

## NCBO DRIVING BIOLOGICAL PROJECT: ANALYSIS OF HIV TRIALS

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Clinical practice advances are based in large part on results from randomized controlled trials (RCTs). RCT results are published in journal articles that are not suited for computation. Hence clinicians, systematic reviewers and trial designers have difficulty finding, interpreting and applying RCT results to their practice. The existence of conflicting evidence complicates further the task of these professionals. In the HIV/AIDS domain, two areas with conflicting RCT evidence are prevention of mother-to-child-transmission (MTCT) and anti-retroviral (ART) treatment strategies for patients whose first ART regimen has failed. Trials in these areas are complex and heterogeneous and the need exists for computational support to visualize and analyze them to address these critical health problems of global importance.

The Trial Bank Project started answering the need for computational support by making clinical trial reports available in a machine-understandable "trial bank," called RCT Bank, so that computational tools can be used to help analyze and apply evidence from these trials. RCT Bank is a knowledge base that stores information on the design, execution and results of RCTs. The data model for RCT Bank is a frame-based ontology called RCT Schema, the most detailed ontology in existence for the analysis and interpretation of RCTs. The Trial Bank Project includes Bank-a-Trial, a web-based program for entering trials into RCT Bank, and RCT Presenter, a web-based browser of RCT Bank entries.

The objective of the Trial Bank Project's participation in the National Center for Biomedical Ontology (NCBO) is to drive the development and use of ontology and ontology-based services to augment computational reasoning of RCTs. Examples include using ontologies to drive multi-dimensional visualizations and dynamic manipulation of heterogeneous trials and the use of vocabulary mapping services to semantically correlate RCTs with electronic patient records. The specific aims of our Driving Biological Project are:

1. to collect and annotate RCTs in the areas of MTCT and ART;
2. to use visualization techniques to identify similarities and differences among those trials for meta-analysis (statistical technique used to combine the trials' results) of available evidence;
3. to facilitate the automated determination of the applicability of RCT results to patients, whose data is stored in an electronic medical record (EMR) system and coded in a standard vocabulary (applicability indicates the degree of relevance of the study to the patient); and
4. to inform the design of future trials to maximize the value of the evidence they will provide.

Our project will lead to advanced understanding of important and controversial issues in HIV/AIDS prevention and care, as well as to tools for analyzing RCTs in any other clinical domain. As RCTs yield some of the most valuable evidence for the advancement of clinical science and practice, this Driving Biological Project will serve as a significant demonstration of the practical benefits that can accrue from the National Center for Biomedical Ontology.

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