

# A SOFTWARE FOR AUTOMATIC CALCULATION OF EFFECTIVE RENAL PLASMA FLOW WITH <sup>131</sup>I-HIPURAN

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## INTRODUCTION:

Effective Renal Plasma Flow (ERPF) studies with <sup>131</sup>I-Hipuran are performed in a large number of hospitals throughout the world. The calculation of the ERPF using the bicompartamental model proposed by Sapirstein is not very complex, but tedious and time-consuming.

## OBJETIVE:

The goal of this work is to develop a computing facility to automatically calculate ERPF, using the bicompartamental model proposed by Sapirstein.

The screenshot shows the 'Nucleolab' software window. It has a menu bar and a toolbar. The main area is divided into 'Patient data' and 'Study data' sections. The 'Patient data' section includes fields for surname, forename, age (15 years), height (160 cm), and weight (50 kg). The 'Study data' section includes fields for Dose syringe (4.54), Empty dose syringe (3.32), Standard syringe (4.74), Empty standard syringe (3.59), Standard volume dilution (250), cpm/ml dilute standard (150000), and cpm background (0). There is a table for 't (min.)' and 'cpm/ml' with values for 4, 8, 16, 60, 80, and 100 minutes. Calculated parameters include A = 3400, λ<sub>a</sub> = -0.008, T<sub>a1/2</sub> = 86.44, B = 3796, λ<sub>b</sub> = -0.0069, T<sub>b1/2</sub> = 101.06, R<sup>2</sup> = 0.9966, and R<sup>2</sup> = 0.9929. At the bottom, the 'Effective renal plasma flow' section shows ERPF = 40.7 ml/min and normalized ERPF = 46.9 ml/min.

Figure 1: Form of Nucleolab

## RESULTS:

We have developed a form for automatic calculation of ERPF. This form relies on a database to store, manage and retrieve the data of ERPF studies. Moreover, this form offers the possibility of printing a detailed report of each study. This form is included in a software called **Nucleolab**, which is available at:

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

## MATERIALS AND METHODS:

For developing a software incorporating these calculations we have used Visual Basic 6.0 and Visual Studio Installer.

$$FPRE = I \lambda_a \lambda_b (A \lambda_a + B \lambda_b) = I \ln 2 / (A T_{1/2a} + B T_{1/2b})$$

$$A_t = A e^{-\lambda_a t} \text{ (fast exponential)}$$

$$B_t = B e^{-\lambda_b t} \text{ (slow exponential)}$$

I = doses in cpm

$$\lambda = \ln 2 / T_{1/2}$$

The screenshot shows a printed report from the Nucleolab software. The header is 'Hospital Puerta del Mar / Servicio de Medicina Nuclear'. The title is 'Radioisotope determination of effective renal plasma flow with <sup>131</sup>I-Hipuran'. The 'Patient data' section includes Name: \*\*\*\*\* and Date: 31/07/09. The 'Study data' section includes Age: 15 years, Height: 160 cm, and Weight: 50 kg. The 'Method of bicompartamental model' is listed as 'reposed by Sapirstein'. The results section shows 'ERPF = 40.7 ml/min.' and 'Normalized ERPF = 46.9 ml/min.'. The footer is 'Dra.: Valderas Montes'.

Figure 2: Report of ERPF

## CONCLUSION:

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