

A SOFTWARE FOR AUTOMATIC CALCULATION OF RED CELL SURVIVAL

J. L. Gómez Perales¹, A. García Mendoza², R. Rodríguez Aguilar¹, J. A. Forest Pérez¹.
¹Nuclear Medicine Service, "Puerta del Mar" University Hospital, Cádiz (Spain)
²Nuclear Medicine Service, "San Cecilio" University Hospital, Granada (Spain)

Introduction:

Red cell survival studies are performed in a large number of hospitals throughout the world. The object of these studies is to obtain estimates of the rates of red cell production and destruction. The calculation of the time taken for half the label to leave the circulation ($T_{1/2}$) and the percentage of red cell destroyed a day, are not very complex but annoying and time-consuming

Objective:

The goal of this project is to develop a computing facility to automatically calculate the parameters of red cell survival studies.

Materials and methods:

⁵¹Cr is eluted at a rate which significantly affects estimates of mean red-cell lifespan. The average rate of chromium elution is of the order of 1% per day, which is of the same magnitude as the normal rate of red-cell-destruction. Accordingly, variations in the rate of elution in different individuals may seriously affect the accuracy of estimates of mean red-cell lifespan when survivals is normal or only slightly reduced. Elution is fairly constant in normal subjects and an appropriate correction factor f can be applied. For developing a software incorporating the calculations of f , $T_{1/2}$ and the percentage of red cell destroyed a day, we have used Visual Basic 6.0 and Visual Studio Installer.

The screenshot shows the Nucleolab software window titled "Red cell survival (12 blood specimens)". It features a patient data section with fields for surname, forename, age (36 years), height (161 cm), and weight (52 kg). Below this is a study data table with columns for time (hours) and cpm/ml, and a background cpm/ml field set to 0. The results section displays three models: linear, exponential, and weighted average, with their respective R² values and calculated parameters for $T_{1/2}$ (days) and % destroyed red cell/day.

time (hours)	cpm/ml	time (hours)	cpm/ml	background (cpm/ml)		
0.5	757	757	239	450	450	0
24	799	799	334	431	431	
47	680	680	383	294	294	
95	698	698	431	256	256	
166	566	566	501	247	247	
215	495	495	550	201	201	

Model:	linear	exponential	weighted average
R ² =	0.959053	0.957181	
$T_{1/2}$ (days) =	16.3	14.08	15.31
% destroyed red cell/day =	3.1	3.6	3.3

Results:

We have developed a form which allows an easy calculation of red cell survival studies. This form relies on a database to store, manage and retrieve the data of red cell survival studies. Moreover the form offers the possibility of printing a detailed report of each study. This form is included in a software called Nucleolab, which is freely 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 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.