Technical methods

New disposable plastic syringe for collecting and centrifuging blood

PERCY PEREIRA DOS SANTOS *SQS 112 bl G apt. 502, Brasilia, DF — 70 000, Brasil*

Collecting blood for haematological and biochemical analysis is not as simple a task as it may seem to be. It must be carefully conducted, and the handling of blood after collection must be reduced to a minimum to avoid changes in its composition.

Glass syringes used for this purpose are now largely replaced by disposable plastic syringes. Since the plunger provides a good seal it excels the glass syringe, especially when one needs 'anaerobic' whole blood, plasma or serum. Because there is no leakage between the barrel and the plunger, it is no longer necessary to use liquid petrolatum. Unfortunately, like the glass syringe, it has an inherent handicap in that it does not allow the centrifugation of blood. It is apparent that if blood could be centrifuged in the syringe in which it is collected this would lessen its handling, thus saving time, work, and glassware. The device designed by Gabardi and Davenport (1949) did not solve the problem for it almost doubles the size of the syringe and requires longer buckets and larger centrifuges which are not usually found in small laboratories.

Received for publication 4 October 1976

To solve this problem I have amalgamated into one and the same instrument the hypodermic syringe and the centrifuge tube. Starting with plastic syringes found on the market I began by cutting the flange so that it could enter the centrifuge bucket. I saw at once that if it were possible to remove the plunger's shaft, leaving the barrel unopened, I would certainly solve the problem. Bound to this idea it occurred to me that in order to reach this goal it would suffice to divide the shaft into two articulated pieces, the smaller one (4, Fig. 1) remaining fastened to the plunger (3, Fig. 1) and the longer one (5, Fig. 1) being used as a handle to move the plunger and detachable from it. Provided there was a means to hold the plunger during centrifugation I would begin to run experiments to test the new instrument. This was achieved by means of a plastic ring (1, 2, Fig. 2) which ultimately has come to fulfil a double purpose—to hold the plunger as intended and to determine the volume of blood to be taken. So I designed two rings, the smaller corresponding to a volume of 10.0 ml and the larger of 5.0 ml. Moreover, I included a metal disc to resuspend blood cells by shaking. The new syringe consists of the following parts:

- (a) cylindrical body without flange (1, Fig. 1)
- (b) metal disc (2, Fig. 1)
- (c) plunger (3, Fig. 1)
- (d) plunger support with central thread (4, Fig. 1)

Fig. 1 Components of the syringe; see text for description.

Fig. 2 Syringe assembled (3); rings (1 and 2) to determine 10.0 ml and 5.0 ml volumes of blood, respectively.

(e) detachable shaft with external thread at the distal end (5, Fig. 1)

(f) rings (1 and 2, Fig. 2).

As the barrel carries no flange, to prevent rolling of the instrument when laid on the laboratory bench the plate at the proximal end of the shaft has two parallel edges (5, Fig. 1), the distance between corresponding to the body's outside diameter. Figure 2 shows the instrument (3) assembled.

The instrument is used as an ordinary glass or plastic syringe to handle whole blood, plasma or serum, 'anaerobic' or not. To obtain serum I use a plain syringe, filling it to capacity with blood, remove the needle, cap the tip, detach the shaft, and centrifuge after full clotting. To obtain 'anaerobic' whole blood or plasma I prepare the instrument as usual and, after collecting blood, I remove the needle, cap the tip, detach the shaft, and centrifuge immediately for plasma. When working with whole blood, shaking the metal disc within assures a better homogeneity of blood than rolling the instrument between palms or using a drop of mercury, which is toxic and expensive. The transfer of the sample is performed directly from the instrument to pipettes through a small piece of plastic or rubber tube adapted between both instruments or to any container through a bent needle whose point is held in

contact with its inner wall. After attaching the shaft to the plunger's support, the sample is ejected by pushing it to move the plunger. Obviously, the instrument is held vertically when ejecting the sample.

Figures 1 and 2 are approximately half the actual size of the original drawing in scale 2:1 and represent a syringe of 10.0 ml capacity. By its overall dimensions the syringe fits into the ordinary centrifuge bucket for a 15.0 ml centrifuge tube.

I have been using this disposable plastic syringe¹ since 1970 and I am convinced that once introduced into the daily routine of the staff of any busy laboratory it will alleviate the burden and speed up the work.

Reference

- Gabardi, A. and Davenport, H. W. (1949). An improved device for obtaining plasma anaerobically. *J. Lab. Clin. Med.*, **34**, 1169-1170, cited by Henry, R. J. (1969). *Química Clínica (Bases y Principios)*, vol. 1, p. 542. Editorial JIMS. Barcelona.

¹Obtainable from 'IBRAS-CBO' Indústrias Cirúrgicas e Óticas S.A. Km 103 Rodovia Campinas-Mogi Mirim (Av. do Coboito 1313) 13 100 - CAMPINAS, Estado de São Paulo, Brasil, S.A.