

mGWAS-Explorer 2.0 Tutorial

-- Interpreting MR results with Semantic Triples



Triangulating evidence from semantic triples

- Welcome to the tutorial for interpreting MR results using mGWAS-Explorer 2.0.
- We'll be focusing on triangulating evidence from semantic triples for robust causal inference.

mGWAS-Explorer

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Start with Metabolites Connect metabolites to SNPs, genes or diseases	Start with SNPs Connect SNPs to genes, metabolites or diseases	Start with Genes Connect genes to SNPs, metabolites or diseases	Integrated Search Joint search of individual SNP and/or metabolite
MR Analysis Perform Mendelian randomization analysis	Browse mPheWAS Browse phenome-wide MR of metabolome	Browse mGWAS Browse 65 manually curated mGWAS studies	mGWASR Package Use R package for batch processing or extension

Please use [OmicsForum](#) for support & troubleshooting request

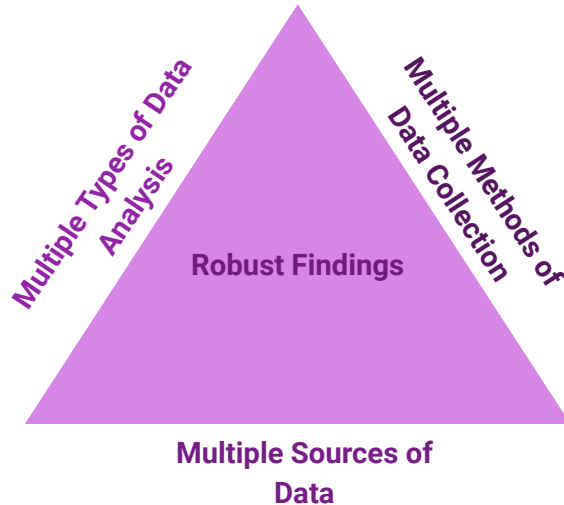
Main Features

Understanding semantic triples

- mGWAS-Explorer 2.0 leverages the [MELODI Presto](#) method to integrate millions of semantic triples curated from [SemMedDB](#), a reputable database that offers literature evidence from all PubMed titles and abstracts.
- A semantic triples consists of a "subject-predicate-object" relationship.
- By identifying overlaps between the 'object' from your exposure query and a 'subject' from your outcome query, you can find enriched terms that may indicate a causal relationship.
- See detailed explanations here:
 - <https://omicsforum.ca/t/what-is-overlapping-enriched-terms/2287>

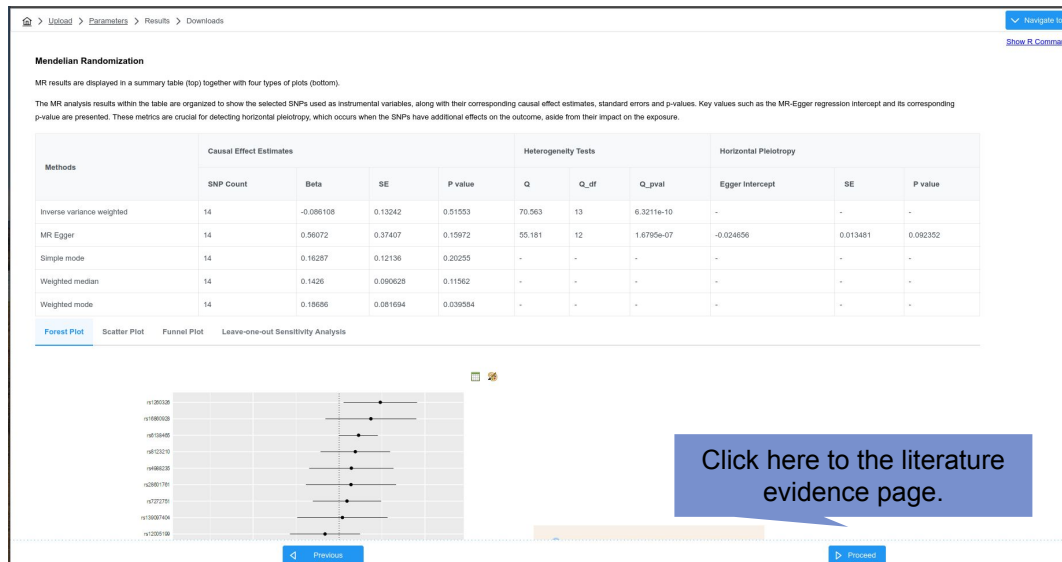
Importance of triangulating evidence

- With this tool, you can identify overlapping terms connecting exposure and disease outcome.
- This offers a way for triangulating causal estimates and checking the mechanisms identified from literature against causal evidence.
- Triangulating evidence minimizes bias and enhances confidence in findings.
- When different data sources lead to the same conclusion, your confidence in the findings should increase ([Lawlor et al. 2016](#)).



Accessing semantic triples in MR Results

- In the results page of the MR module, you have the option to retrieve semantic triples related to your chosen exposure (metabolite) and outcome (disease)



Viewing semantic triple results

- The query usually takes a few seconds and returns the results in two data tables, providing a structured way to interpret the overlapping enriched terms.
- This aids in discovering potential causal links.

Literature Evidence

Integrating evidence from different studies (subject-predicate-object) associated with the same outcome is that if the results from different sources all lead to the same conclusion, the confidence in the findings increases. Users can retrieve the semantic triples (subject-predicate-object) associated with the same outcome, namely, the object from the exposure query overlaps with a subject from the outcome query. The results can be viewed in a network diagram. The links below are answers to some related questions.

- [What is overlapping enriched terms?](#)

[Exposure Triples](#) [Outcome Triples](#)

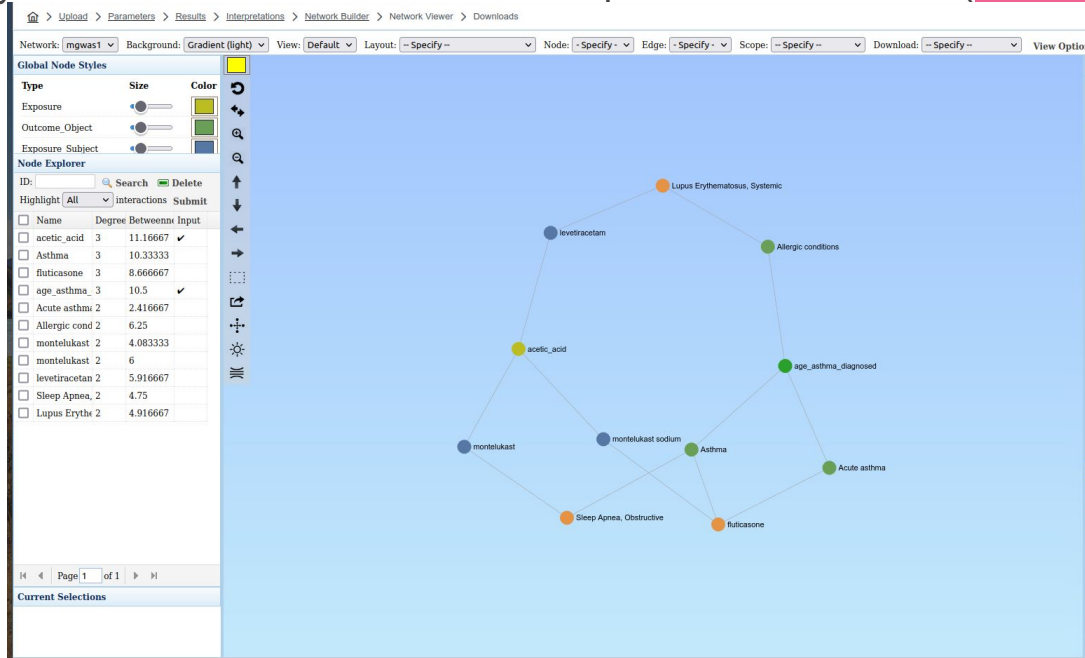
Exposure ↑↓	Exposure_Subject ↑↓	Exposure_Predicate ↑↓	Exposure_Pval ↑↓	Exposure_PMIDs ↑↓	Overlap ↑↓	Action
ascorbic_acid	montelukast	TREATS	5.5562e-21	View	Sleep Apnea, Obstructive	Delete
ascorbic_acid	montelukast sodium	COEXISTS_WITH	1.2682e-20	View	fluticasone	Delete
ascorbic_acid	montelukast	TREATS	5.5562e-21	View	Sleep Apnea, Obstructive	Delete
ascorbic_acid	montelukast sodium	COEXISTS_WITH	1.2682e-20	View	fluticasone	Delete
ascorbic_acid	montelukast sodium	COEXISTS_WITH	1.2682e-20	View	fluticasone	Delete
ascorbic_acid	montelukast sodium	COEXISTS_WITH	1.2682e-20	View	fluticasone	Delete
ascorbic_acid	levetiracetam	CAUSES	1.441e-07	View	Lupus Erythematosus, Sys	Delete

(1 of 1)

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Visualizing semantic triples

- For an alternative, more visual approach, you can explore the results using a network diagram.
- This can help you better understand the relationships between variables ([Liu & Gaunt 2022](#)).



Conclusion

- Using mGWAS-Explorer 2.0 to triangulate evidence from semantic triples can enhance the credibility of your findings.
- We encourage you to experiment with this feature, and to contact us with any questions or feedback you may have:

<https://omicsforum.ca/c/mgwas-explorer/12>