

Community-Reviewed Biological Network Models for Toxicology and Drug Discovery Applications

[sbv IMPROVER project team and challenge best performers](#); [Aishwarya Alex Namasivayam](#)¹, [Alejandro Ferreiro Morales](#)², [Ángela María Fajardo Lacave](#)², [Aravind Tallam](#)³, [Borislav Simovic](#)⁴, [David Garrido Alfaro](#)², [Dheeraj Reddy Bobbili](#)¹, [Florian Martin](#)⁵, [Ganna Androsova](#)¹, [Irina Shvydchenko](#)⁶, [Jennifer Park](#)⁷, [Jorge Val Calvo](#)⁸, [Julia Hoeng](#)⁵, [Manuel C Peitsch](#)⁵, [Manuel González Vélez Racero](#)², [Maria Biryukov](#)¹, [Marja Talikka](#)⁵, [Modesto Berraquero Pérez](#)², [Neha Rohatgi](#)⁹, [Noberto Díaz-Díaz](#)², [Rajesh Mandarapu](#)¹⁰, [Rubén Amián Ruiz](#)², [Sergey Davidyan](#)¹¹, [Shaman Narayanasamy](#)¹, [Stéphanie Boué](#)⁵, [Svetlana Guryanova](#)¹², [Susana Martínez Arbas](#)¹, [Swapna Menon](#)¹³, [Yang Xiang](#)⁵

Affiliations expand

- PMID: 27429547
- PMCID: [PMC4944831](#)
- DOI: [10.4137/GRSB.S39076](#)

Free PMC article

Abstract

Biological network models offer a framework for understanding disease by describing the relationships between the mechanisms involved in the regulation of biological processes. Crowdsourcing can efficiently gather feedback from a wide audience with varying expertise. In the Network Verification Challenge, scientists verified and enhanced a set of 46 biological networks relevant to lung and chronic obstructive pulmonary disease. The networks were built using Biological Expression Language and contain detailed information for each node and edge, including supporting evidence from the literature. Network scoring of public transcriptomics data inferred perturbation of a subset of mechanisms and networks that matched the measured outcomes. These results, based on a computable network approach, can be used to identify novel mechanisms activated in disease, quantitatively compare different treatments and time points, and allow for assessment of data with low signal. These networks are periodically

verified by the crowd to maintain an up-to-date suite of networks for toxicology and drug discovery applications.

Keywords: COPD; biological network; crowdsourcing; drug discovery; toxicology.