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ANNOUNCEMENTS

Development Of A Micro Glucose Bulb For Plasma Glucose Assay In Two Drops Of Blood

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ABSTRACT

We have devised a Micro-glucose bulb, where two drops of blood are collected by finger prick. After standing for 20 minutes, 10uL plasma can be collected by micropipette from bulb without centrifugation. The amount of plasma is sufficient for glucose estimation in 1000uL of glucose oxidase-peroxidase based reagent and absorbance can be read by a colorimeter.

This procedure of blood collection has been compared with that of classical procedure for glucose estimation. Regression analysis gave the equation of $y = 1.008x + 0.248$ and R value = 0.999. This validates the blood collection in Micro-glucose bulb.

We routinely employ this method of blood collection in our hospital when only glucose is to be estimated in a patient. We also use this method during screening of Diabetes mellitus in Community. This method will be useful to developing countries for time saving and economic reasons.

Key Words: Micro-glucose bulb, finger prick, two drops blood, glucose assay.

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Introduction

Plasma glucose assay is the commonest investigation in Clinical Biochemistry Laboratory. Frequently, a camp is being organised in Community to screen diabetes mellitus. For this, minimum 1.0ml of blood is drawn routinely by venepuncture in to glucose bulb. This becomes inconvenient for Paediatric age group, in case where repeated glucose is to be assayed in same patient i.e. during insulin standardization in type 1 diabetes mellitus, post-renal transplant cases etc. Glucometer requires one drop of blood, but still results are not perfect by any Company's instrument.

Materials & Methods

a) Preparation of bulb: Press cap 1.0 ml plastic vial of Luxbro Company is used (small eppendorf tube can also be used). With 02 drops of blood volume calculation, 10uL of anti-coagulant is dispensed at the bottom of vial and dried at 60°C for 2 hrs.

Anti-coagulant: Routinely used, sodium fluoride 2.5 gm and potassium oxalate 2.0 gm dissolved in 100 ml of analytical water.

The bulbs are kept standing vertically in 48 hole plastic stand after numerical marking by marker pen for identification.

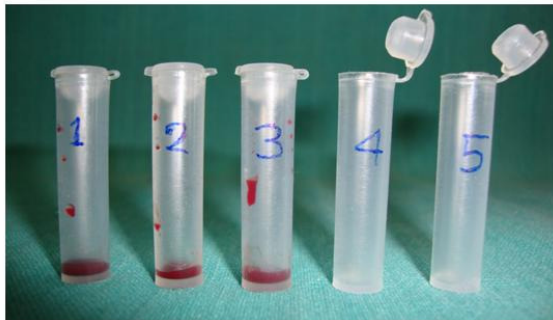
b) Collection of blood: Blood was collected from a person twice:

a) 1.0 ml of blood from antecubital vein in routine glucose vial

b) 02 drops of blood by finger prick in Micro-glucose bulb. Photographs showing blood collected in Micro-glucose bulb [Table/Fig 1] and kept in stand [Table/Fig 2].

c) Micro-glucose bulb, if kept standing for 20 minutes, RBCs settle down at the bottom giving plasma supernatant [Table/Fig 3]. Holding the tube in inclined position, 10uL of plasma can

easily be taken out by a micropipette; no centrifugation is required.

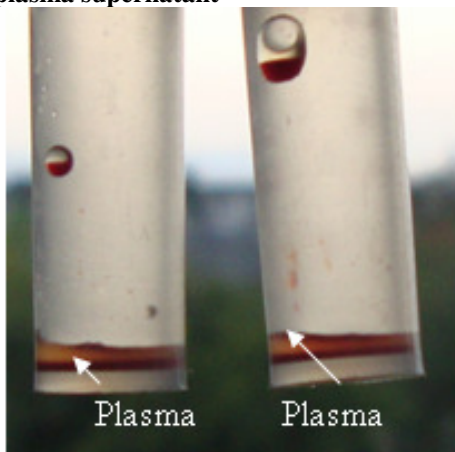


(Table/Fig 1) Photographs showing blood collected in 03 Micro-glucose bulb.

(Table/Fig 2) Photographs showing blood collected in Micro-glucose bulb kept in stand



(Table/Fig 3) RBCs settle down at the bottom giving plasma supernatant



c) **Glucose estimation method:** Plasma glucose is assayed by widely used Glucose oxidase-peroxidase method. To 1000uL glucose colour reagent 10uL of plasma is dispensed and mixed. After 15 minutes, absorbance is taken at 505 nm

by colorimeter. The above procedure of glucose assay was followed for both the methods.

Results

Very little variation of plasma glucose values from Micro-glucose bulb were found as compared to that of routine procedure of blood collection in glucose bulb. Regression analysis gave equation of $y = 1.008x + 0.248$ and R value is 0.999 [Table/Fig 4]

(Table/Fig 4) Plasma glucose values.

Sr. No.	Glucose conc. (mg/dL) from routine bulb	Glucose conc. (mg/dL) from Micro-glucose bulb
1.	43.6	44.1
2.	53.2	54.6
3.	62.7	64.0
4.	74.3	76.0
5.	81.5	81.0
6.	87.4	89.1
7.	92.2	94.2
8.	103.0	103.2
9.	112.3	111.1
10.	119.9	121.4
11.	127.8	126.2
12.	136.6	138.8
13.	142.5	145.1
14.	163.0	166.3
15.	184.5	187.5
16.	199.1	202.4
17.	212.2	211.3
18.	226.4	229.7
19.	238.1	242.3
20.	257.1	260.3
21.	283.0	283.5
22.	312.3	315.6
23.	320.7	322.7
24.	336.8	340.0
25.	370.9	375.1
$Y = 1.008x + 0.248, R = 0.999$		

Discussion

Capillary blood contains 1.4mg/dL glucose more as compared to that of venous plasma¹. Plasma glucose values correlated highly with that of Micro-glucose bulb glucose values (R= 0.999), so blood drawing was very reliable for glucose assay. The developed Micro-glucose bulb becomes very convenient for the patient, where only glucose is to be estimated for Paediatric patients and in cases where repeated plasma glucose estimation is to be done in same patient.

Further, finger prick obviates the need of syringe, thus cost is reduced. Tourniquet is not required, so the process of blood withdrawal becomes quick and saves time. This procedure becomes time saving, easy and less costly for blood drawing. We routinely use this procedure in our hospital and for screening of diabetes

mellitus in Community. So, this procedure will be useful to developing countries for time saving and economic reasons.

Conclusion

Plasma glucose estimation by our developed Micro-glucose bulb is comparable with that of routine glucose bulb, a quick process, obviates the cost of syringe and easy for diabetes mellitus screening in community.

References

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