Technical methods

A simple constant-infusion apparatus for very small quantities of fluid delivered over long periods

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Constant-injection devices are mostly expensive and complex. An extremely simple, reliable, and inexpensive device particularly suited to delivering small volumes over long periods is described below.

Essentially it consists of a micrometer syringe driven by a small synchronous electric motor and coupled so that the driving spindle of the motor disengages when the required volume has been discharged (Fig. 1). A suitable micrometer syringe is the standard commercially available Agla syringe. The only modification required is the attachment of the coupling device, which consists of a slotted perspex tube fixed to the end of the micrometer head. This slot takes the driving rods of the motor spindle (Fig. 2). A wide range of synchronous motors is available ranging from one revolution per second to one revolution per week.

We wish to thank Dr. M. C. G. Israels for his help and Ekco Ltd. for the loan of apparatus.

REFERENCES


FIG. 1. Photograph of the assembled constant infusion apparatus.

FIG. 2. Simplified diagram of side and end elevation of coupling. (A) end of micrometer head; (B) perspex tube; (C) slot; (D) spindle from motor; (E) driving rod at end of spindle.

In the model illustrated (Fig. 1) the Agla syringe is held firmly in two perspex uprights by screws. The motor is held in place by long knurled screws. The depth of the driving rods of the spindle in the perspex tube will then correspond to the maximum movement of the micrometer head (and therefore the movement of the syringe plunger) which can occur before the rods disengage.

Received for publication 23 April 1964.
Method of silver impregnation for nervous tissue embedded in paraffin

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The aim of the silver impregnation methods for paraffin-embedded sections of nervous tissue is to combine fineness of histological detail with an easy method of processing.

The following method is presented here because of its rapidity, reliability, staining quality, and utility as a general purpose stain. The basic technique, without the variations, was devised by Fincher (1932) on the basis of Hortega’s silver carbonate impregnation method for astrocytes and its purpose was to stain cerebral tumours.

METHOD

1 Paraffin sections, 5 to 8 μ for pathological studies and of 10 to 20 μ for anatomical studies, are mounted on albuminized slides a few hours before use. The sections are then slowly brought through xylol (5 minutes), absolute alcohol (5 minutes), and alcohol 95% (5 minutes), and washed in distilled water.

2 Mordant in the following solution at 60°C. until yellow.

- Silver nitrate 2% .................. 30 ml.
- Pyridine ................................ 10 drops
- Absolute alcohol ........................ 15 drops

This usually takes 30 minutes. I prefer not to pre-warm my solution. Prolonged mordanting gives too dark a picture.

3 Wash quickly in 95% alcohol.

Received for publication 31 March 1964.

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A simple constant-infusion apparatus—continued.

At present two of these models are being used for the injection of tritiated thymidine into rats at a rate of 0.5 ml. per 25 hours (Foot, 1963).

The advantages of the present device are its simplicity, cheapness, accuracy, ‘foolproofness’, and the minute amounts that can be injected. Its working can also be checked easily by observing the rotation of the micrometer head. Its disadvantage is that a separate motor is required for each different speed but these are cheap and can be changed in a few moments.

The author is in receipt of a grant from the British Empire Cancer Campaign.

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4 Impregnate in the following solution at 60°C. until a dark amber colour. If the solution has been pre-warmed this takes from 15 to 30 minutes; if not it may take up to an hour, at which time the section should be taken out no matter what colour it is.

- Hortega’s strong silver carbonate
  (lithium or sodium) .................. 30 ml.
- Pyridine .................................. 10 drops
- Absolute alcohol .......................... 15 drops

5 Wash rapidly in 95% alcohol.

6 Reduce in 10% formol for one to two minutes.

7 Wash in distilled water.

8 If desired tone in a 0.2% gold chloride solution.

9 Wash in distilled water.

10 Leave in a 2% oxalic acid solution for a few minutes until the sections become reddish. This step accentuates the staining of axones.

11 Fix, if desired, in a 5% solution of sodium thiosulphate.

12 Wash in distilled water, dehydrate, clear, and mount in balsam.

* Lithium carbonate solution To 5 ml. 10% silver nitrate add 20 ml. of a saturated solution of lithium carbonate and then drop by drop add 28% ammonia water barely to dissolve the precipitate. Bring volume to 75 ml. with distilled water and filter. Keep in brown bottle.

** Sodium carbonate solution To 5 ml. 10% silver nitrate add 20 ml. 5% sodium carbonate solution and then drop by drop add 28% ammonia water barely to dissolve the precipitate. Add about 20 ml. distilled water and filter, bringing volume to 45 ml. Keep in brown bottle.

FIG. 1. Normal Purkinje cells, and horizontal fibres of basket cells. Variant 4 × 120 (mordanting, one hour, and impregnation one hour).
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*J Clin Pathol* 1965 18: 251-252
doi: 10.1136/jcp.18.2.251

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