RED CELL LABELING AND WASHING IN A SYRINGE BY MEANS OF A SHIELD FOR SYRINGE CENTRIFUGATION

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Red cell labeling requires sterile techniques throughout the procedure. During a 1-year period we have used a self-constructed syringe shield which enables us to place disposable, plastic syringes directly in the centrifuge. Collection, tagging, washing, suspension, and injection of the red blood cells are performed in the same syringe. We believe that this procedure reduces contamination risk of the tagged erythrocytes to a minimum. However, the volume of saline possible to use for red cell washing within the syringe is limited, and one is therefore usually constrained to use smaller wash volumes than those prescribed by the International Committee for Standardization in Haematology (ICSH) (*1*).

This paper describes briefly the syringe shield and its use, and compares the results of red cell labeling within the syringe with results that conform strictly to ICSH recommendations (*1*).

SYRINGE SHIELD

The syringe shield is made of brass (tensile strength 25 tons/in.^{2}) with steel screw fittings. Figure 1 is a photograph of the shield with an empty 20-ml syringe inserted. Figure 2 shows its construction.

The shield is of the swing-out type. During centrifugation the syringe rotates in a horizontal position with the piston side towards the periphery and the nozzle pointing towards the rotation axis. A second shield with a waterfilled syringe is used as counterweight. At standstill the syringe assumes a vertical position with the nozzle pointing upwards. After centrifugation blood is separated with plasma on the top and corpuscles at the piston end. Plasma can thus easily be expelled, leaving the packed red

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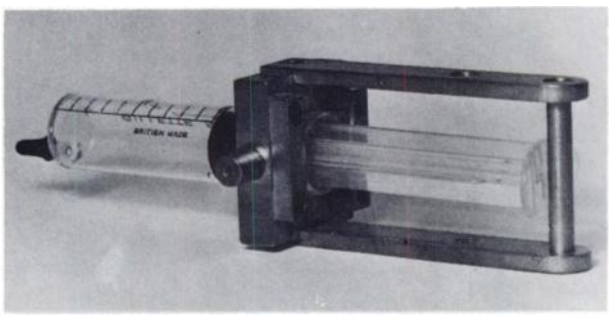

FIG. 1. Swing-out syringe shield for centrifugation of disposable, plastic syringes (empty syringe inserted).

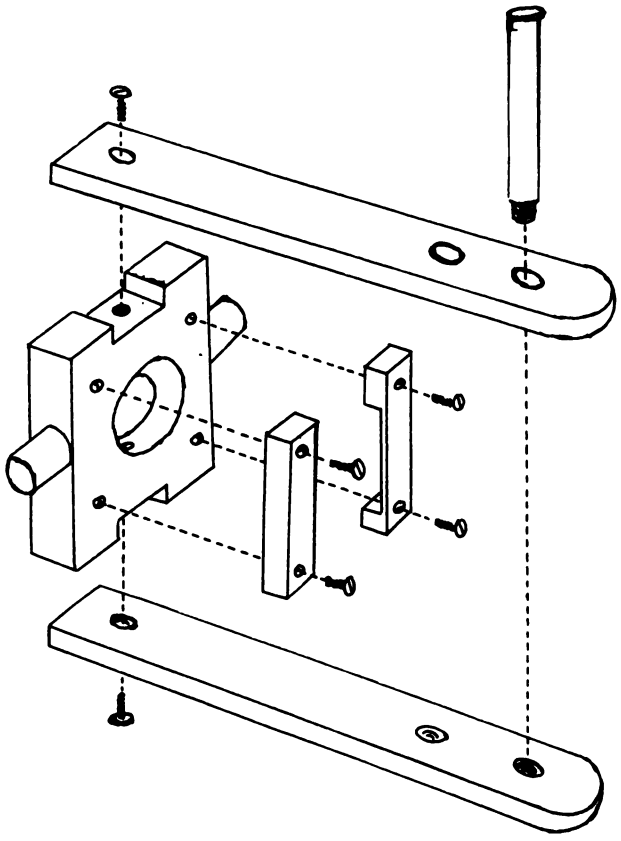

FIG. 2. Construction of syringe shield for centrifugation of syringes.

TABLE 1. COMPARISON BETWEEN ^{51}Cr RED CELL LABELING IN GLASS VIAL ACCORDING TO ICSH METHOD "A" AND OUR MODIFIED METHOD

	Labeling and washing in glass vial (ICSH): Distribution of ^{51}Cr activity (%)				Labeling and washing in disposable, plastic syringes: Distribution of ^{51}Cr activity (%)			
Patient No.	Washed cells	Wash 1	Wash 2	Wash 3	Washed cells	Wash 1	Wash 2	Wash 3
1	85.8	13.5	0.6	0.1	91.4	7.7	0.8	0.2
2	68.9	30.1	1.0	0.05	91.6	7.5	0.7	0.1
3	72.8	26.3	0.8	0.1	90.9	8.2	0.6	0.1
4	75.4	24.1	0.5	0.05	93.2	5.3	1.1	0.2
Mean	75.7	23.5	0.7	0.08	91.8	7.2	0.8	0.15

cells behind. The shields have been subjected to test runs for 8 hr at top speed in the centrifuge (R. C. F. 2,000 × G at the piston end). One pair of shields has been used for red cell labeling procedures (1,400 × G) in 65 patients without showing signs of deterioration.

RED CELL LABELING

Except for one modification we have adopted recommended Method "A" of ICSH (*1*). According to this recommended method labeled cells should be washed twice in 4–5 volumes of isotonic saline so that after the second wash there is less than 1% of the remaining activity in the supernatant liquid. When labeling and washing are performed in the collecting-injecting syringe, the wash volume will usually be only 1–2 volumes. However, we have found that two washes with this lesser volume are sufficient to reduce the supernatant radiochromate concentration to an acceptable level. As shown in Table 1, the second wash contains on an average only 0.8% of the total added activity, and the third wash less than 0.2%.

The ^{51}Cr-labeling efficiency in the disposable, plastic syringes is good with more than 90% of the radioactivity bound to the red cells after incubation at room temperature for 15 min. This compares favorably (Table 1) with the labeling efficiency obtained in glass vials with larger wash volumes but under otherwise identical conditions. The intra-syringe labeling procedure has had no demonstrable effect on red cell survival.

CONCLUSION

The syringe shield is of great practical convenience in routine work. Red cells are labeled efficiently without damage. The device saves time and laboratory utensils while the elimination of red cell transfer steps throughout the procedure, from collection to injection, minimizes the risk of bacterial contamination.

REFERENCE

1. ICSH panel on diagnostic applications of radioisotopes in haematology: Recommended methods for radioisotope red-cell survival studies. *Brit J Haematol* 21: 241–250, 1971