

**Title:** ATRACURIUM IN PATIENTS WITH NO RENAL FUNCTION

**Authors:** J. E. Utting, F.F.A.,R.C.S., J. M. Hunter, F.F.A.,R.C.S.,  
and R. S. Jones, Dr.Vet.Med.

**Affiliation:** University Department of Anaesthesia, Royal Liverpool Hospital, P.O. Box 147,  
Liverpool L69 3BX, England

**Introduction.** Atracurium dibesylate is a new non-depolarising muscle relaxant developed by Stenlake<sup>2</sup>; its pharmacology has been described previously<sup>2</sup> and a clinical paper on its use in humans has also appeared<sup>3</sup>. Though stable in solution for many months at a temperature of 5°C and a pH of 3.5 the injected drug has a half-life of only 30 min at a temperature of 37°C and a pH of 7.4: it would thus appear to be potentially of especial value in anaesthesia for patients with no renal function in whom the usual non-depolarising muscle relaxants may cause prolonged curarisation.

**Methods and materials.** Atracurium was given to 25 patients with no renal function whatsoever and the results compared with those obtained from 25 normal patients. In both the initial dose of atracurium used was 0.5 mg kg<sup>-1</sup> (the dose sufficient for endotracheal intubation being 0.3 mg kg<sup>-1</sup>) and incremental doses were of 0.2 mg kg<sup>-1</sup>. In addition, a small series of patients (17) with no renal function were given tubocurarine (initial dose 0.5 mg kg<sup>-1</sup> and up to three increments of 5 mg thereafter). In every case induction of anaesthesia was with droperidol, fentanyl and thiopentone: maintenance was with nitrous oxide in oxygen with increments of fentanyl but without volatile adjuvants. Pulmonary ventilation was controlled, endotracheal intubation having been performed shortly after the initial dose of relaxant was given. At the end of anaesthesia an attempt was made to reverse residual neuromuscular block with neostigmine - either one or two doses of 2.5 mg being given according to the state of recovery at the time. Neuromuscular function was monitored using the mechanical response to the so-called train-of-four stimuli. Informed consent was obtained from those patients receiving atracurium and the investigation had the permission of the relevant hospital ethical committee.

**Results.** In all the patients who received atracurium the initial dose caused complete ablation of all four twitch responses and the time to the re-appearance of a response was the same in normal (mean = 35 min) and renal failure patients (mean = 29 min) as was the time to recovery of the initial twitch to 10% of control (normals = 39 min; patients with renal failure 35 min). In both groups incremental doses were required at something in the order of intervals of 30 min. There was no evidence of a cumulative effect of atracurium in patients in renal failure. In this group up to 2.3 mg kg<sup>-1</sup> (9 increments) was given (i.e. between seven and eight times the dose required to perform endotracheal intubation) but reversal of residual block was, as in the normal patients, rapid and adequate. No adverse cardiovascular effects were demonstrated. The response of patients with renal failure to tubocurarine was very variable; for example, the initial dose produced complete ablation of twitch response in only 6 of the 17 patients but in 4 the initial response to the train-of-four never fell below 10% of the control value, and in one patient the maximum fall was to only 23% of control. After reversal in 3 of the patients given curare there were some signs of residual effect (e.g. diplopia).

**Discussion.** There are many reports of prolonged curarisation following the use of non-depolarising muscle relaxants in patients with renal failure, and though there are probably differences in this respect between gallamine, tubocurarine, alloferin and pancuronium such differences are probably marginal. The appearance of a non-depolarising muscle relaxant which does not depend in any circumstances on renal excretion for the termination of its action would seem to offer advantages and to represent an advance in the anaesthetic management of patients in this type.

#### References.

1. Stenlake JB: Ions - cyclic nucleotids - cholinergy. In: *Advances in Pharmacology and Therapeutics*, pp 303. Ed. Stocklet JC, Pergamon Press, Oxford and New York, 1979
2. Hughes R, Chapple DJ: The pharmacology of atracurium; a new competitive neuromuscular blocking agent. *Brit J Anaesth*, 1981, 53, pp 31-43
3. Payne JP, Hughes R: Evaluation of atracurium in anaesthetised man. *Brit J Anaesth*, 1981, 53, pp 45-54