

The Use of Testing Confidence Value for Transitional Decisions of Single-Arm Phase II Oncology Trials

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Abstract

Many phase II oncology trials are single-arm clinical trials that aim to decide whether the test treatment has sufficient therapeutic efficacy for a phase III study. Such a decision is called a transitional “Go / No Go” decision.

The high failure rate in phase III oncology trials suggests that the “Go / No Go” decisions based on traditional hypothesis testing are often incorrect, at least for the “Go” decisions. We show that the actual type I and type II error rates are typically much higher than the set targets (5% type I error and 20% type II error) for single-arm trials. This is partly due to ignoring the uncertainty associated with the specified null hypothesis.

We propose the Testing Confidence Value Decision Rule (TCVDR), a statistical decision rule for transitional “Go / No Go” decisions for single-arm phase II trials with binary endpoints. The TCVDR is based on a new statistical index, Testing Confidence Value (TCV), which evaluates confidence on the hypothesis testing result by incorporating the uncertainty associated with the specified null. We show that for single-stage phase II trials, TCVDR has a lower probability of making incorrect “Go / No Go” decisions than both the traditional frequentist hypothesis testing method and Thall and Simon’s Bayesian method (the most widely used Bayesian approach for single-arm phase II trials).

There are an increasing number of two-stage phase II oncology trials. In this pilot project, we propose to extend the development of TCVDR to two-stage single-arm phase II trials, and compare the operating characteristics of the TCVDR with the decision rule of Simon’s two-stage design. We also propose to apply the new decision rule retrospectively to phase II prostate cancer trials for a comparison to the actual decisions made in these trials.