JMP Clinical® 4.0

adds Ways to Explore Clinical Trials Data Visually

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SAS Institute

jmp Statistical Discovery™ From SAS.

sas THE POWER TO KNOW®

JMP Clinical is Parts of the JMP Family for Statistical Discovery

JMP

This is the JMP product you've known and loved for more than 20 years. It's the standard for visual data analysis right on the desktop. JMP links statistics with graphics, making information accessible in ways a spreadsheet never could. JMP empowers you to enjoy one breakthrough after another.

JMP Pro

JMP Pro includes everything you'll find in JMP, plus powerful new capabilities designed for advanced analytic users who need data mining techniques to create robust predictive models. If you have large data volumes, want to engage in data mining or build predictive models that generalize well, then JMP Pro is for you.

JMP Clinical

JMP Clinical software shortens the drug development process by streamlining safety reviews of clinical trials data. It helps clinicians and biostatisticians migrate into the modern review environment using CDISC data. Intuitive dashboards create a visual framework for rigorous statistical analysis.

JMP Genomics

The desktop solution for analysis and visualization of genomics data, JMP Genomics combines the power of the JMP statistical discovery platform with industry-leading SAS Analytics and customized applications tailored for vast genomic data sets.

What is JMP® Clinical?

- JMP Clinical software from SAS shortens the drug development process by streamlining both internal safety reviews during preclinical, clinical trials and final evaluation by the Food and Drug Administration (FDA).
- JMP Clinical creates reports from standard Clinical Data Interchange Standards Consortium (CDISC) and Standard for Exchange of Non-Clinical Data (SEND) data, facilitating communication between (pre-) clinicians and biostatisticians at the sponsor organization and, subsequently, between sponsors and FDA reviewers.
- It targets Pharmacovigilance sector by using the 4 industry standards algorithms for signal detection in the disproportionality analysis
- It dynamically links advanced statistics and graphics, enabling sophisticated analysis in a user-friendly environment.
- Interactive graphs offer multiple views of patient profiles and reveal hidden patterns in drug-drug, drug-adverse events interactions.

JMP® Clinical is the *de facto* standard for clinical data analysis software.

- It uses standard data (CDISC: SDTM & ADaM; SEND)
- It follows standard reporting recommended by medical authorities reviewer guidance (ICH-E3)
- It is based on industry standard tools (JMP and SAS)
  - JMP is the most widely used review tool at the FDA (40% of medical reviewers at CDER/CBER)
  - JMP is used at the EMEA in Pharmacovigilance
  - JMP is widely used in clinical groups at sponsors
  - SAS is the standard analysis and reporting tool of biostatistics groups at sponsors

JMP® Clinical

Highly Visual
Interactive Graphics
Intuitive

Scalable
Validated Powerful Analytics

JMP® Clinical Platform

Consumers

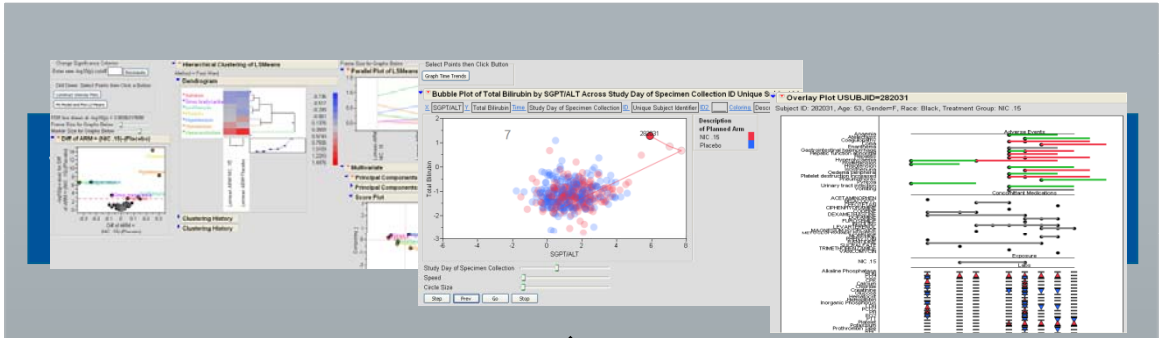
Knowledge Deployment

Producers

Knowledge Generation

Data Layer

Data Gathering



Workflows

Statistical Reporting Tools

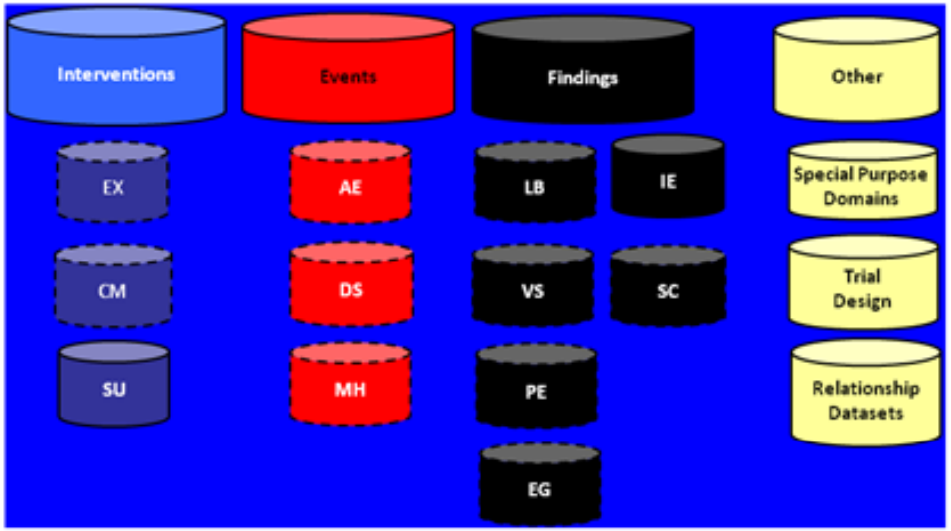
sas

CDISC

SDTM, ADAM, SEND

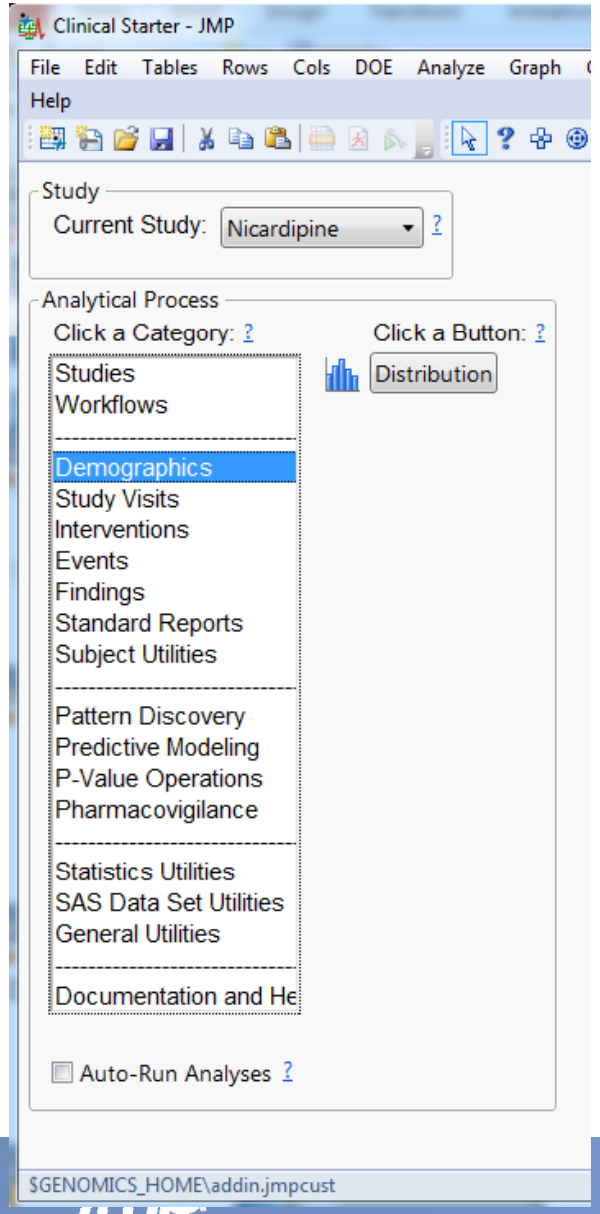
THE POWER TO KNOW.

SDTM data example



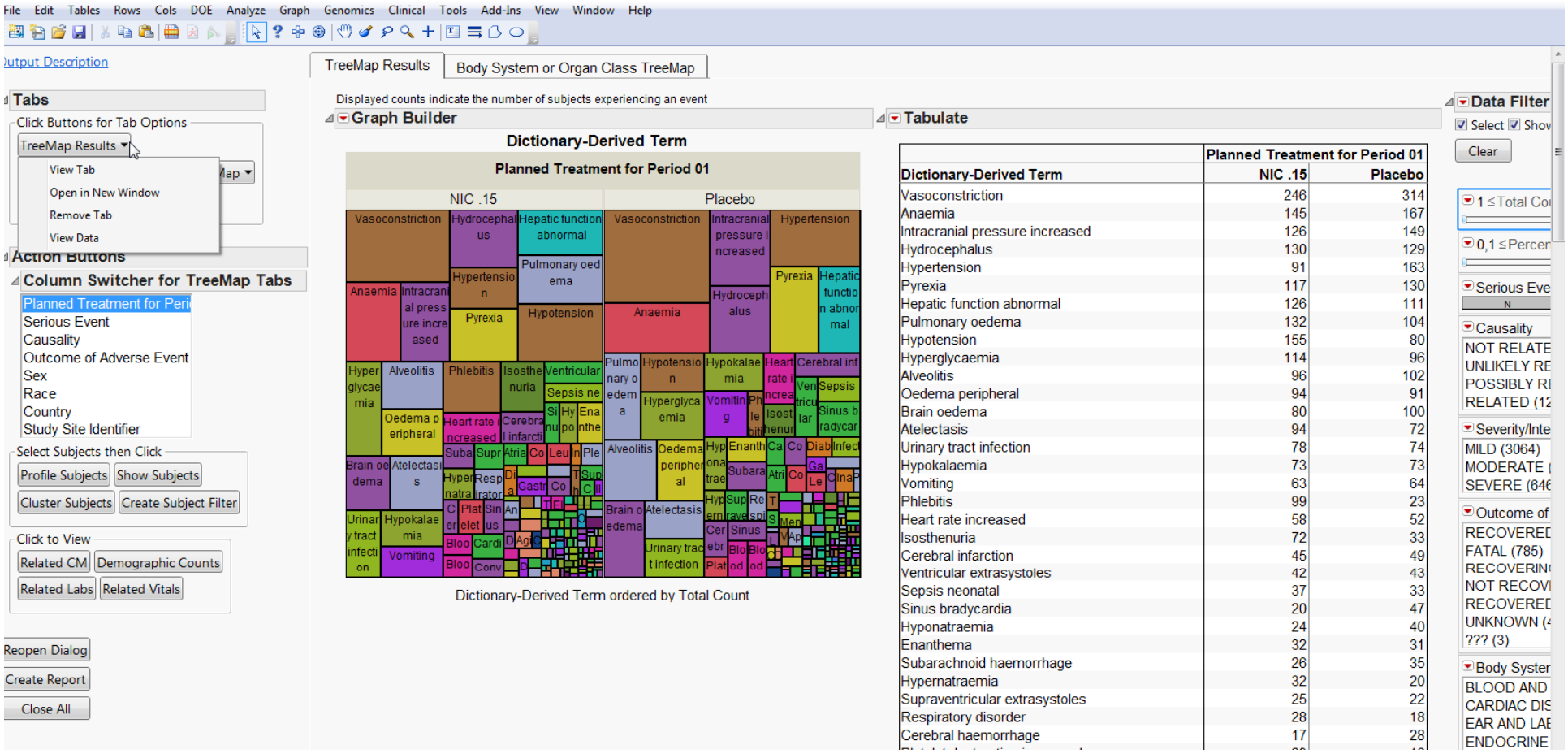
- **Interventions**
  - EX – Exposure
  - CM – Concomitant Medications
  - SU – Substance Use
- **Events**
  - AE – Adverse Events
  - DS – Disposition
  - MH – Medical History
- **Findings**
  - LB – Laboratory Tests
  - VS – Vital Signs
  - PE – Physical Examinations
  - EG – ECG Tests
  - IE - Inclusion/Exclusion Exceptions
  - SC - Subject Characteristics
- **Others – Special Purpose Domains**
  - DM – Demographics

JMP® Clinical Processes on the shelf

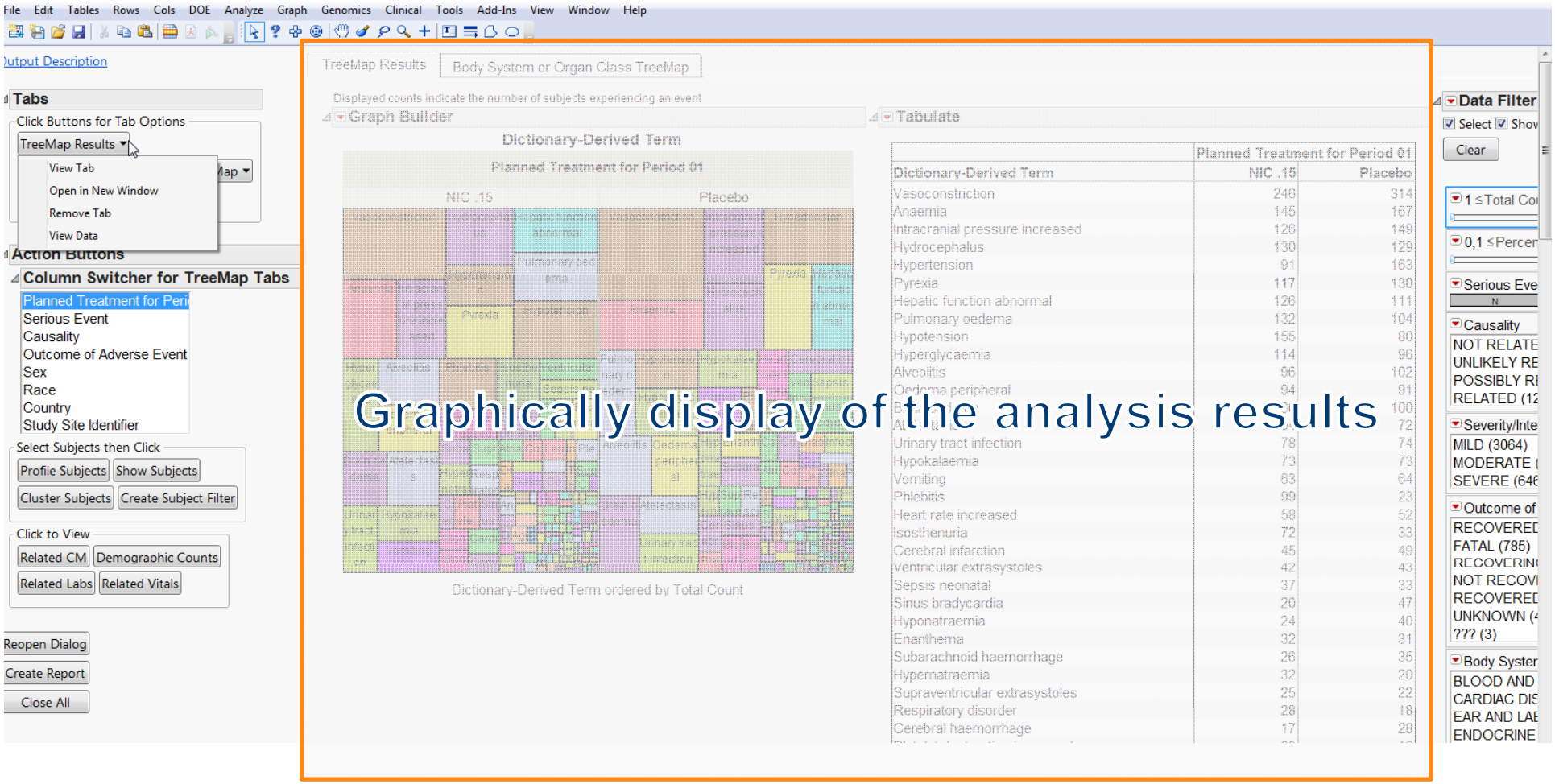


- JMP Clinical has all processes in place to go through a standard clinical review process.
- Based on the availability of the different data domains, you will be able to graphically review :
  - Interventions, Events, Findings, Special
  - All Graphics linked to the data, with drill-down options and patient profiles

Reports when a process is run

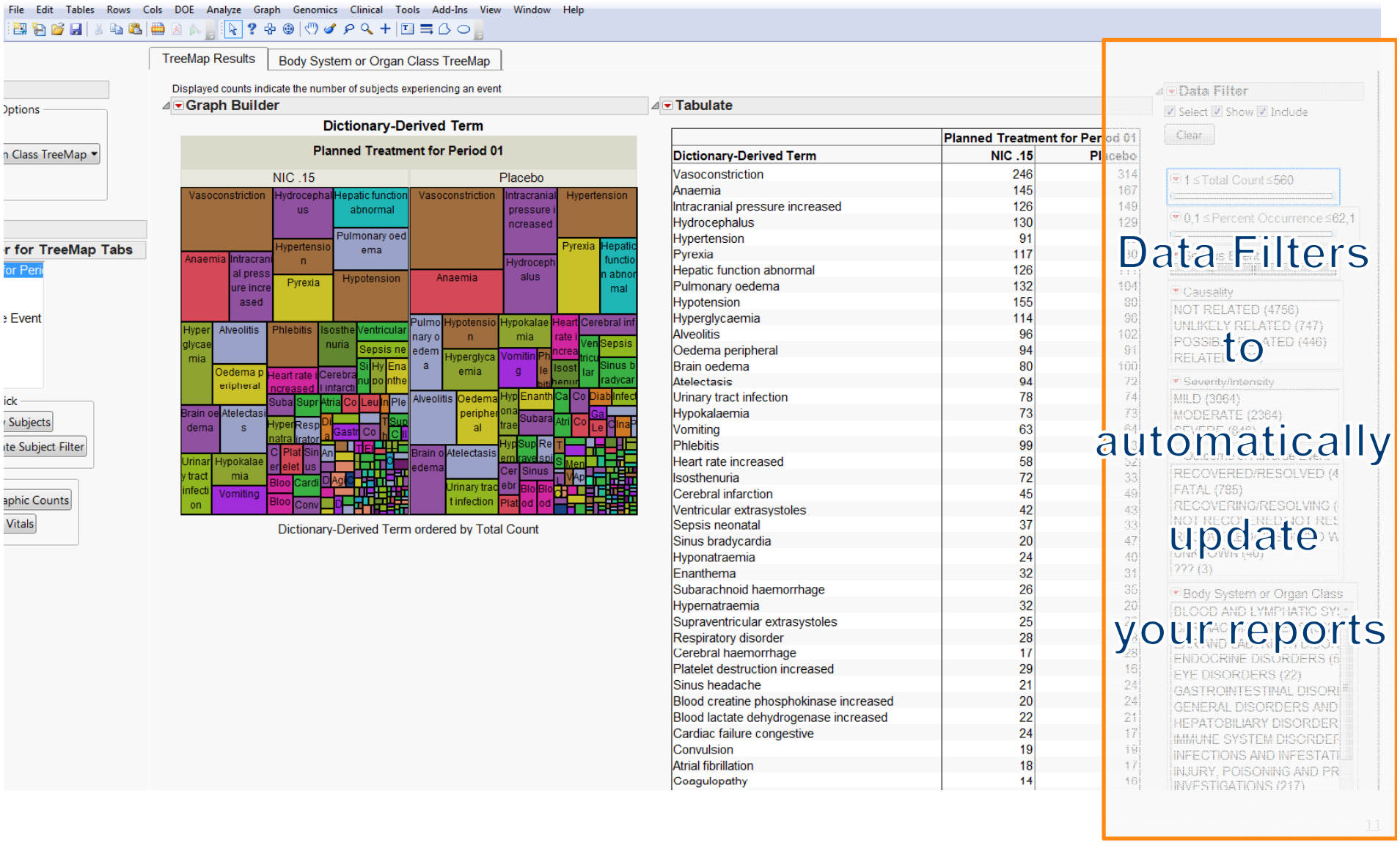


Reports when a process is run



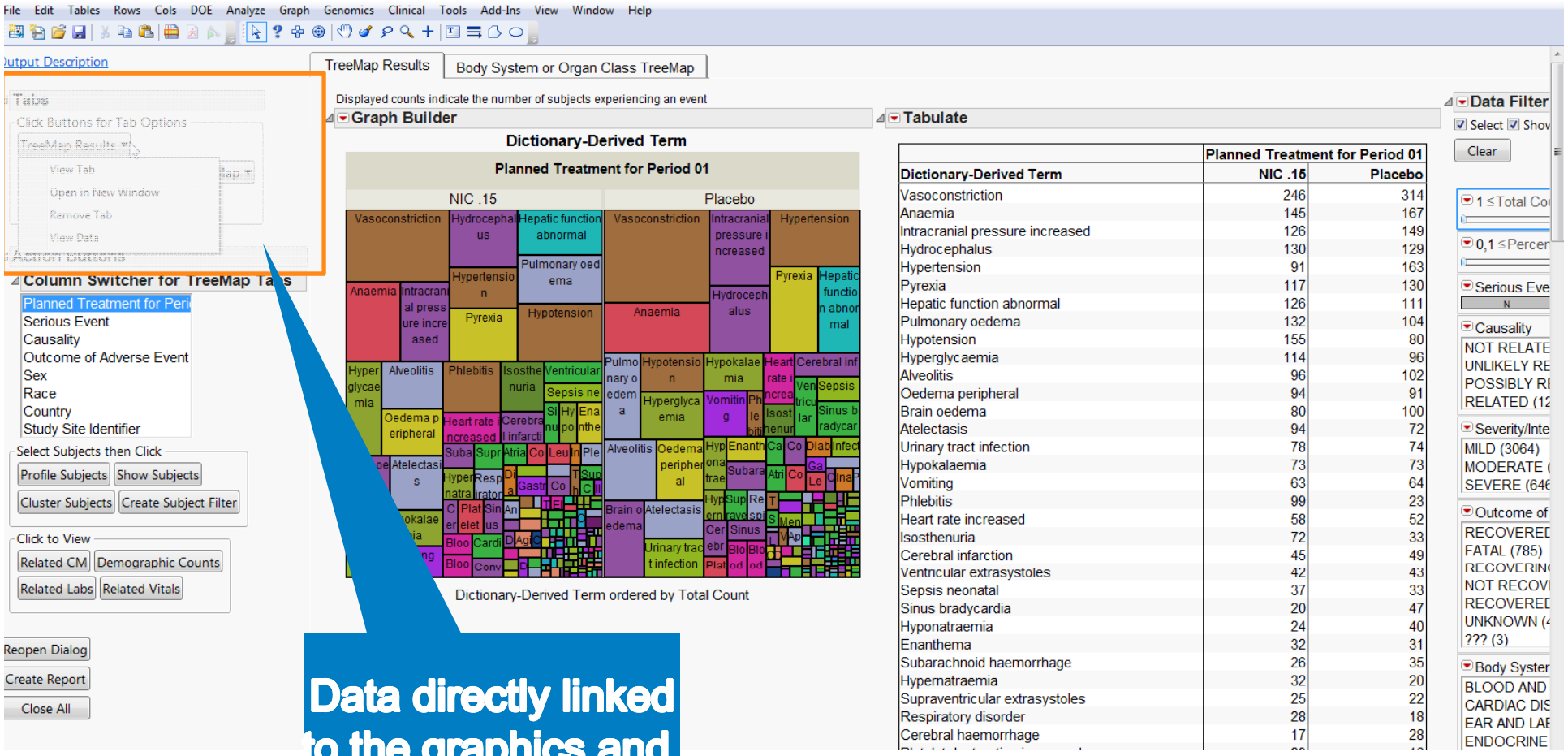
Graphically display of the analysis results

Reports display when a process is run



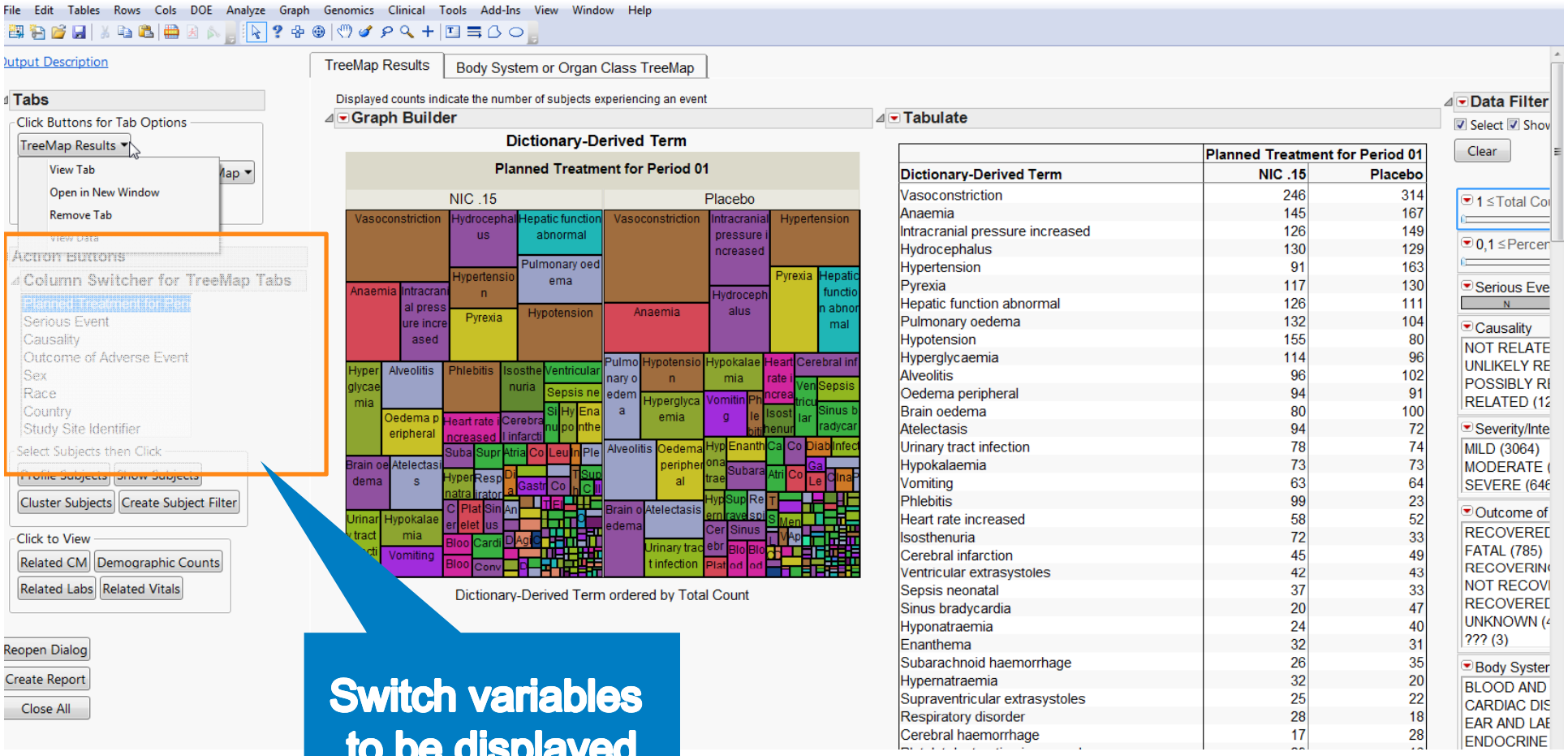
Data Filters to automatically update your reports

Reports when a process is run



Dictionary-Derived Term	Planned Treatment for Period 01	
	NIC .15	Placebo
Vasoconstriction	246	314
Anaemia	145	167
Intracranial pressure increased	126	149
Hydrocephalus	130	129
Hypertension	91	163
Pyrexia	117	130
Hepatic function abnormal	126	111
Pulmonary oedema	132	104
Hypotension	155	80
Hyperglycaemia	114	96
Alveolitis	96	102
Oedema peripheral	94	91
Brain oedema	80	100
Atelectasis	94	72
Urinary tract infection	78	74
Hypokalaemia	73	73
Vomiting	63	64
Phlebitis	99	23
Heart rate increased	58	52
Isosthenuria	72	33
Cerebral infarction	45	49
Ventricular extrasystoles	42	43
Sepsis neonatal	37	33
Sinus bradycardia	20	47
Hyponatraemia	24	40
Enanthema	32	31
Subarachnoid haemorrhage	26	35
Hypernatraemia	32	20
Supraventricular extrasystoles	25	22
Respiratory disorder	28	18
Cerebral haemorrhage	17	28

Reports when a process is run



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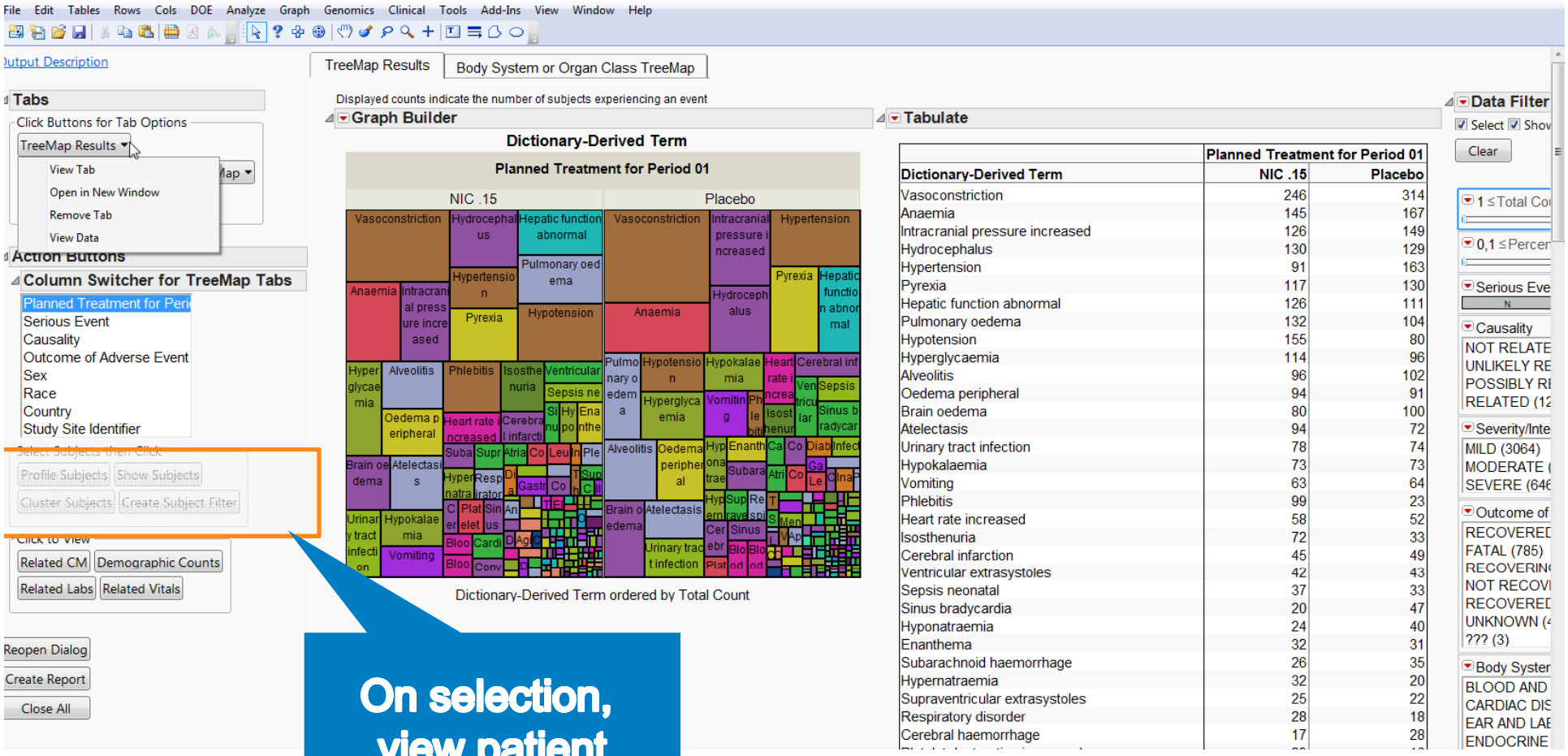
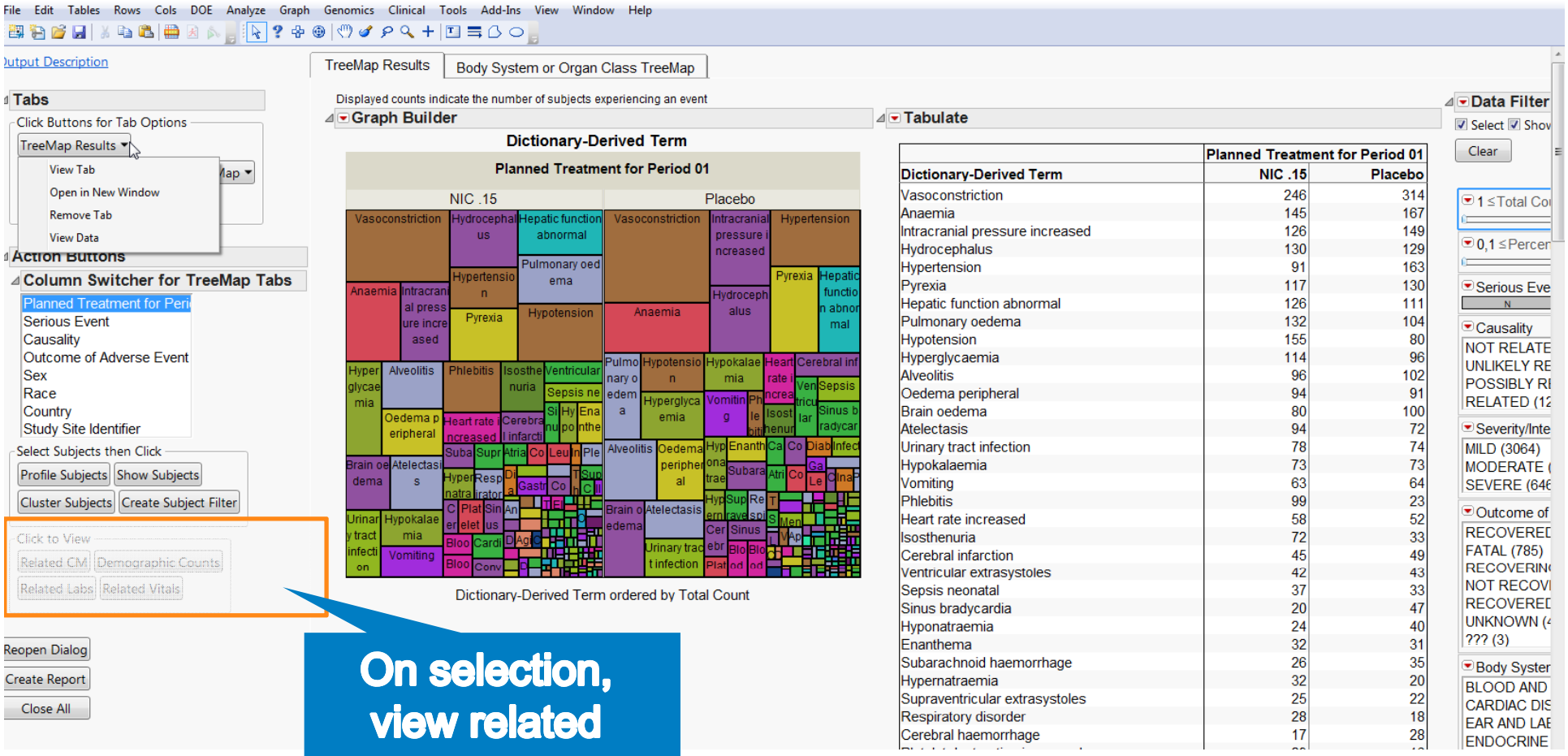
Reports when a process is run

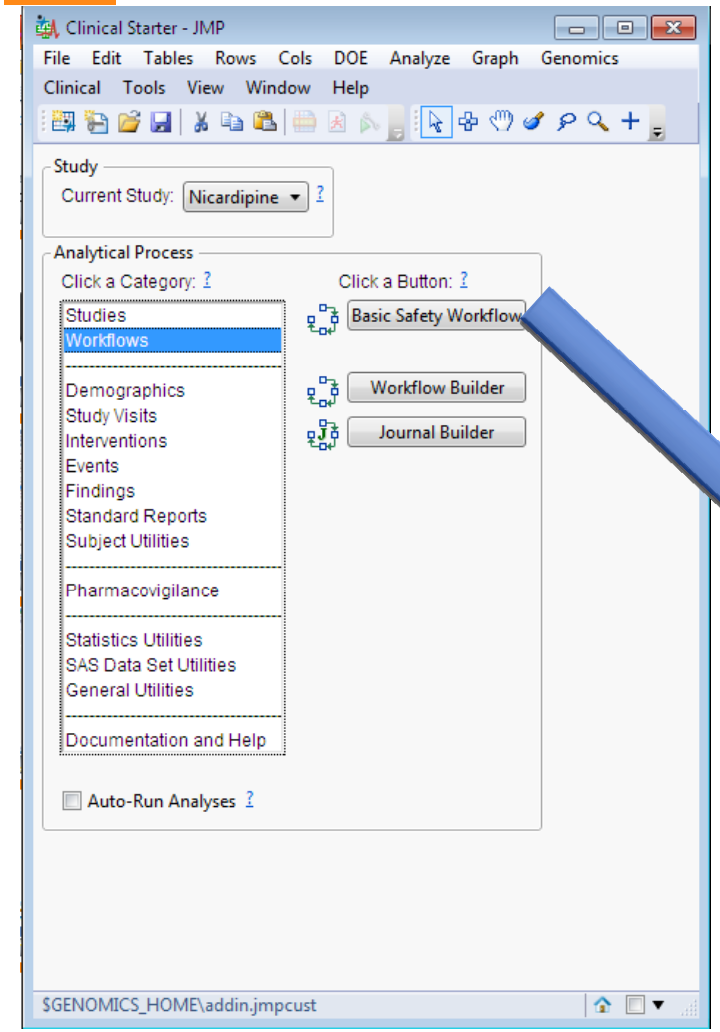


Reports when a process is run



On selection, view related events and findings

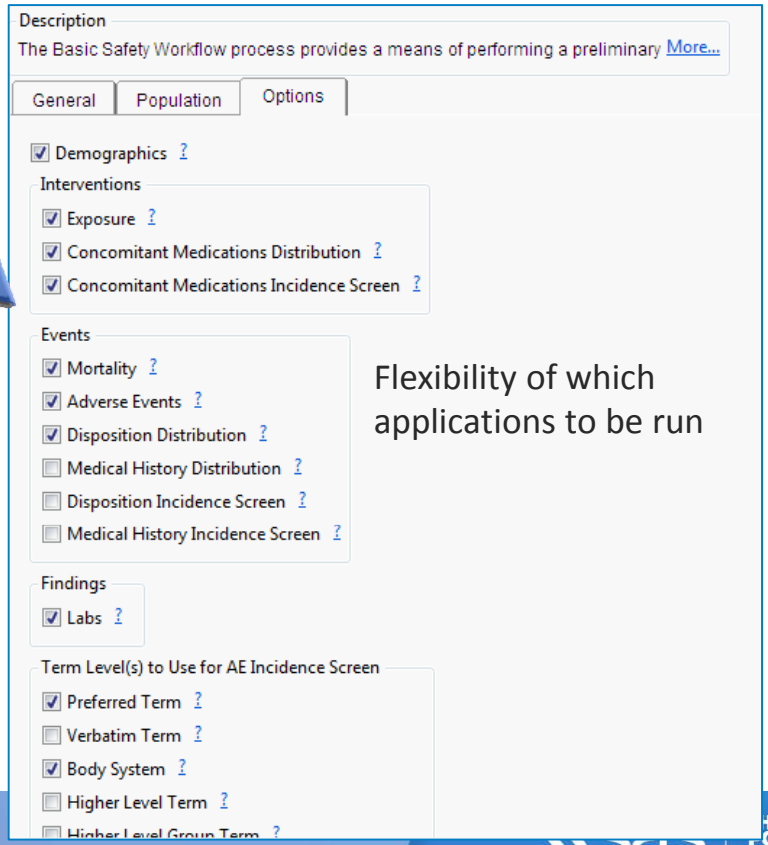
Fast Getting Started: Basic Safety Workflow



One Single Dialog to run a complete set of clinical safety reports

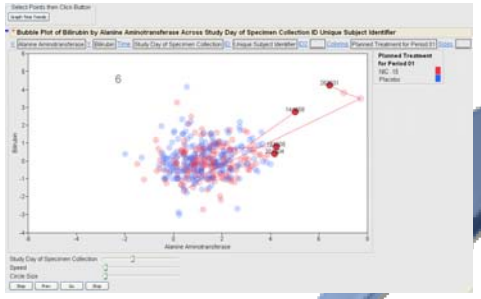
You might be doing many similar experiments where the analytic methods used must be the same time after time.

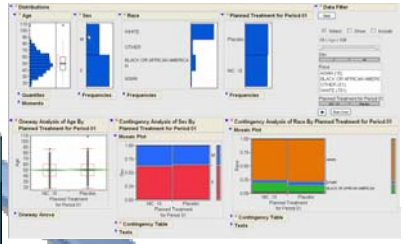
JMP Clinical has a remarkable flexibility how to proceed with your analysis. A very simple and not doubt an extremely fast way how to proceed, is the Basic Safety Workflow.

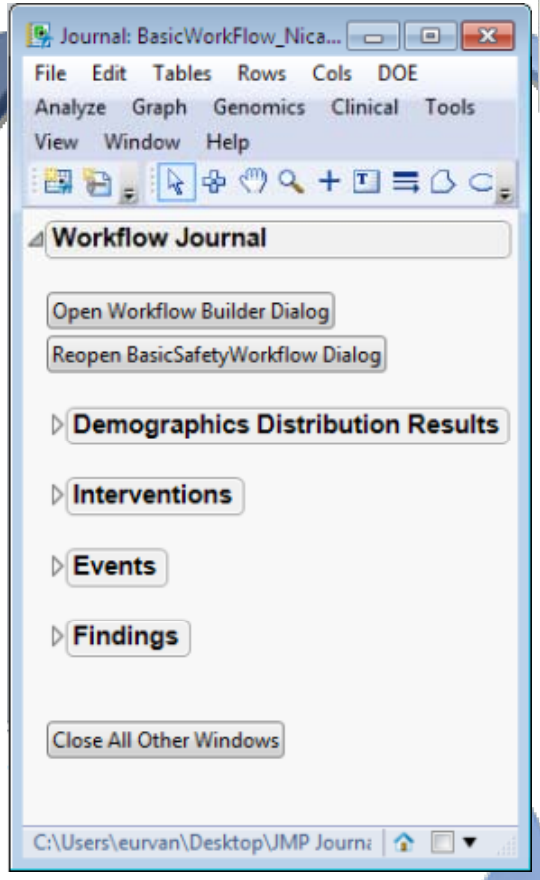


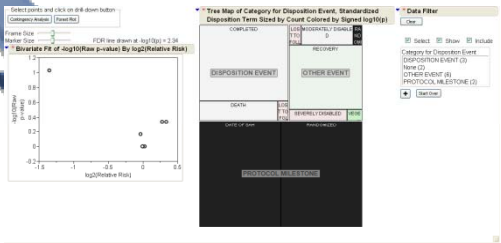
Flexibility of which applications to be run

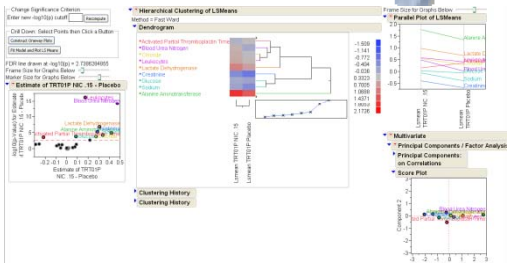
A complete set of reports that embrace the clinical safety review process

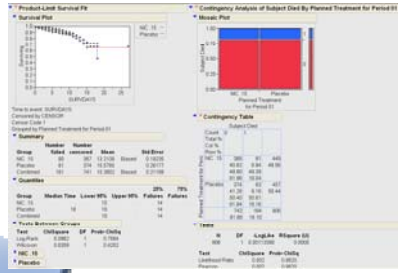


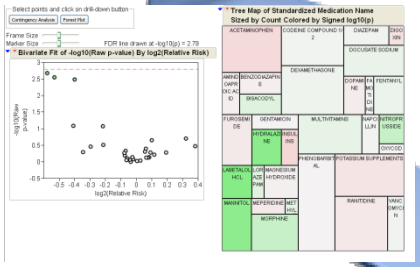


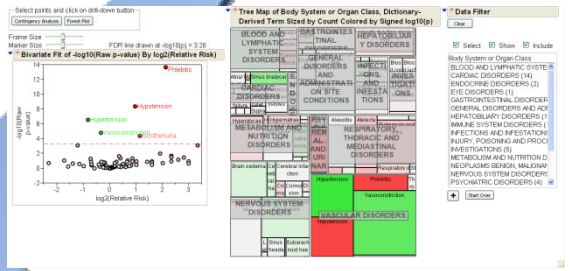












Benefits for producers and consumers

JMP Clinical streamlines the clinical reporting and reviewing process by:

- Faster and easier safety review process by delivering unparalleled flexibility, point and click and drill down functionalities for exploring prominent results in more detail.
- Lower cost-to-market via better decision making on safety outcomes: JMP Clinical reduces the false discovery rate, by mitigating the risk of over-reporting adverse events.
- Spending time more efficiently in the safety review process: more time spend by exploring patterns and predicting outcomes in clinical trials data – and less time programming or manipulating data tables.

JMP® Clinical

Data Analysis Workflow
Live Demonstration

jmp Statistical Discovery™ From SAS.

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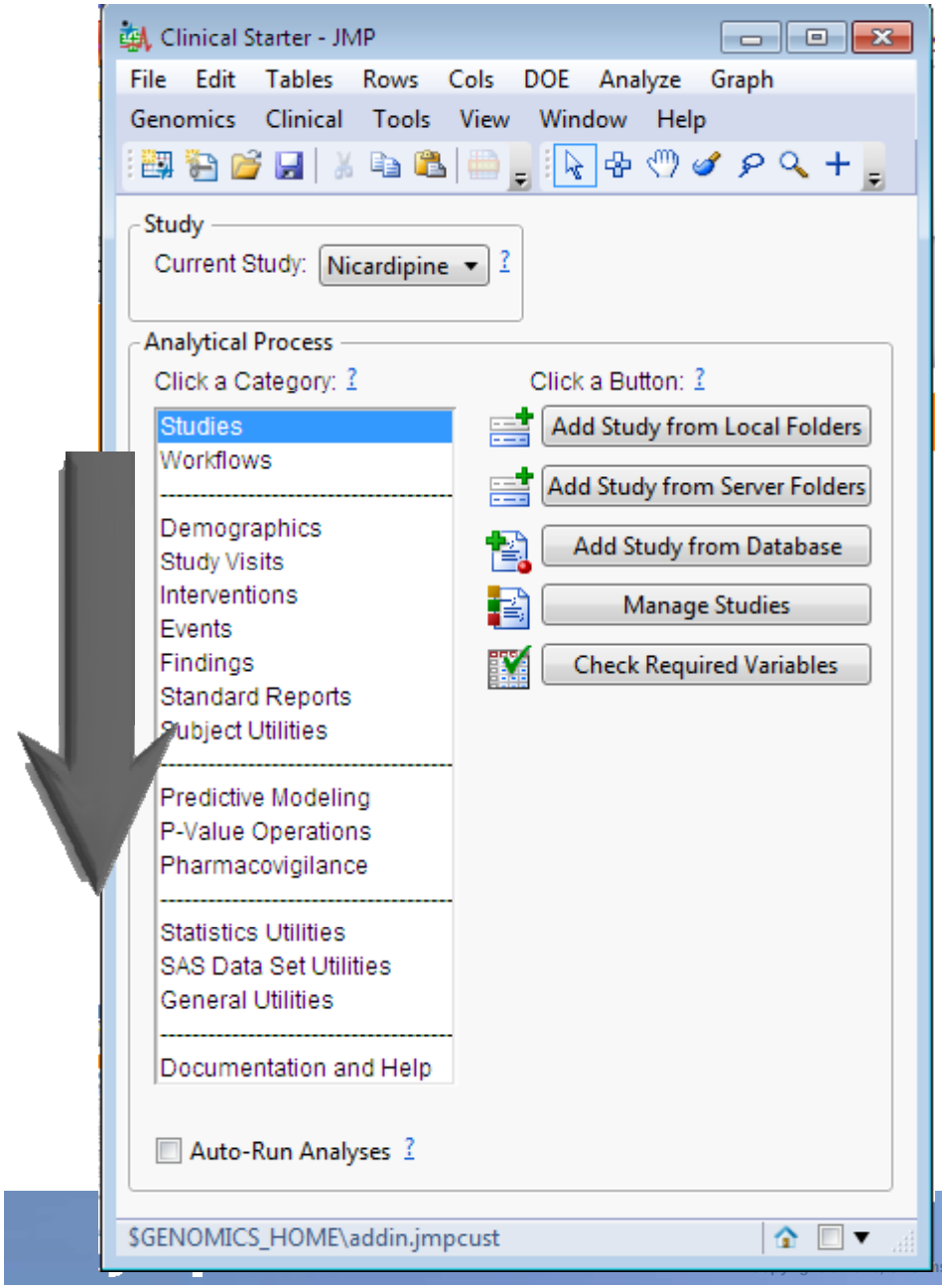
The Study Design

The Clinical Study used is the following:

- Nicardipine treatment of 906 subjects that had Subarachnoid Hemorrhage.
- All the patients were included in a randomized double-blind placebo-controlled study; 449 patients received Nicardipine while 457 received the placebo.
- Patients in each group were balanced with regard to prognostic factors for overall outcome.
- Nicardipine and the placebo were delivered continuously at 0.15 mg for up to 14 days and patients were followed for up to 120 days following administration of the drugs.
- Results are formatted according to the CDISC Study Tabulation Model.

JMP® Clinical Starter Menu

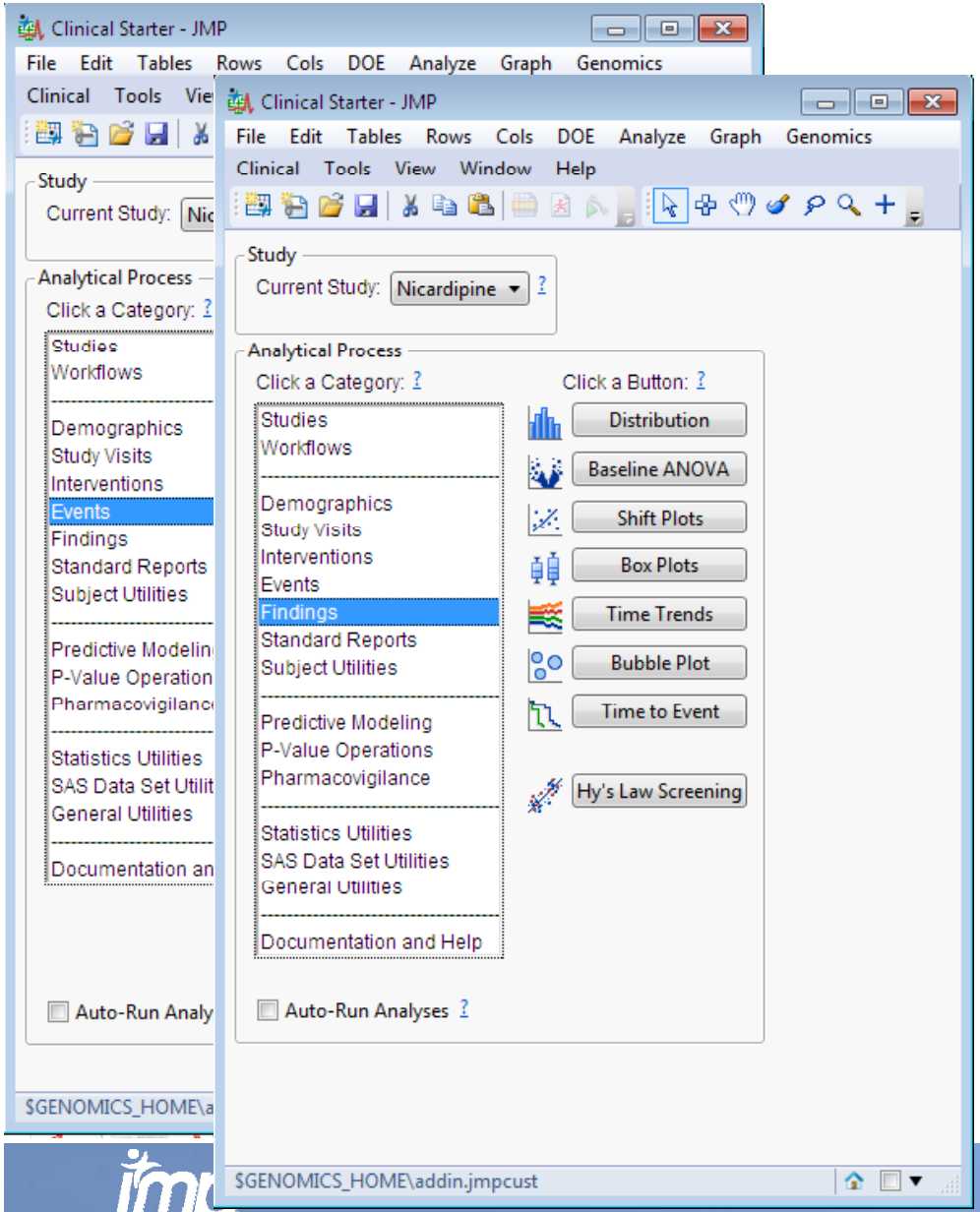


JMP Clinical comes with its JMP Clinical Starter.

This dialog enables you to quickly view and access all JMP Clinical, workflows, and applications.

The order of this menu is important. It follows roughly the order described in the ICH-E3 reviewer guidance

JMP® Clinical Starter Menu

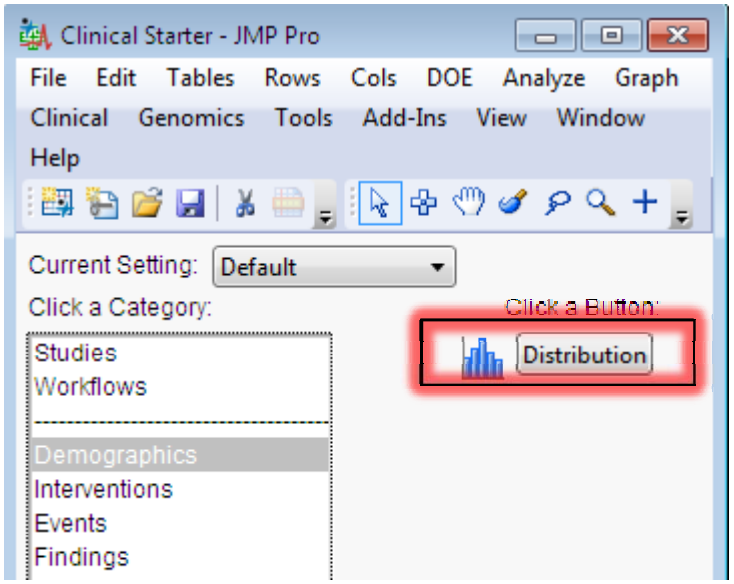


JMP Clinical comes with its JMP Clinical Starter.

This dialog enables you to quickly view and access all JMP Clinical, workflows, and applications.

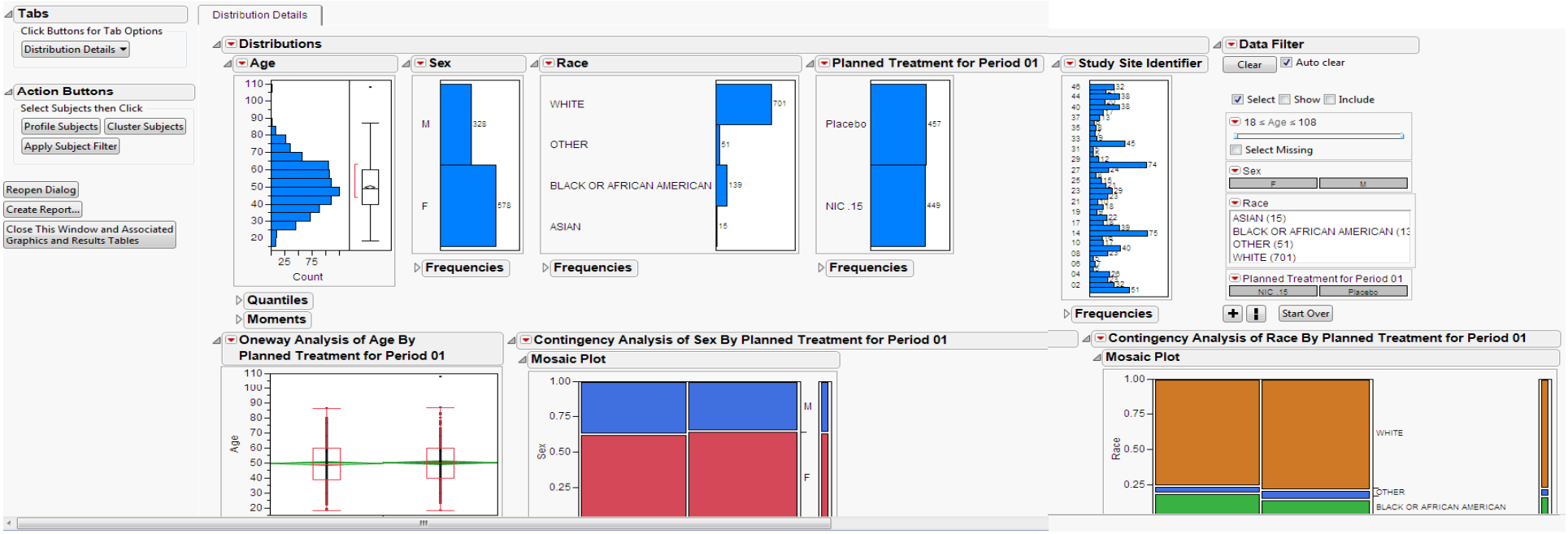
The Applications are ordered in categories and subcategories for the ease of use

JMP® Clinical Analysis Workflow

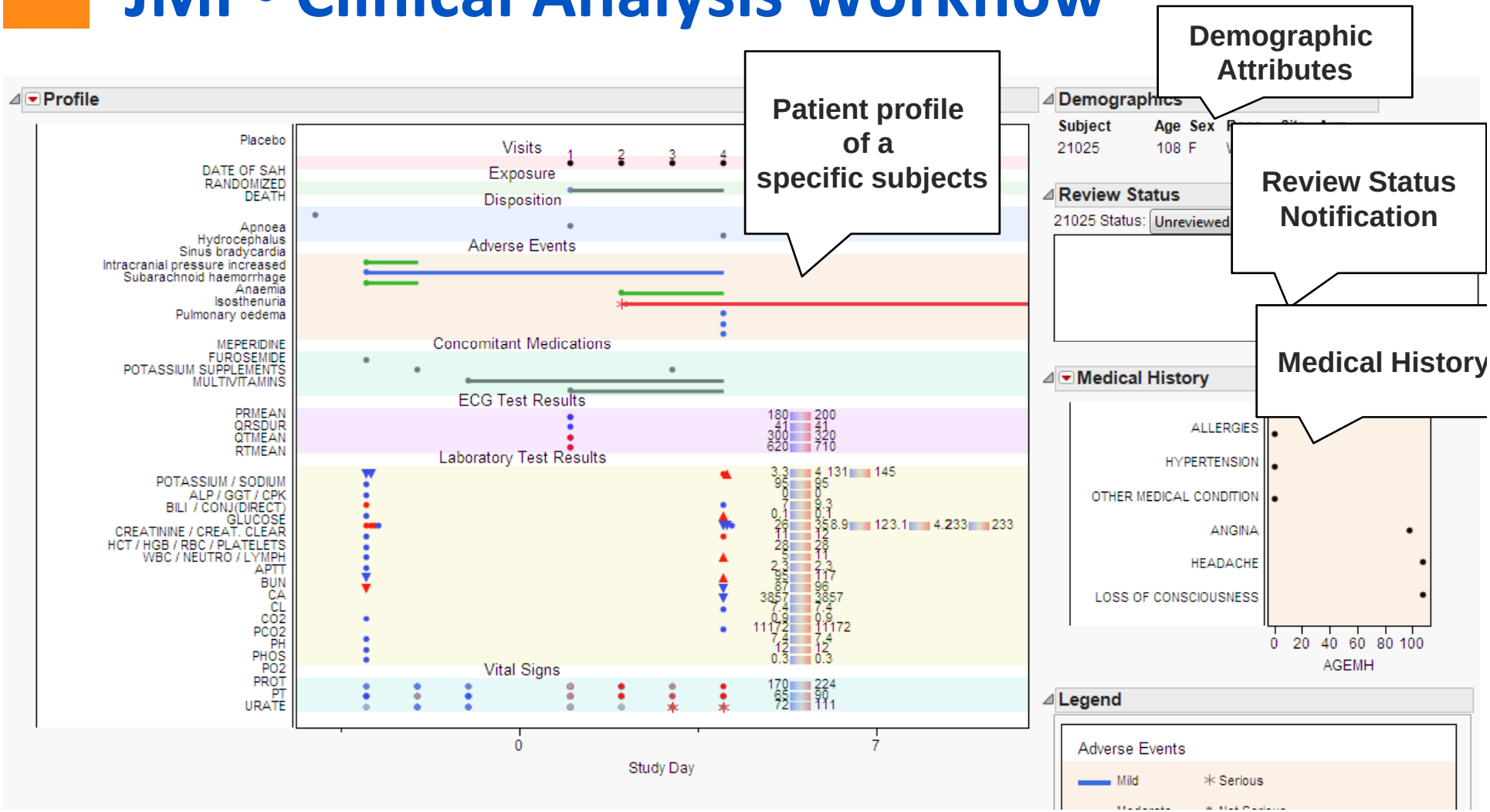


Visualize relationships between demographic characteristics and treatment groups

One would need to check for consistency in the demographics distributions to evaluate any significant deviation among age, sex ,race groups and sites within the different treatment groups



JMP® Clinical Analysis Workflow



JMP® Clinical Analysis Workflow

Patient Narratives

Subject: 101001
Randomized Arm: Placebo
Investigator: 101A

Subject 101001 was a 63-year-old white female. Her medical history included headache associated with sah (1988), hypertension with this sah (1988), vomiting associated with sah (1988) and hypertension prior to sah (1981). She began dosing with 40 mg/h of placebo on 21JAN1988 (Day 1). The subject discontinued the trial on 18FEB1988 (Day 29) due to death.

Other Significant Adverse Event (coded term [reported term]): HYDROCEPHALUS [HYDROCEPHALUS]

On 21JAN1988 (Day 1) the subject experienced a hydrocephalus (mild) which was considered a significant adverse event. At the time of the event, the subject was taking 40 mg/h of placebo and had been at this dose for 1 day. The significant AE occurred on the first day of dosing with any study medication. Trial medication had an action of drug withdrawn as a result of the event. It is not known from the case report form if therapeutic measures were administered to treat the event.

Adverse events that occurred within a ±3-day window of the onset of the significant AE included vasoconstriction (moderate) and vomiting (mild). Concomitant medications taken at the onset of the significant AE included potassium supplements, codeine compound 1/2, docusate sodium and multivitamins.

The investigator considered the AE to be not related to study medication. The final outcome of the event was reported as recovered/resolved on 02FEB1988 (Day 13).

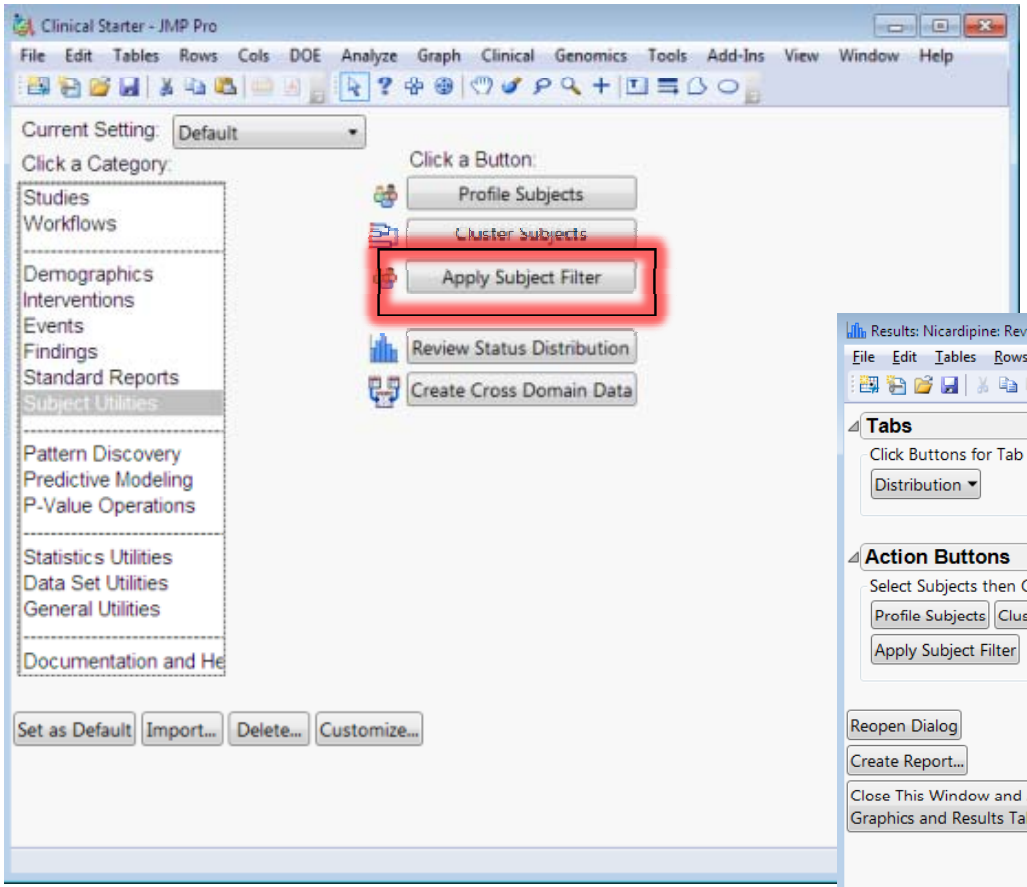
Other Significant Adverse Event (coded term [reported term]): PYREXIA [PYREXIA]

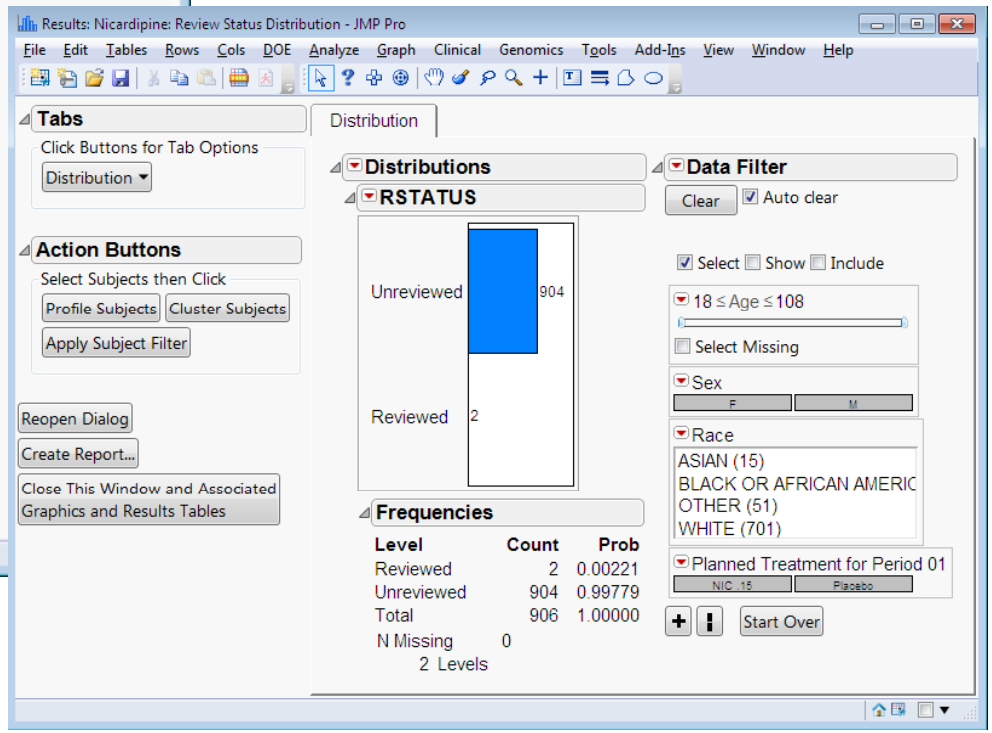
On 25JAN1988 (Day 5) the subject experienced a pyrexia (mild) which was considered a significant adverse event. At the time of the event, the subject was taking 40 mg/h of placebo and had been at this dose for 5 days. The significant AE occurred 4 days after the first dose of any study medication. Trial medication had an action of dose not changed as a result of the event. It is not known from the case report form if therapeutic measures were administered to treat the event.

Adverse events that occurred within a ±3-day window of the onset of the significant AE included vomiting (mild). Concomitant medications taken at the onset of the significant AE included potassium supplements, docusate sodium, multivitamins and codeine compound 1/2.

The investigator considered the AE to be not related to study medication. The final outcome of the event was reported as recovered/resolved on 31JAN1988 (Day 11).

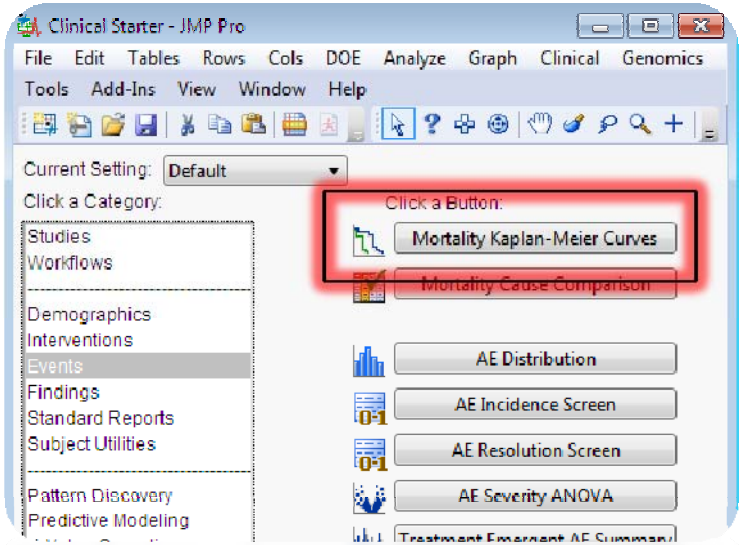
JMP® Clinical Analysis Workflow





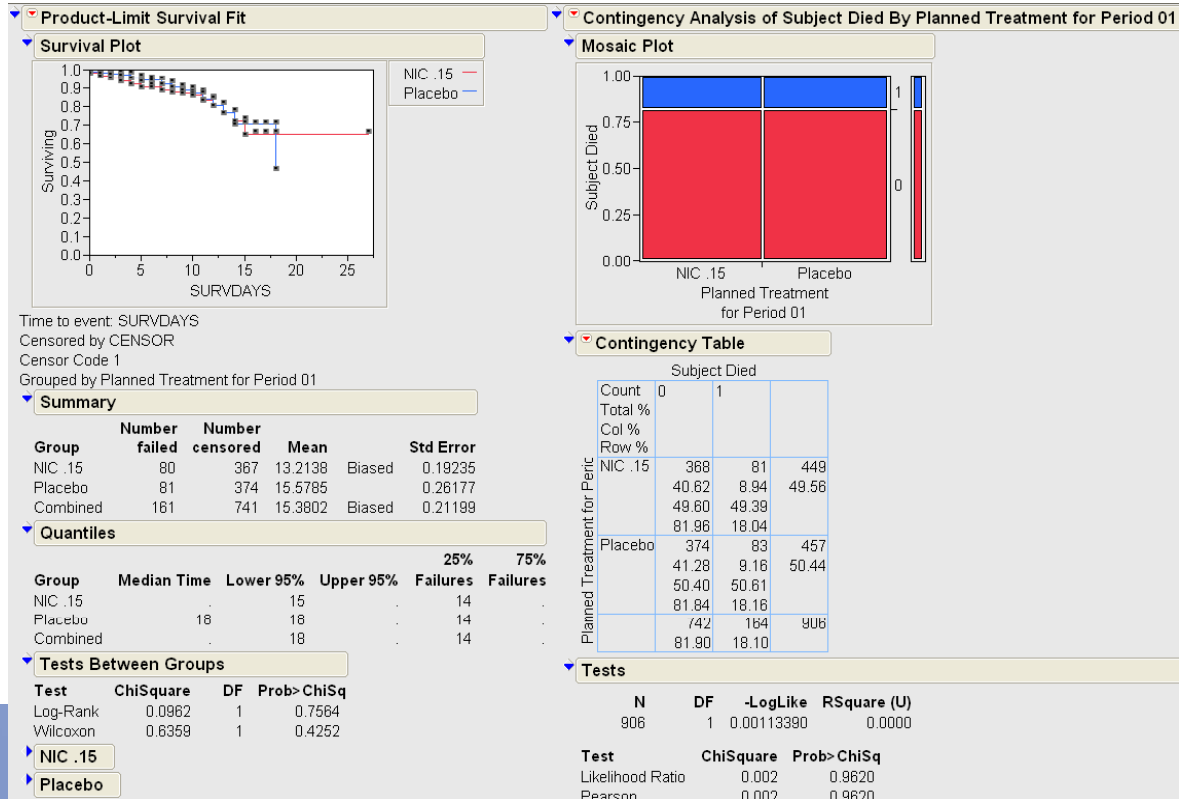
The Process shows the distribution of the review status of subjects in a study.

JMP® Clinical Analysis Workflow

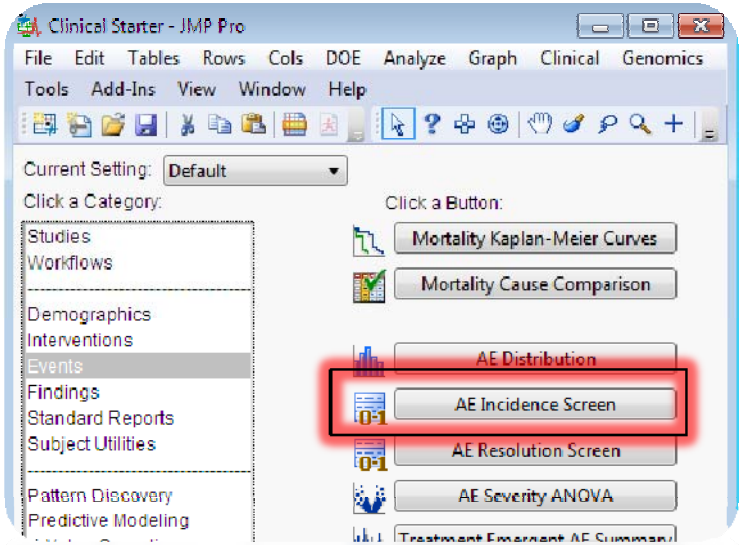


Visualize Relationships between Mortality Rate and treatment groups

It is Important to know if there are significant deviations in the mortality rate across treatment groups

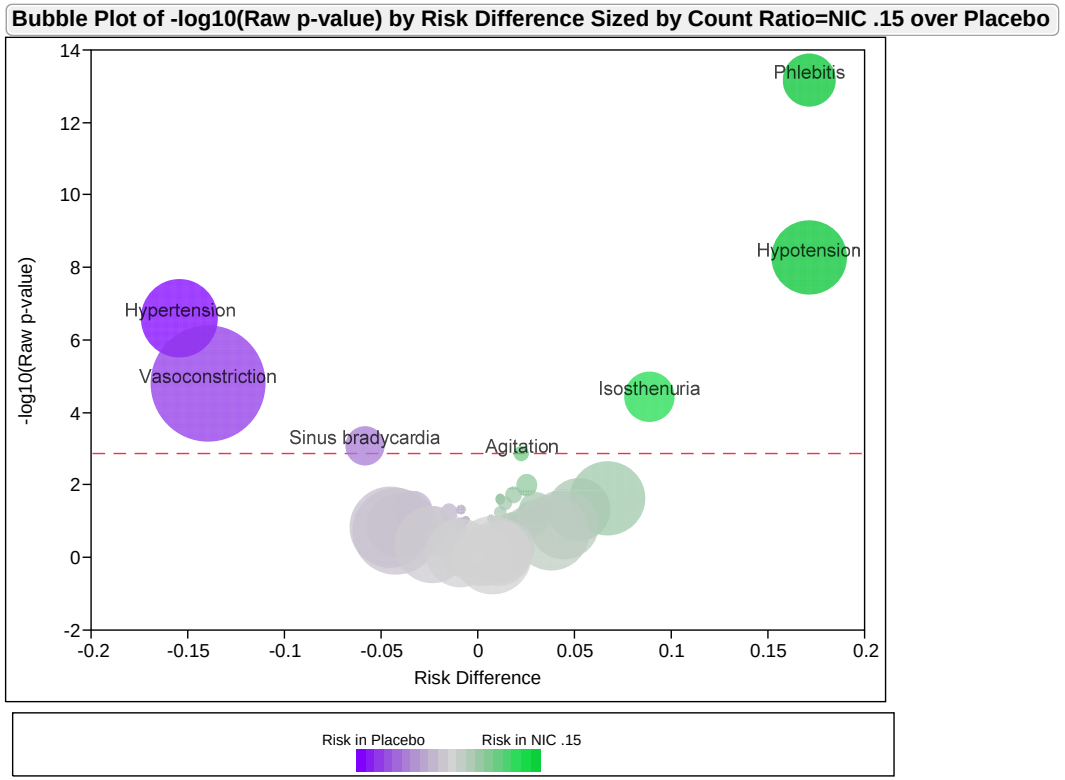


JMP® Clinical Analysis Workflow

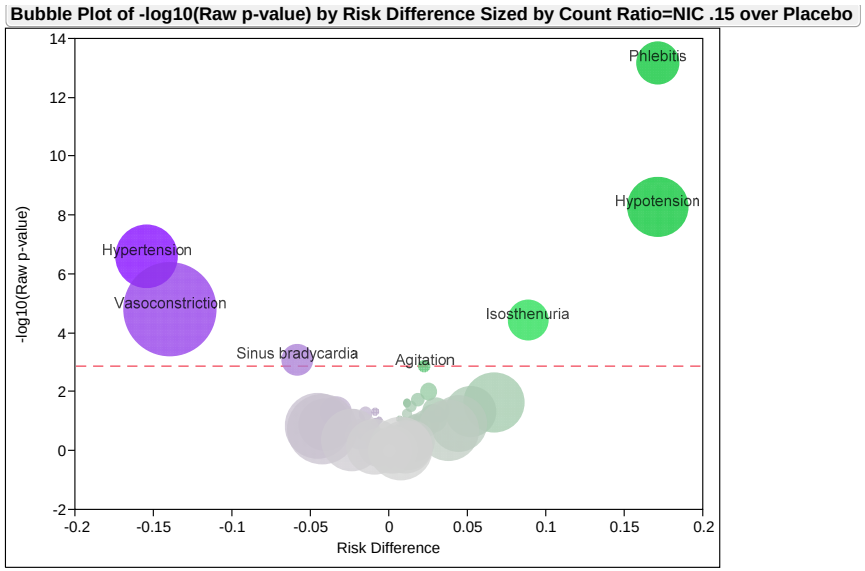


Visualise significance analysis tests reports of Adverse Events

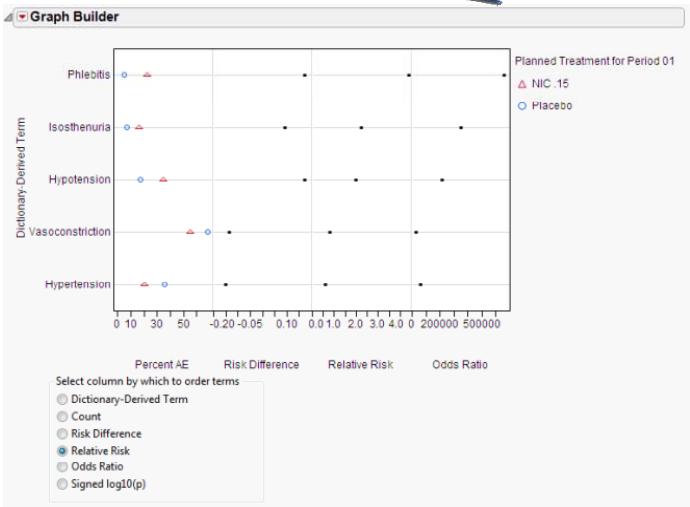
Once adverse events have been detected, it is important to find out if those are significant by means of Fisher's exact test or for more complex models, by Mixed Model Analysis.



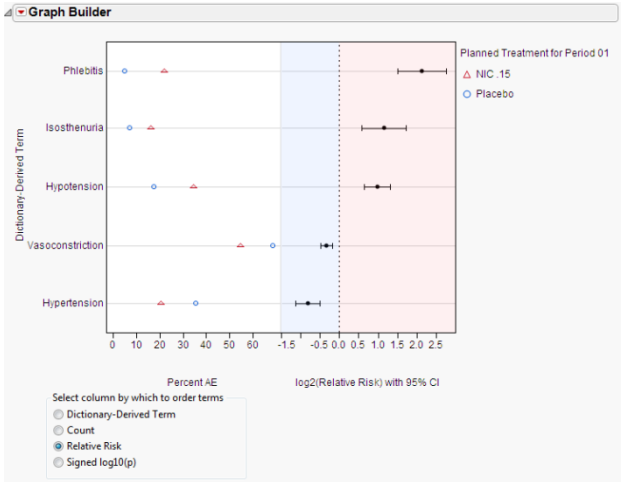
Drill Down Options
From the incidence
Screen platform



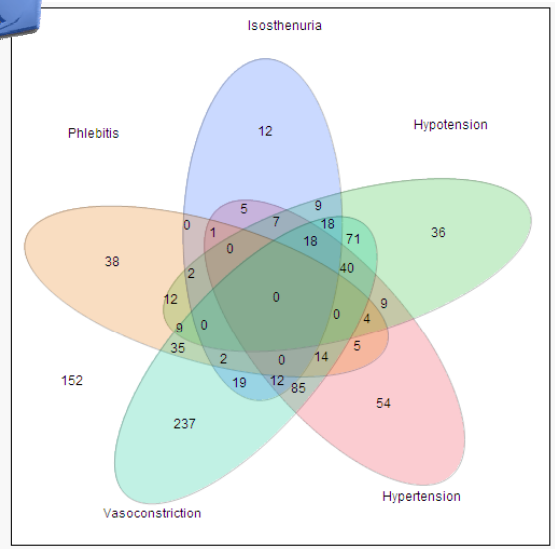
Drill down to Dot Plot



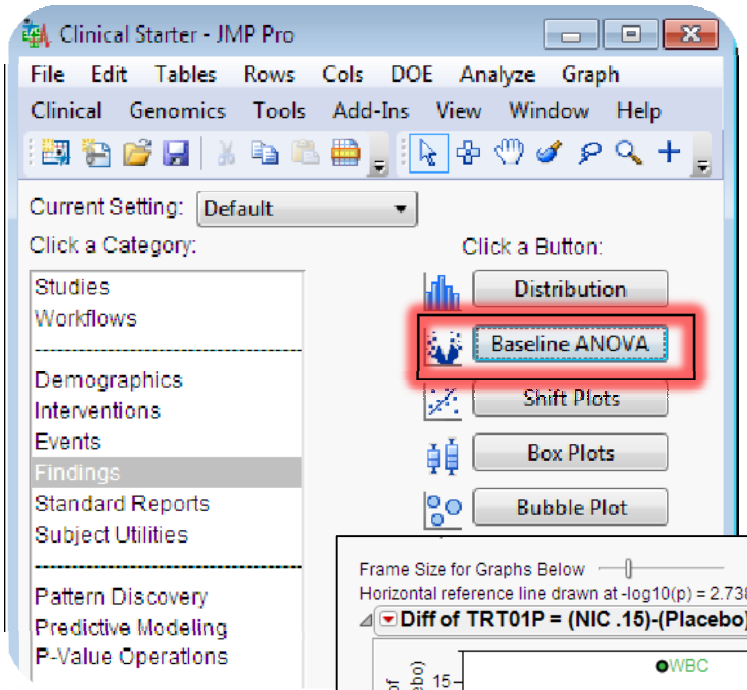
Relative Risk Plot



Venn Diagram

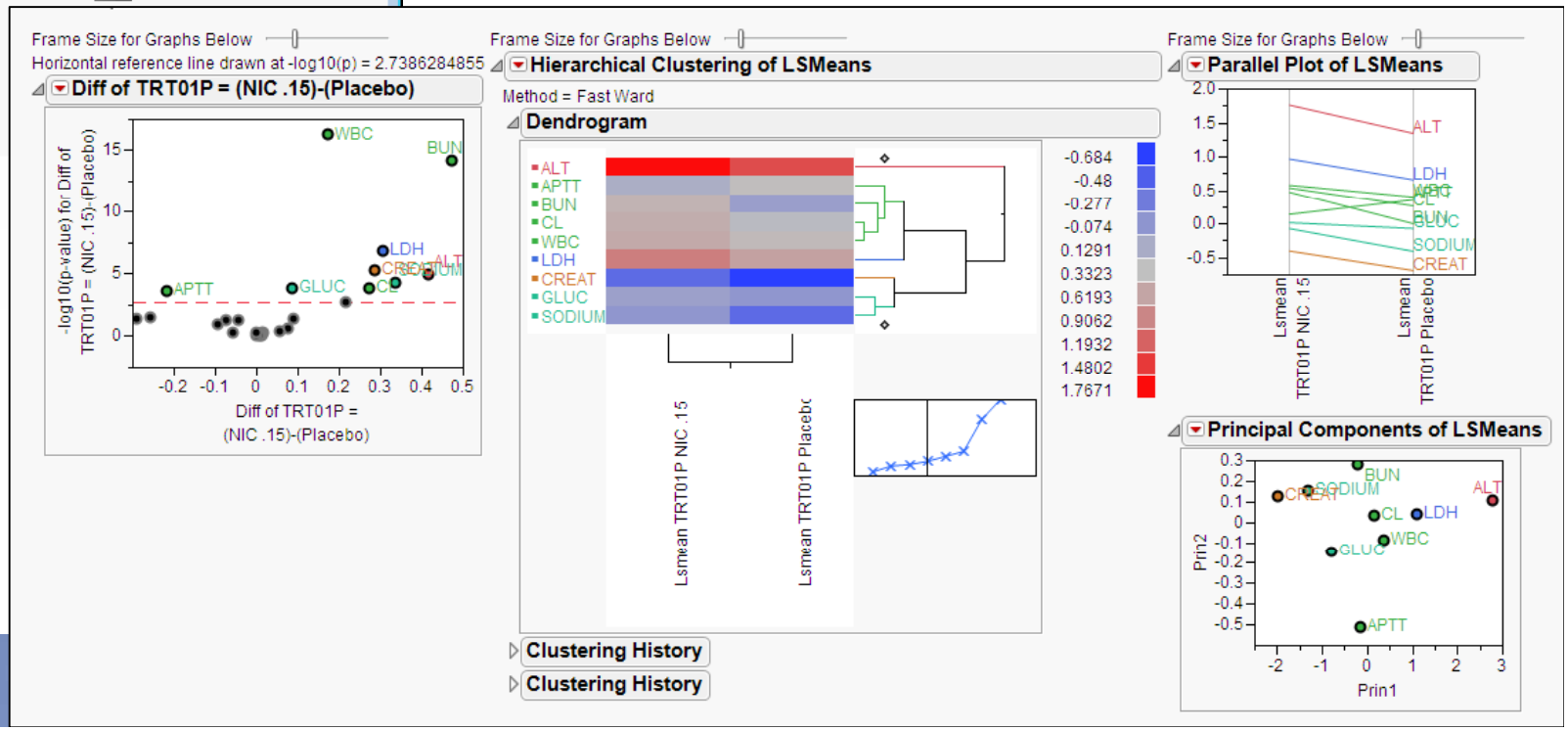


JMP® Clinical Analysis Workflow

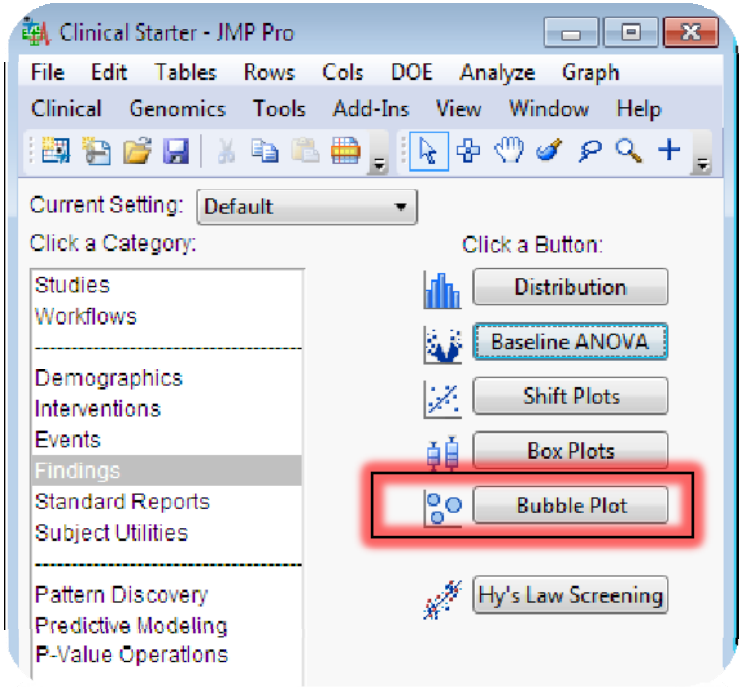


Visualise significant analysis test reports of lab measurements

Which Lab measurements are significantly different across treatment groups and have potentially higher risk to occur?

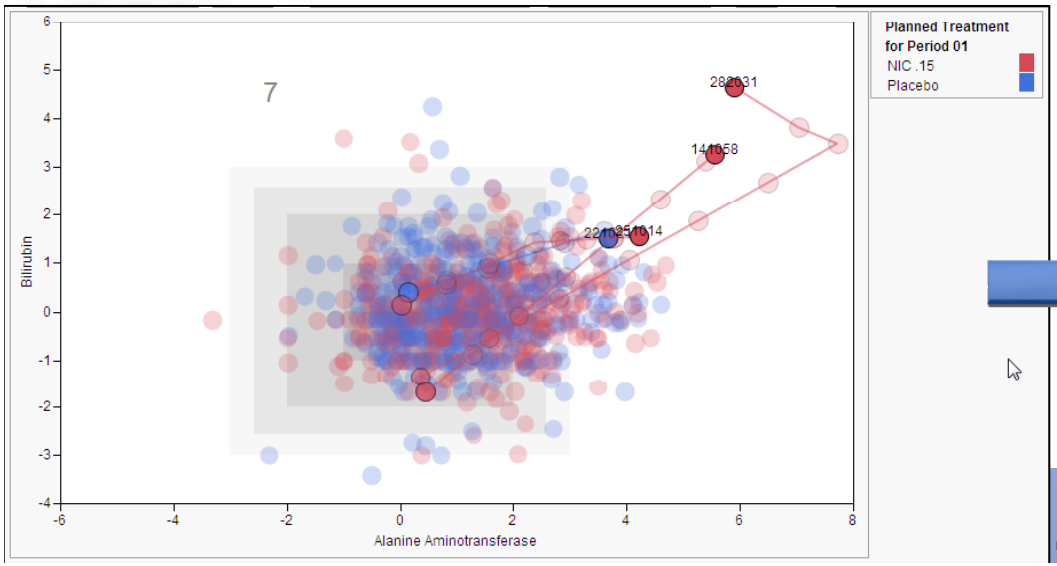


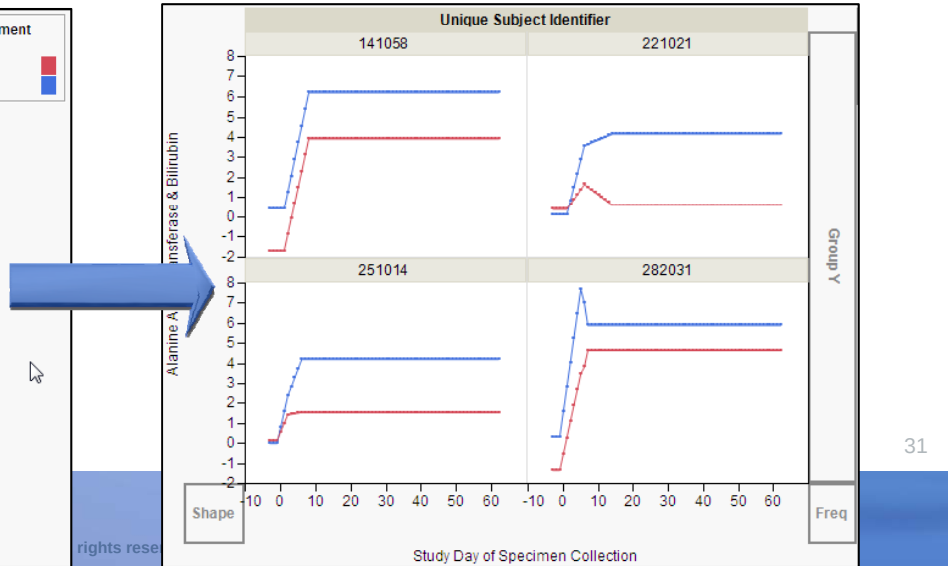
JMP® Clinical Analysis Workflow



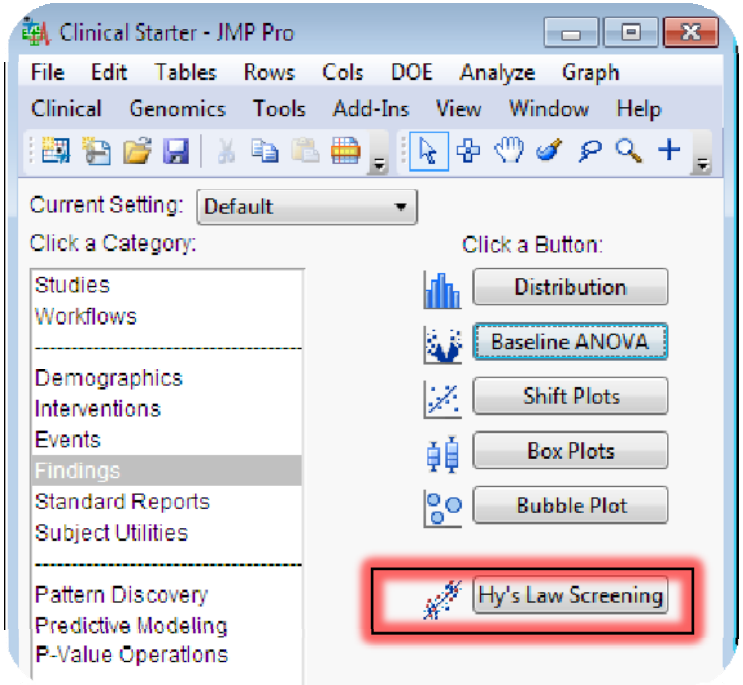
Monitor Animated Patients Laboratory Tests to detect Hy's Law Profiles

Quickly identify subjects with high risk of liver toxicity, meeting the criteria of Hy's Law.



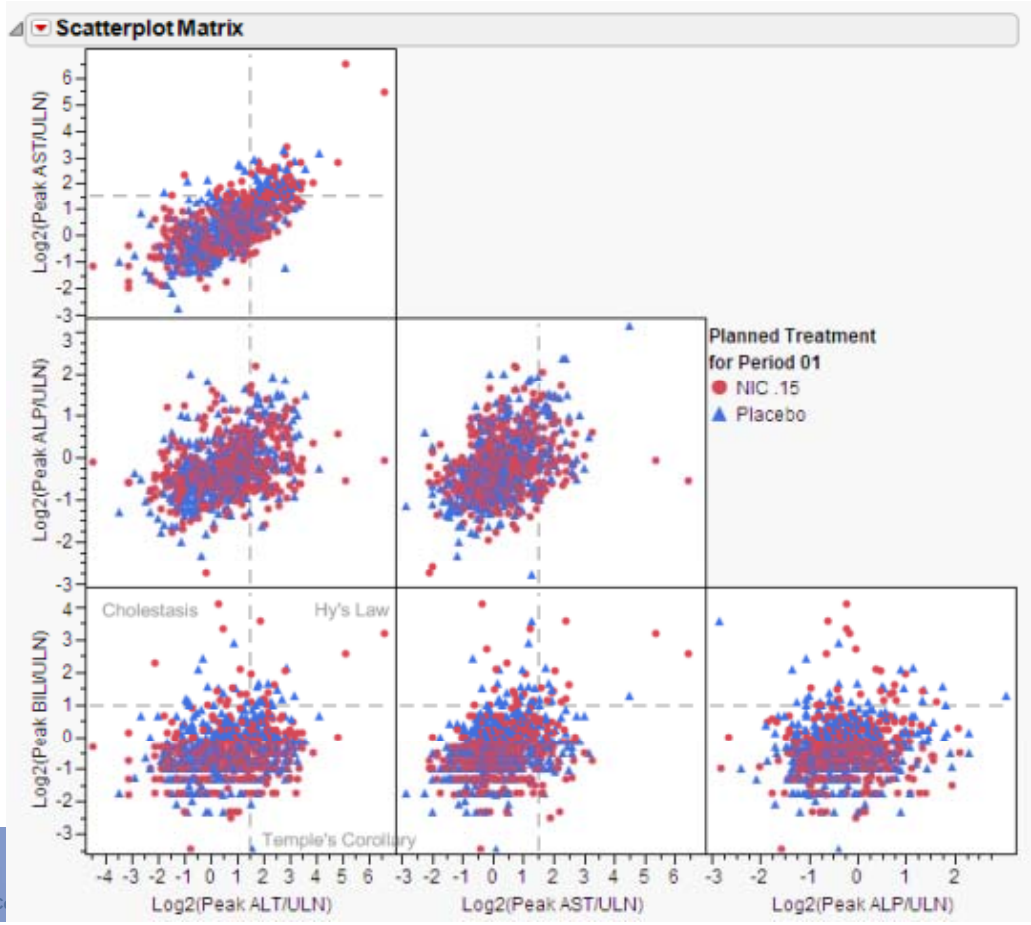


JMP® Clinical Analysis Workflow

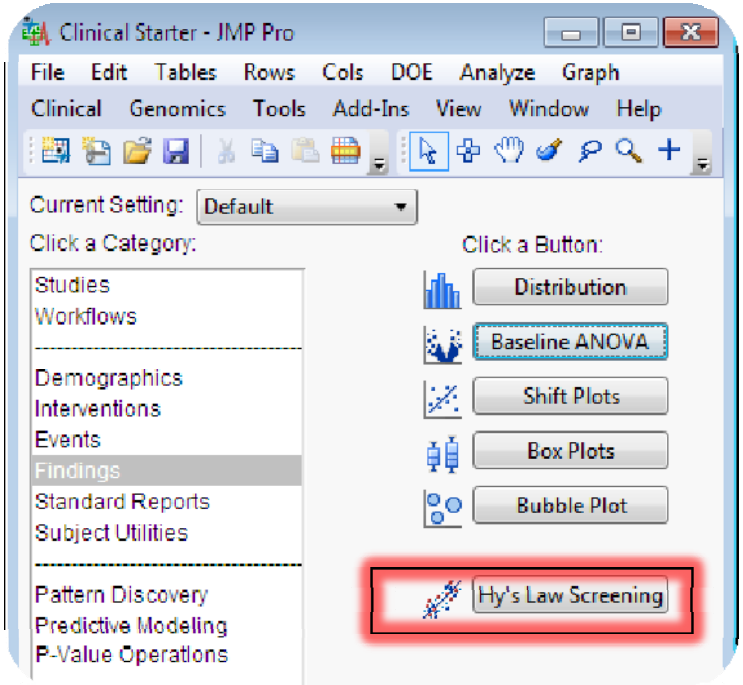


Screen for Hy's Law Profiles

Quickly identify subjects with high risk of liver toxicity, meeting the criteria of Hy's Law and drill down to patient profiles

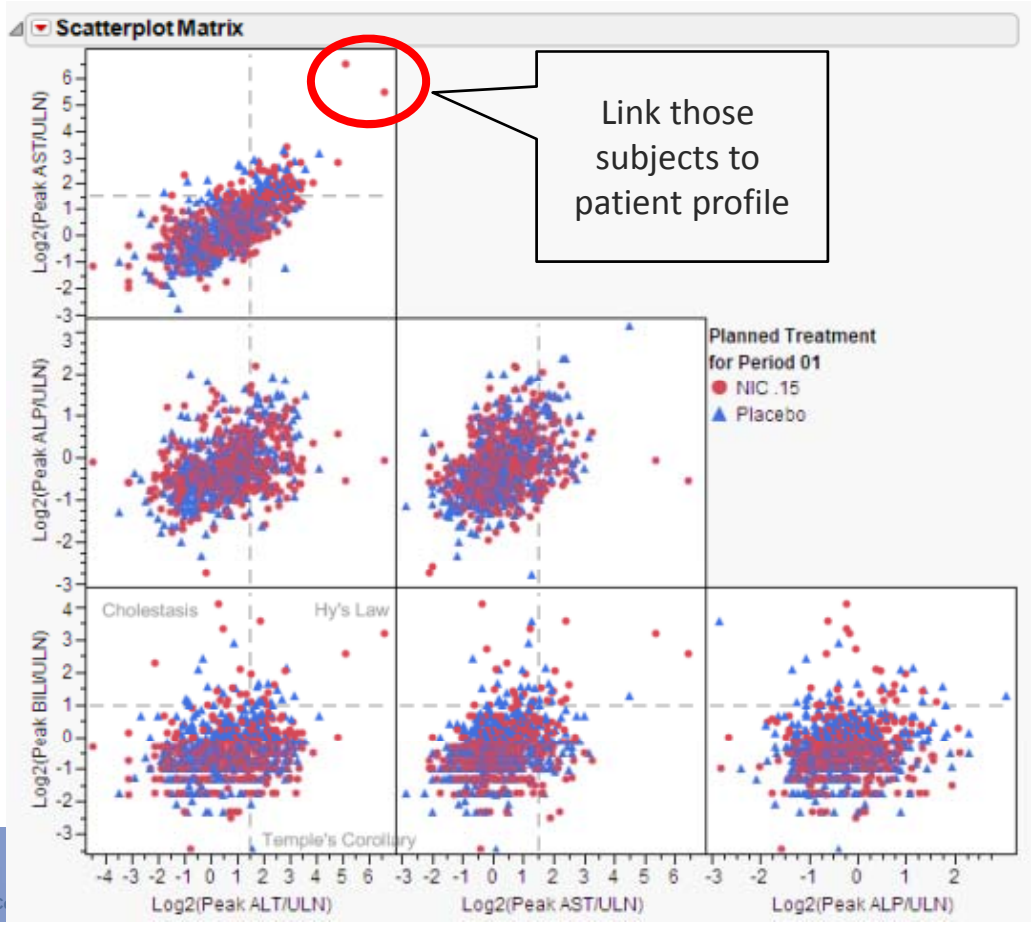


JMP® Clinical Analysis Workflow

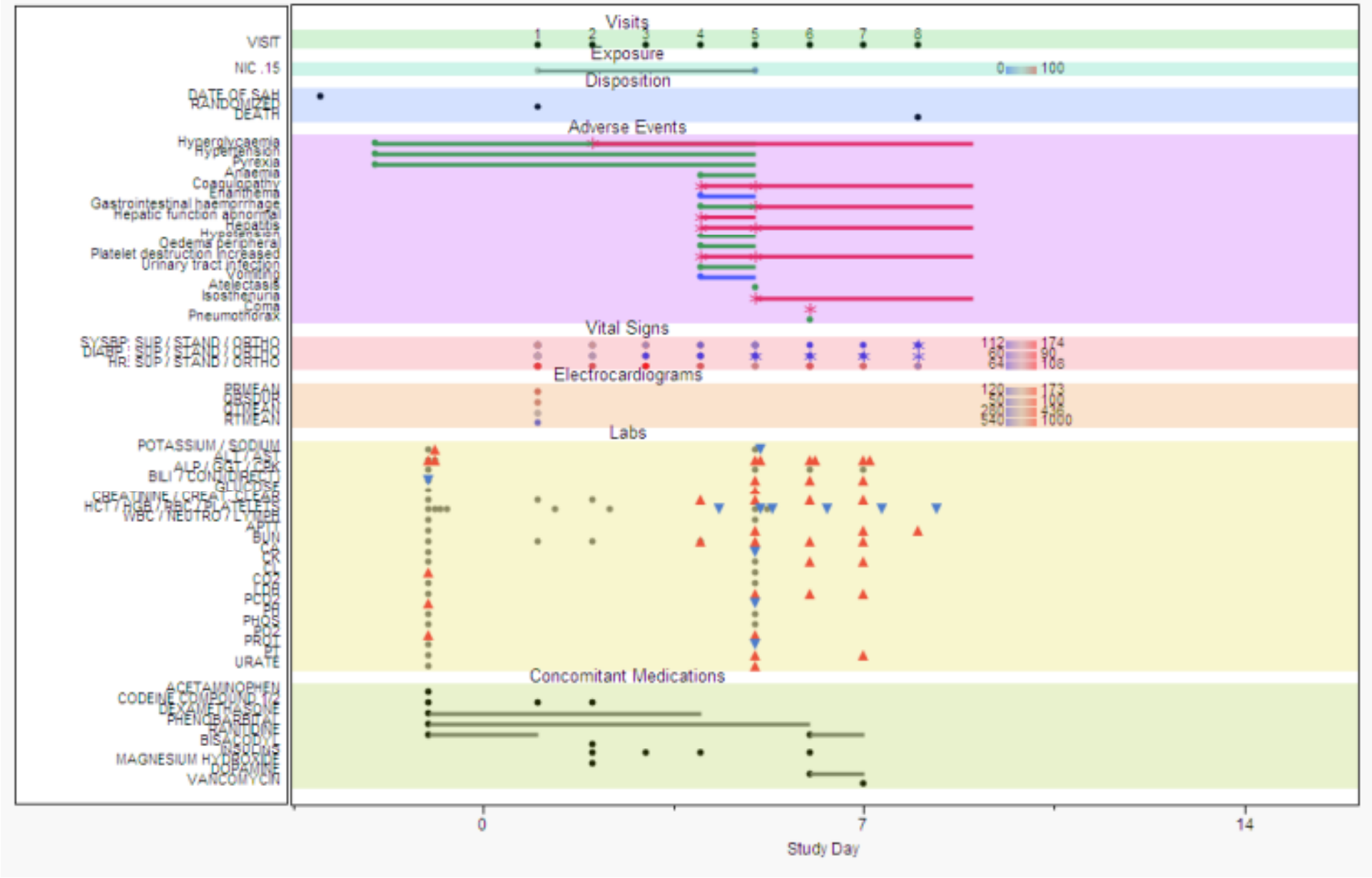


Screen for Hy's Law Profiles

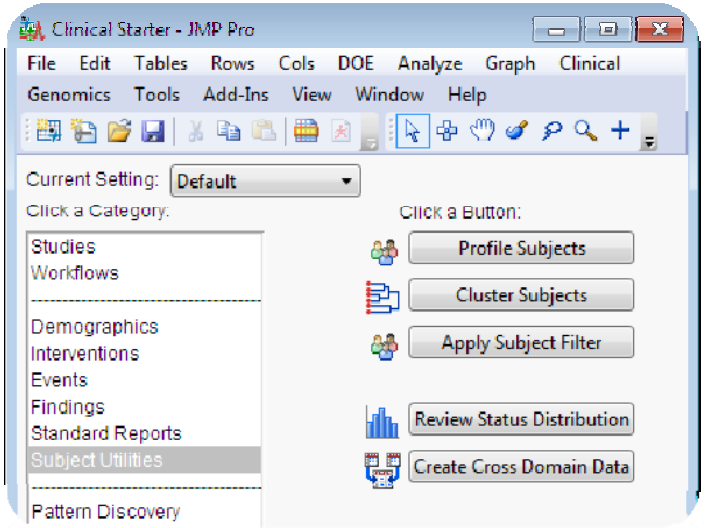
Quickly identify subjects with high risk of liver toxicity, meeting the criteria of Hy's Law and drill down to patient profiles



JMP® Clinical Patient Profiler

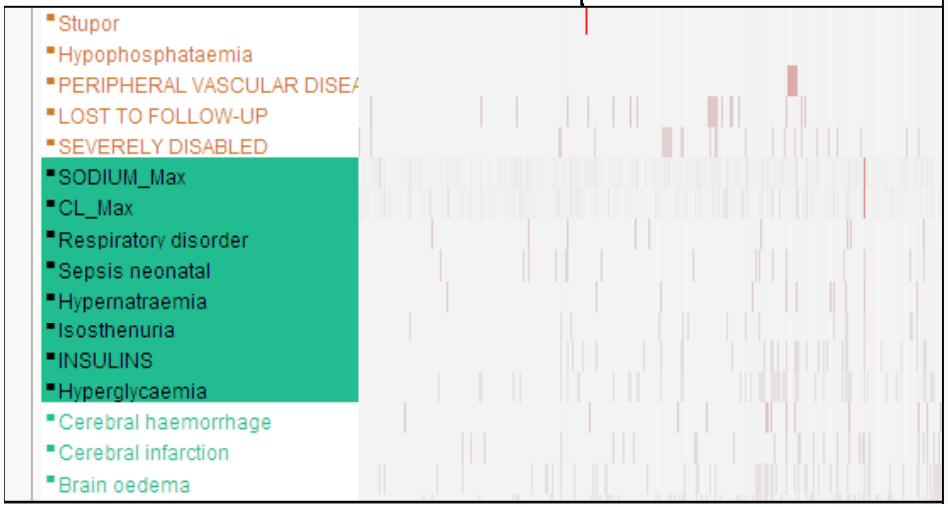


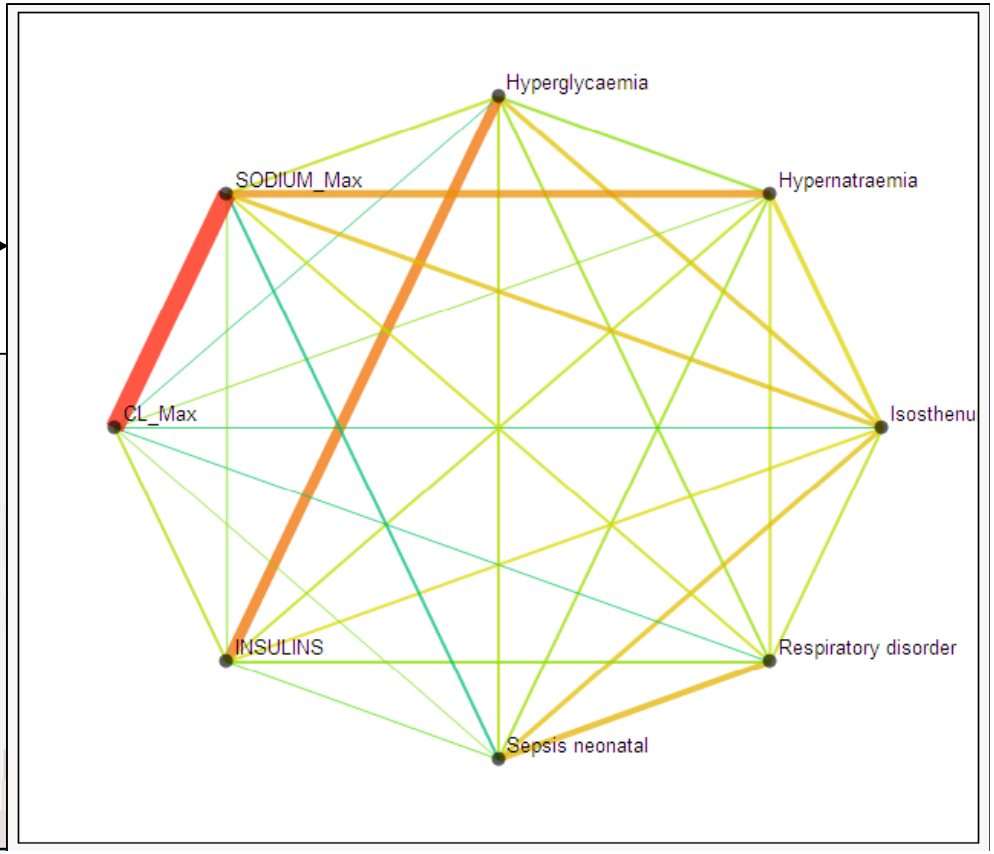
JMP® Clinical Analysis Workflow



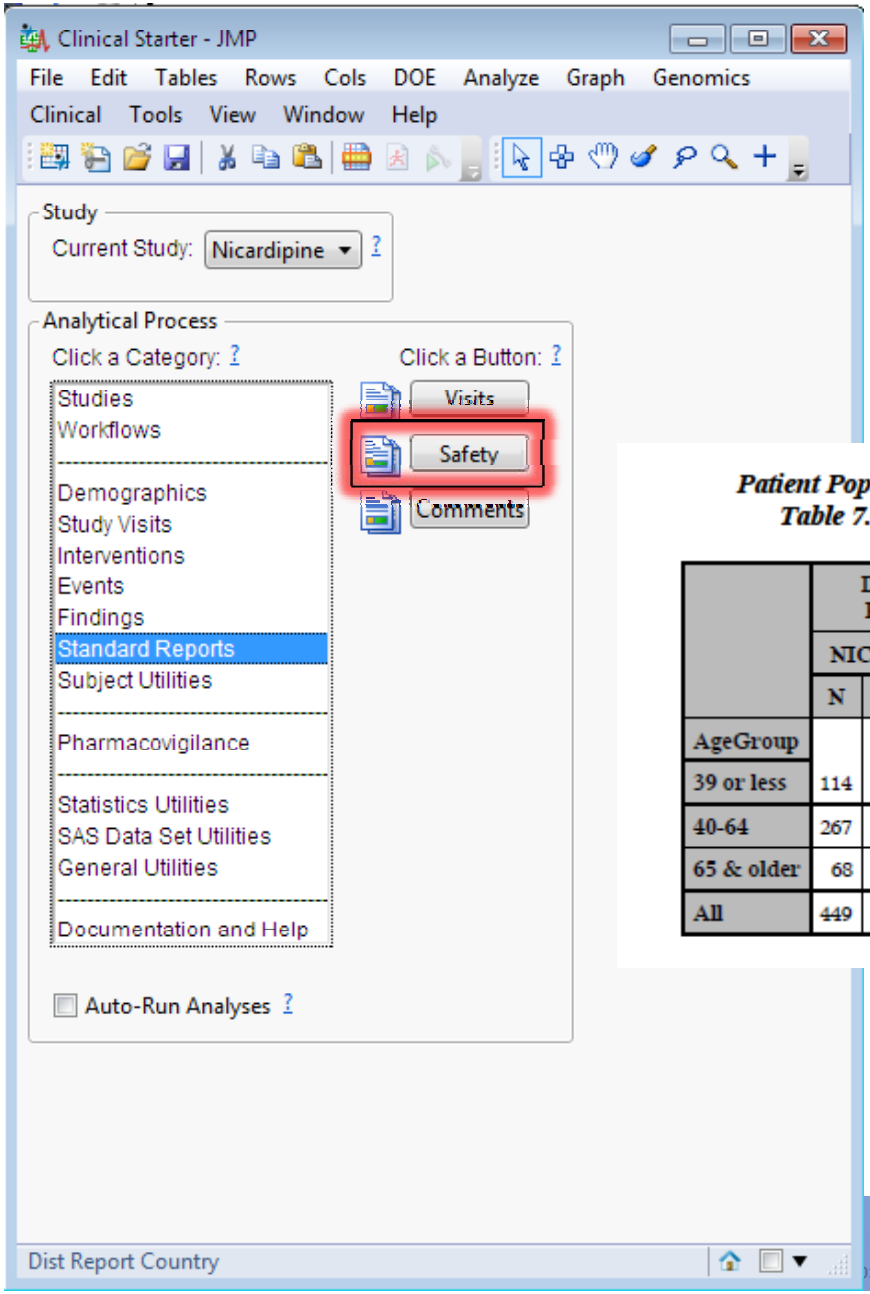
Find out relationships between different domain

JMP Clinical permits clustering of all adverse events, interventions and findings across safety domains. Reviewers can screen concomitant medications and medical history for drug-drug and drug-disease interactions, respectively, and find out relationships.





JMP® Clinical Analysis Workflow



The Process creates various standard safety tabular reports in rtf, pdf, html, or plain text format

Patient Population By Age Group
Table 7.2.1.2.1 of the GRP

10:47 Friday, March 11, 2011

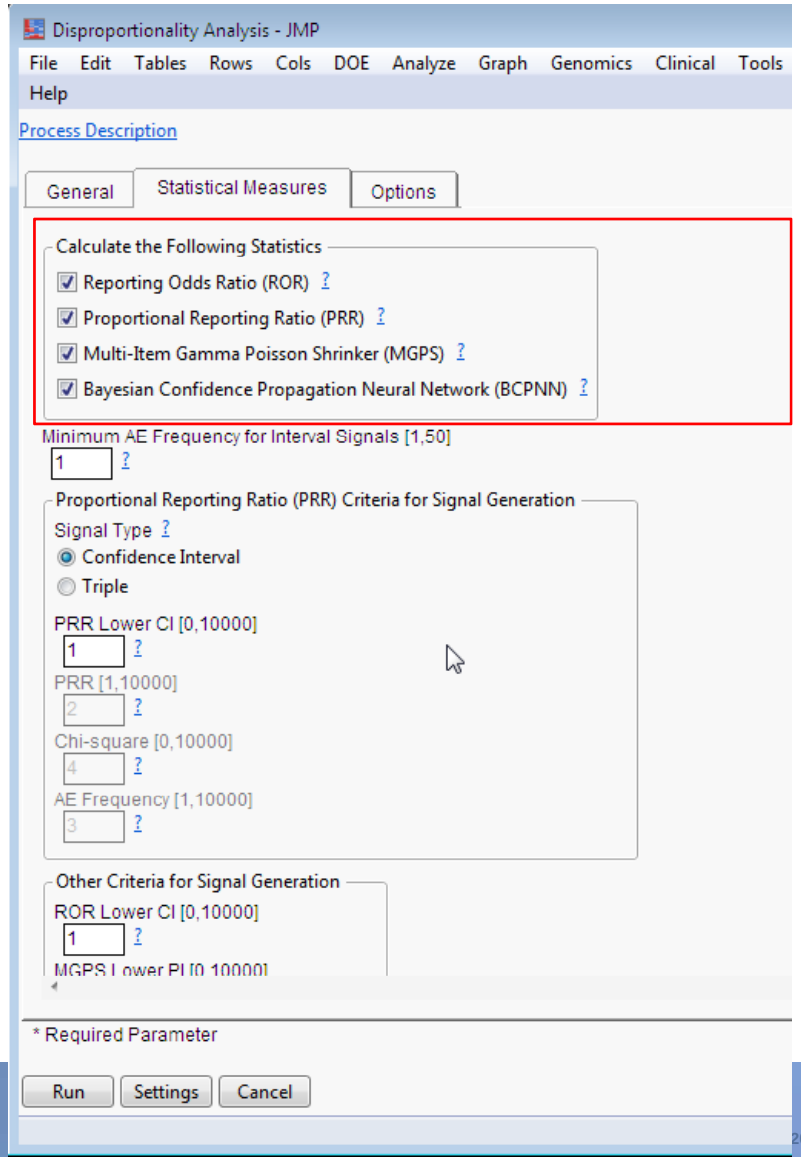
	Description of Planned Arm				All	
	NIC .15		Placebo			
	N	%	N	%	N	%
AgeGroup						
39 or less	114	12.58	108	11.92	222	24.50
40-64	267	29.47	286	31.57	553	61.04
65 & older	68	7.51	63	6.95	131	14.46
All	449	49.56	457	50.44	906	100.00

10:47 Friday, March 11, 2011

stem Organ Class and Preferred Term,
e

		Description of Planned ARM			
		C .15	Placebo		
		(%)	N	(%)	Fishers Exact P-value
		(22)	23	(5)	.0000
		(15)	143	(31)	.0000
VASCULAR DISORDERS : Hypotensio	150	(33)	79	(17)	.0000
RENAL AND URINARY DISORDERS : I	70	(15)	30	(6)	.0000
VASCULAR DISORDERS : Vasoconstr	239	(53)	307	(67)	.0000
PSYCHIATRIC DISORDERS : Total	25	(5)	4	(0)	.0000
RENAL AND URINARY DISORDERS : T	73	(16)	37	(8)	.0002
CARDIAC DISORDERS : Sinus brady	15	(3)	41	(8)	.0005
PSYCHIATRIC DISORDERS : Agitati	10	(2)	0	(0)	.0008
RESPIRATORY, THORACIC AND MEDIA	585	(30)	498	(8)	.0011
PSYCHIATRIC DISORDERS : Deliriu	6	(1)	0	(0)	.0146

JMP Clinical Disproportionality Analysis for Signal Detection

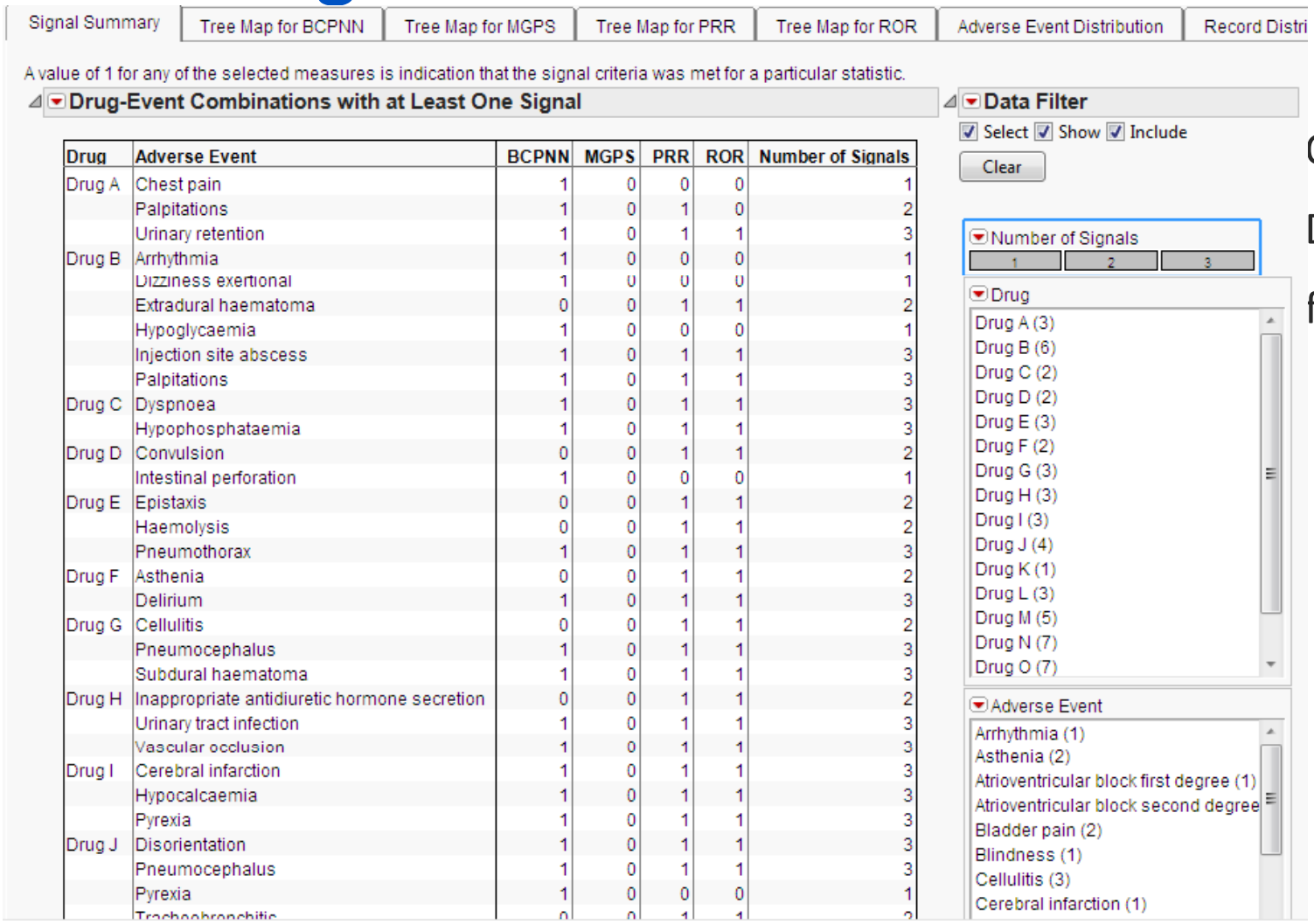


The Disproportionality analysis in JMP Clinical includes the 4 industry standard disproportionality analyses used for signal detection. PRR, ROR, MGPS and BCPNN

JMP Clinical Disproportionality Analysis for Signal Detection

- Disproportionality analysis is associated to “Signal Detection” in Pharmacovigilance.
- Pharmacovigilance, abbreviated PV, is the pharmacological science to detect signal or adverse events (ae) once the drug is on the market (post-submission), similar to drug-ae surveillance.
- The Disproportionality analysis in JMP Clinical includes the 4 industry standard disproportionality analyses used for signal detection.

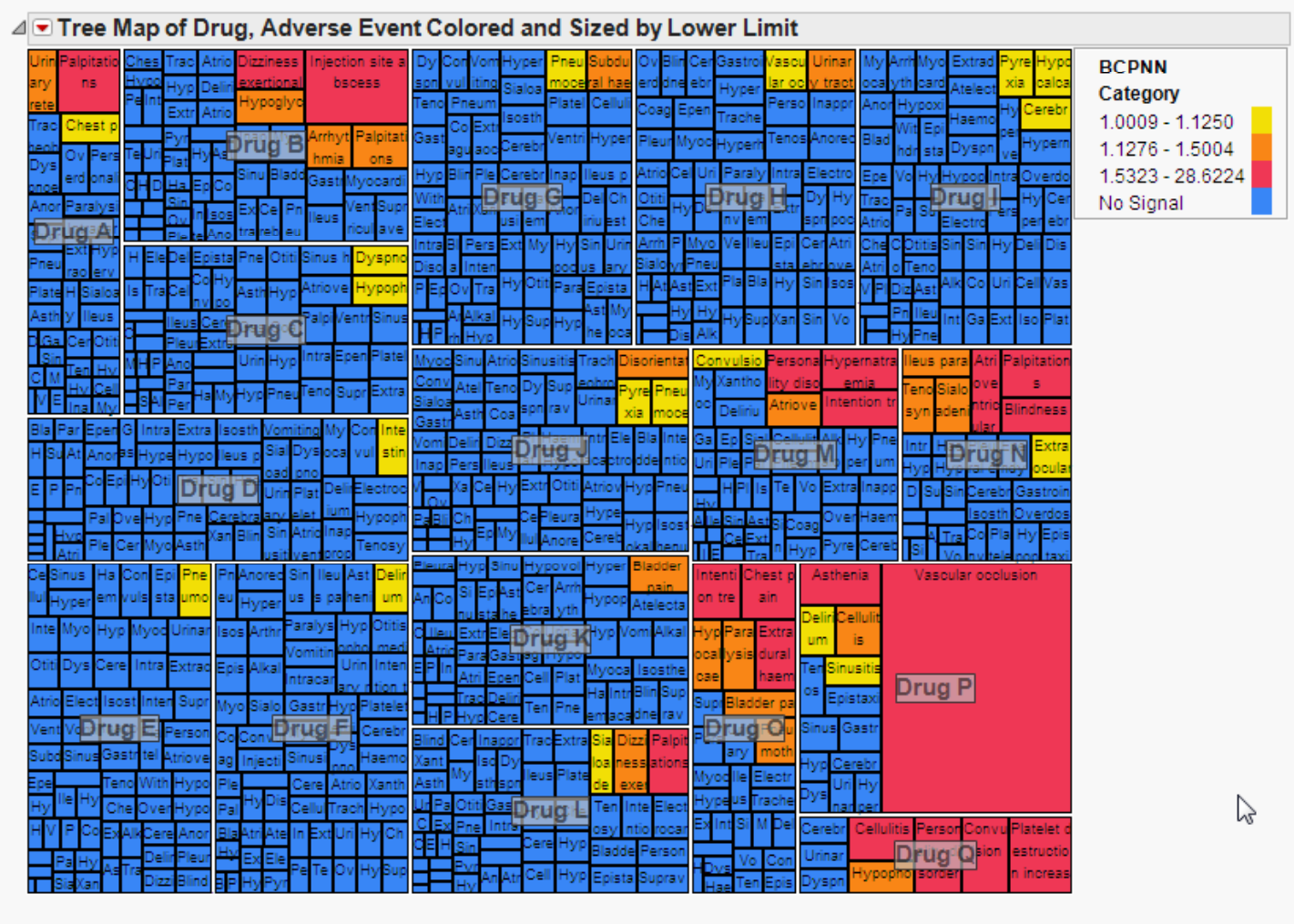
JMP Clinical Disproportionality Analysis for Signal Detection



Drug	Adverse Event	BCPNN	MGPS	PRR	ROR	Number of Signals
Drug A	Chest pain	1	0	0	0	1
	Palpitations	1	0	1	0	2
	Urinary retention	1	0	1	1	3
Drug B	Arrhythmia	1	0	0	0	1
	Dizziness exertional	1	0	0	0	1
	Extradural haematoma	0	0	1	1	2
	Hypoglycaemia	1	0	0	0	1
	Injection site abscess	1	0	1	1	3
	Palpitations	1	0	1	1	3
Drug C	Dyspnoea	1	0	1	1	3
	Hypophosphataemia	1	0	1	1	3
Drug D	Convulsion	0	0	1	1	2
	Intestinal perforation	1	0	0	0	1
Drug E	Epistaxis	0	0	1	1	2
	Haemolysis	0	0	1	1	2
	Pneumothorax	1	0	1	1	3
Drug F	Asthenia	0	0	1	1	2
	Delirium	1	0	1	1	3
Drug G	Cellulitis	0	0	1	1	2
	Pneumocephalus	1	0	1	1	3
	Subdural haematoma	1	0	1	1	3
Drug H	Inappropriate antidiuretic hormone secretion	0	0	1	1	2
	Urinary tract infection	1	0	1	1	3
	Vascular occlusion	1	0	1	1	3
Drug I	Cerebral infarction	1	0	1	1	3
	Hypocalcaemia	1	0	1	1	3
	Pyrexia	1	0	1	1	3
Drug J	Disorientation	1	0	1	1	3
	Pneumocephalus	1	0	1	1	3
	Pyrexia	1	0	0	0	1
	Tracheobronchitis	0	0	1	1	2

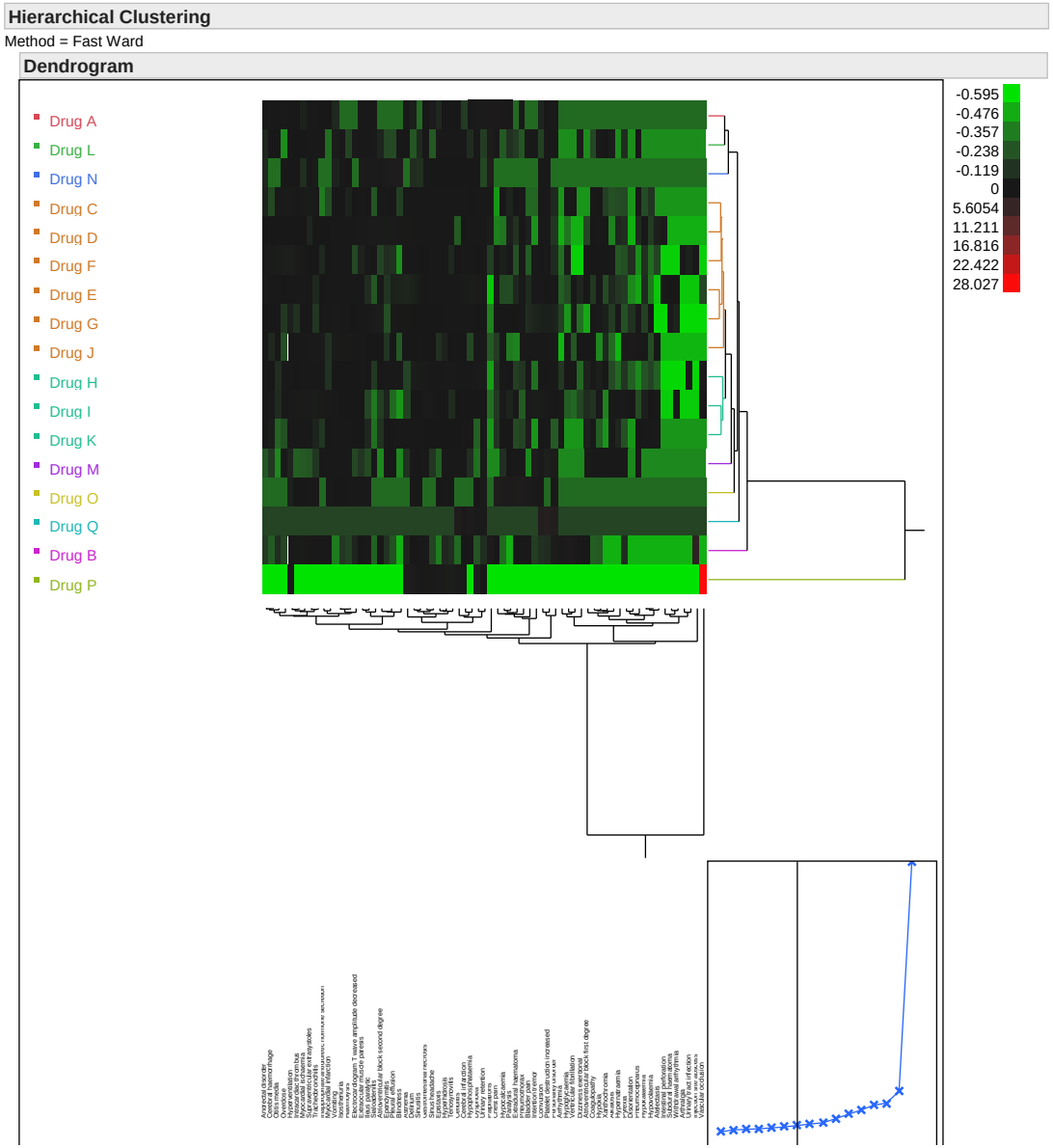
Overall Signal Detection Summary for the 4 algorithms

JMP Clinical Disproportionality Analysis for Signal Detection



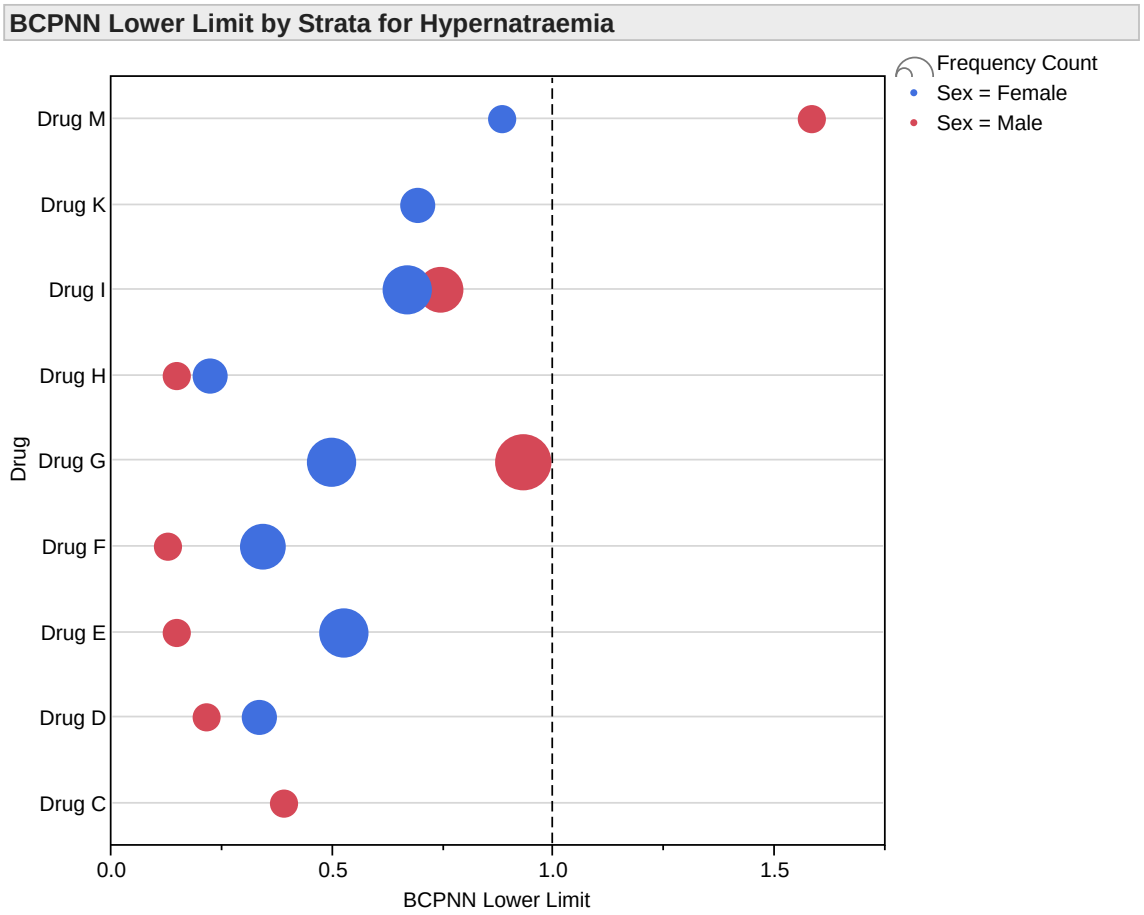
Tree Map view of overall AE frequency and signal detection category (here an example of BCPNN)

JMP Clinical Disproportionality Analysis for Signal Detection



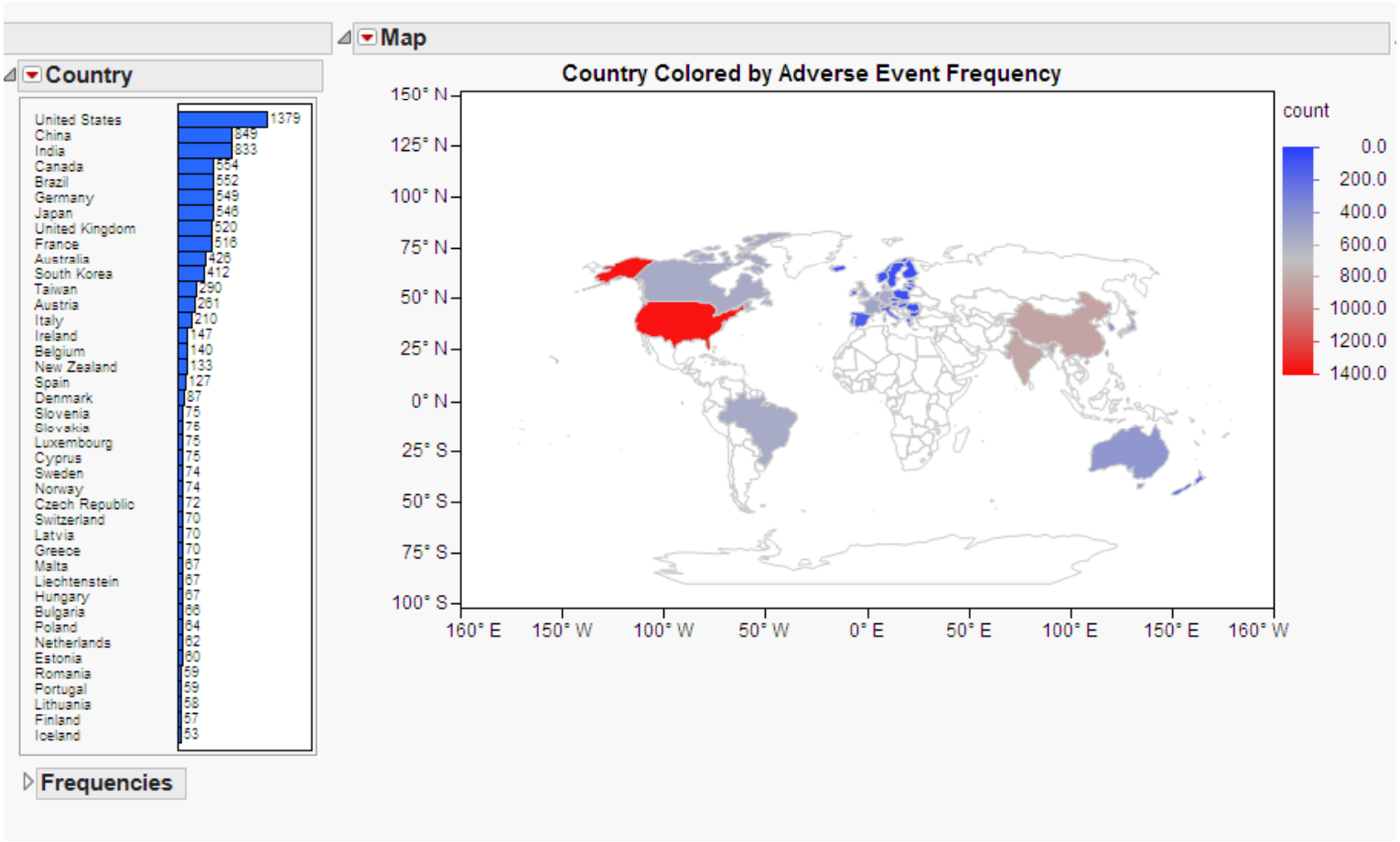
Views allowing to cluster either Drugs or AE with similar behavior

JMP Clinical Disproportionality Analysis for Signal Detection



Views allowing to compare AE frequency with Stratification variable

JMP Clinical Disproportionality Analysis for Signal Detection



Geographical distribution of AE frequency

Conclusion

JMP® Clinical is

- Intuitive, Interactive, Comprehensive, Highly Visual.
- Easy to use
- Platform embraced at all levels of safety review process
- Facilitates interpretation, communication and reporting
- Helps users to improve the safety review process better, faster, cheaper

For more information,

ask for a demo

or visit

http://www.jmp.com/software/clinical/