

A SOFTWARE FOR AUTOMATIC CALCULATION OF RED CELL VOLUMEN AND PLASMA VOLUMEN BY ISOTOPIC DILUTION METHOD

J.L. Gómez Perales¹, A. García Mendoza², R. Rodríguez Aguilar¹, A. García Curiel¹.
¹Nuclear Medicine Service, "Puerta del Mar" University Hospital, Cádiz, Spain
²Nuclear Medicine Service, "San Cecilio" University Hospital, Granada, Spain

Introduction:

A nuclear medicine study is the gold standard for blood volume measurement. Blood volume studies using the indicator dilution technique and radioactive tracers have been performed in nuclear medicine departments for over 50 years.

The calculation of red cell volume and plasma volume are not very complex but annoying and time-consuming.

Objective:

The aim of this study is to develop a software tool to automatically calculate the red cell volume and the plasma volume.

Materials and methods:

For developing a software incorporating these calculations we have used Visual Basic 6.0

Results:

We have developed two forms for easy calculation of red cell volume and plasma volume. This forms relies on a database to store, manage and retrieve the data of red cell volume and plasma volume studies. Moreover the form offers the possibility of printing a detailed report of each study. These forms are included in a software called Nucleolab, which is available at:

www.radiofarmacia.org/nucleolab-english

Conclusion:

The software we have developed has an easy-to-use interface, that makes the calculation complexity of red cell volume and plasma volume completely hidden for the user, saving you the time that you previously spent on these laborious calculations and reducing the risk of error.

Parameter	Value
Standard syringe	4.36
Empty standard syringe	3.35
Dose syringe	17.8
Empty dose syringe	8.17
Standard volume dilution (ml)	250
Hematocrit (%)	59
f = Hc / Hv	0.91
cpm background	117
cpm/ml dilute standard	1325
cpm/ml en blood(30 min.)	740

Category	Value	Change
Ideal Red Cell Vol.	1909 ml	
Measured Red Cell Vol.	2727 ml	42.8% bigger
Ideal Plasma Vol.	2903 ml	
Measured Plasma Vol.	2352 ml	19% smaller
Ideal Blood Vol.	4812 ml	
Measured Blood Vol.	5079 ml	5.5% bigger

Error Type	Value
f real	0.76, 1.15
%PV	-30, 82
%BV	-16, 26

Parameter	Value
Dose syringe	3.79
Empty dose syringe	3.11
Standard syringe	3.95
Empty standard syringe	3.15
Standard volume dilution (ml)	100
f = Hc / Hv	0.91
cpm background	54
cpm/ml dilute standard	54621, 54512
Plasma specimens	2441, 2541, 2211, 2189, 2005, 1998
min	10, 20, 30
Hematocrit (%)	48.2
R ²	0.994028

Category	Value	Change
Ideal Plasma Vol.	2958 ml	
Measured Plasma Vol.	1952 ml	34% smaller
Ideal Red Cell Vol.	1960 ml	
Measured Red Cell Vol.	1525 ml	22.2% smaller
Ideal Blood Vol.	4918 ml	
Measured Blood Vol.	3477 ml	29.3% smaller

Error Type	Value
f real	0.76, 1.15
%RCV	35, -37
%BV	13, -21