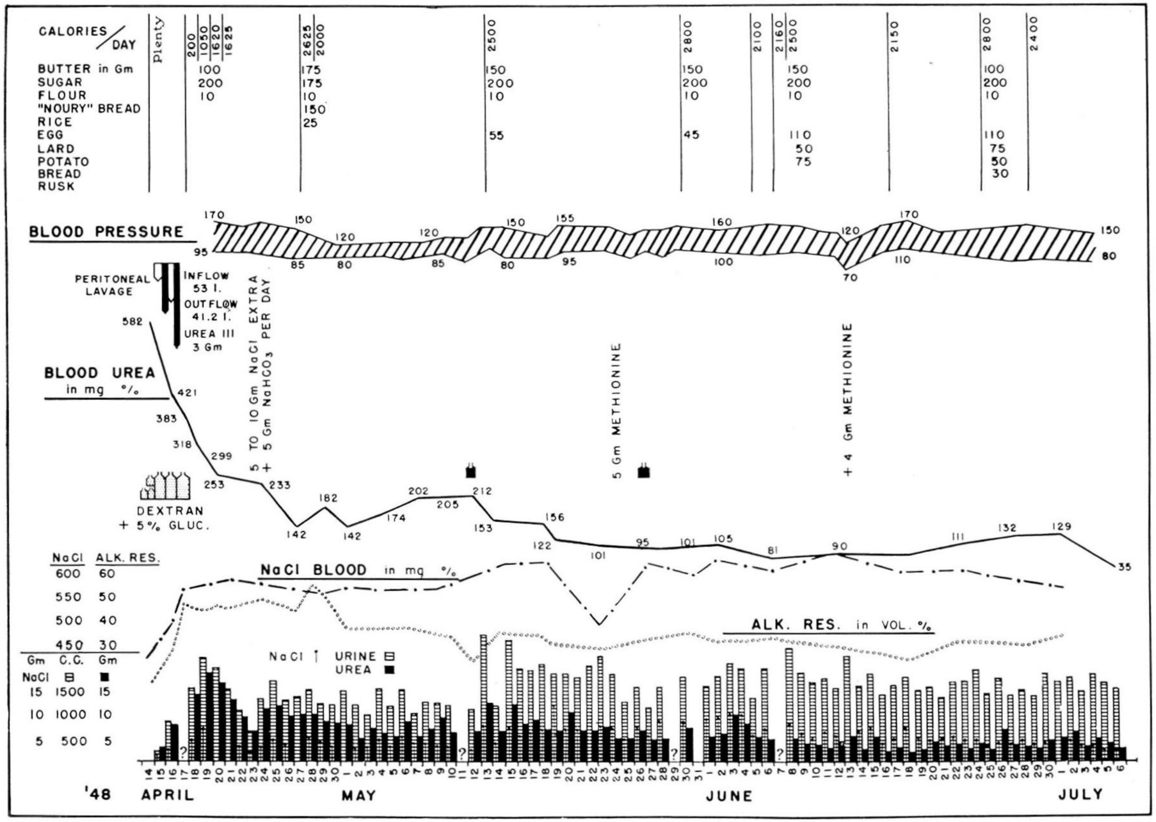
4. Magnesium and sodium sulfate have proved suitable for maintaining the osmotic activity of the perfusion fluid. Some magnesium and probably more sodium are absorbed; this is disadvantageous in that hypermagnesemia may occur (especially in anuria) with the danger of depression of respiration, and because too great an absorption of sodium from the sodium sulfate-containing solutions may aggravate the disturbance of homeostasis of the body fluids and lead to serious hypertensive crises.

The following is an example of the composition of such a rinsing fluid: NaCl O, $NaHCO_3$ 200, KCl 40, $CaCl_2$ 28, sucrose 6000, glucose 3600 mg. per hundred ml. The osmotic activity is 484 m. osmols/L. However, as Visscher has already indicated, the cells of the intestinal mucosa may be changed; for example: by perfusion with aqua destillata or by the addition of a trace of bichloride of mercury. At present it is extremely difficult or impossible to predict how the mucosa of a certain patient is liable to react and, if an intestinal dialysis is done, constant supervision of the blood plasma electrolytes is necessary.

Two methods of intestinal dialysis have been used. (1) Intestinal dialysis using the entire tract for the treatment of acute uremia. (2) Dialysis through an isolated intestinal loop for the treatment of chronic uremia. In (1) the fluid is introduced through a jejunal tube at a rate of 1 L. per hour and the outflow is affected through a large tube in the rectum.

The intestinal peristalsis moves the rinsing fluid from the oral to the distal parts of the intestines. However, I have seen paralysis occur, making it virtually impossible to recover any of the introduced rinsing fluid. After having witnessed the treatment of a dozen patients by a man as experienced as Dr. Twiss, I am still unconvinced that intestinal dialysis, using the entire tract, has an advantage over the artificial kidney or peritoneal lavage.

(2) Since the first uremic patient was treated, in 1946, with dialysis through an intestinal loop, we have been alert for patients in whom the uremia was severe enough and the condition distressing enough to justify a trial with this form of dialysis. About 2 meters of small intestine are used, the ends of which are sutured in the abdominal wall simulating an artificial anus; the remainder of the gut is anastomosed end to end. While the remaining intestinal tract will accommodate the patient's digestive function, the isolated loop may be used for dialysis. It is not difficult to prove that from 5 to 10 Gm. or even more of urea can be removed by dialysis through such an intestinal loop in the course of 8 to 10 hours; this amount of urea is sufficient as long as the patient is maintained on a high caloric low protein diet. The ultimate incentive is to dialyze the patient nocturnally during sleep and to have him perform his customary work in the daytime. One man who was virtually nephrectomized was maintained on this regimen for 46 days. He has been in urea balance for 16 consecutive days by utilization of the intestinal loop. (He died from a cerebral vascular accident.) Inasmuch as most patients with chronic uremia do well on



Graph 5. Forty-nine-year-old man with polycystic kidneys and hypertension admitted with blood urea of 580 mg. per hundred ml. After peritoneal lavage lasting 2 days, he was able to take butter and sugar diet. When caloric intake was covered, 5 Gm. of methionin, 2 eggs, and 50 Gm. of ordinary bread were allowed without noticeable increase in urea excretion. Blood urea varied between 130 and 35 mg. per hundred ml.

the forced high caloric diet as described before, we have had few opportunities to repeat this procedure.

D. Exsanguino or Replacement Transfusion. Exsanguino transfusion has been introduced by Bessis[1] in the treatment of uremia. In this method a large volume of blood is infused in one arm while an equal volume is removed and discarded from the other arm. It is easy to calculate how much blood should be withdrawn to remove a certain amount of urea. If the blood urea is 400 mg. per cent the removal of 1 L. of blood will eliminate almost 4 Gm. of urea. The removal and replacement of 5 to 7 L. of blood every other day would be an expensive procedure in this country. Even when utilizing this process the amount of retention products which can be removed is less than when using dialyzing methods. I have used this form of treatment in many cases of uremia to restore the hemoglobin. If a patient with uremia is transfused in the ordinary way there is definite danger that he will develop congestive heart failure and pulmonary edema. It is more satisfactory to remove an equal, or preferably larger, volume of blood from the patient at the same time. If fresh, concentrated red cells are transfused instead of whole blood, this method is even more effective. One patient had a blood urea of 242 mg. per cent. Nine bottles of blood were removed, and at the same time 8 bottles of blood were reinfused. Immediately following this procedure the blood urea was found to be 233. The hemoglobin content, however, was restored without evidence of having overburdened the circulation.

The smallest scale in which this procedure may be used is the withdrawal of 500 ml. of the patient's blood in a transfusion bottle. After sedimentation, which takes place in 1 hour, the plasma should be discarded and the red cells reinfused. This may be done when a venesection is necessary in severely anemic patients.

E. Cross or Exchange Transfusion. During this procedure equal amounts of blood are transfused from a healthy donor to the patient and from the patient to the healthy donor. Cross transfusion has been practiced successfully in dogs for a long time. It is possible to reduce the blood urea of a uremic dog to about half its previous level by means of cross transfusion within a few hours. After extensive studies[11] this method was applied to human beings by Salisbury. Unfortunately a phenomenon occurred never observed in hundreds of experiments on dogs. A healthy donor, cross transfused with a patient having nephrosis, failed to recover. He developed an incurable blood disease, perhaps best described as a panmyelophthisis, and died 20 days after the cross transfusion. Once this has been observed further clinical cross transfusion is out of the question.

In conclusion graph 5 outlines the course of a patient with severe chronic uremia in whom many of the previously described procedures have been applied.

A 49-year-old man who had polycystic kidneys and hypertension for many years was admitted in poor condition with a blood urea of 582 mg. per cent. He was dehydrated, acidotic and had hypochloremia. Peritoneal lavage removed 111 Gm. of urea. His shock was treated with intravenous infusion of Dextran (Makrodex) and his alkali reserve and serum chlorides were corrected.

Makrodex* is a complex glucose molecule which may be used as a blood substitute. In patients with uremia it has the advantage of being broken down to glucose, which aids the caloric intake, rather than to amino acids and urea like most other substitutes as well as plasma.

Summary

Restriction of water and electrolytes are imperative in the treatment of acute anuric uremia. Clinical judgment and laboratory technics should control water and electrolyte balance if the kidneys are unable to do so, as in the diuretic phase of acute uremia and in many cases of chronic uremia.

The forced high caloric low protein diet (Borst) prolongs life in cases of acute uremia and in addition may make life worth living in chronic uremia. Artificial kidney and peritoneal lavage may help a patient through an acute phase of the disease toward recovery or in chronic cases may restore the patient's nitrogen equilibrium. Intestinal dialysis employing the entire tract appeared difficult and exhausting to patients in severe clinical condition. Dialysis through an isolated loop offers a chance to those patients with chronic uremia to whom we can offer nothing else. Replacement transfusions are useful in the restoration of hemoglobin but cumbersome when utilized to combat uremia. Makrodex is preferred over other blood substitutes if hypotension has to be treated in patients with uremia.

I wish to thank Dr. Robert D. Taylor for his assistance in preparing this manuscript.

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**Makrodex was supplied by Pharmacia in Sweden and by Mr. Nathan Katz, Pharmacia Laboratories, Inc. 2 Park Avenue, New York 16, N. Y.*

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PRACTICAL SUGGESTIONS IN THE PREPARATION OF A HIGH CALORIC LOW PROTEIN DIET

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and
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Emulsion for intragastric drip according to Bull, Joekes and Lowe

Glucose	400	This is made in the pharmacy at the Cleveland Clinic. Given as continuous drip through nasal catheter. Use plastic tube.
Peanut oil	100	
Acacia	q. s. to emulsify, usually 25 Gm.	
Water	1 liter	
Vitamins		

The butter soup according to Borst

Sugar	150 Gm.	1775 calories, 2 Gm. protein. When divided over 6 portions of 100 ml. each portion will contain approximately 300 calories.
Salt free butter	150 Gm.	
Flour	q. s. to make emulsion, usually 20 Gm.	
Water	Approximately 300 Gm.	Vitamins preferably parenteral.
Coffee extract	q. s.	

Method of preparation: Mix sugar and flour together. Add enough water to make a paste. Add butter. Cook in double boiler, stirring constantly. When flour is well-cooked and starch taste disappears, gradually add water until total volume is 600 ml. Cook thoroughly, stirring constantly. Remove from heat and stir until cool. Add flavoring; strong coffee extract is appreciated most although lemon, vanilla, etc., may be tried. If properly made, the Borst butter soup should stay in emulsion, thin enough to drink from a cup. It should be divided in portions throughout the day; for example, 7 a.m., 9 a.m., 11 a.m., 3 p.m., 6 p.m., 9 p.m., each serving 100 ml. The patient should drink the soup at once, rather than postpone it. If he vomits, continue it. If the patient prefers the drink hot, heat only one portion at a time, otherwise emulsion may be destroyed.

One or more of the following "suggestions" may be supplemented at the time of the usual meals, or given to replace a portion of the butter soup. However, these should not be started before the patient has shown his cooperation in taking the butter soup.

Even if all ten of these suggestions were followed in one day, the patient would only get 22 Gm. of protein. Sometimes it is necessary to leave the butter out of some of the suggestions. Some patients can be allowed large amounts of fruit juice or Kool-aid with which the intake of sugar may be encouraged.

Suggestions to be used as supplements or substitutions for Borst butter soup

	Amt. in Gm.	Calories		Amt. in Gm.	Calories
1.			6.		
½ cupful cooked rice	100	210	½ cupful boiled sweet potato (contains 200 mg. potassium)	100	380
1½ squares butter	15		3½ squares butter	35	
2.			7.		
½ cupful baked potato (contains 400 mg. potassium)	100	200	1 pancake	50	320
1½ squares butter	15		1 square butter	10	
			3 tablespoons syrup (maple or white sugar syrup)	40	
3.			8.		
1 zwieback (low salt)	8	90	½ cupful chocolate pudding (4.5 Gm. protein)	100	280
2 teaspoons jelly	10		1 tablespoon whipped cream	15	
½ square butter	5				
4.			9.		
fresh tomato puree (canned may be used if salt is allowed)	75	265	cinnamon toast		340
1 teaspoon sugar	5		1½ slices bread (4.5. Gm. protein)	45	
3 squares butter	30		2 squares butter	20	
			4 teaspoons sugar	20	
5.			10.		
fresh cooked celery (contains 225 mg. potassium)	75	275	½ cupful corn meal mush	100	220
3 squares butter	30		2 squares butter	20	
1 tablespoon cream	15				