

## BioPortal: Ontologies and Integrated Data Resources at the Click of the Mouse

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### Abstract

*BioPortal* (<http://bioportal.bioontology.org>) is an open repository of biomedical ontologies that provides programmatic and web-based access to ontologies developed in OBO, OWL, Protégé frames, and RDF. Features include browsing, searching, and visualization of ontologies. Searching of integrated data resources is also possible through ontology-based indexing of biomedical resources with *BioPortal* ontologies.

### Introduction

A variety of ontology repositories exist, however they differ by either method of ontology content collection or ontology formats supported.<sup>1-6</sup> *BioPortal* is an open repository of biomedical ontologies that store ontologies developed in various formats, that provides for automatic updates by user submissions of new versions, and that provides access via Web browsers and through Web services.

### BioPortal Content and Functionality

The ontology content of *BioPortal* covers a wide range of subject matter such as anatomy, phenotype, imaging, chemistry, and experimental conditions. *BioPortal* supports ontologies in OBO, OWL, Protégé frames, and RDF. Metadata collected for each ontology include keywords, version information, release date, and ontology author contact information. *BioPortal* also supports filters of the ontology content such as limiting the view to OBO Foundry ontologies.<sup>7</sup>

*BioPortal* users can browse and search the ontologies, submit new versions of the ontologies in the repository, comment on any ontology (or portion of an ontology) in the repository, add a review of the ontology, describe their experience in using the ontology, or make suggestions to ontology developers. The focus on enabling members of the community to contribute actively to *BioPortal* content and to increase the value of that content to other users distinguishes *BioPortal* from other

ontology repositories. Another key feature of *BioPortal* is the ability to query biomedical data resources such as ArrayExpress, the Gene Expression Omnibus (GEO), and ClinicalTrials.gov through the annotation and indexing of these resources with ontologies in *BioPortal*.<sup>8,9</sup>

### Conclusion

*BioPortal* not only provides investigators, clinicians, and developers “one-stop shopping” to programmatically access biomedical ontologies, but also integrates data from various biomedical resources.

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