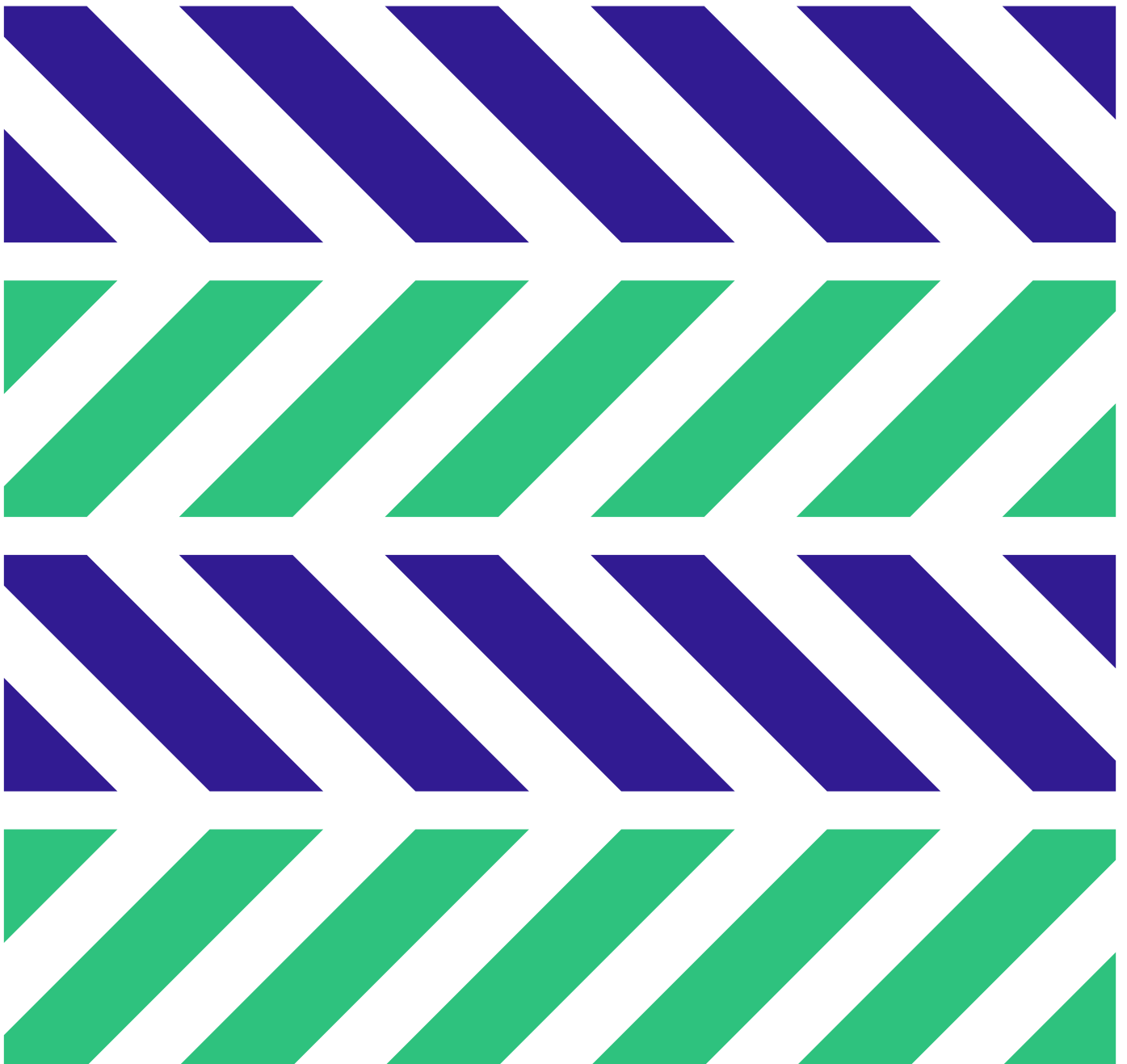




Biodose Tools

User Manual & Documentation

Alfredo Hernández



Biodose Tools

User Manual & Documentation

Alfredo Hernández

2019-07-05

Contents

About	4
Structure of the book	4
Acknowledgements	5
About the authors	5
Background and goals	6
I. Using Biodose Tools	7
1. Getting Biodose Tools	8
1.1. Online	8
1.2. On RStudio	8
2. Usage	9
2.1. User interface	9
II. Statistical Methods	10
3. Introduction	11
4. Dicentric analysis	12
4.1. Dose-effect curve fitting	12
4.2. Dose estimation	12
5. Translocation analysis	13
5.1. Dose-effect curve fitting	13
5.2. Dose estimation	13
A. Implementation details	14
B. How to cite Biodose Tools	15

About



This project is 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.



The online version of this book is licensed under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License.

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 (UAB), Bundesamt für Strahlenschutz (BfS), Durham University (DU), Institut de Radioprotection et de Sûreté Nucléaire (IRSN), Universidad de la Rioja (UdR), and Public Health of England (PHE).

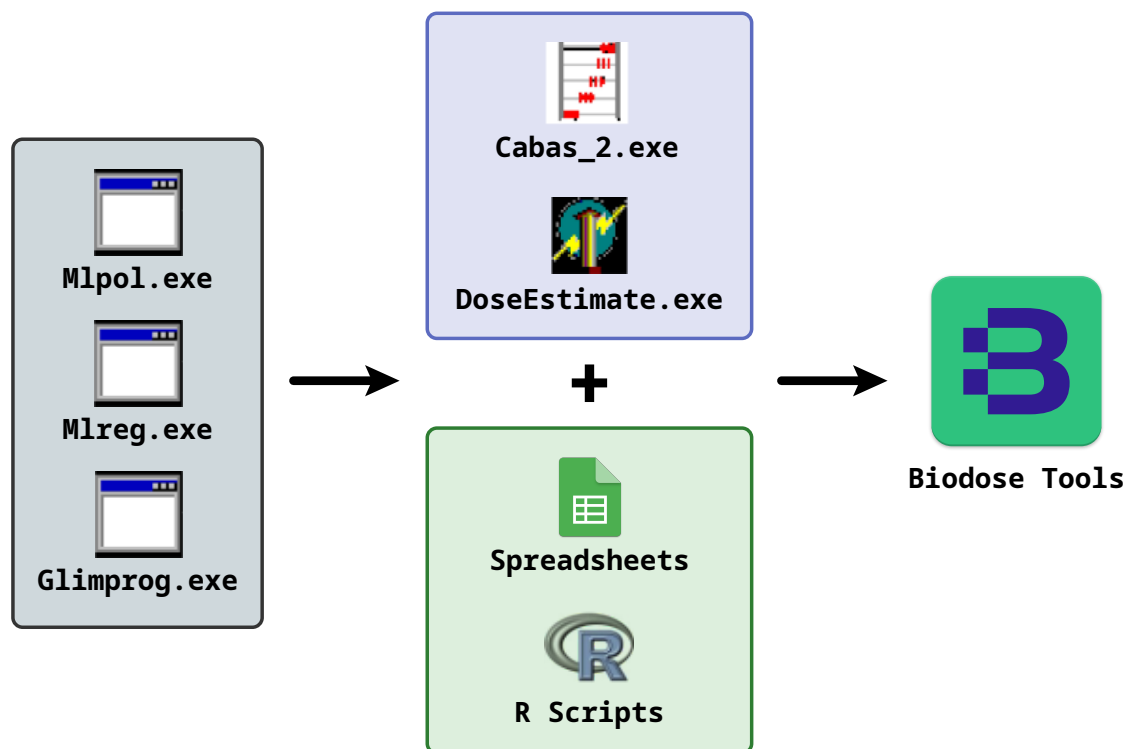
Principal contributors

Name	Institution	Role
Alfredo Hernández	UAB	Statistical programmer and main author
Joan Francesc Barquinero	UAB	Biologist
David Endesfelder	BfS	Mathematician
Pere Puig	UAB	Mathematician
Lleonard Barrios	UAB	Biologist
Jochen Einbeck	DU	Statistician
Amine Benadjaoud	IRSN	Biostatistician
Elizabeth Ainsbury	PHE	Physicist

Contributors

Name	Institution	Role
Ulrike Kulka	BfS	Biologist
Eric Grègoire	IRSN	Biologist
Manuel Higuera	UdR	Mathematician
Gruel Gaëtan	IRSN	Biologist
Ursula Oestreicher	BfS	Biologist
David Lloyd	PHE	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 running

```
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

Color is an effective, powerful and instantly recognizable medium for visual communications. In Biodose Tools color is used to identify different sections of information, a technique called *color-coding*.

Once users are attuned to the color schemes, they can use them. Even before then, they'll know when they've left one section for another, if they notice that the color scheme changed. So color-coding works to distinguish one section from another; it makes the boundaries clear.

– Jenifer Tidwell (Tidwell, 2010)

Rich Blue
#5b5ea8

Boston Blue
#2b7c9a

Lochinvar
#2b9a7c

Casablanca
#f6a945

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

D	N	X	C0	C1	C2	C3	C4	C5	DI	u
0.00	5000	8	4992	8	0	0	0	0	0.9985997	-0.0748406
0.10	5002	14	4988	14	0	0	0	0	0.9974005	-0.1348939
0.25	2008	22	1987	20	1	0	0	0	1.0804910	2.6098032
0.50	2002	55	1947	55	0	0	0	0	0.9730135	-0.8614691
0.75	1832	100	1736	92	4	0	0	0	1.0259749	0.7898872
1.00	1168	109	1064	99	5	0	0	0	0.9992767	-0.0175514
1.50	562	100	474	76	12	0	0	0	1.0639572	1.0765604
2.00	333	103	251	63	17	2	0	0	1.1407182	1.8218931
3.00	193	108	104	72	15	2	0	0	0.8336227	-1.6377580
4.00	103	103	35	41	21	4	2	0	0.8823529	-0.8442765
5.00	59	107	11	19	11	9	6	3	1.1498550	0.8107914

Download dicentrics distribution

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 supported), or by an instance of QtWebKit if the app is run through RStudio.

Chapter B. How to cite Biodose Tools

If you want to cite Biodose Tools, you can use the following BibTeX entry:

```
@Manual{BiodoseTools2019,  
  title = {{Biodose Tools}},  
  author = {Alfredo Hernández and Joan Francesc Barquinero and David Endesfelder and Per  
  year = {2019},  
  url = {https://biodosimetry-uab.github.io/documentation/},  
}
```

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.
- Tidwell, J. (2010). *Designing Interfaces: Patterns for Effective Interaction Design*. O'Reilly Media, Inc.