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Pharmacokinetics of Intravenous Amoxicillin in Pediatric Patients

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Pharmacokinetic parameters were obtained from 14 infants and children receiving intravenous amoxicillin. Peak serum values increased proportionally to the increase in dose; the serum half-life was similar in the three dose groups studied.

Amoxicillin is a new semisynthetic penicillin with an antibacterial spectrum similar to that of ampicillin (1). Recently, a parenteral form of amoxicillin has become available for research use (provided by Beecham Laboratories, Bristol, Tenn.). This has made it possible to study the pharmacokinetics of amoxicillin in pediatric patients after intravenous (i.v.) administration.

Pharmacokinetic analyses were done in 14 hospitalized pediatric patients with a variety of proven or suspected infections. Amoxicillin was given in a slow i.v. drip over a period of 20 to 30 min in a dose of 13 to 43 mg/kg every 6 h (52 to 152 mg/kg per day). The patients' mean age was 15 months, with a range of 1 month to 5 years. All received i.v. amoxicillin for a minimum of 3 days. Patients were entered in the study after informed and signed consents were obtained from their parents.

Serum samples for amoxicillin levels were obtained on day 2 of treatment immediately preceding administration of the next scheduled dose of amoxicillin and at 1, 1.5, 3, and 6 h after beginning the infusion.

Serum concentrations of amoxicillin were determined by the micromethod of Simon and Yin (3), utilizing *Sarcina lutea* (ATCC 9341) as the test organism. Pharmacokinetic values were obtained with a program written for a Hewlett Packard 9821-A calculator. The data were fitted to a regression line by the method of least mean squares; the serum half-life was calculated by dividing $\log_{10}2$ by the slope of the line. The area under the serum concentration time curve was obtained by successive trapezoidal approximation, and the plasma clearance was obtained by dividing the total dose by the area under the serum concentration time curve and adjusting this value for surface area (2).

Table 1 shows the results obtained. Peak serum levels and the area under the curve increased proportionally to the increase in dose. The serum half-life was similar in the three dose groups studied.

The advantage of oral amoxicillin in producing serum levels two times higher than those with ampicillin (5) disappears when the drug is given i.v.; results from this study, as well as those obtained from adult patients, showed peak levels similar to those obtained after i.v. administration of comparable doses of ampicillin (4, 6).

TABLE 1. *Pharmacokinetic parameters obtained from 14 infants and children*

No. of patients	Mean dosage (mg/kg per dose)	Mean age (mo)	Mean serum concn (μg/ml) at h:					Mean serum half-life (h)	Mean area under curve [h × (μg/ml)]	Mean plasma clearance (ml/min per 1.73 m²)
			0[a]	1	1.5	3	6			
2	14.8	16	0.5	18.4	10.35	2.9	0.3	0.85	31.1	305
10	26.4	10	2.2	34.1	26.7	6.4	2.1	1.22	75.4	214
2	41.5	36	0.9	43.5	33.9	10.2	2.6	1.16	94	322

[a] Zero time levels obtained 6 h after a previous dose.

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