

.....

.....

.....

.....EDTA

.....

.....

.....

.....

.....

A2

.....

PCV

.....

.....

.....

.....

.....

CBC

/ ₋+ / mg (EDTA) EDTA
(19 – 23G)

(. / * / cm [%] * cm)
(Safety box)

A2 A2

(A)
(pipette filler)
(C)

(Safety Box)

/ g

...

:

)

(

...

A2

.

)

(

()

*

/

median cubital

()

*

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%

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(

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EDTA

EDTA

EDTA (Ethylenediamin Tetra acetic Acid)

CBC

EDTA

EDTA (EDTA -K₂,2H₂O)

EDTA

EDTA (EDTA -NA₂,2H₂O)

EDTA (EDTA -K₃)

CBC

EDTA

%

K₃ EDTA

%

()

EDTA

MCV, Platelet , PCV , Hb , W.B.C , R.B.C

/ ()

EDTA / _+ /

EDTA

EDTA-K₃

PCV

MCHC MCH

EDTA

EDTA

EDTA

EDTA

%

* =

* = /

/

.

%

EDTA

()

()...

()

Back ground

()

)

(

).

(

T-Brittin

(

).

(

).

:

Back ground

)

(

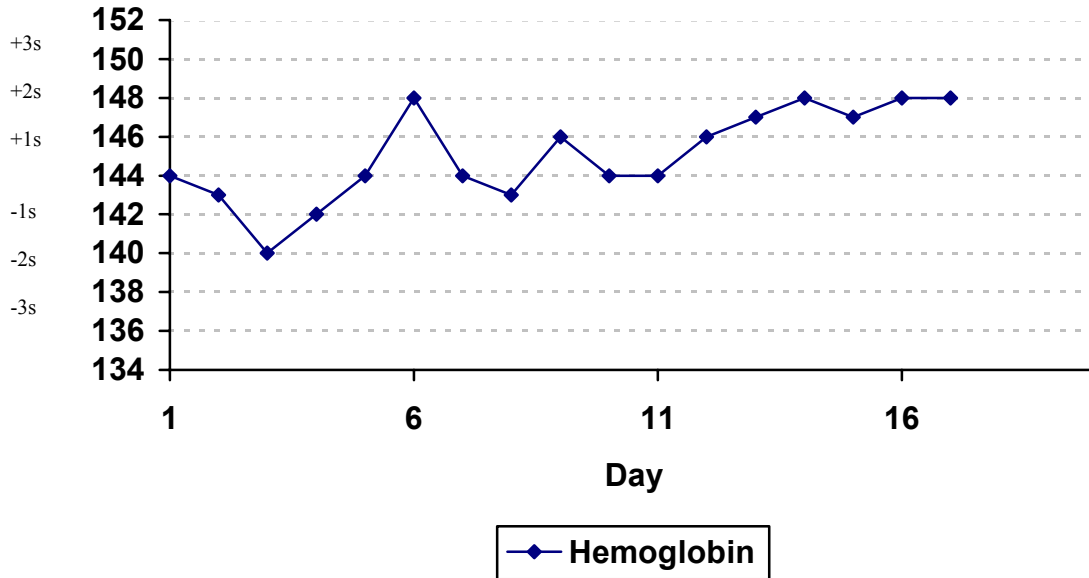
$$\text{(Calibration Factor)} = \frac{\text{_____}}{\text{_____}} \times 100$$

$$\text{_____}^* = \frac{\text{_____}}{\text{_____}}$$

$$\text{CF} = \text{_____} \times$$

_+ SD _+ SD _+ SD

—+ SD —+ SD +— SD



()

- (1) One control value outside the mean \pm 2SD Warning
- (2) One control value outside the mean \pm 3SD Reject:SE or RE
- (3) 2 consecutive controls exceed mean \pm 2SD Reject:SE
- (4) 4 consecutive controls exceed mean +1SD or mean -1SD Reject:SE
- (5) 6 consecutive controls on one side of the mean Warning:SE

SE=Systematic error
 RE=Random error

HCT Hb RBC WBC

T-

Brittin

$$Sd = \sqrt{\frac{\sum(d^2) - \frac{(\sum d)^2}{n}}{n-1}}$$

$$t_n = \frac{\bar{d}}{sd} \sqrt{n}$$

()
n
d
Sd
t
%

T-Brittin

مقدار هموگلوبین روز اول	مقدار هموگلوبین روز دوم	d	d ²
123	120	-3	9
135	139	4	16
176	181	5	25
155	150	-5	25
142	138	-4	16

$\sum d = -3$	$(\sum d)^2 = 9$
$\sum (d^2) = 91$	
$\bar{d} = \sum d / 5 =$ $3/5 = 0.6$	

$$Sd = \sqrt{\frac{91 - 9/5}{4}} = 4.72$$

$$tn = \frac{0.6}{4.72} \times \sqrt{5} = 0.28$$

(t) / t

(CV)

(CV)

Replicate tests

CV

CV SD

WBC count	$x - \bar{x}$	$(x - \bar{x})^2$
7.6	-0.03	0.0009
7.5	-0.13	0.017
7.8	0.17	0.029
7.6	-0.03	0.0009
7.5	-0.13	0.017
7.9	0.27	0.073
7.5	-0.13	0.017
7.6	-0.03	0.0009
7.5	-0.13	0.017
7.8	0.17	0.029
$\Sigma x = 76.3$ $\bar{x} = 7.63$		$(x - \bar{x})^2 = 0.201$

$$SD = \sqrt{\Sigma (x - \bar{x})^2 / n - 1}$$

$$SD = \sqrt{0.201 / 9} = 0.148$$

$$CV = SD / \text{mean} \times 100$$

$$CV = 0.148 / 7.63 \times 100 = 1.9\%$$

(Duplicate)

(Duplicate)

±2SD

SD

$$SD = \sqrt{\frac{\sum d^2}{2n}}$$

: (Duplicate) :
 (g/L) (g/L) d d²



$$SD = \sqrt{\frac{\sum d^2}{2n}} = \sqrt{\frac{112}{10}} = 3.34$$

2SD=6.7

2SD

(Duplicate)

(Check Test)

+ SD

(MCHC,

()

MCH, MCV)

(Delta check)

Hb	2	g/dl
PCV	0.05	L/L
MCV	>6	fL
MCH	> 5	pg
WBC	Normal to abnormal	
Platelets	Reduced or increased by more than 50%	

()

()

Deviation Index (DI)

DI < 1

DI 1-2

DI 2-3

DI > 3

A2

EDTA

HbA2

ml / hour

A2

A

HbA2

A2

A2

A2

A2

C	HbA2		HbA2	HbA2		:
	.		(A'2) A2			—
HbA2	C,E,Oarab		%	A2		,E ,O arab
	E,C,G,D,S					—

()

% A2
()

Heparin

EDTA

).

(.

gr/dl

:

()

).

(")

(.

A, F, S, C

, S F, A

C

PH

PH

(Smear)

% (KCN)

:
(
(
(
(

()

(
(Icebag)

")

(Hem)

(HbH)

HbA

PCV

Packed cell volum (PCV)

PCV

(. % /).

PCV

.

PCV

).

.(%

.

% /

Duplicate

K2EDTA

MCV %

K3EDTA .

()

± %

PCV

/ / :

:

(Plasma trapping)

%

%

:

EDTA:

:

C

g

RCF

()

=RCF
=RPM

RCF= Relative Centrifugal Field
RPM = Revolution Per Minute
 $RCF=1.118 \times 10^{-5} \times r \times RPM^2$

()

:

ATDE

:

/

Time	PCV	
	Sample 1	Sample 2
2.0	0.40	0.59
2.5	0.39	0.58
3.0	0.38	0.57
3.5	0.38 (minimum packing time)	0.56
4.0	-	0.55
4.5	-	0.55 (minimum packing time)

/ /

/ /

(/) ATDE /

(g)

/ /

(Class A)

).

(.

(

) NCCLS

KCN	0.05 g
K ₃ Fe(CN) ₆	0.2g
KH ₂ PO ₄ (Anhydrous)	0.140 g
Nonionic Detergent	0.5-1 ml
Clinical laboratory Reagent water (type I)	1000 ml

)

(.

/ / mg /ml

(

) EDTA

%

K₃ EDTA

/

(Macro dilution)

:

/ /
/

/

g/L

$$\times \text{—————} = (\quad)$$

/ / /

()

()

Linearity

/ (Stock) g/l
 (/ / / /)
)
 (Observed) /
 (OD)
 / /
 / /
 / X
 /
 (Expected) X
 Bias

$$\text{Bias} = \frac{\text{Expected} - \text{observed}}{\text{Expected}} * 100$$

(OD observed)	(OD expected)	%Bias
2.094	2.075	-0.91
1.663	1.66	-0.18
1.259	1.245	-1.12
1.017	1.037	1.97
0.826	0.83	0.48
0.415	-	-
0.212	0.207	-2.1

%

/

:

/ =

/ =

/

)

/

(Na OH)

(

/

/

*

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=

/

=

/

/

(

)

:

/

/

+

/

(

)

(.)

(Drift)

. (.)
+ /

(Stray light)

. (.) %

(Control button)

()

(Unwetted Tip)

)

()

:

() . %

:

()

(

/ mg/dl
 mg/dl /
 /
 mg/dl / mg
 / /
 /
 stock /
 /

10	10	1	1/101
20	20	2	1/101
25	25	2.5	1/101
50	50	5	1/101
100	100	10	1/101
200	200	2	1/11
500	500	5	1/11
1000	1000	10	1/11

(CV%)
 %
 A A
 / /

$$\text{Bias \%} = \frac{\text{Bias} - \text{(Expected)}}{\text{Bias}} * 100$$

(Tip-holder) (O-ring)

()

HIV

()
()

()

) /

/
(%

()

(Safety Box)

(Biohazard)

(Sterilization) :

()

(

(Disinfection) :

/

%

/

%

(Waste Management) :

()

()

()

()

(Safety Box)