Chronic hemodialysis with the hollow fiber artificial kidney (HFAK)
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Clinical experience involving more than 1,900 hemodialyses was analyzed and correlated with changing fabrication parameters of a hollow fiber artificial kidney. At an average blood flow rate of approximately 210 ml/min and a dialyzate flow rate of 500 ml/min, the dialysance of urea and creatinine averaged 130 ml/min and 175 ml/min respectively. Ultrafiltration was linearly related to trans-membranes pressure and was determined to be 1 min/hr/mm Hg trans-membranes pressure.
Thrombogenicity of the dialyzer was found to be dependent on both dialyzer and patient variables. Patient dependent influence on thrombogenicity appeared to correlate with the bleeding time, prothrombin consumption and platelet aggregation with collagen. A clinical evaluation of cell thrombogenicity lead to the conclusion that the dialyzer was satisfactory as a reusable dialyzer in 20 patients, satisfactory as a disposable dialyzer in 10 patients and too unpredictable in thrombogenicity to be satisfactory in 10 patients for long term use.
Clinical effectiveness was judged in 19 patients undergoing 4-11 months of hollow fiber artificial kidney dialysis therapy. Satisfactory clinical control of the chronic uremic syndrome was achieved with an average of 21 hours of dialysis/week.
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Lack of dialyzable insulin antagonist in uremia
Intravenous glucose tolerance tests were performed on 8 uremic patients before and after repeated hemodialyses. Serum was obtained before each test for use in an in vitro rat hemidiaphragm assay specifically designed to measure insulin antagonism. With this modification the activity of insulin added to the pre- and post-dialysis sera of the same patient can be compared on the tissues from one rat, thus eliminating variation between animals. Although glucose tolerance improved in every patient (p > .005) there was no difference in the activity of insulin added to sera collected before and after treatment. It is concluded that glucose intolerance in uremia is probably not due to a dialyzable insulin antagonist.
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Recurrent septic pulmonary embolization complicating maintenance hemodialysis
Recurrent episodes of septic pulmonary embolization are described in three patients undergoing maintenance hemodialysis. Abnormalities of serum bilirubin, alkaline phosphatase, and serum glutamic-oxalacetic transaminase were observed in two patients and pericarditis with effusion
and atrial fibrillation in one patient. Serial chest roentgenograms showed one or more small areas of infiltration in the peripheral lung fields.

There was no correlation between gross evidence of local infection and the occurrence of septic pulmonary embolization. Hemodialysis treatments were often associated with an exacerbation of the clinical picture, suggesting infection in the region of the arteriovenous shunt as the cause. Once septic pulmonary emboli recurred in the same individual, antibacterial therapy was ineffective. The clinical course in these patients suggested that the indwelling foreign body—the arteriovenous shunt—was responsible for the poor response to antibiotics.

The recommended treatment for recurrent septic pulmonary embolization complicating maintenance hemodialysis is removal of the shunt and control of systemic infection. Recannulation should be performed in a different extremity, only after all signs of systemic infection have resolved.

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Internal redistribution of tissue protein synthesis in uremia


Tissue composition and in vivo tissue protein synthesis were altered by acute uremia, induced in rats by bilateral nephrectomy. Net protein synthesis (anabolism minus catabolism) was increased in liver and heart and decreased in skeletal muscle, as judged from changes in total organ weight, ratios of protein: DNA and RNA: DNA, and leucine14-C incorporation into trichloroacetic acid (TCA)-insoluble, nucleic acid-free material. Concentration of free lysine, a major constituent of histones and ribonucleoproteins, also was increased in liver and decreased in skeletal muscle, a finding suggesting lysine shifted from muscle to liver in association with the changes in protein synthesis. Acute uremia also altered tissue levels of other amino acids. Hepatic concentrations and liver: blood concentration ratios tended to be increased for the essential, but not for the non-essential amino acids. Moreover, the phenylalanine: tyrosine concentration ratio which reflects activity of the enzyme phenylalanine hydroxylase, was increased in blood, muscle and liver. These findings indicate uremia selectively alters tissue composition and protein synthesis in different organs and may modify intermediary metabolism of some individual amino acids.

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Clinical spectrum of glutethimide intoxication; hemodialysis reevaluated


Thirty-nine proven cases of glutethimide intoxication were treated in a three year period. Concomitant barbiturate ingestion was ruled out chemically in 31 instances, and by history in the remaining 8. Blood glutethimide concentrations were measured by the method of Goldbaum et al. (Anal. Chem. 32: 81, 1960) with a re-productibility of ± 5%. Twenty-two patients were comatose on admission, 17 of whom were hypotensive and most required supportive ventilation. Two of these severely intoxicated patients died. The blood glutethimide concentration could not be correlated with any aspect of the clinical course; ‘blood levels observed in more than half the severely intoxicated patients on admission being in the same range as that observed with mild intoxication. Of the 20 comatose patients who survived, 6 awoke despite a blood glutethimide concentration equal to or higher than the admission value; only 2 remained comatose until the
drug level had fallen below one half the admission value. Five of the 17 hypotensive, comatose patients were treated by hemodialysis for 12 to 22 hours. The severity of their intoxication appeared to be clinically comparable to that of the remaining patients in this group. A total of 950 mg to 3,000 mg of glutethimide was recovered in the dialysate. Comparing dialysed and clinically comparable patients who were not dialysed, the authors conclude that hemodialysis: (1) did not shorten the duration of coma (41 hours with dialysis, 36 hours without); (2) did not lessen the incidence of complications; (3) did not improve survival.

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Optimal dietary protein treatment during chronic hemodialysis

Twenty-three uremic male outpatients undergoing maintenance hemodialysis, 11 hours twice weekly, were randomly assigned to 0.75 g/kg or 1.25 g/kg high caloric protein diets. Both diets contained primarily high biologic value protein. Careful dietary supervision was performed by a single dietician and continued effort was maintained to encourage maximal dietary adherence. Balance studies were performed on 3 patients fed each diet for 3 to 4 weeks. In balance studies, the 0.75 g/kg protein diet was associated with slightly positive and the 1.25 g/kg protein diet with more strongly positive nitrogen balance. Outpatients, however, found the lower protein diet difficult to prepare and not satisfying, and frequently ingested 0.8 to 0.9 g/kg of protein. Although patients prescribed the higher protein intake desired less protein and ingested closer to 1.1 to 1.2 g/kg, they still became more uremic. In both groups of outpatients, serum albumin and dry body weight increased, indicating that the previous diet was probably inadequate. On the basis of these and other available data, the authors recommend that patients undergoing twice weekly chronic dialysis receive a diet containing at least 35 cal/kg and 0.8 to 0.9 g/kg of protein, of which 0.63 g/kg should be of high biological value.

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