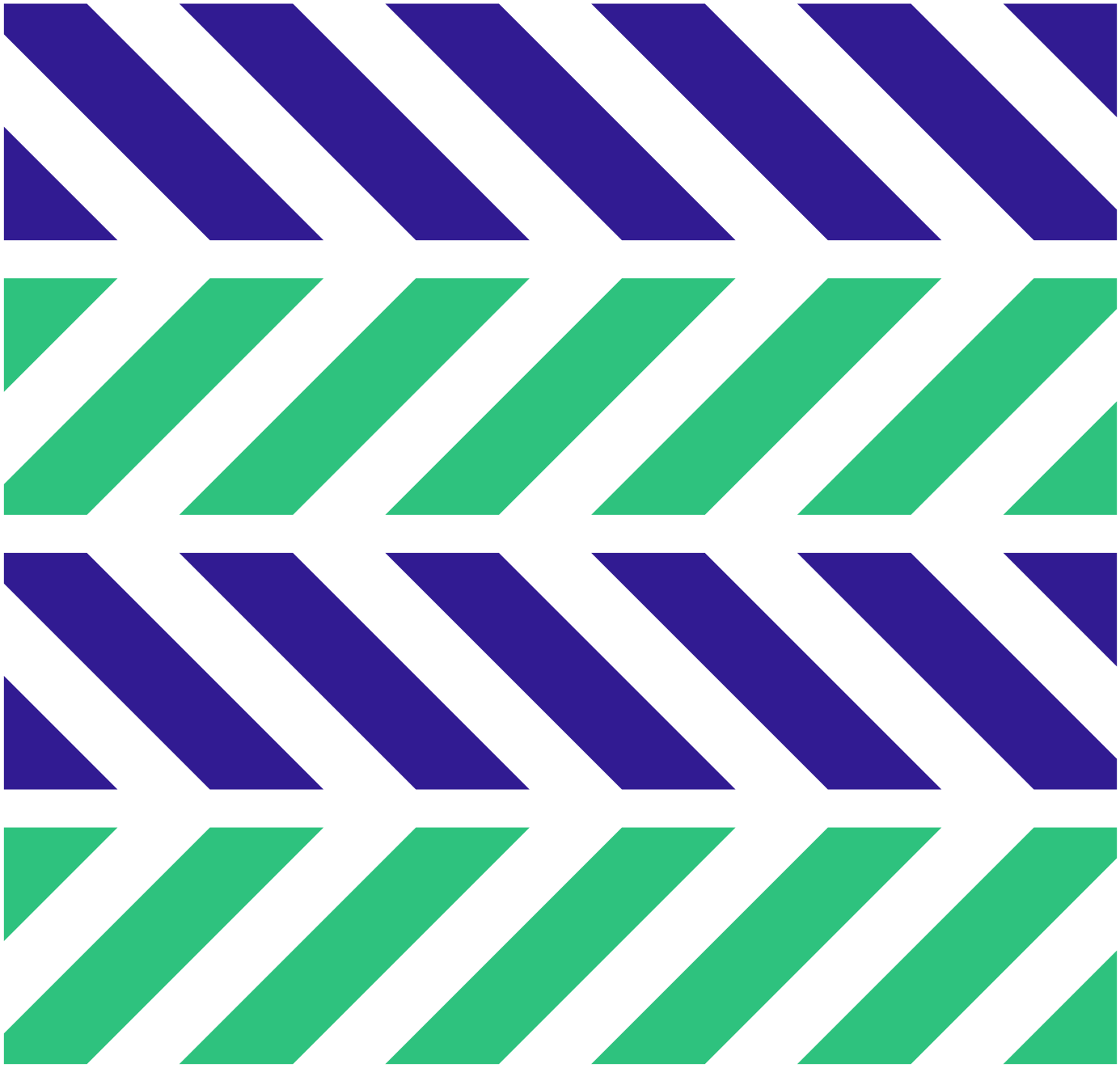
Biodose Tools

User Manual & Documentation

Alfredo Hernández



Biodose Tools

User Manual & Documentation

Alfredo Hernández

2019-07-03

Contents

About **4**
Structure of the book 4
Acknowledgements 5
About the authors 5

Background and goals **7**

I. Using Biodose Tools **8**

1. Getting Biodose Tools **9**
1.1. Online 9
1.2. On RStudio 9

2. Usage **10**
2.1. User interface 10

II. Statistical Methods **11**

3. Introduction **12**

4. Dicentric analysis **13**
4.1. Dose-effect curve fitting 13
4.2. Dose estimation 13

5. Translocation analysis **14**
5.1. Dose-effect curve fitting 14
5.2. Dose estimation 14

A. Implementation details **15**

About

This project in an app to be used by biological dosimetry laboratories. Biodose Tools is an open-source project that aims to be a tool to perform all different tests and calculations needed. The app is developed with R (R Core Team, 2019) together with Shiny (Chang et al., 2019) to offer an on-line, easy-to-use solution. Although the intention is to provide the application as a website, all R routines can be downloaded for improvement or personal use.

We also aim to clarify and explain the tests used and to propose those considered most appropriate. Each laboratory in its routine work should choose the optimum method, but the project aims to reach a consensus that will help us in case of mutual assistance or intercomparisons.

The project is initially developed by RENEB association, but contributions are always welcome.

Structure of the book

Chapter 1 introduces the user to Biodose Tools and how to use it either online or with RStudio. 2 introduces the basic design principles behind the user interface, and the usage of the different modules.

...

In Appendix A, a technical review of the implementation of Biodose Tools is discussed.

Acknowledgements

About the authors

The project is initially developed by RENEB association, as a collaboration between Universitat Autònoma de Barcelona, Bundesamt für Strahlenschutz, Durham University, Institut de Radioprotection et de Sûreté Nucléaire, Universidad de la Rioja, and Public Health of England.

Below, a list of the team behind the development of Biodose Tools.

Universitat Autònoma de Barcelona

- **Alfredo Hernández**
  - Statistical programmer
  - Main author
- **Pere Puig**
  - Mathematician
- **Joan Francesc Barquinero**
  - Biologist
- **Lleonard Barrios**
  - Biologist

Bundesamt für Strahlenschutz

- **David Endesfelder**
  - Mathematician
- **Ulrike Kulka**
  - Biologist
- **Ursula Oestreicher**
  - Biologist

Durham University

- **Jochen Einbeck**
  - Statistician

Institut de Radioprotection et de Sûreté Nucléaire

- **Amine Benadjaoud**
  - Biostatistician
- **Gruel Gaëtan**

  - Biologist
- **Eric Grègoire**
  - Biologist

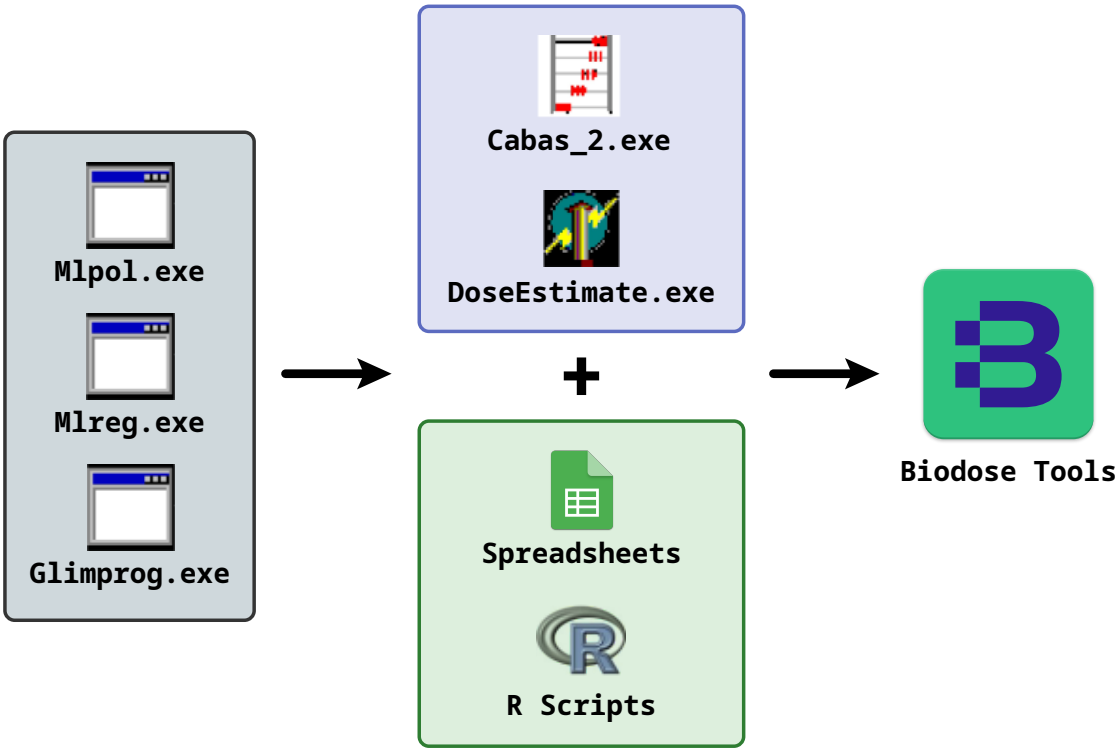
Universidad de la Rioja

- **Manuel Higueras**
  - Mathematician

Public Health of England

- **Elizabeth Ainsbury**
  - Physicist
- **David Lloyd**
  - Biologist

Background and goals



Part I.

Using Biodose Tools

Chapter 1. Getting Biodose Tools

Stuff

1.1. Online

During the beta testing phase, the application is hosted on Shinyapps.io: https://aldomann.shinyapps.io/biodose-tools-beta/

1.2. On RStudio

This is a work in progress.

The application can be easily installed by runnning

```
install.packages("biodose-tools")
```

Alternatively, if you want to download the development version, you can just run

```
devtools::install_github("biodosimetry-uab/biodose-tools-package")
```

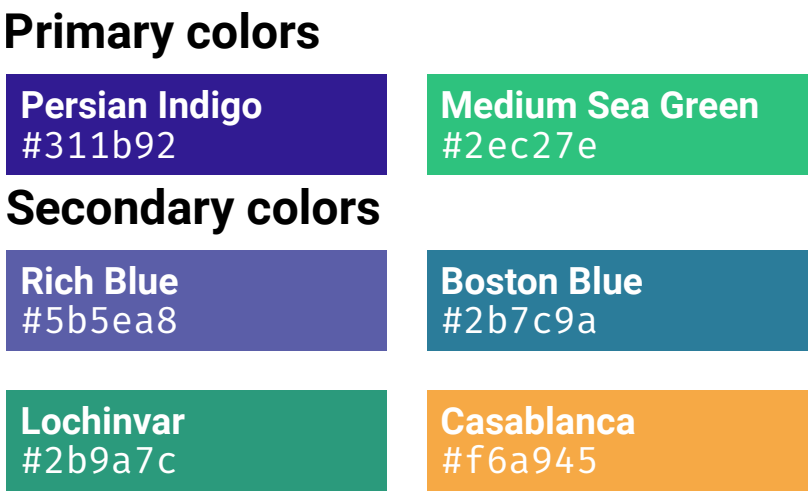
Chapter 2. Usage

Stuff

2.1. User interface

We describe the user interface (UI) components in this section.

2.1.1. Design principles



Part II.

Statistical Methods

Chapter 3. Introduction

Here is a review of existing statistical methods for the different implemented modules, i.e.,

- Dicentric analysis
- Translocation analysis

The primary objective of this section is to provide biologists with technical information about the statistical methods and tests used on Biodose Tools. The main source is (International Atomic Energy Agency, 2001)

Chapter 4. Dicentric analysis

4.1. Dose-effect curve fitting

4.2. Dose estimation

Chapter 5. Translocation analysis

5.1. Dose-effect curve fitting

5.2. Dose estimation

Chapter A. Implementation details

The Biodose Tools user interface is written in (Chang et al., 2019) using Bootstrap 4 (Granjon, 2019), analyses are implemented in the R programming language (R Core Team, 2019), with the resultant tables and plots rendered in HTML through JavaScript libraries. This is done by the browser of choice (Google Chrome, Firefox, Microsoft Edge, and Safari are officially suppored), or by an instance of QtWebKit if the app is run through RStudio.

References

Chang, W., Cheng, J., Allaire, J., Xie, Y., and McPherson, J. (2019). *shiny: Web Application Framework for R*. R package version 1.3.2.

Granjon, D. (2019). *bs4Dash: A 'Bootstrap 4' Version of 'shinydashboard'*. R package version 0.3.0.

International Atomic Energy Agency (2001). Cytogenetic Analysis for Radiation Dose Assessment - A Manual. *Technical Report Series*, page 138.

R Core Team (2019). *R: A Language and Environment for Statistical Computing*. R Foundation for Statistical Computing, Vienna, Austria.