A New Highly Potent and Short-acting Analgesic, Carfentanyl (R 33799), in Combination with the Hypnotic Agent, Etomidat (R 26490), as a Method of Anaesthesia in Guinea Pigs

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Summary. Anaesthesia in guinea pigs with a new highly potent and short-acting analgesic, carfentanyl (R 33799), combined with the hypnotic, etomidat (R 26490), is reported. Clinical observations as well as respiratory and circulatory variables have revealed this combination to be safe. Profound surgical anaesthesia has been obtained with good sedation, analgesia, and immobilisation. This method has been evaluated clinically and can be recommended with confidence in this species.

Key words: Anaesthesia – Guinea pigs – Carfentanyl – Etomidat

Different concepts of anaesthesia have been used in guinea pigs. Inhalation with methoxyflurane (Green 1975; Simmons and Smith 1968), ether (Rummel and Seifen 1975), halothane (Göthert 1972) or i.m. or i.v. injection of pentobarbitone (Cannell 1972; Tober-Meyer 1977), fentanyl-diazepam (Green 1975), Innovar-Vet (Love 1970; Rubright and Thayer 1970; Schatzmann and Dürr 1976; Wasel 1976), ketamine (Green 1975; Mayr 1970; Stunkard and Miller 1974), xylacine (Tober-Meyer 1977), fluanisone-fentanyl (Höhne 1975) or fluanisone-fentanyl-metomidate (Erhardt et al. 1979) each offer more or less convenient anaesthesia in this species which causes anaesthetic difficulties for the investigators (Cannell 1972).

Not only is the response to injectable agents extremely variable but induction with inhalation anaesthetics is also inconstant (Green 1975). Therefore, our intention was to assay a new anaesthetic technique which would fulfil the following conditions:

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The agent must be easily administered by i.m. injection, because of the impossibility of establishing i.v. administration in conscious animals. It must provide good analgesia and relaxation with loss of reflex activities for surgical procedures (Baumann et al., in prep.) and it has to have a wide margin of safety without increased bronchial secretions. In addition, it must cause as little circulatory and respiratory depression as possible. The duration of anaesthesia should be adapted to an operation time of about 20 min and should offer the possibility of prolongation with further injections. The waking time should be short and uncomplicated without convulsions and tremors, leading to complete recovery very quickly.

After our own investigations in the dog (Erhardt et al. 1978; Neumann et al. in prep.), we decided to combine the short-acting analgesic, carfentanyl (R 33799), with the short-acting hypnotic, etomidate (R 26490). To test the reliability of this anaesthesia, we investigated clinical behaviour as well as circulatory and respiratory variables.

Material and Methods

Pharmacology

Carfentanyl (R 33799): methyl 1-phenethyl-4-(N-phenylpropionamido)isonipecotate citrate

\[
\text{C}_{24}\text{H}_{30}\text{N}_{2}\text{O}_{5}\cdot \text{C}_{6}\text{H}_{8}\text{O}_{7}
\]

Molecular weight: 586.64

Chemical structures:

Carfentanyl (R 33799)

\[
\text{O} \quad \text{C} - \text{O} - \text{CH}_3 \quad \text{CH}_2\text{COOH} \quad \text{HO} - \text{C} - \text{COOH} \quad \text{CH}_2\text{COOH}
\]

Fentanyl (R 4263)

\[
\text{O} \quad \text{N} - \text{C} - \text{CH}_2 - \text{CH}_3
\]

Carfentanyl is a carboxylated fentanyl (R 4263), synthesized by Janssen Pharmaceutica (Beerse/Belgium) in 1974. The slightly beige to white powder was dissolved in distilled water to a concentration of 2 µg/ml (Janssen 1976).

Etomidate (R 16659): R-(-)-ethyl-1-(α-methyl-benzyl)-1-H-imidazole-5-carboxylate C_{14}H_{16}N_{2}O_{2}

Molecular weight: 342.36

1 Supplied by Janssen Pharmaceutica, Beerse, Belgium