

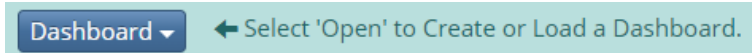
Clinical Explorer Tool

Overview

The **Clinical Explorer** feature is only accessible to registered users (i.e. those with a SysBioCube account and logged in). It can be accessed through the **Clinical Portal** of the **Tools** tab on the navigation menu. The **Clinical Explorer** is a data agnostic module that integrates preclinical and clinical datasets and translates the information into various interactive and dynamic visualizations (e.g. bar graphs, pie charts, dot plots, etc.). This tool allows clinicians and researchers to dynamically filter, download and run analytics on the data; moreover, it can be used to help identify subject cohorts of interest, which is why it is sometimes referred to as the ‘cohort builder’.

The information below will help you navigate through the tool once your data has been integrated into it. For details on how to conform your data so it can be integrated into the tool, please reach out to a SysBioCube representative at sysbiocube@mail.nih.gov.

2.0 Dashboard



A *dashboard* is an informational management tool for visually monitoring data. In the context of the **Clinical Explorer**, users can create one or more individualized dashboards composed of data elements and subject groups of interest for each study. The options for creating a dashboard are defined by the data elements within the study dataset.

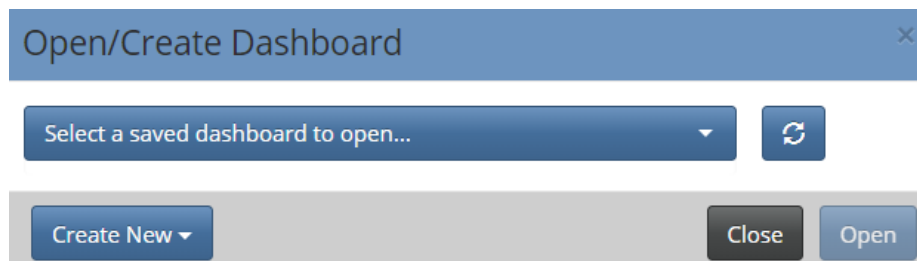


Figure 1. Dashboard Selection Option Menu

The first time a user accesses the **Clinical Explorer**, the only option for the *Dashboard* dropdown will be ‘Open’. Selecting this option will generate a pop up window (Figure 1), from which the user can select either of the following options:

- 1) **‘Create New’**: This dropdown menu will automatically populate with a list of all studies that the user has access to.

After selecting the study of interest, a blank screen will appear with a message ‘There are currently no charts loaded.’ (Figure 2). To add a chart, click the ‘Charts’ dropdown above and then ‘Select Fields’. Once the fields of interest are selected, be sure to select ‘Apply’ and the graphical displays will replace the warning message.

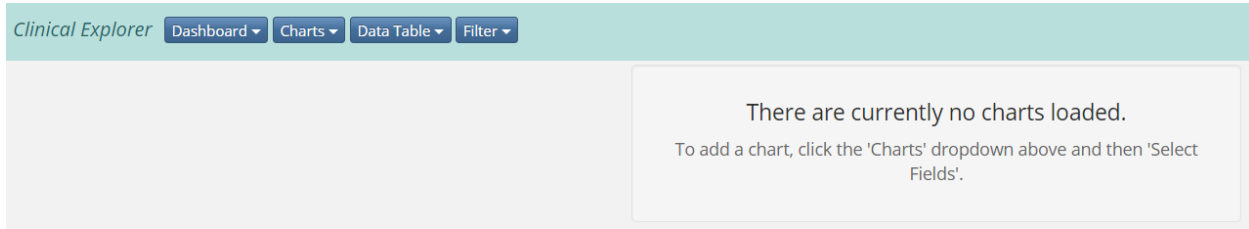


Figure 2. Initiating a New Dashboard

In addition to selecting data fields, a user can also apply filters to the data in the dashboard. Refer to the [Chart Filters](#) section for information on using filters.

Once a user has created a dashboard they think will be useful in the future, they can save it by selecting the 'Save As' option from the 'Dashboard' dropdown menu at the top of the screen (see Figure 2). Note that a user cannot save a blank dashboard, the option is only available once atleast one chart has been selected.

 The image shows a 'Save New Dashboard' dialog box. The title bar is blue with a close button (X). Below the title bar is a section titled 'Dashboard Information' with a light blue background. It contains four input fields: 'Name:' with a placeholder 'Enter dashboard name', 'Description:' with a placeholder 'Enter short description', 'Notes:' with a larger text area, and 'Sharable:' with an unchecked checkbox. At the bottom of the dialog are two buttons: 'Close' and 'Save'.

Figure 3. Saving a New Dashboard

At minimum, to save a new dashboard a user is required to 'Name' the dashboard. There is no defined character limit, and valid characters in the name can include: Upper/Lowercase Letters A-Z, Numbers 0-9, Space, Period, Comma, -, :, [], (), |. It is strongly recommended a user provides a short (<15 characters in length) name.

Although optional, a 'Description' and 'Notes' can help a user remember the value of a particular dashboard e.g., *Did you identify an interesting trend or cohort of interest, Are there specific data fields worth noting?*, etc.

A user might then choose to share the dashboard with study team members by selecting 'Sharable'. Note that making a dashboard sharable means it can be viewed, not edited, by all users with access to the relevant study datasets.

- 2) **'Select a saved dashboard to open...'**: This dropdown menu will automatically populate with a list of all the studies the user has been granted access to, as well as all corresponding, shared dashboards including an **Example* dashboard created by the development team.

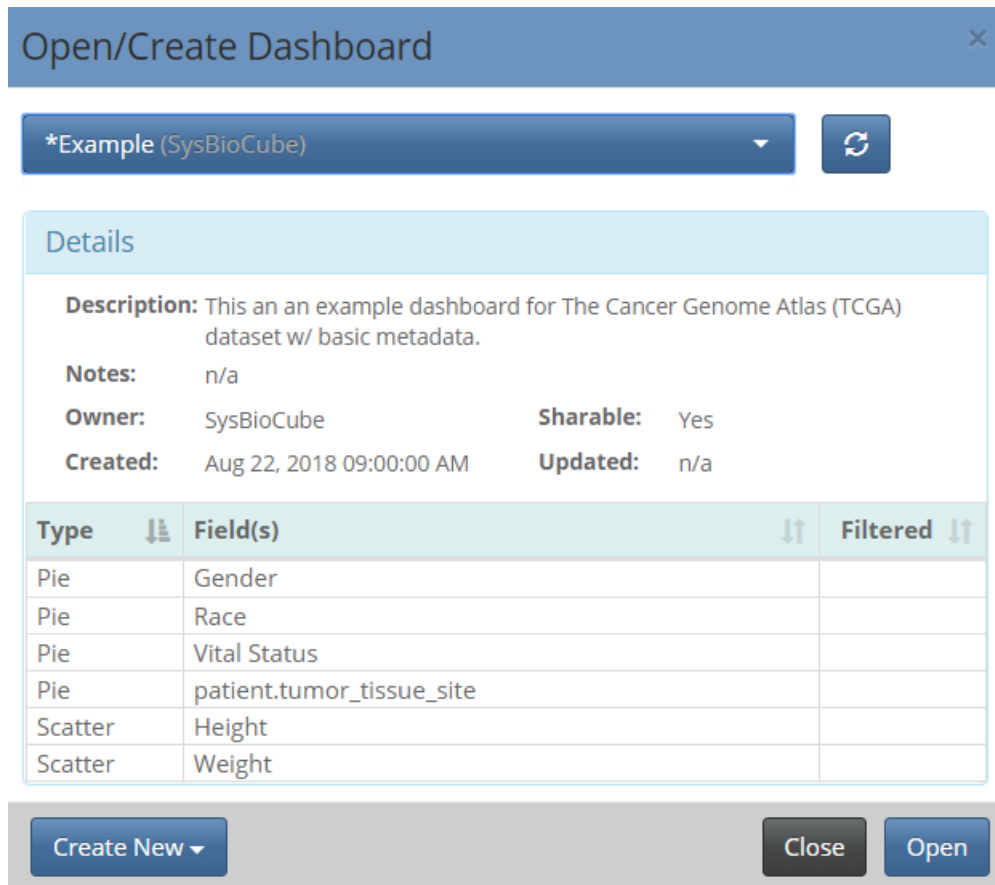


Figure 4. Dashboard Features Snapshot

When a previously created dashboard is selected, a pop up menu will appear outlining details about the dashboard (See Figure 4) including: Name, Description, Notes, Owner (user who created the dashboard), Created (date dashboard was created by the owner), Updated (date when the dashboard was most recently updated by the owner), and then a table list of all the data fields in the dashboard along with how they are visualized (i.e. ‘Type’ – Pie, Scatter, etc.) and if the data was filtered (i.e., Yes or No (implied by blank box)).

A user can temporarily make changes to a dashboard shared by another user, however they can only save the changes by creating (‘Save As’) a completely new dashboard.

2.1 Header Bar Features

Once a user has selected a dashboard to begin, or opted to create a new one, it is important they understand how to navigate the header bar features: **Charts**, **Data Table**, and **Filter**.



Charts provides a visual translation of selected data fields. The features of a chart (e.g. type, color, legends, etc.) are defined in the metadata for the study – prior to the data

being integrated into the tool. **Data Table** is a tabular view of selected data fields.

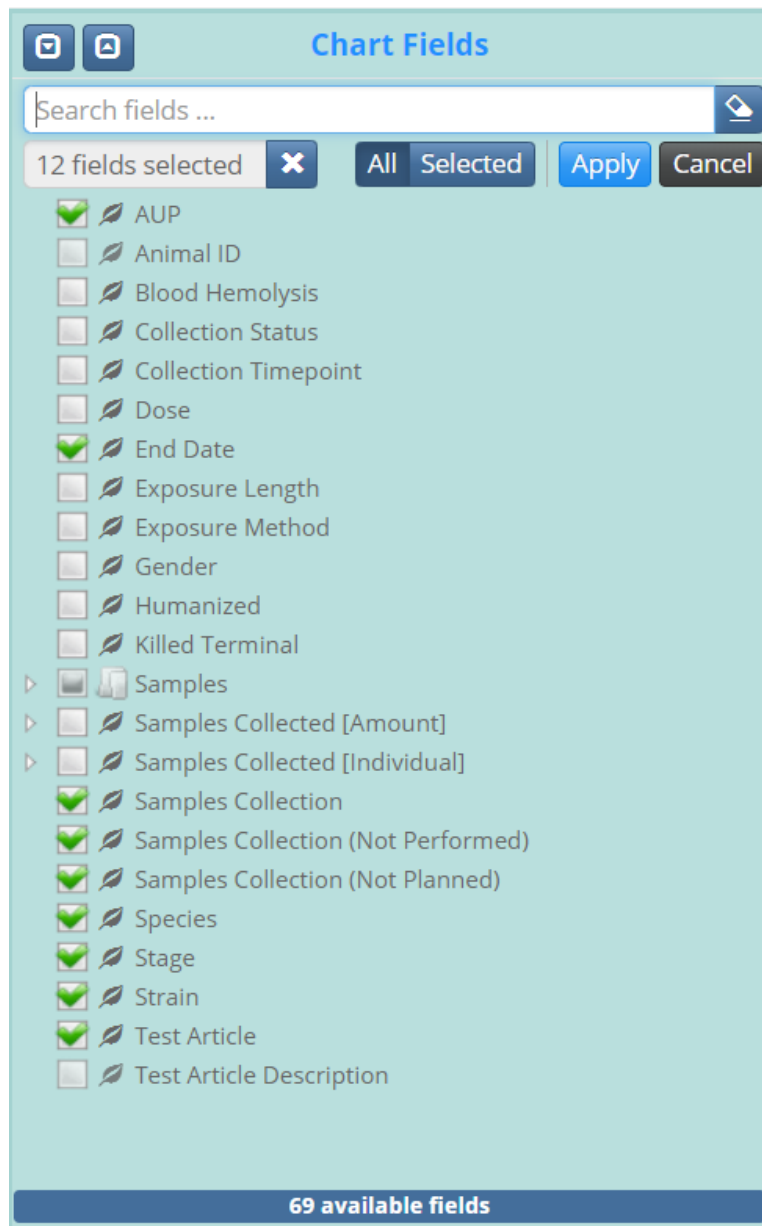
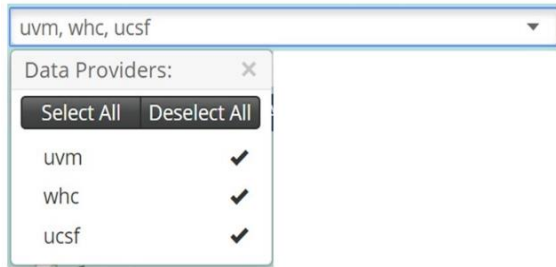


Figure 5. Example Pop-Up Menu for **Select Fields** when Defining Charts and/or Data Tables

The first option in the dropdown menu for these features is **Select Fields**. When this option is selected, under either **Charts** or **Data Table**, a new menu will appear on the left hand side of the screen (Figure 5). The contents of this menu are study-defined.

A user can select from the available fields by clicking the white boxes to the left of each field name and, in doing so, the box will fill with a green check mark and the tally of fields selected at the top of the menu will adjust accordingly. A white arrow to the left of the check box denotes those fields with subfields; clicking on the arrow will expand the menu display to include the subfields. The total number of fields available to select is noted at the very bottom of the menu.



For studies in which multiple organizations are providing data incorporated into the **Clinical Explorer**, there will be an additional horizontal bar at the top of the menu so a user can select one or more of the ‘Data Providers’ (image on left). In cases with only one organization providing data, this bar is absent from the menu (See example in [Figure 5](#)).

At times a user can choose to have different data fields visualized in the charts as compared to those data fields in the data tables. The **Charts** and **Data Table** features each have their own, independent **Select Fields** menus. For example, a user may identify a cohort of interest in the charts and then want to export alternative data fields for that cohort from the data table for subsequent analysis. This can be achieved by selecting data fields for each (e.g., **Charts** and **Data Table**) individually. Alternatively, when a user wants the selected fields to match, the **Sync with** option synchronizes the data fields being displayed between the **Data Table** and **Charts**.

Jump To brings a user to the top of the respective section; this is especially useful when several charts and/or a long data table are being displayed.

Filter allows users to limit data in both **Charts** and **Data Tables** by subject (e.g. Patient Id, Animal Id) through either Inclusion or Exclusion criteria. Similar to **Select Fields**, after selecting the option a new menu bar will appear on the left side of the screen (See [Figure 6](#)). This new menu provides comprehensive instructions to guide a user through its application.

3.2 Chart Filtering



For pie charts, the filter feature is always active. A user can filter by individual data fields by hovering over the appropriate section within the chart, then clicking once. A user can also filter data fields by clicking on the data field in the *Table of Contents* to the right of each chart. Clicking twice using either approach will remove the applied filter. Once a filter is added, the chart will update with a note in the upper left-hand corner defining the applied **Filter**. Note that multiple “or” filters can be made in a pie chart by clicking on each section once, i.e., X or Y; X or Y or Z. [Figure 7](#) is an illustration of a pie chart with (B, C) and without (A) filters. Specifically in [Figure 7B](#), the ‘African American’ section of the chart was selected; accordingly, all other charts in the dashboard update to show only data for ‘African American’. In [Figure 7C](#), the ‘African American’, ‘Caucasian’, and ‘Asian’ sections were selected – in no specific order.

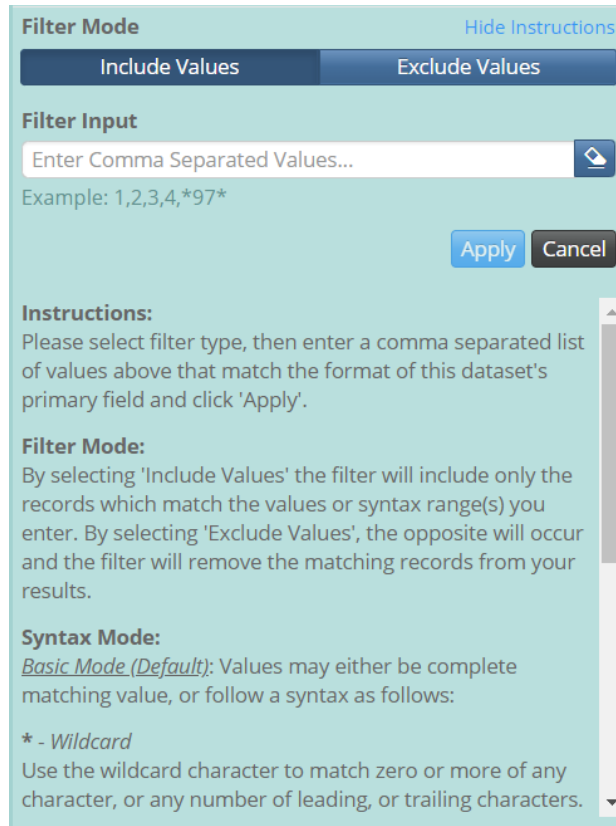


Figure 6. Example Pop-Up Menu for **Filters**

For the scatter plots and bar charts, the filter feature has to be turned on by clicking the **Selection OFF** button; it will then transition to **Selection ON** and change colors (i.e. black to green). Once ON, a user will notice their mouse appears as a cross hair over the chart area; to make a selection and filter the data, click and drag. Similar to the pie charts, the filtered area will be defined both visually with gray coloring but also called out in the upper left-hand corner as the **Filter Range**. Additionally, if there are any statistics noted at the bottom of the chart, the statistics will change to include statistics for the full dataset as well as the filtered dataset. [Figure 8](#) is an illustration of a dot blot with and without filtering (i.e., Selection).

[reset] To remove the current selections (filters) from any chart, select Reset in the upper right hand corner of the chart.

Note that when filters are applied to one chart, all charts dynamically sync based on those filters.

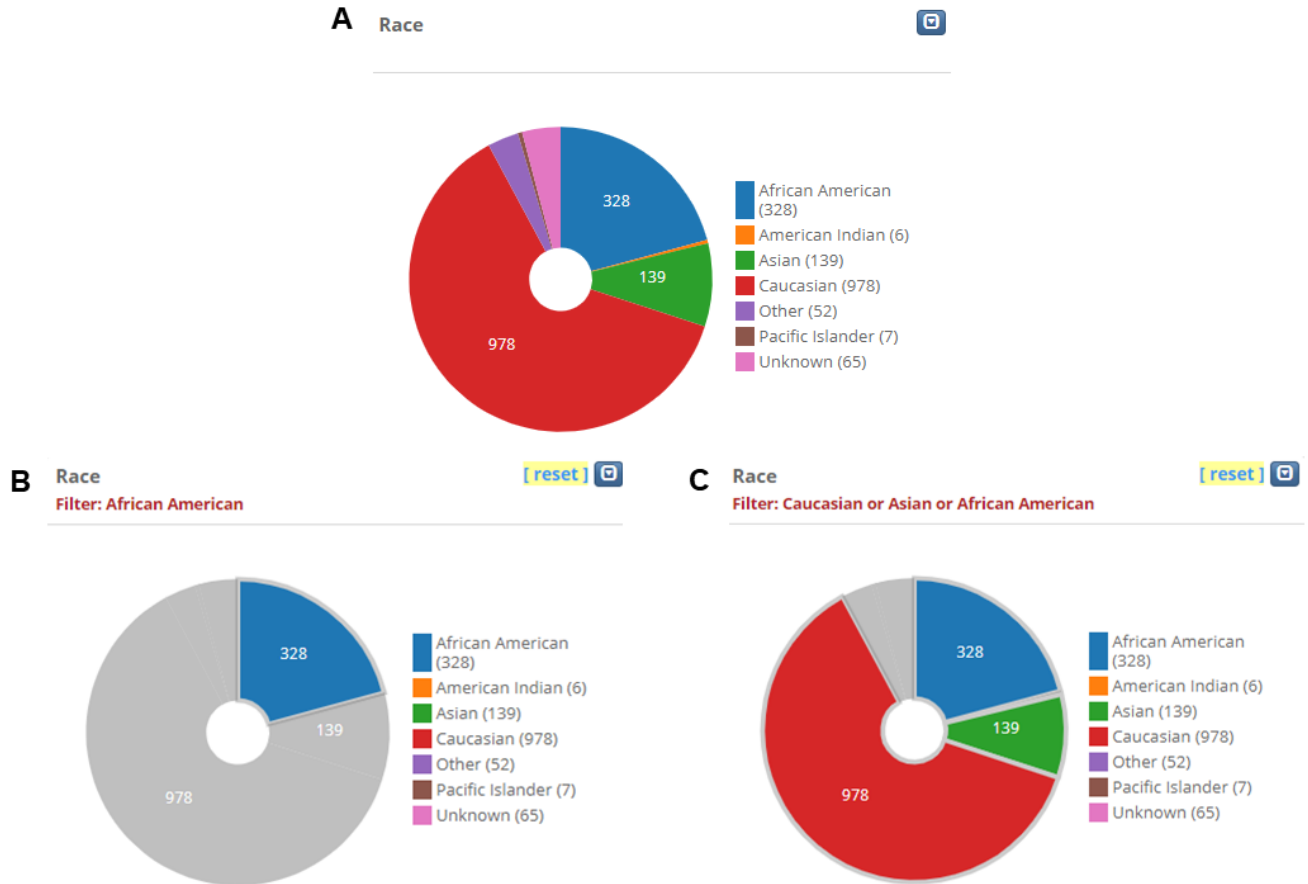


Figure 7. Example of a Chart (A) Unfiltered or with a (B) Single or (C) Multiple Filter(s)

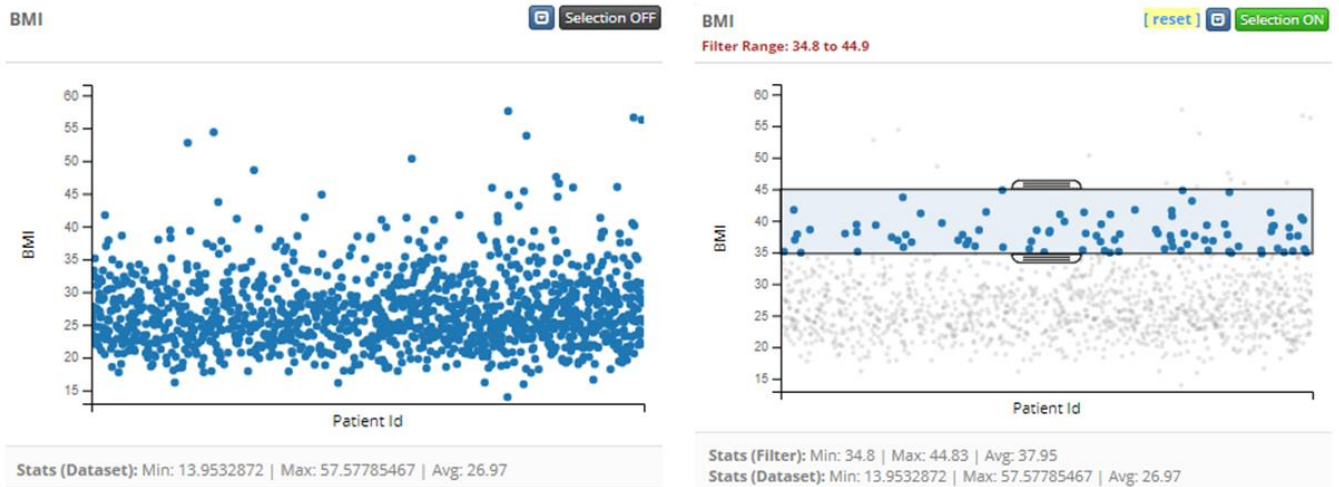


Figure 8. Example of a Dot Plot Without (left) and With (right) Filtering

3.3 Data Table Features

Refresh Data

When filters are applied to the **Charts**, the **Refresh Data** tab will appear above the **Data Table**. By clicking this button, the **Data Table**

will be updated to only reflect the data points applicable to the selected filters applied to the **Charts**. Note: This **does not** sync the data fields in the **Data Table** with the data fields in the **Charts**.



The data from both the **Patients** (or **Subject ID**) and **Field Descriptions** tabs can be exported by selecting the excel button at the top right-hand corner of the Data Table.

Box Plots are a standard method for displaying the distribution of data. Figure 9 provides an overview of the components (left) for each box plot. When these are translated to the example on the right, they are as follows: Maximum = 346, Third Quartile = 272, Median = 242, First Quartile = 221, and Minimum = 151. The red dots denote outliers. In order to be an outlier, the data value must be larger than Q3 by atleast 1.5 times the interquartile range (IQR) or smaller than Q1 by atleast 1.5 times the IQR.

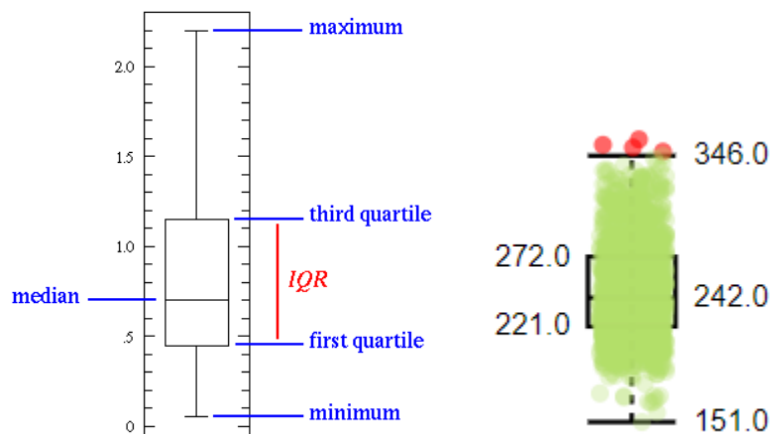


Figure 9. Box Plot ¹Breakdown

To populate a box plot, a user must choose a data field from the **X-Axis** and **Y-Axis** dropdown menus then select **Display**.

- The study data dictionary influences the selections available in the **Box Plots**. Only data fields which were defined as *data type - string* will be integrated as **X-Axis** options; only data fields which were defined as *data type - number*, will be integrated as **Y-Axis** options.
- The data visualized in the **Box Plot** is linked to the **Charts**, i.e., the filters applied in the charts are applied to the data points in the **Box Plots**.

Line Charts offer users an approach to visualizing longitudinal data. A user must choose from the **X-Axis** and **Y-Axis** dropdown menus for the desired data fields, as well as call out the subjects of interest (e.g. Patient ID, Animal ID) then select **Display**.

- As with Box Plots, the study data dictionary defines the data available to be plotted. Only data fields longitudinal in nature (time points) will be integrated as

¹ <http://www.physics.csbsju.edu/stats/box2.html>

X-Axis options; only data fields which have values captured at multiple time points will be **integrated** as **Y-Axis** options.

- Rather than plotting data for all subjects/animals, which would likely result in an uninterpretable line chart, a user needs to define the subjects to be plotted by selecting from the scrollable dropdown or typing in specific **Animal ID (Subject ID)**.
- The data visualized in the **Line Charts** is linked to the **Charts**, i.e., the filters applied in the charts are applied to the data points in the **Line Charts**.

For any additional questions or concerns, reach out to the SysBioCube support team at sysbiocube@mail.nih.gov