

Measuring Surrogacy of Candidate Biomarkers in Clinical Research

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Abstract

In clinical research, validated surrogate markers are highly desirable in study design, monitoring, and analysis, as they do not only reduce the required sample size and follow-up duration, but also facilitate scientific discoveries. However, challenges exist to identify a reliable marker. One particular statistical challenge arises on how to measure and rank the surrogacy of potential markers quantitatively. We review the main statistical methods for evaluating surrogate markers. In addition, we suggest a new measure, the so-called “population surrogacy fraction of treatment effect,” or simply the rho-measure, in the setting of clinical trials. The rho-measure carries an appealing population impact interpretation and supplements the existing statistical measures of surrogacy by providing “absolute” information. We apply the new measure along with other prominent measures to the HIV Prevention Trial Network 052 Study, a landmark trial for HIV/AIDS treatment-as-prevention.