A software for automatic calculation of platelet survival

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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.

MATERIALS AND METHODS

The equations used in the calculations are:

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

Linear model: $A_L(t) = A_L(0) - a\,t$ $\quad$ PS $= A_L(0) / a$
Exponential model: $A_E(t) = A_E(0) + \exp(-\lambda t)$ $\quad$ 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
λ = exponential constant
k = weighted constant

Weighted average: $Tw = k\,T_E + (1 - k)\,T_L$ $\quad$ $k = S_L / (S_L + S_E)$
$\quad\quad$ $S_L = \sum (A_L(t_i) - A(t_i))^2$ $\quad$ $S_E = \sum (A_E(t_i) - A(t_i))^2$

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

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.