Translational Medicine Ontology: A Patient-Centric Ontology for Drug Development and Clinical Practice

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Abstract

The aim of personalized medicine is for patients to receive the right drug at the right time and at the right dose. To achieve this aim, traditionally separate data sets, in drug discovery, hypothesis management, formulation, clinical trials and clinical research need to be integrated, queried and analyzed collectively to identify biomarkers necessary to tailor pharmaceuticals. Ontologies, a formal representation of domain knowledge, can drive data integration; however, at present few ontologies exist that bridge genomics, chemistry and medicine. We present a high-level, patient-centric ontology to facilitate integration of data relating to translational medicine and describe prototype applications within both pharmaceutical research and clinical practice. The ontology has been developed by participants in the World Wide Web Consortium's Semantic Web for Health Care and Life Sciences Interest Group and members of the National Center for Biomedical Ontology.

Introduction

The Translational Medicine Ontology (TMO) is an application ontology that draws on existing open domain ontologies and provides a framework to describe patient-centric information.

Methods

We identified roles played by people across the fields of healthcare and life sciences, collected questions that people in these roles typically ask, and identified relevant domain ontologies[1] that can be used to formulate these questions. This guided our initial selection of classes within the TMO. We developed drug discovery and clinical practice use cases to help refine the ontology[2]. The TMO has been aligned with the Basic Formal Ontology[3], an upper-level ontology, to facilitate interoperability with other ontologies.

Results

The TMO is available under the Creative Commons 3.0 BY license for download.[4]

Discussion

We have developed an initial version of a patient-centric application ontology for translational medicine, in a collaborative effort between industry and academia. It will serve as a framework for enabling scientists to more easily answer interesting but difficult questions, especially those that span currently unconnected data 'silos'. The presentation will highlight our methodology, work to date, and future steps.

References

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