ELIMINATION OF BARBITURATES DURING EXTRACORPOREAL DIALYSIS

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Since 1960 we have performed 129 extracorporeal dialyses on 77 patients suffering from severe acute narcotic poisoning. Long-acting barbiturates were predominant (Figure 1). We studied the elimination of these long-acting barbiturates during extracorporeal dialysis. The barbiturate concentration in the blood (mg.%) and in the dialysate (g.) was determined every 2 hours\(^1-4\).

Figure 2 shows the relation between the eliminated amount of barbiturate and the preliminary concentration. The higher the initial blood concentration, the more barbital, phenobarbital or cyclobarbital is eliminated per 2-hourly interval.

Figure 3 and 4 show, in their lower sections, that the phenobarbital and cyclobarbital concentration in the blood decreased exponentially during dialysis. Thus the phenobarbital concentration decreased during dialysis on the average 4.78 (± 0.43) %/hr., the cyclobarbital concentration 6.2 (± 1.1) %/hr., and the barbital concentration 7.7 (± 1.4) %/hr.\(^5\). The renal elimination, even in the presence of adequate function, amounts however to 0.42-0.63 %/hr., or about 12% in 24 hours\(^6,7\). We observed that the elimination of these 3 long-acting barbiturates is 10 times greater with dialysis. This is also shown by comparing the dialysance with the renal clearance (Table I).

**TABLE I**

**COMPARISON BETWEEN THE BARBITURATE-DIALYSANCE (IN VIVO) AND THE RENAL CLEARANCE OF BARBITURATES**

**DIALYSANCE (Alwall and Travenol-Dialyser)**

Phenobarbital = 25.4 (± 2.5) ml. blood/min.
Barbital = 32.9 (± 4.4) ml. blood/min.
Cyclobarbital = 26.0 (± 5.5) ml. blood/min.

**CLEARANCE**

Phenobarbital = 0.7 - 4.5 ml./min.
Barbital = 4.0 - 20.0 ml./min. [P. Lous Acta Pharmacol. 10, 147 (1954)]

Figure 3 and 4 also show the mean concentration when the patients awake from coma and there is no damage to the central nervous system. This zone is reached faster with hemodialysis, and the upper sections of Figure 3 and 4 show the 2-hourly and the total quantities of barbiturate in the dialysate. During 1 dialysis we found up to 3 g. of phenobarbital in the dialysate, and during another dialysis up to 2 g. of cyclobarbital. By repetition of dialysis on the same patient it was possible to eliminate up to 6.5 g. of phenobarbital (Patient A, Figure 3) and up to 3 g. of cyclobarbital (Patient A, Figure 4) through extracorporeal hemodialysis alone.

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Suppliers

Avesta Jernverks A.B., Avesta, Sweden.
Alwall's Dialyser
Travenol GmbH. Munich, Germany.
Twin coil kidney

REFERENCES


HEMODIALYSIS IN ACUTE SEDATIVE POISONING

Figure 1. Hemodialysis in acute sedative poisoning. March 1960-August 1964. 77 patients, 129 dialyses.
Figure 2. The correlation between the eliminated barbiturates (mg./2 hours) and the initial blood concentration.

Figure 3 and 4. Changes of phenobarbital (cyclobarbital) blood concentration with recovery of phenobarbital (cyclobarbital) in the dialysate. 8 dialyses (6 dialyses), 3 patients (A, B, C).

Upper section: □ = 2-hourly amounts of phenobarbital (Cyclobarbital) in mg.

- = Sum total of phenobarbital (cyclobarbital) in g.

Lower section:
- = Changes without dialysis.
- = Changes with dialysis.
DIALYSES IN CYCLOBARBITAL POISONING

Figure 4.