

# A software for automatic calculation of platelet survival

J.L. Gómez Perales<sup>1</sup>, A. García Mendoza<sup>2</sup>

<sup>1</sup>Nuclear Medicine Service. "Puerta del Mar" University Hospital (Cádiz, SPAIN)

<sup>2</sup>Nuclear Medicine Service, "Torrecárdenas" Hospital (Almería, SPAIN)

## INTRODUCTION

The object of platelet survival studies is to obtain rates estimates of platelets production and destruction.

The calculation of the time taken for half the labelled platelets to leave the circulation ( $T_{1/2}$ ), the percentage of platelet destroyed a day and the mean platelet life span (PS), are not very complex, but tedious and time-consuming.

## OBJETIVE

The goal of this work is to develop a software to automatically calculate the parameters of platelet survival studies.

**Patient data**

surname: \_\_\_\_\_ forename: \_\_\_\_\_

age: 36 years height: 165 cm weight: 58 kg gender: female

**Study data**

	time (h)	cpm/ml blood		cpm/ml plasma		
Dose syringe:	10	0.5	20654	20654	323	323
Empty dose syringe:	5	2	20759	20759	315	315
Standard syringe:	7	3	19129	19129	303	303
Empty standard syringe:	5	6	18394	18394	300	300
Standard volume dilution (ml):	250	24	6863	6863	91	91
cpm/ml dilute standard:	175000	48	5360	5360	66	66
Hematocrit:	0.45	72	3685	3685	45	45
cpm background:	35	96	1722	1722	40	40
		120	954	954	39	39
		144	847	847	35	35
		160	700	700	33	33
		185	600	600	33	33

**Results**

	Model:	linear	exponential	weighted average
$R^2 =$		0.749581	0.961734	
$T_{1/2}$ (days) =		3.05	1.39	1.8
% destroyed platelets/day =		16.4	36.1	31.2
platelet survival (days) =		6.09	2	3.02
% recovery (t = 0) =		53.9	56.6	55.9

## MATERIALS AND METHODS

The equations used in the calculations are:

$$\% \text{ destroyed red cell/day} = 100/2T_{1/2}$$

Linear model:  $A_L(t) = A_L(0) - a t$   $PS = A_L(0) / a$

Exponential model:  $A_E(t) = A_E(0) + \exp(-\lambda t)$   $PS = 1 / \lambda$

Weighted average:  $W(t) = k A_E(t) + (1 - k) A_L(t)$

$A_L(0)$  = y- intersection of the linear function

a = slope of the linear function

$A_E(0)$  = y- intersection of the exponential function

$\lambda$  = exponential constant

k = weighted constant

Weighted average:  $T_w = k T_E + (1 - k) T_L$   $k = S_L / (S_L + S_E)$

$$S_L = \sum (A_L(t_i) - A(t_i))^2 \quad S_E = \sum (A_E(t_i) - A(t_i))^2$$

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

## RESULTS

We have developed a software for automatic calculation of platelet survival studies. This software relies on a database to store, manage and retrieve the data of platelet survival studies. Moreover the software offers the possibility of printing a detailed report of every and each study.

This software is included in a computer application called Nucleolab, which is available at

[www.radiofarmacia.org/nucleolab-english](http://www.radiofarmacia.org/nucleolab-english)

## CONCLUSION

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