
Safety Signal Detection Visualization using Spotfire including R

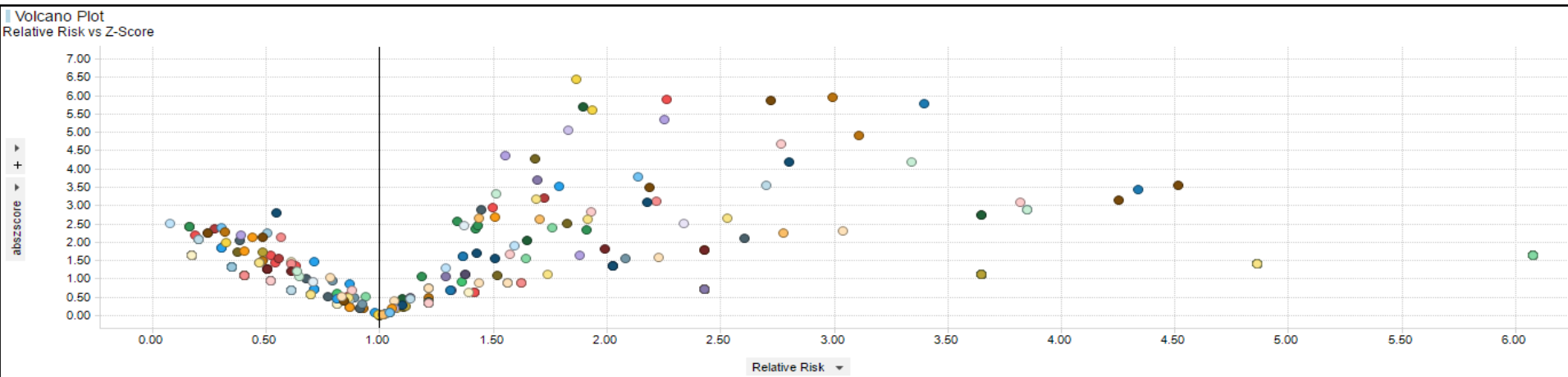
Michaela Mertes

7Nov2018



Agenda

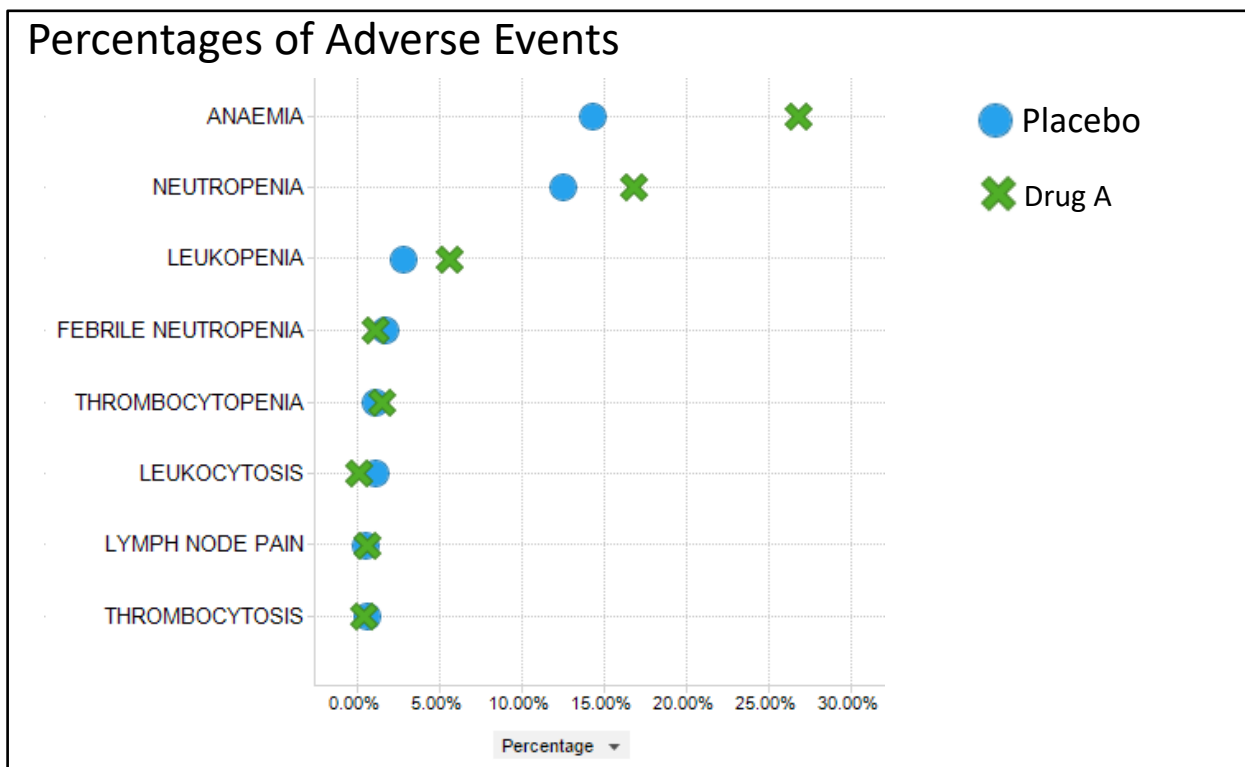
- Sources
- Example to include simple R code into Spotfire
- Live Demo of Safety Signal Detection Visualizations in Spotfire



Presentation on visualization in signal detection

(e.g. The Forest for the Trees Visualizing Adverse Events (DIA 2011))

(Andreas Brueckner, Bayer Healthcare)

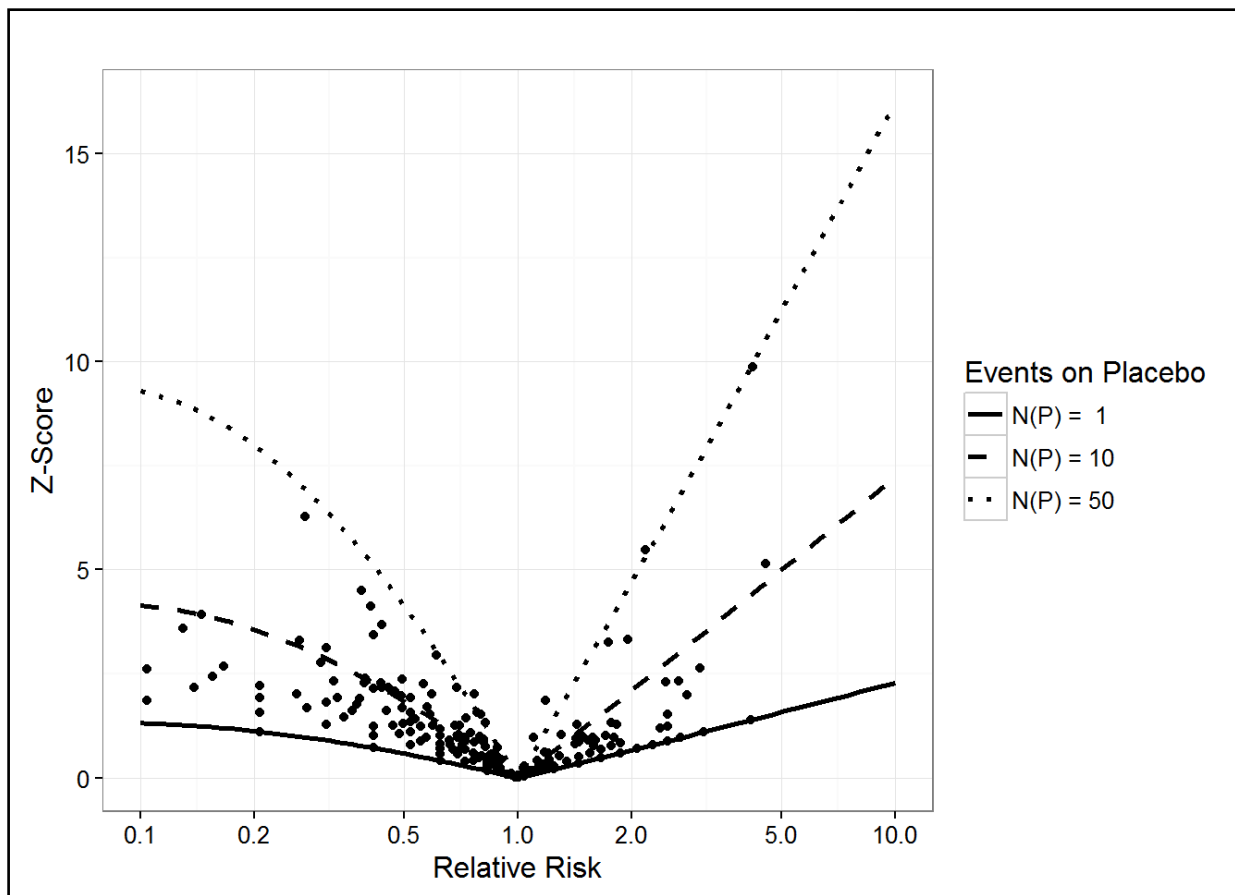


Summary of Adverse Events by Body System and Preferred Term

Body System or Organ Class	Dictionary-Derived Term	PLACEBO			DRUG A		
		N	%	Events	N	%	Events
BLOOD AND LYMPHATIC SYSTEM DISORDERS	Subtotal	206	20.96	640	332	41.04	757
	ANAEMIA	141	14.34	230	217	26.82	321
	NEUTROPENIA	123	12.51	238	136	16.81	301
	LEUKOPENIA	28	2.85	51	45	5.56	79

P-Risk Plots / Volcano Plots

Relative risk (RR) versus z-score





Analysis and Displays Associated with Adverse Events



Project: Analysis and Display
White Papers Project Team

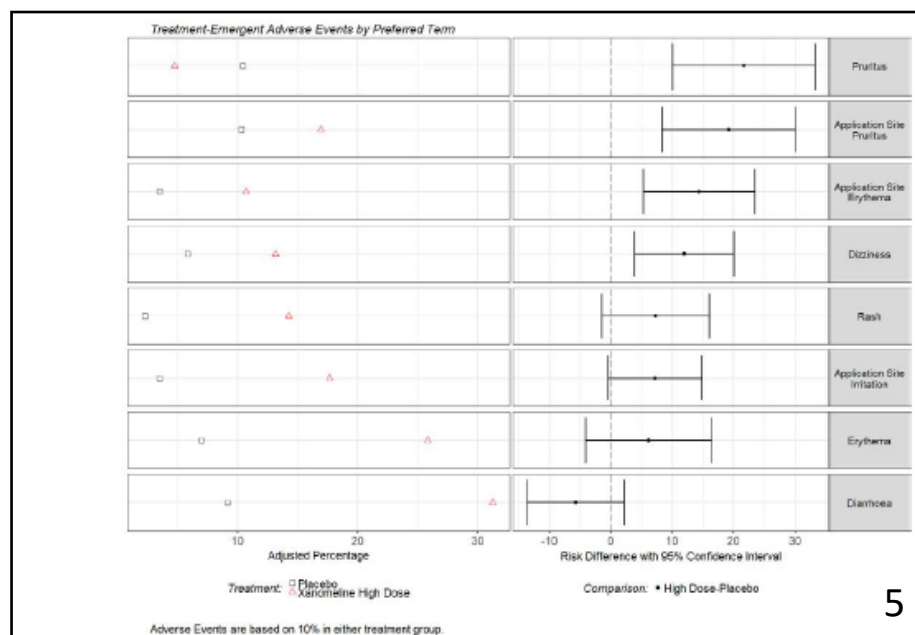
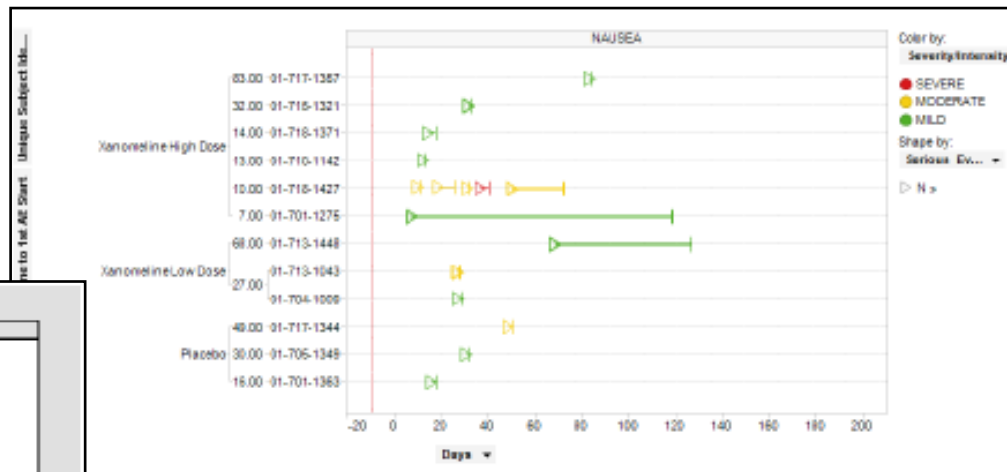
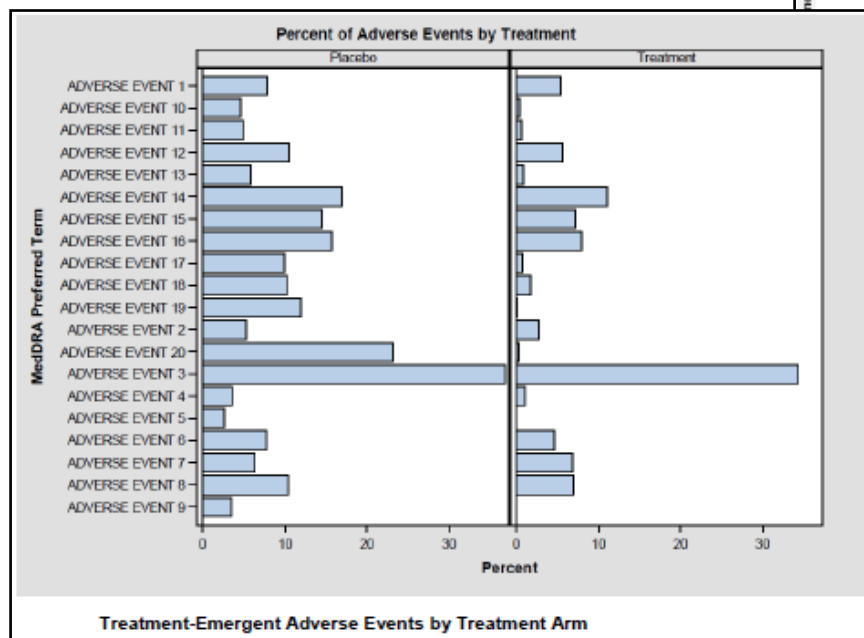
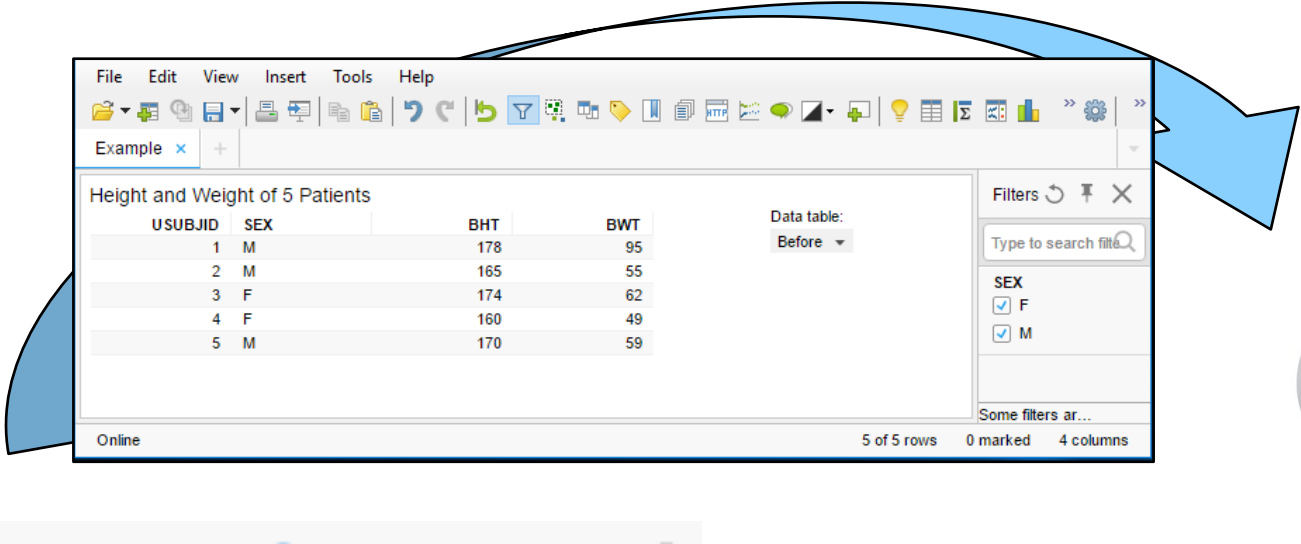


Figure 12.1.

Common Treatment-Emergent Adverse Events

Overview of including R script into Spotfire

tibcospotfire:server:http\://pdspotfire.roche.com/:analysis:/SPA/Play/Basel_testing/Michaela/ExampleR



File Edit View Insert Tools Help

Example x +

Height and Weight of 5 Patients

USUBJID	SEX	BHT	BWT
1	M	178	95
2	M	165	55
3	F	174	62
4	F	160	49
5	M	170	59

Data table: Before

Filters

Type to search filter

SEX

☒ F

☒ M

Some filters ar...

Online 5 of 5 rows 0 marked 4 columns

TIBCO® Spotfire®

```
adsl <- dsin

adsl$bhtn <- as.numeric(dsin$BHT)
adsl$bwtn <- as.numeric(dsin$BWT)

adsl$bbmi <- (adsl$bwtn*1000) / (adsl$bhtn*adsl$bhtn)
```

Calculation of BMI with R

USUBJID	SEX	BHT	BWT	bhtn	bwtn	bbmi
1	M	178	95	178.00	95.00	3.00
2	M	165	55	165.00	55.00	2.02
3	F	174	62	174.00	62.00	2.05
4	F	160	49	160.00	49.00	1.91
5	M	170	59	170.00	59.00	2.04

Data table: adsl

SEX

☒ F

☒ M

Spotfire - Layout of the Visualisation Pages



Go to: [CoverPage](#)

[Reset Filters and Markers](#)

[ShowModifiedFilters](#)

ShowModifiedFilters button displays filters used in the visualization

Visualizations

Filters

Type to search filters

- ☒ Subject Death Flag
- ☒ Y
- Age 65 Categories (years)**
 - ☒ <65
 - ☒ >=65
- Sex**
 - ☒ F
 - ☒ M
- Race**
 - ☒ AMERICAN INDIAN OR AL...
 - ☒ ASIAN
 - ☒ BLACK OR AFRICAN AME...
 - ☒ MULTIPLE
 - ☒ NATIVE HAWAIIAN OR OT...
 - ☒ UNKNOWN
 - ☒ WHITE
- Ethnicity**
 - ☒ HISPANIC OR LATINO
 - ☒ NOT HISPANIC OR LATINO
 - ☒ NOT REPORTED
 - ☒ UNKNOWN
- Country**
 - ☒ BRA
 - ☒ FIN
 - ☒ ITA
 - ☒ LBR
 - ☒ PYF

Listing: Demographics

Study Identifier	Study Site Identifier	Unique Subject Identifier	Subject Death Flag	Age	Age Units	Sex	Race	Date of Randomization	Date of Informed Consent	Date of Enrollment	End of Status
adae											

- 1 – Pages, 2 – Filter selection, 3 – Display and reset of filters,
4 – Listing of underlying data

Live Demo (WebPlayer Link)

http://pdspotfire.roche.com/spotfire/wp/ViewAnalysis.aspx?file=/SPA/Play/Basel_testing/Michaela/SafetySignalDetection_AD_AE_phuse_dv10_v1

Table of Contents

Safety Data Domain	Summary Tables/Plots	Listings / By-Patient Plots
Demographics	Summary: Demographics *	Listing: Demographics
AE	Summary: Adverse Events	Listing: Adverse Events Plot: Adverse Event Start and End
	Scatter Plot (%) Scatter Plot (%) Severe AEs * Bar Chart (%) Related AEs (R) *	
	Tornado Plot Tornado Plot (Diff) *	
	Volcano Plot *	
	Risk Difference Percentage / Risk Difference Percentage / Risk by Subgroup *	Listing: Relative Risk ≥ 3 or p-value < 0.1 Listing: Percentage and Risk Statistics
	Line Graph: Time To Event *	Listing: Time To Event
	Summary: Patient Years at Risk *	

All visualizations are DRAFT.

Not used within Roche as a standard process – suggestion.



Thank you

***Doing now what patients need
next***

Include R program to Spotfire

USUBJID	BHT	BWT
1	178	95
2	165	55
3	174	62
4	160	49
5	170	59

- 1) Insert example data into Spotfire
- 2) Tools -> Register Data Function (Edit R Script)

Register Data Functions

New Function Open Import Save Save As Export Run

Name:
example

Type:
R script - Open Source R

Packages (separated by semicolons):
dplyr

Description:

☒ Allow caching

Script Input Parameters Output Parameters

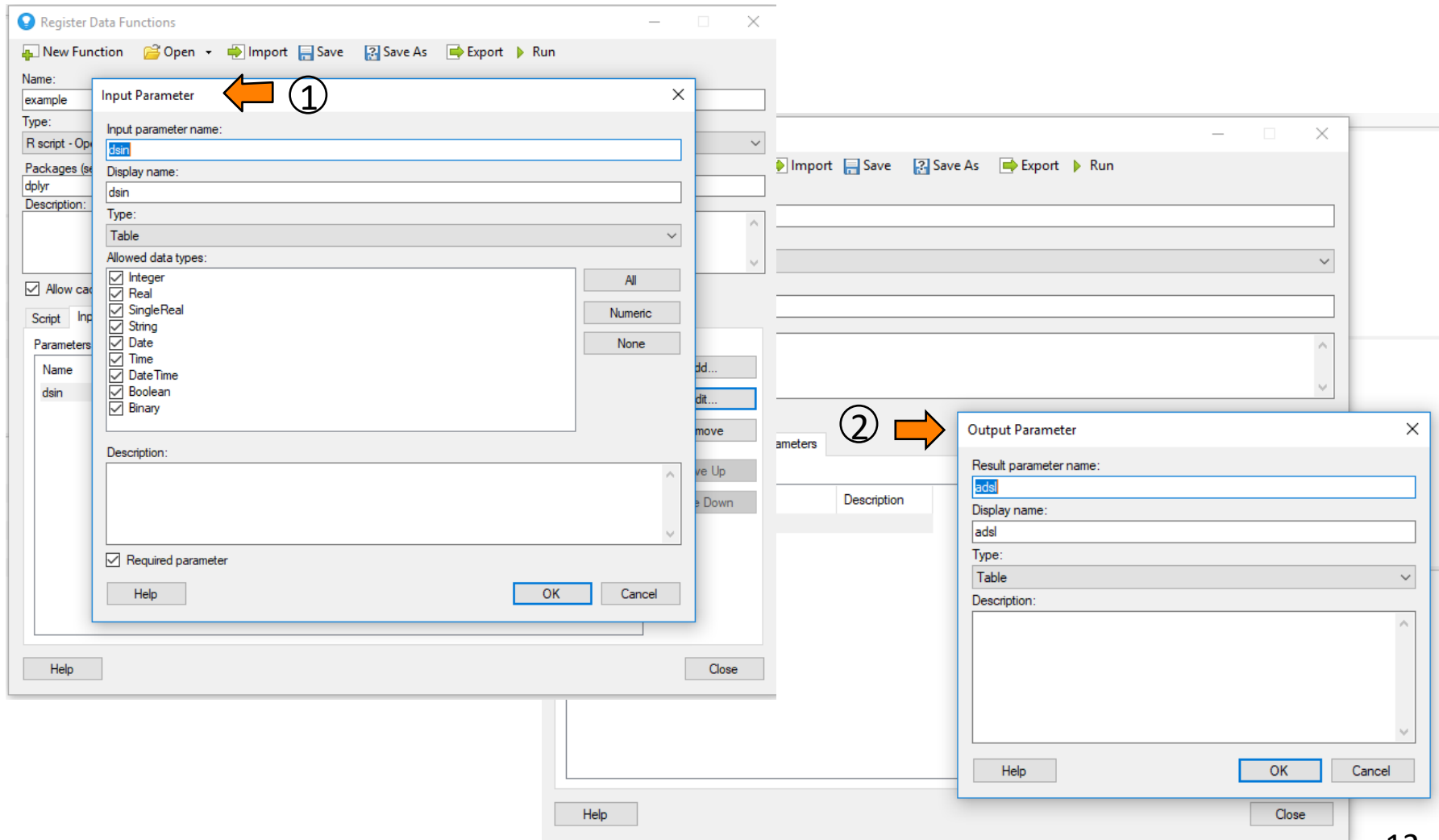
```
1 adsl <- dsin
2
3 adsl$bhtn <- as.numeric(adsl$BHT)
4 adsl$bwtn <- as.numeric(adsl$BWT)
5
6
7 adsl$bbmi <- (adsl$bwtn*10000)/(adsl$bhtn*adsl$bhtn)
```

2) →

3) dsin needs to be specified as Input Parameter

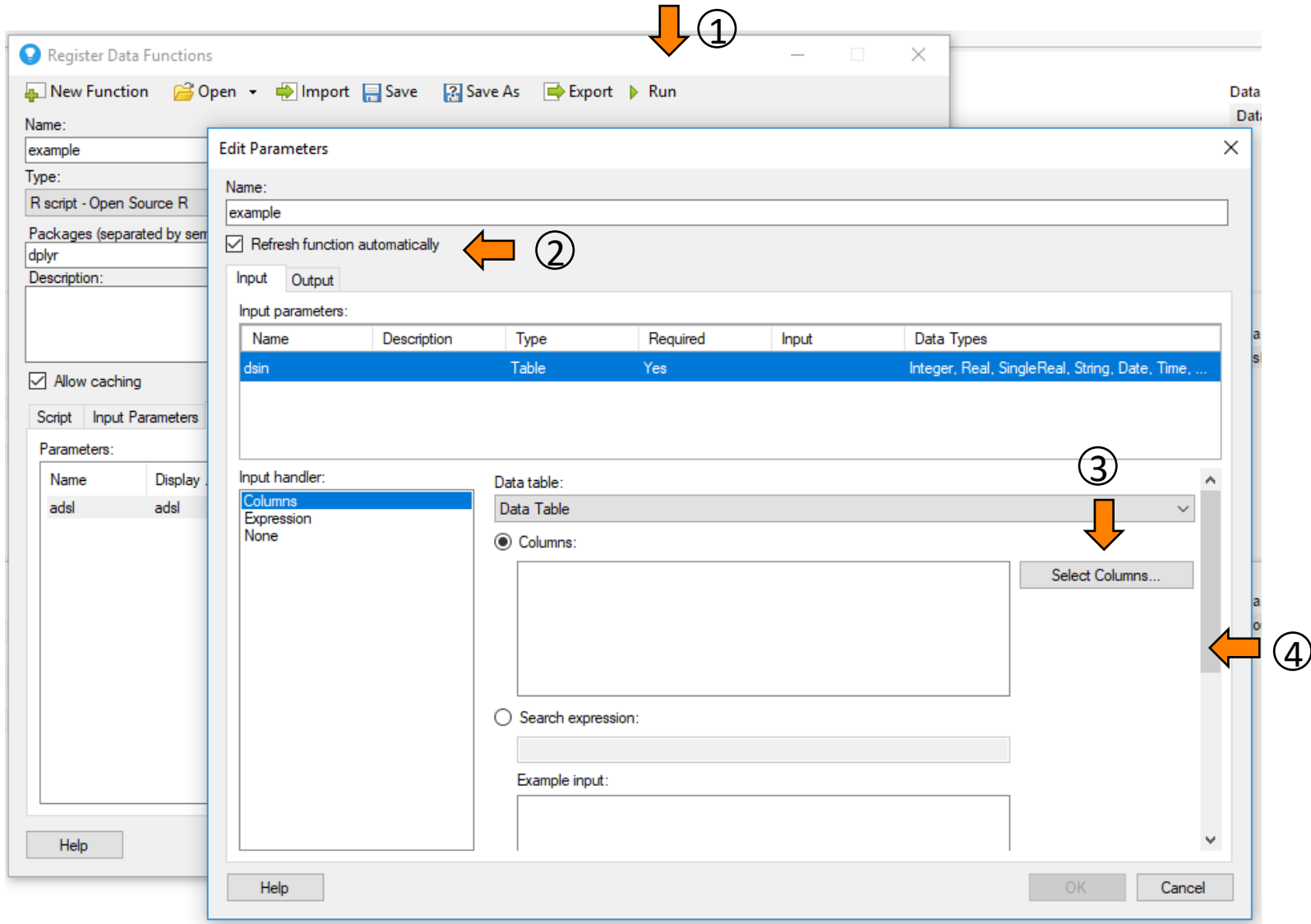
4) adsl needs to be specified as Output Parameter →

Specify Input and Output parameters needed in R function: dsin and adsl



Run the Function

Specify Input and Output for Spotfire



Result of R script run in Spotfire

ExampleR - TIBCO Spotfire

File Edit View Insert Tools Help

Example x +

Before

USUBJID	SEX	BHT	BWT
1	M	178	95
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4	F	160	49
5	M	170	59

Data table: Before

Filters

Type to search filters

Before

SEX

☒ F

☒ M

adsl

SEX

☒ F

☒ M

Calculation of BMI with R

USUBJID	SEX	BHT	BWT	bhtn	bwtm	bbmi
1	M	178	95	178.00	95.00	3.00
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5	M	170	59	170.00	59.00	2.04

Data table: adsl

Summary: Demographics

①

②

③

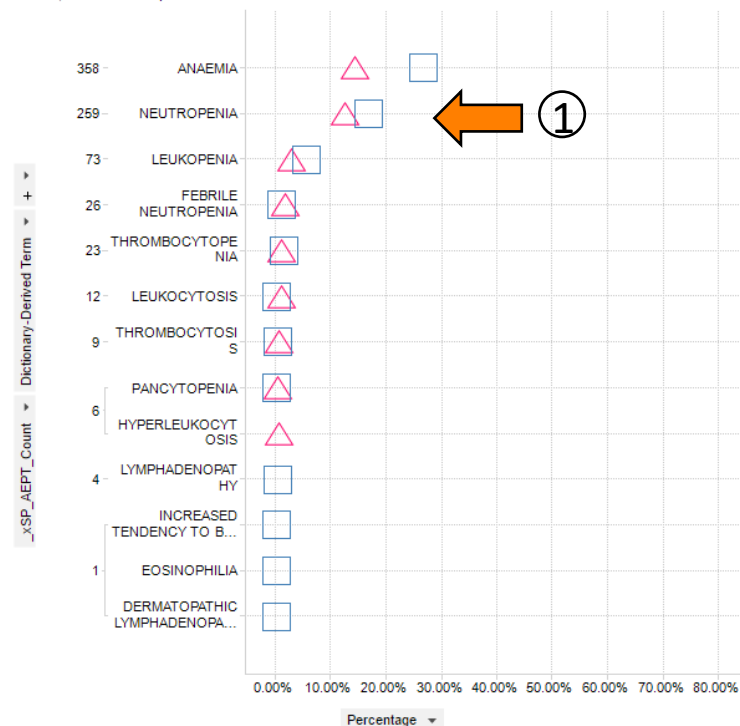
④



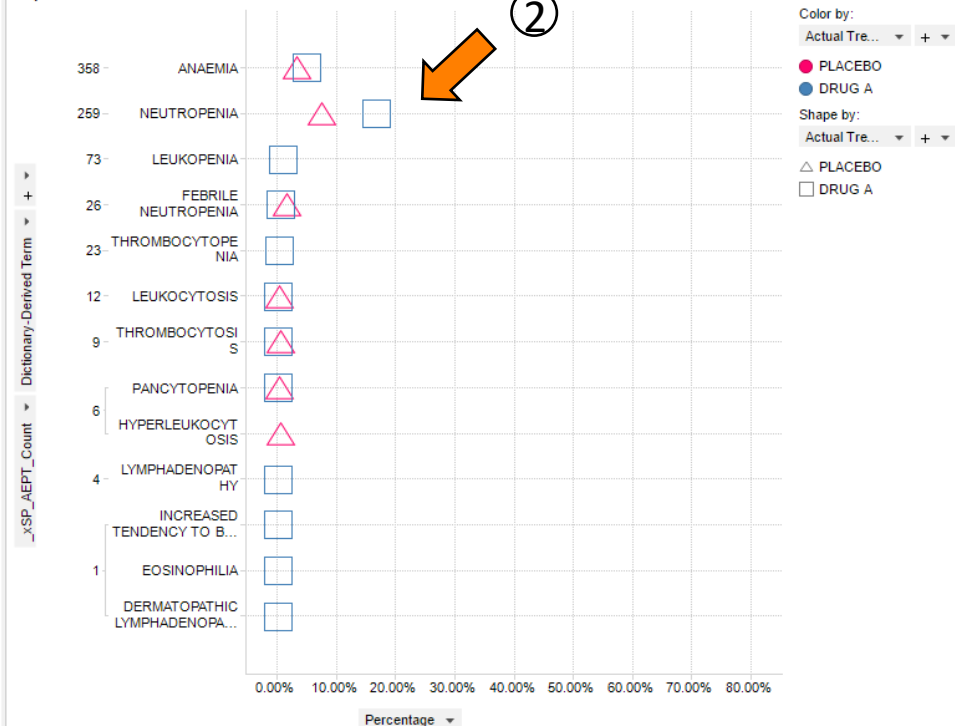
- 1 – Pages, 2 – Filter selection, 3 – Display and reset of filters,
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Scatter Plot: Severe AEs

Adverse Events - Preferred Term
All AEs, if at least one preferred term is severe



Adverse Events - Preferred Term
Only severe AEs



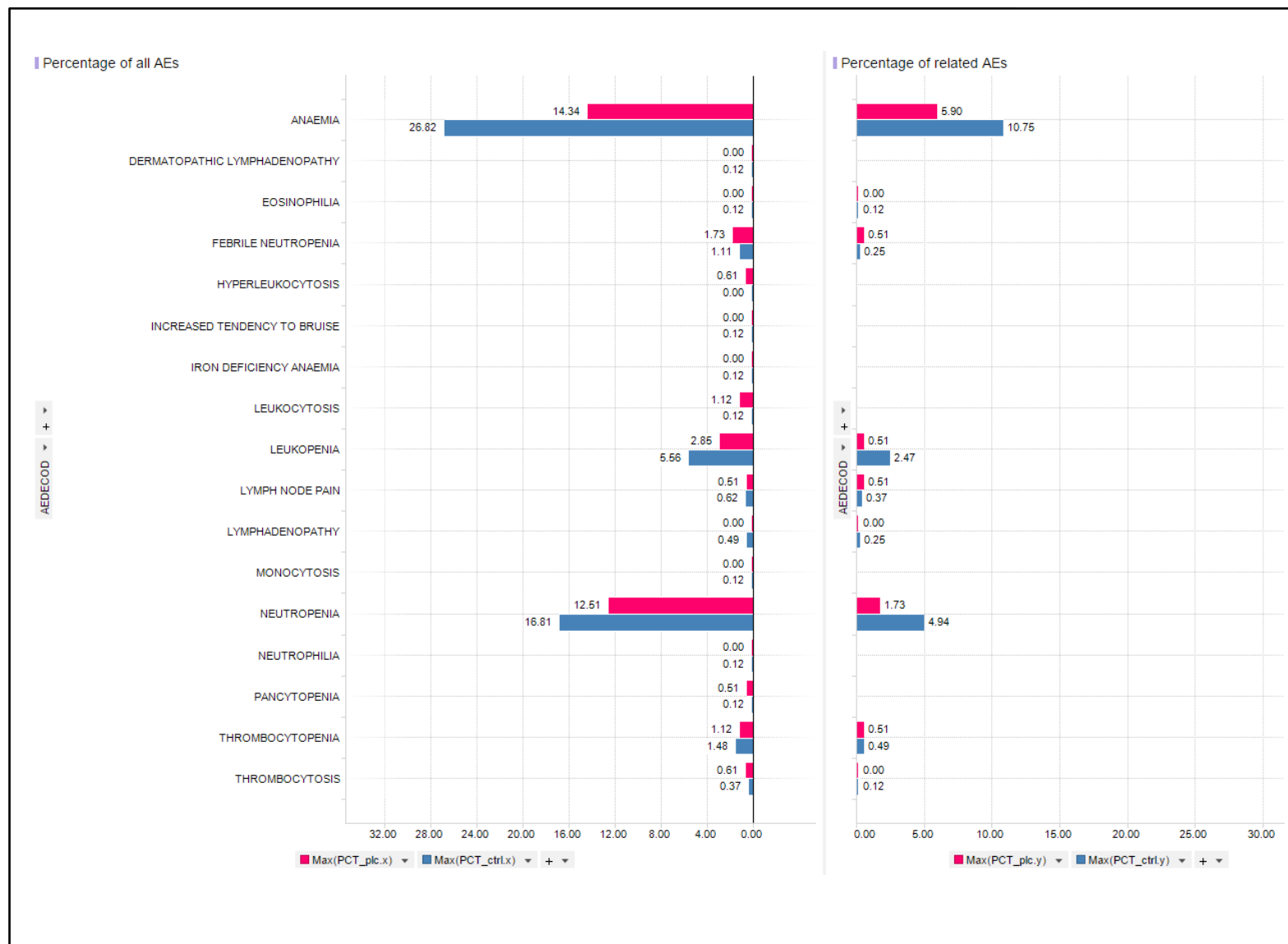
Listing: Adverse Events

Study Identifier	Unique Subject Identifier	Actual Treatment for Period 01	Dictionary-Derived Term	Analysis Start Date-Time	Period Description	Subperiod within Period - Description	Analysis Duration (days)	End Date-Time of Last Dose	Last Dose Relative Time (min)	AE Analysis Flag	Severity	MedDRA version	Subject ID
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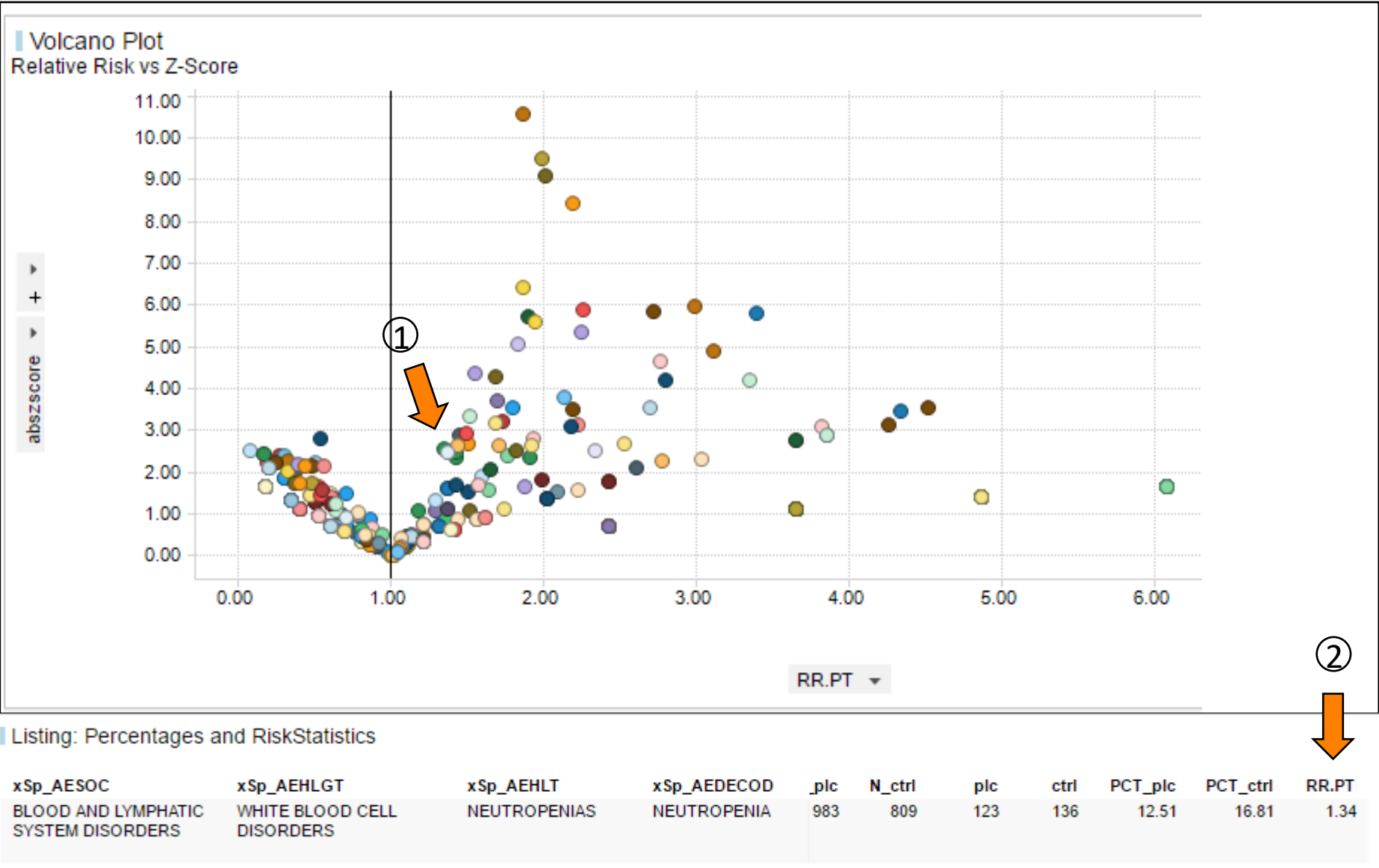
Bar Chart (%) Related AEs

Placebo

Drug A



Volcano Plot



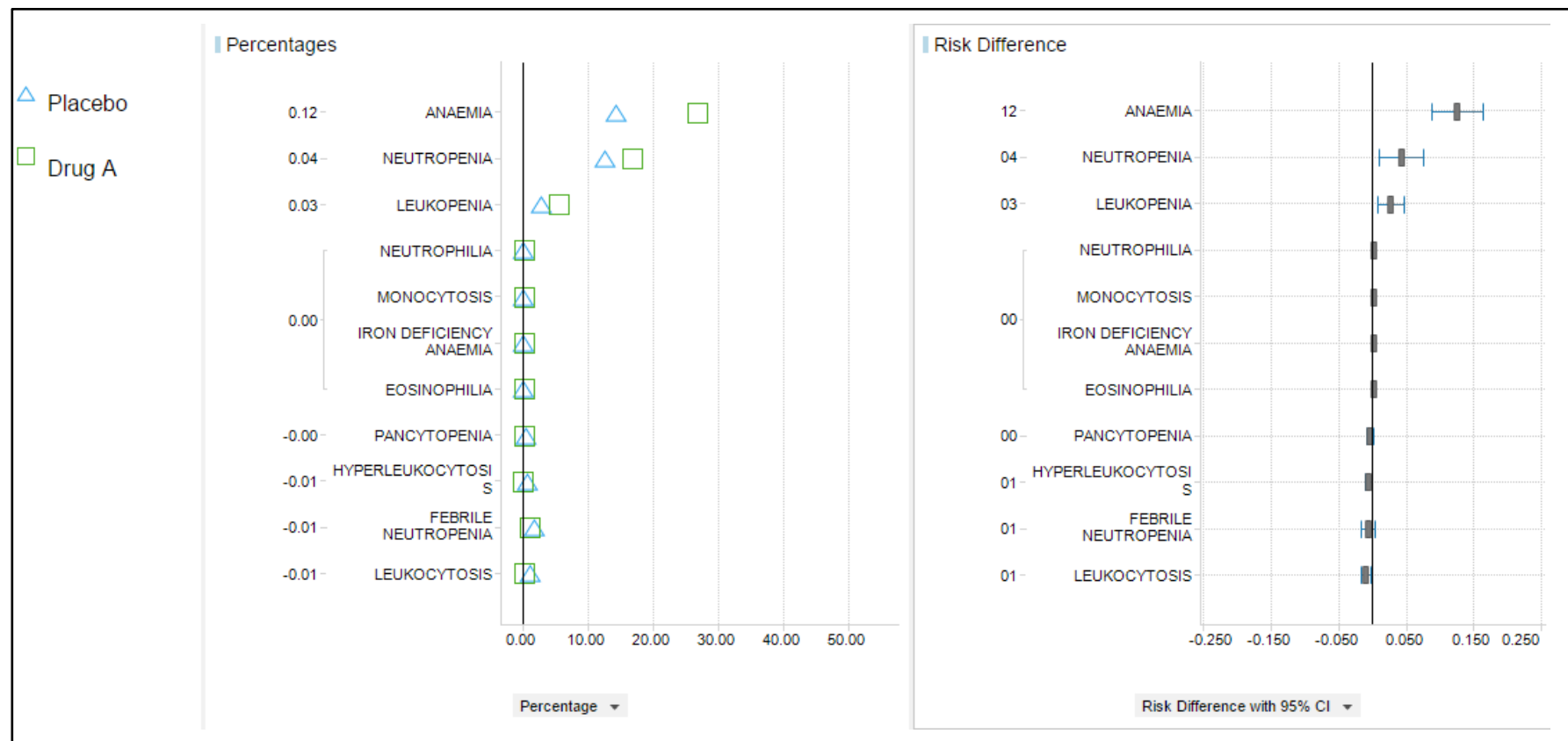
Percent/Risk Diff. by subgroup



Analysis and Displays Associated with Adverse Events

I

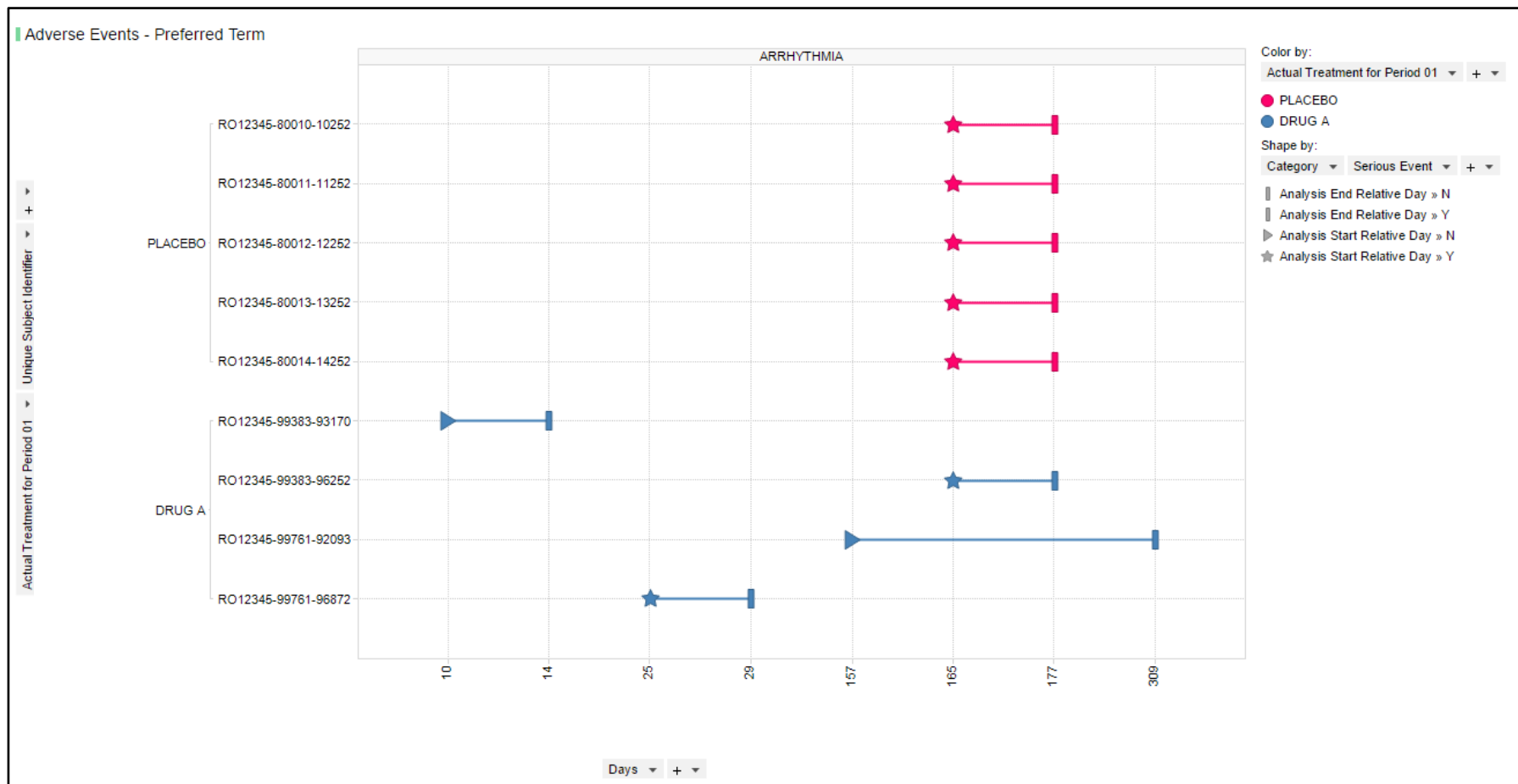
Percentages / Risk Difference with 95% Confidence Interval



Analysis and Displays Associated with Adverse Events

II

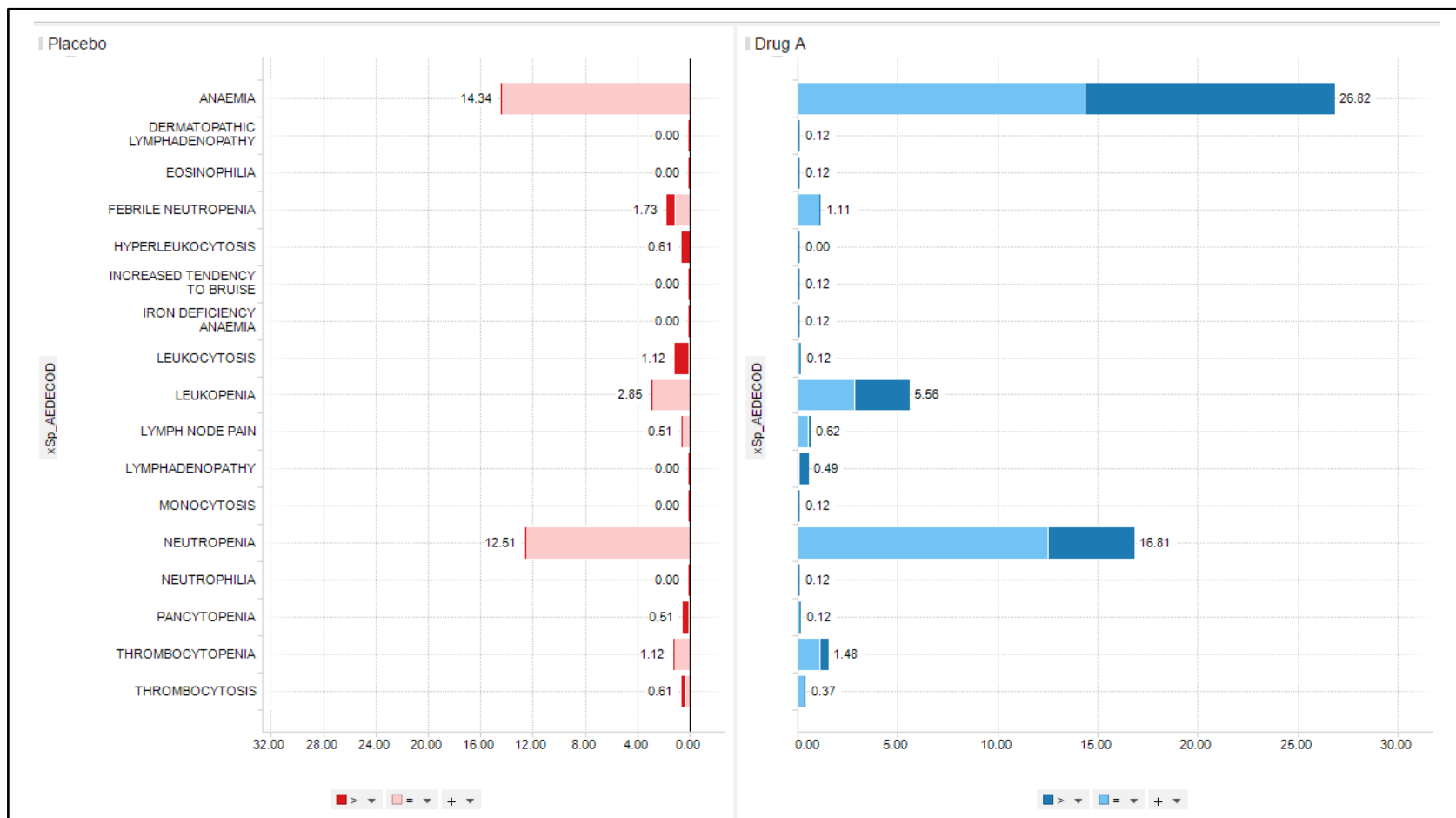
Plot of Adverse Event Start and End Days per Patient



Analysis and Displays Associated with Adverse Events

III

Percentages of Adverse Events



***Doing now what patients need
next***