AbstractID: 4947 Title: EUCLID: A New Outcome Analysis Tool for High-Dimensional Clinical Studies

Purpose: To develop a clinical outcome statistical analysis tool available for clinicians and researchers to perform univariate and multivariate analysis of a clinical study with a possibly large number of clinical, biological, physiological and dose-volume variables.

Method and Materials: The program was developed using the MATLAB software. The bases for this work were laid out in the DREXLER software, developed at Washington University. New functions were added, including data histogramming and equivalent doses calculations (EUD, gEUD, BED), as well as the possibility to apply a threshold on variables to select a subset of patients. A new user interface was developed with the goal of allowing easy manipulation and analyzing of large clinical studies along with the graphical and tabular reporting of outcomes and correlations with useful statistical information.

Results: EUCLID provides a user-friendly graphical interface that allows several aspects of the analysis at the same time, using several windows. The input data can include for every patient an unlimited number of clinical, biological, physiological variables, outcomes and dose-volume histogram (DVH) points. The univariate analysis includes plotting and histogramming the variables individually. If survival time is available, the Kaplan-Meier method is used to calculate the survival curve. The multivariate analysis allows the user to show a map of correlation coefficients between all possible pairs of variables. The user may also perform a logistic regression analysis to use clinical and DVH variables to predict an outcome. The predictive power of the model can be visualized on a cumulative probability histogram, contour plot, octile plot or Receiver-Operating Characteristic (ROC) curve. If DVH data are present, the DVH can be displayed, and the TCP, NTCP and equivalent doses can be analyzed.

Conclusion: EUCLID is a powerful, user-friendly tool that allows researchers to quickly obtain a complete statistical analysis of potentially large clinical studies.