



BOADICEA

RISK ESTIMATION SOFTWARE ON THE WORLD WIDE WEB

**BOADICEA Web Application version 1.0
November 2007**

**Cancer Research UK Genetic Epidemiology Unit
Strangeways Research Laboratory
Worts Causeway, Cambridge CB1 8RN**

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BOADICEA publications

This guide describes BOADICEA Web Application version 1.0 (BWA 1.0). Users should cite the following paper when describing results generated with BWA 1.0:

Antoniou A.C., Cunningham A.P., Peto J., Evans D.G., Lalloo F., Narod S.A., Risch H.A., Eyfjord J.E., Hopper J.L., Southey M.C., Olsson H., Johannsson O., Borg A., Passini B., Radice P., Manoukian S., Eccles D.M., Tang N., Olah E., Anton-Culver H., Warner E., Lubinski J., Gronwald J., Gorski B., Tryggvadottir L., Syrjakoski K., Kallioniemi O-P., Eerola H., Nevanlinna H., Pharoah P.D.P. and Easton D.F., The BOADICEA model of genetic susceptibility to breast and ovarian cancers: updates and extensions, *British Journal of Cancer*, advance online publication 18 March 2008 (doi: 10.1038/sj.bjc.6604305).

To access this paper via PubMed click [here](#).

A validation study describing the performance of this version of BOADICEA and other risk models has been published recently in the Journal of Medical Genetics:

Antoniou A., Hardy R., Walker L., Evans D.G., Shenton A., Eeles R., Shanley S., Pichert G., Izatt L., Rose S., Douglas F., Eccles D., Morrison P., Scott J., Zimmern R., Easton D. and Pharoah P., Predicting the likelihood of carrying a BRCA1 or BRCA2 mutation: validation of BOADICEA, BRCAPRO, IBIS, Myriad and the Manchester scoring system using data from UK genetics clinics, *Journal of Medical Genetics*, advance online publication 15 April 2008 (doi:10.1136/jmg.2007.056556).

To access this paper via PubMed click [here](#)

A previous version of the BOADICEA model is described in the following papers:

Antoniou, A.C., Pharoah, P.P.D., Smith, P. & Easton, D.F. 2004. The BOADICEA model of genetic susceptibility to breast and ovarian cancer, *British Journal of Cancer*, **91**(8), 1580–1590.

Antoniou, A.C. and Easton, D.F. 2006. Risk prediction models for familial breast cancer, *Future Oncology*, **2**(2), 257–274.

Antoniou A.C., Durocher F., Smith P., Simard J., INHERIT BRCAs program members and Easton D. 2006. BRCA1 and BRCA2 mutation predictions using the BOADICEA and BRCAPRO models and penetrance estimation in high-risk French-Canadian families, *Breast Cancer Research*, **8**(R3), doi:10.1186/bcr1365.

Barcenas C.H., Hosain G.M.M., Arun B., Zong J.H., Zhou X.J., Chen J.F., Cortada J.M., Mills G.B., Tomlinson G.E., Miller A.R., Strong L.C. and Amos C.I. 2006. Assessing BRCA carrier probabilities in extended families, *Journal of Clinical Oncology*, **24**(3), 354–360.

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1.0 Introduction

The [BOADICEA Web Application \(BWA\)](#) enables you to estimate BRCA1/BRCA2 mutation carrier probabilities and breast/ovarian cancer risks on the basis of family history. This document provides a brief introduction to its use. We strongly recommend that new users read these notes before attempting to use BOADICEA on the Web.

In this guide, key points are highlighted with an arrowhead ►. These short paragraphs describe the most important software issues. Additional information is available in the [Frequently Asked Questions](#) section of the BOADICEA Web site.

This guide accompanies BWA version 1.0.

1.1 Computer requirements

1.1.1 Active scripting and popup windows

The program has been designed for use with modern PC Web browsers such as *Microsoft Internet Explorer* and *Mozilla Firefox*. However, you may need to make some adjustments to your browser settings to enable the program to function properly.

► **The program uses scripts that run in your browser to check input data, and so your browser must have 'active scripting' enabled. It is quite likely that active scripting is enabled in your browser already.**

► **The program also displays pedigree drawings in popup windows. Some browsers and firewalls block popup windows. Recent versions of *Microsoft Internet Explorer* or *Mozilla Firefox* generate a message similar to 'The current Web page has attempted to open a popup window. Allow popup windows from this site?' If you OK this, then the program should function normally from then on.**

1.2 BOADICEA workflow

The program has been designed around a simple online workflow (Figure 1).

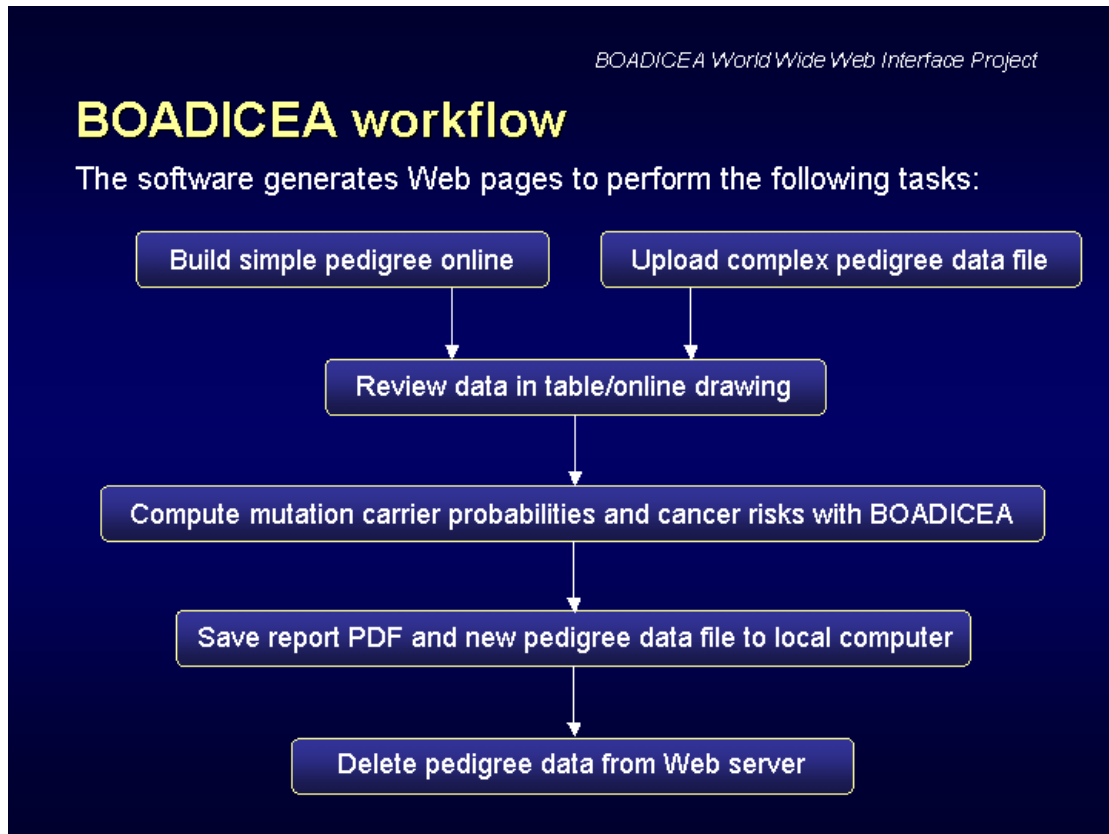


Figure 1. The BOADICEA online workflow.

The workflow consists of a series of tasks culminating in a BOADICEA risk calculation. The four main activities are: (1) creating your pedigree, (2) reviewing your pedigree, (3) computing risks, and (4) saving your results. These activities are described in the following sections of this guide.

2.0 Creating your pedigree

The first task involves creating an input pedigree data set. You can do this in one of two ways:

- Build a simple pedigree online
- Upload a large/complex pedigree as a text file

The following sections of this report describe pedigree data input in more detail.

2.1 Building pedigrees online

The program enables you to build a simple pedigree online, comprising a basic set of first and second-degree relatives (Figure 2).

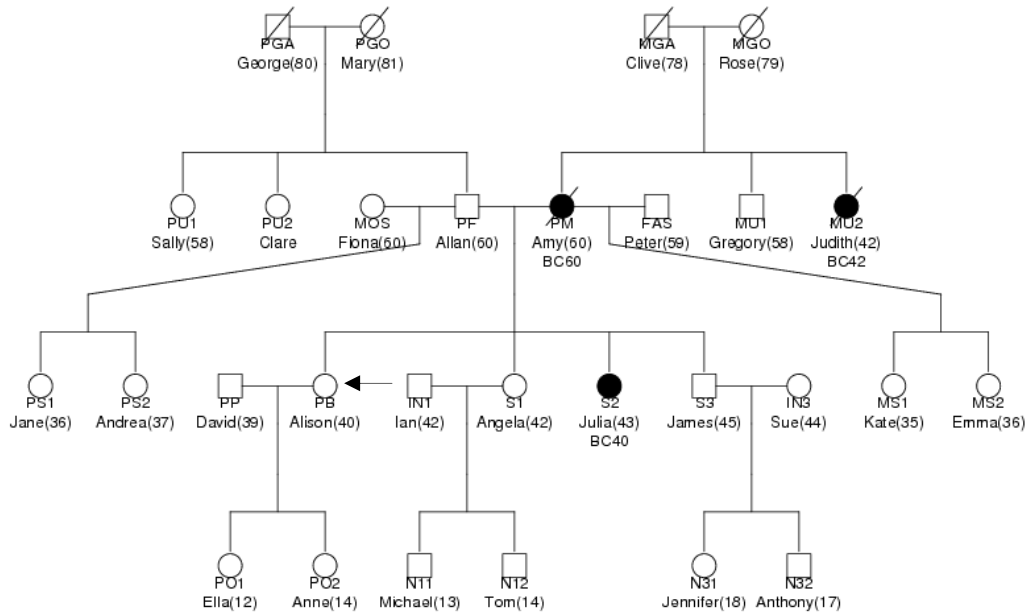


Figure 2. Example online pedigree. This pedigree was built online with the BWA (the proband is labelled with an arrow). It shows the first and second-degree relatives available for online pedigree construction. This example shows a maximum of four siblings within each nuclear family (the proband and her three siblings). However, you can include up to eight siblings in each nuclear family when building pedigrees online.

To begin this process, select 'Build a simple pedigree online' from the SESSION OPTION Web page (Figure 3), and press the 'Next Page' button to continue.

► Always use the buttons at the bottom of each Web page to submit data for processing, rather than the 'Return' key on your keyboard. Also, try to avoid pressing the submit button several times if the program fails to respond right away.

► At any point, you can reinitialise your session by selecting the 'Reset' button, or terminate it by selecting the 'Logout' button. If you select 'Reset', the program will reinitialise the session and return you to the SESSION OPTION Web page. In both cases, all data files created on the Web server during the session will be deleted.

► The program will not process 'cached' Web pages stored in your browser (accessed by pressing the 'Back' arrow in your main browser menu).

Figure 3. The SESSION OPTION Web page.

Once you have made this selection, the program will generate Web pages that enable you to build a new pedigree online. Initially, the program prompts for a ‘Pedigree number’ i.e. a unique code that is used to identify the data set. It then gathers information about each family member in turn. When building pedigrees online, you will encounter two different types of Web page: FAMILY MEMBER and FAMILY EXTENT Web pages (described in the following sections of this guide).

Data entry order

Pedigrees are built online in a specific order. Initially, the program gathers information on the proband, and it then works outward and upward through the family tree.

2.1.1 Completing FAMILY MEMBER Web pages

FAMILY MEMBER Web pages are used to gather information about specific individuals. Figure 4 shows the FAMILY MEMBER Web page used to gather details of the proband’s mother.

Figure 4. The FAMILY MEMBER Web page used to gather details of the proband’s mother.

Figure 4 shows prompts for sex, vital status, age or age at death (age at last follow up), cancer history, and genetic status. Although FAMILY MEMBER Web pages appear quite complicated at first sight, they have been designed to be filled out quickly and easily. To complete a FAMILY MEMBER Web page, work down the form entering the individual's personal details, and press the 'Next Page' button to submit it for processing.

Mandatory data items

Most FAMILY MEMBER data items are optional. However, you must supply a 'First name/ID' and an 'Age or age at death' in order to submit the Web page for processing (Figure 4). These data items are mandatory.

The 'First name/ID' is merely a text label used to identify the individual in tables and pedigree drawings. We recommend that users supply an anonymous code in this field to maintain patient anonymity.

The 'Age or age at death' is the age at last follow-up.

► **If no data exist for a particular family member, you can type any text into the 'First name/ID' text field (e.g. 'Anon' for anonymous), and set the 'Age or age at death' to 'unknown'.**

Mandatory data items - family members with cancer

The BOADICEA core program requires that all family members with cancer have: (1) a valid age or age at death (age at last follow up), (2) a valid year of birth, and (3) a valid age at diagnosis. All three parameters must be supplied to avoid underestimating risks. As a result, the program checks that these details have been supplied for each affected family member, and it generates an error if any information is missing.

If you specify an age at cancer diagnosis as 'Unknown' when building a pedigree online, it will be reset to the age at last follow up before risks are computed. Similarly, if you specify an age at cancer diagnosis as unknown with the 'AU' code in a BOADICEA import/export format pedigree file (BOADICEA I/E pedigree file, described in Appendix A), it will be reset to the age at last follow up before risks are computed.

Input data checks

When you submit a FAMILY MEMBER Web page for processing, the program checks the form for input data errors. If the program finds an error, it will display an error message in an alert window. If this happens, simply amend the data as required and resubmit the Web page.

- The program does not run checks between family members. Therefore, you should ensure that: (1) the age of a living parent is greater than that of his/her offspring; and (2) identical twins have the same sex, genetic status, and age if both living.

2.1.2 Completing FAMILY EXTENT Web pages

FAMILY EXTENT Web pages are used to input the ‘First names/IDs’ of additional family members, in order to add these individuals to the pedigree.

- FAMILY EXTENT Web pages become ‘locked’ once they have been submitted to the Web server for processing. This is intentional; it ensures consistency between data submitted on successive Web pages throughout your session. However, it means that FAMILY EXTENT Web pages must be filled in correctly first time.

The screenshot shows a web form for entering family details. It is divided into three main sections: 'Proband's partner', 'Proband's offspring', and 'Proband's siblings'. The 'Partner' section has a checkbox for 'Does the proband have a partner?' which is checked, and a text field for 'Partner's first name/ID' containing 'John'. The 'Offspring' section has a pull-down menu set to 'one' and eight text fields for names/IDs, with the first one containing 'Anne'. The 'Siblings' section has a pull-down menu set to 'three' and eight text fields for names/IDs, with the first three containing 'Jane', 'Erica', and 'Emily'. A 'Sibling 3' dropdown is also present. The top right corner says 'Page locked on submission'. At the bottom are 'Logout', 'Reset', 'Previous Page', and 'Next Page' buttons.

Figure 5. The proband FAMILY EXTENT Web page. In this example, the proband has a partner ‘John’, a daughter ‘Anne’, and three siblings ‘Jane’, ‘Erica’ and ‘Emily’. Erica has also been twinned with Emily (Sibling 3). ‘Page locked on submission’ in the top right-hand corner of the Web page indicates that the form cannot be amended once it has been submitted for processing.

Figure 5 shows the FAMILY EXTENT Web page that is used to add the proband’s partner, offspring and siblings. It is typical of the FAMILY EXTENT Web forms. To complete the form, work downward through each of the three sections. If the proband has a partner and offspring, you must first select the ‘Does the proband have a partner?’ checkbox, to switch on the ‘Proband’s Offspring’ pull-down menu. You can then use the ‘Proband’s Offspring’ and ‘Proband’s Siblings’ pull-down menus to switch on the accompanying ‘First name/ID’ text fields.

Use the ‘Proband’s Offspring’ and ‘Proband’s Siblings’ pull-down menus to specify the number of additional relatives you wish to add, and then enter the ‘First name/ID’ of each individual in turn in the accompanying text fields.

After you have submitted the Web page, the program will generate FAMILY MEMBER Web pages (as per Figure 4) for each new family member in turn. You can also use

FAMILY EXTENT Web pages to add in-laws, nephews/nieces, half-siblings, uncles/aunts and grandparents.

Identical twins

You can also use FAMILY EXTENT Web pages to identify identical twins in your input pedigree. To do this, use the ‘Twin with...’ pull-down menus to select the twin from the available list. In the example in Figure 5, the proband sibling ‘Erica’ has been twinned with sibling 3 ‘Emily’. These menus also enable you to twin the proband with her siblings, and the proband’s parents with her uncles and aunts.

► **The twinning menus only allow you to link two individuals within each nuclear family. Identical triplets and quads are not allowed (in practice, rare in the general population).**

► **The program does not run checks between family members. Therefore, you should ensure that identical twins have the same sex, genetic status, and age if both living. If twins are supplied with a different sex or genetic status, the BOADICEA core program will return an error message if you proceed with a risk calculation.**

To build your new pedigree, work through the FAMILY MEMBER and FAMILY EXTENT Web pages, filling in the necessary details. Online data entry finishes with prompts for details of the proband’s grandparents. After these details have been supplied, the program generates a FAMILY SUMMARY Web page (described in section 3.0).

2.2 Uploading pedigrees for processing

Pedigrees built online are restricted to 1st and 2nd degree. However, the BOADICEA core program will process pedigrees of any size and structure. As a result, the BWA enables you to upload larger, more complicated pedigrees to the Web server for processing. To achieve this, you must first prepare a text file in the BOADICEA I/E pedigree file format (described in Appendix A). If your pedigree data are stored in a database, BOADICEA I/E pedigree files can be created by setting up a database query to export the data in a TAB delimited text format. Alternatively, BOADICEA I/E files can be created directly in *Microsoft Excel* (Appendix B).

To upload a BOADICEA I/E pedigree file, select the option ‘Upload a pedigree file from your computer’ on the SESSION OPTION Web page (Figure 3). The program will then generate a PEDIGREE FILE UPLOAD Web page (Figure 6).

Figure 6. The PEDIGREE FILE UPLOAD Web page. This form is used to select a BOADICEA I/E pedigree file on your computer for processing.

When you select the ‘Browse’ button, the program will open a FILE NAVIGATION window (Figure 7) to enable you to select a BOADICEA I/E pedigree file for processing.

► For security reasons, the program checks the upload pedigree file name, and it may display an error message when you press the ‘Upload File’ button. The pedigree file name must include a three letter extension (e.g. ‘pedigree.txt’ or ‘pd4556.dat’). If an error message persists, try copying the pedigree file onto the C: drive of your computer, and reloading it from there.

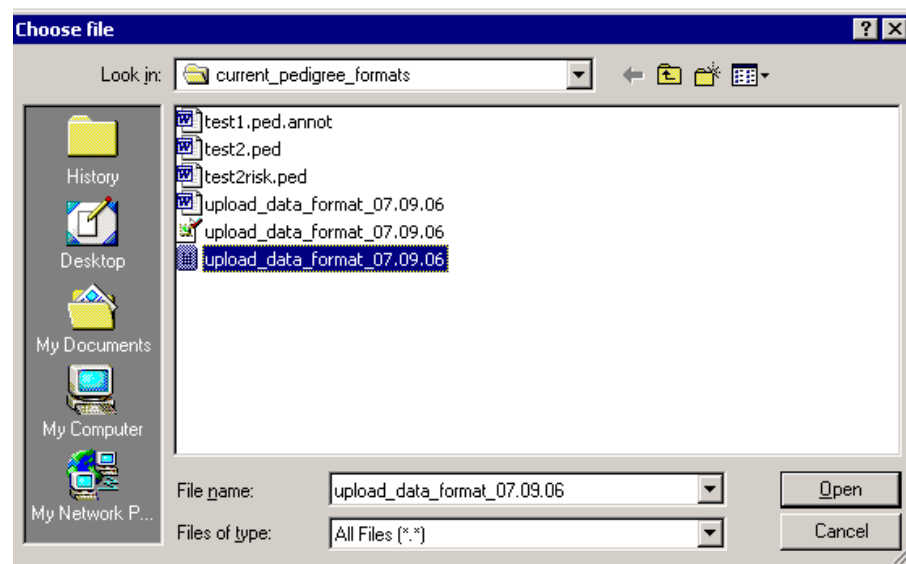


Figure 7. The FILE NAVIGATION window. Use this window to select a BOADICEA I/E pedigree file on your computer for processing.

2.2.1 Upload pedigree data checks

The program checks all BOADICEA I/E pedigree files for data errors when they are uploaded to the Web server for processing. If the program finds a problem, it will generate an error message (Figure 8).

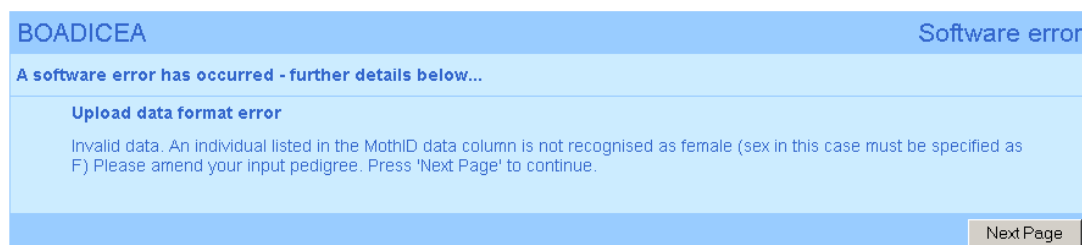


Figure 8. Example error message reporting a problem in an uploaded BOADICEA I/E pedigree file.

If an error occurs, you should amend the pedigree file (see Appendix B) and reload it for processing. If the uploaded pedigree file passes all input data checks, the program generates a FAMILY SUMMARY Web page (described in section 3.0 below).

► **The program does not run checks between family members. Therefore, you should ensure that identical twins have the same sex, genetic status, and age if both living. If twins are supplied with a different sex or genetic status, the BOADICEA core program will return an error message if you proceed with a risk calculation.**

3.0 Reviewing your pedigree

When pedigree data entry is complete, the program generates a FAMILY SUMMARY Web page (Figure 9). This Web page displays the input pedigree data set in a table which you can check for errors before proceeding further. The target (index or subject of the risk calculation) is marked with a grey table row, and the letter 'T' in the 'Tgt' column (Figure 9).

BOADICEA																	Family summary	
Your input pedigree is listed below...																		
	Name	Tgt	IndivID	FathID	MothID	Sex	Twin	Status	Age	Yob	1BrCa	2BrCa	OvCa	ProCa	PanCa	Gtest	Mutn	Ashkn
1	Alison	T	PB	PF	PM	F		alive	40	1967								
2	Amy		PM	MGA	MGO	F		dead	55	1940	55							
3	Allan		PF	PGA	PGO	M		alive	unsp	unsp								
4	John		PP			M		alive	39	1968								
5	Anne		PO1	PP	PB	F		alive	20	1987								
6	Jane		S1	PF	PM	F		alive	38	1969	38							
7	Enica		S2	PF	PM	F	S3	alive	36	1971								
8	Emily		S3	PF	PM	F	S2	alive	36	1971								
9	Ian		PGA			M		alive	unsp	unsp								
10	Daisy		PGO			F		dead	40	1915	40							
11	Michael		MGA			M		alive	unsp	unsp								
12	Rose		MGO			F		alive	unsp	unsp								

Logout Reset Previous Page Draw Pedigree Switch Target Compute Risks

Figure 9. The FAMILY SUMMARY Web page. This Web page lists your input pedigree in a summary table. The target (index or subject of the risk calculation) is marked with a grey table row, and the letter 'T' in the 'Tgt' column. The buttons at the bottom of the Web page enable you to draw the pedigree, switch the current target, or compute cancer risks.

The input pedigree data are listed in a series of table rows. The accompanying column headings are explained in Table 1 below.

Column Heading	Explanation
Name	First name/ID of the family member
Tgt	The target (index or subject of the risk calculation)
IndivID	The unique ID of the family member
FathID	The unique ID of the family member's father
MothID	The unique ID of the family member's mother
Sex	Male or female
Twin	IDs or characters used to identify identical twins
Status	Dead or alive
Age	Age or age at death (age at last follow up)
Yob	Year of birth
1BrCA	Age at first breast cancer diagnosis
2BrCa	Age at contralateral breast cancer diagnosis
OvCa	Age at ovarian cancer diagnosis
ProCa	Age at prostate cancer diagnosis
PanCa	Age at pancreatic cancer diagnosis
Gtest	Genetic test type. Mutation search (srch) or direct/predictive gene test (gtest)
Mutn	Genetic test result. Negative, BRCA1 +ve, BRCA2 +ve or BRCA1 and BRCA2 +ve
Ashkn	Ashkenazi origin (A)

Table 1. Column headings used in the FAMILY SUMMARY Web page.

3.1 Drawing your pedigree

The program also provides a facility to draw your pedigree using Kinship software [Zhao, 2006]. To do this, press the 'Draw Pedigree' button on the FAMILY SUMMARY Web page (Figure 9). A popup window should appear in a few seconds showing the

current pedigree (Figure 10). If the pedigree drawing window fails to appear, you may need to make adjustments to your browser or firewall settings (section 1.1.1).

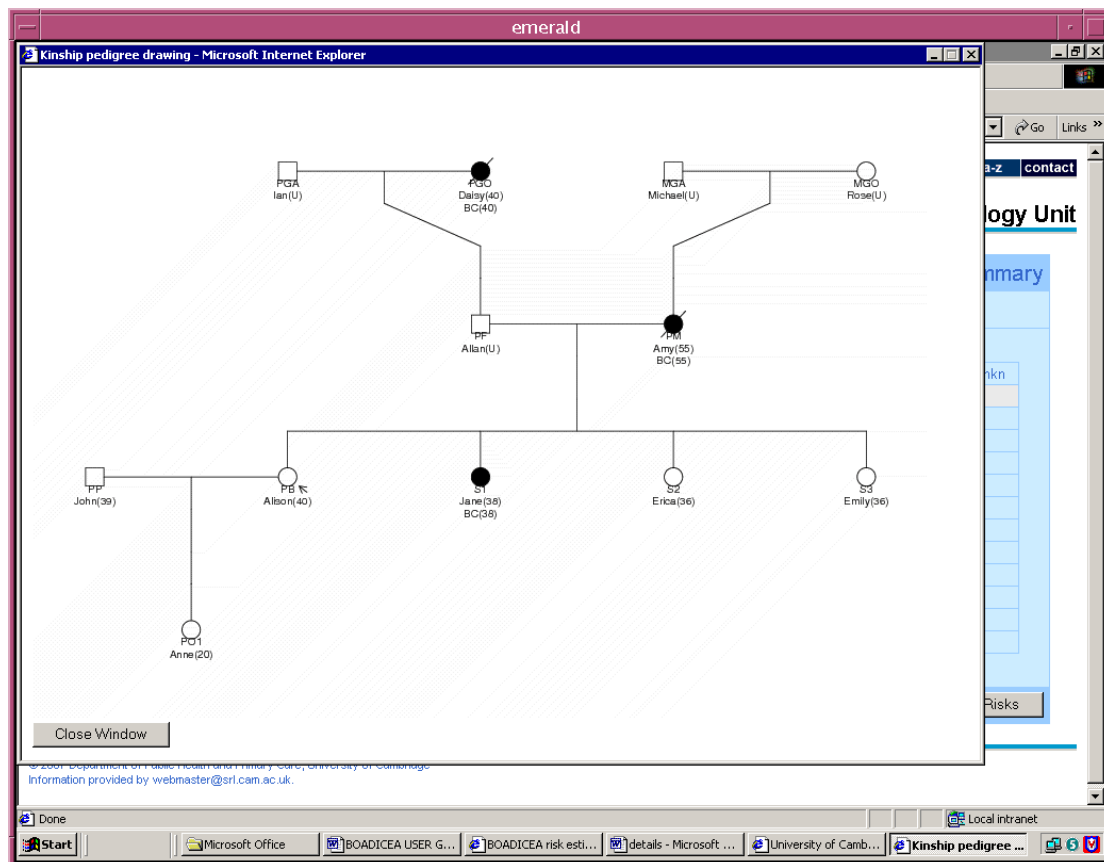


Figure 10. Example online pedigree drawing. The pedigree is annotated in the conventional manner: the target (index or subject of the risk calculation) is identified with an arrow; family members who have developed cancer are shaded; unaffected family members are unshaded; text beneath each family member describes his/her unique identifier, First name/ID, age at last follow up, cancer history, genetic status, and whether he/she is of Ashkenazi origin.

► Although input pedigrees can include identical twins, twins are not drawn explicitly as identical siblings in existing pedigree diagrams. This is a limitation of the current version of the BWA. Nevertheless, information on identical twins is included in all risk calculations.

► In some cases, Kinship may fail to generate a pedigree drawing. If this happens, the pedigree drawing window will display an error message, or it will appear blank. However, this will not affect subsequent risk calculations.

Additional information on pedigree drawing is available in the [Frequently Asked Questions](#) section of the BOADICEA Web site.

4.0 Computing risks

When you are satisfied that your input pedigree is correct, you can proceed with a risk calculation. To compute BRCA1/BRCA2 mutation carrier probabilities and breast/ovarian cancer risks, press the 'Compute Risks' button on the FAMILY SUMMARY Web page (Figure 9). In a few seconds, the program will generate a COMPUTED RESULTS Web page (Figure 11).

BOADICEA		Computed results		
Computed results are as follows...				
Family member: Alison(PB)				
Genetic status		Mutation carrier probabilities		
No mutation		0.9277		
BRCA1		0.0324		
BRCA2		0.0400		
Age	Breast cancer risks	Ovarian cancer risks		
41	0.0050	0.0003		
42	0.0105	0.0007		
43	0.0165	0.0011		
44	0.0229	0.0015		
45	0.0297	0.0020		
50	0.0692	0.0047		
55	0.1125	0.0091		
60	0.1528	0.0147		
65	0.1873	0.0197		
70	0.2161	0.0244		
75	0.2409	0.0290		
80	0.2612	0.0333		
If the target has already developed breast cancer (BC), BC risks represent the risk of contralateral BC.				
Logout	Reset	Previous Page	Generate Report	

Figure 11. The COMPUTED RESULTS Web page. This document shows BRCA1/BRCA2 mutation carrier probabilities and breast/ovarian cancer risks estimated by the BOADICEA core program. Cancer risks are estimated for the target (index or subject of the risk calculation) at 1 year intervals for the next 5 years, and then at 5 year intervals up until the age of 80.

4.1 Switching the target

By default, the proband is the target (index or subject of the risk calculation) in pedigrees that are built online. If you wish to compute risks for a different family member, you can select that individual using the 'Switch Target' button on the FAMILY SUMMARY Web page (Figure 9). If you do this, the program returns a SWITCH TARGET Web page with a list of appropriate family members.

► The SWITCH TARGET Web page only lists family members with a valid year of birth and 'Age or age at death' (age at last follow up), as both parameters must be set in order to compute risks.

4.2 Interpreting your results

The COMPUTED RESULTS Web page (Figure 11) lists the BRCA1/BRCA2 mutation carrier probabilities and breast/ovarian cancer risks calculated in the basis of your input pedigree.

4.2.1 BRCA1/BRCA2 mutation carrier probabilities

The left-hand table (Figure 11) shows BRCA1/BRCA2 mutation carrier probabilities. These figures are written as decimal probabilities e.g. a figure of 0.020 is equivalent to a percentage probability of 2%, or 1 in 50.

Family members who carry both BRCA1 and BRCA2 mutations

For modelling purposes, the program assumes that family members who carry both BRCA1 and BRCA2 mutations are BRCA1 positive only. This assumption has an important implication when interpreting results:

► **If the target (index or subject of the risk calculation) has tested positive for both BRCA1 and BRCA2 mutations, she/he will be assigned a BRCA1 mutation carrier probability of 1.0 only.**

4.2.2 Breast and ovarian cancer risks

The right-hand table (Figure 11) shows breast and ovarian cancer risks. The risks are calculated for the target (the index or subject of the risk calculation) at one year intervals for the next five years, and subsequently at five year intervals until 80 years of age. Again, the figures are expressed as decimal probabilities.

► **Cancer risks will only be computed if the target (index or subject of the risk calculation) is a female unaffected by cancer, or a female who has developed one breast cancer.**

► **If the target has already developed one breast cancer, the breast cancer risks describe the likelihood of developing a contralateral breast cancer.**

Additional information on interpreting results is available in the [Frequently Asked Questions](#) section of the BOADICEA Web site.

5.0 Saving your results

When you have finished your calculations, you can save your results. To generate your output data files, select 'Generate Report' on the COMPUTED RESULTS Web page (Figure 11). In a few seconds, the program will return a PROCESSING REPORT Web page (Figure 12).

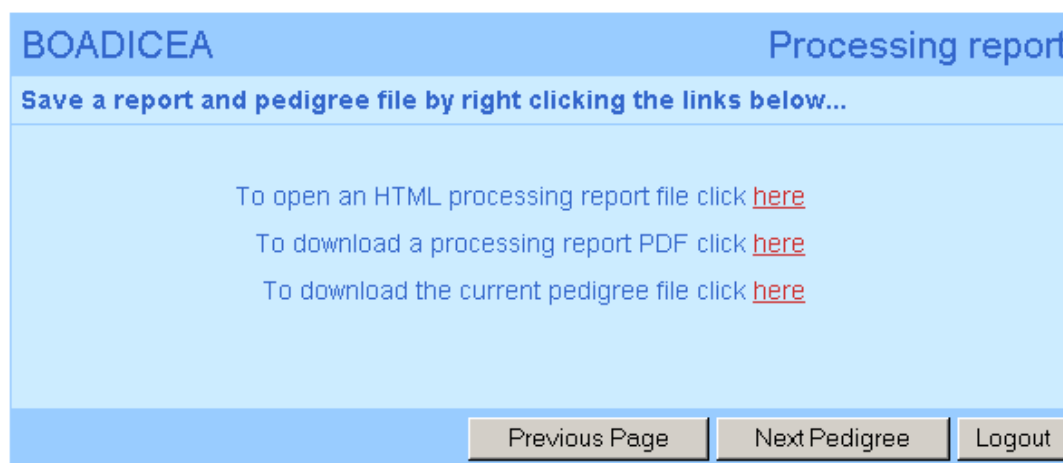


Figure 12. The PROCESSING REPORT Web page.

This Web page enables you to print and/or download your output data files. The Web page includes links to:

- Processing report in HTML format
- Processing report in PDF format
- Output BOADICEA I/E pedigree file

Processing report in HTML format

The processing report includes a pedigree data table and drawing, and the computed results. To view the report in HTML format, right click [here](#) in the first line of text (Figure 12), and select 'Open in New Window' in your browser menu. If you confirm your selection, the processing report should appear in the new browser window (Figure 13).

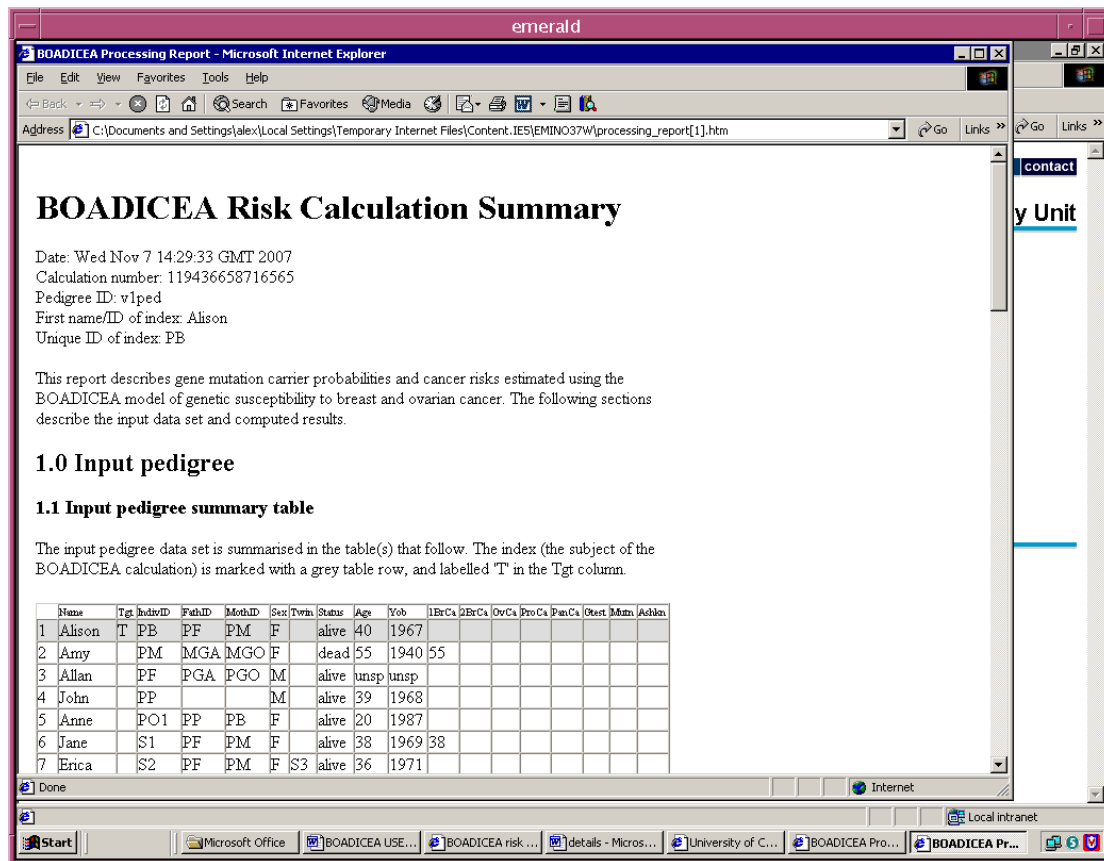


Figure 13. BOADICEA processing report file displayed in HTML format.

Processing report in PDF format

To view the processing report in PDF format right click [here](#) in the second line of text (Figure 12), and select 'Open in New Window' in your browser menu. If your computer is appropriately configured with *Adobe Reader*, the processing report should appear straight away in a new browser window.

We recommend that users always save the processing report in PDF format. To do this, right click [here](#) in the second line of text (Figure 12), and select 'Save Target As' in your browser menu. The report PDF provides a permanent record of your risk calculation, and can be viewed and printed with *Adobe Reader*.

► **We recommend that users save the processing report file in PDF format (rather than HTML).**

BOADICEA import/export pedigree file

To download the current pedigree in a BOADICEA I/E pedigree file (Appendix A), right click [here](#) in the third line of text (Figure 12), and select 'Save Target As' in your browser menu.

If you previously built a new pedigree online, the new pedigree data will be saved in the download file.

If you previously uploaded a BOADICEA I/E pedigree file for processing, the same pedigree will be saved in the download file. However, the download file will include further amendments if: (1) you reselected the target (index or subject of the risk calculation) before processing, and/or (2) the original upload file included an unknown age at diagnosis (denoted by the code AU, affected unknown).

If you wish, you can modify the downloaded BOADICEA I/E pedigree file in *Microsoft Excel*, and reload it to run a modified risk calculation later (Appendix B).

6.0 Logging out

When you have saved your results, you can either reset the session by selecting the 'Next Pedigree' button on the PROCESSING REPORT Web page (Figure 12), or terminate it by selecting the 'Logout' button (Figure 12). If you select the 'Next Pedigree' button, then the program will return you to the SESSION OPTION Web page (Figure 3). Alternatively, if you select the 'Logout' button, the program will return a SESSION COMPLETED Web page (Figure 14).

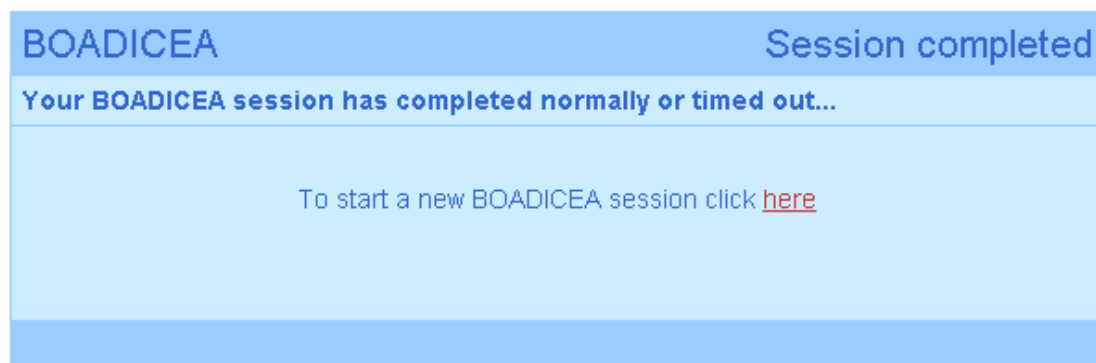


Figure 14. The SESSION COMPLETED Web page. This Web page is returned when you log out of the system, or when your session times out (has been inactive for several hours). Select [here](#) to initiate a new login session.

When you reset your session or logout, all data files created up to that point are deleted from the Web server. This helps us to conform to UK Data Protection Principles.

► **If you do not logout, the session will timeout and all data files will be automatically deleted the following day. We always recommend that users logout when they complete their work, to ensure that data do not remain on the Web server longer than necessary.**

References

Zhao, J.H. 2006. Pedigree-drawing with R and graphviz, *Bioinformatics*, **22** (8), 1013-1014.

Appendix A

BOADICEA import/export pedigree data format

The BOADICEA import/export data format is as follows:

BOADICEA import pedigree file format 1.0

FamID	Name	Target	IndivID	FathID	MothID	Sex	Twin	Dead	Age	Yob	1BrCa	2BrCa	OvCa	ProCa	PanCa	Gtest	Mutn	Ashkn
uf9	Clive	0	101	0	0	M	0	0	92	1914	0	0	0	0	0	0	0	0
uf9	Rose	0	102	0	0	F	0	1	40	1915	0	0	0	0	0	0	0	0
uf9	Alison	0	301	201	202	F	0	0	32	1974	0	0	0	0	0	0	0	0
uf9	Peter	0	103	0	0	M	0	1	60	1915	0	0	0	0	0	0	0	0
uf9	Jenny	0	104	0	0	F	0	1	59	1913	0	0	58	0	0	0	0	0
uf9	Alan	0	201	101	102	M	0	0	0	0	0	0	0	0	0	0	0	0
uf9	Sarah	0	202	103	104	F	\$	1	55	1944	53	0	0	0	0	0	0	0
uf9	Amy	0	203	103	104	F	\$	0	62	1944	0	0	0	0	0	0	0	0
uf9	Clare	1	204	103	104	F	0	0	60	1946	0	0	0	0	0	0	0	0
uf9	Mary	0	302	201	202	F	0	0	30	1976	0	0	0	0	0	0	0	0

Data fields should be separated by tab or whitespace characters only. Items highlighted in blue are required for the BOADICEA risk calculation. Other items are used for pedigree drawing, or to ensure forward compatibility with future versions of the software. Please note:

- (1) The first line of text 'BOADICEA import pedigree file format 1.0' must be included, and the file version number must be set to 1 or 1.0.
- (2) A second line of text must be included before the pedigree data records begin. We recommend that this shows column names as above.
- (3) In BOADICEA import/export data files, each family member must have either no parents specified, or both parents specified.
- (4) The IDs used to define family structure (IndivID, FathID and MothID) are case sensitive.

FamID: Family/pedigree ID, character string (maximum 13 characters)

Name: First name/ID of the family member, character string (maximum 8 characters)

Target: The family member for whom the BOADICEA risk calculation is made, 1 = target for BOADICEA risk calculation, 0 = other family members. There must only be one BOADICEA target individual.

IndivID: Unique ID of the family member, character string (maximum 7 characters)

FathID: Unique ID of their father, 0 = no father, or character string (maximum 7 characters)

MothID: Unique ID of their mother, 0 = unspecified, or character string (maximum 7 characters)

Sex: M or F

Twin: Identical twins, 0 = no identical twin, any non-zero character = twin. In the example pedigree above, Sarah and Amy are listed as identical twins

Dead: The current status of the family member, 0 = alive, 1 = dead

Age: Age at last follow up, 0 = unspecified, integer = age at last follow up

Yob: Year of birth, 0 = unspecified, or integer (consistent with Age if the person is alive)

1BrCa: Age at first breast cancer diagnosis, 0 = unaffected, integer = age at diagnosis, AU = unknown age at diagnosis (affected unknown)

2BrCa: Age at contralateral breast cancer diagnosis, 0 = unaffected, integer = age at diagnosis, AU = unknown age at diagnosis (affected unknown)

OvCa: Age at ovarian cancer diagnosis, 0 = unaffected, integer = age at diagnosis, AU = unknown age at diagnosis (affected unknown)

ProCa: Age at prostate cancer diagnosis 0 = unaffected, integer = age at diagnosis, AU = unknown age at diagnosis (affected unknown)

PanCa: Age at pancreatic cancer diagnosis 0 = unaffected, integer = age at diagnosis, AU = unknown age at diagnosis (affected unknown)

Gtest: Genetic test status, 0 = untested, S = mutation search, T = direct gene test

Mutn: 0 = untested, N = no mutation, 1 = BRCA1 positive, 2 = BRCA2 positive, 3 = BRCA1 and BRCA2 positive

Ashkn: 0 = not Ashkenazi, 1 = Ashkenazi

Appendix B

Modifying BOADICEA import/export pedigree files

The BWA enables you to download pedigree data files that you have built online in BOADICEA I/E pedigree format. In many cases, you may wish to modify these files and reload them in order to run an updated risk calculation. You can edit BOADICEA I/E pedigree files as follows:

1. Read the BOADICEA import/export data file into *Microsoft Excel* by selecting:

File→Open, with Files of Type→Text Files

2. In the Text Import Wizard:

Step 1 of 3 Click 'Next'

Step 2 of 3 Select the Tab and Space checkboxes, and click 'Next'

Step 3 of 3 Select 'Finish'

3. Edit your data as required

4. Save the data by selecting:

File→Save As, with Save as Type→Text (tab delimited)

Microsoft Excel generates a warning at this point, click 'Yes' to save your spreadsheet to a new BOADICEA I/E pedigree file. You can then upload this new file to the Web server to run an updated risk calculation.