

# Metabolic Map: Homo sapiens

Species code: hsa  
Enzyme coverage threshold: 66%  
Rescued modules: 3

## Summary Statistics

### Input Data

Metric	Count
Total KEGG reactions	12,384
Species enzyme-backed reactions	2,231
Modules selected	124
Reactions before graph construction	3,112

### Final Graph

Node Type	Count
Reactions	1,655
Compounds	1,048
Genes	1,259
Modules	105
Pathways	122

Total edges: 15,469

# Graph Schema

## Node Types

Each node has a `group` attribute: `Compound`, `Reaction`, `Gene`, `Module`, or `Pathway`.

## Node Identifiers

Group	ID Format	Example
Compound	<code>kegg:CXXXXX</code>	<code>kegg:C00001</code>
Reaction	<code>kegg:RXXXXX</code>	<code>kegg:R00286</code>
Module	<code>kegg:MXXXXX</code>	<code>kegg:M00001</code>
Pathway	<code>kegg:mapXXXXX</code>	<code>kegg:map00010</code>
Gene	<code>kegg:hsa:XXXXXXXX</code>	<code>kegg:hsa:100037283</code>

## Additional Node Attributes

Group	Attributes
Compound	<code>compound_name</code>
Gene	<code>gene_symbol</code> , <code>ensembl_id</code> , <code>ncbi_gene_id</code>
Module	<code>module_name</code>
Pathway	<code>pathway_name</code>

## Edge Attributes

- **Compound ↔ Reaction:** `coef` (stoichiometric coefficient), `compartment`
  - **Gene/Module/Pathway → Reaction:** no additional attributes
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## Rescued Modules

The following modules were manually included despite lacking species-specific KEGG submaps:

- M00978
- M00367
- M00088

## Dropped Modules

The following 29 modules met the coverage threshold but were not included:

Module	Coverage	Reactions	Reason	Name
M00013	86%	7	no species-specific KEGG submap	Malonate semialdehyde pathway, propan...
M00074	80%	5	no species-specific KEGG submap	N-glycan biosynthesis, high-mannose type
M00093	67%	3	no species-specific KEGG submap	Phosphatidylethanolamine (PE) biosynt...
M00102	76%	18	no species-specific KEGG submap	Ergocalciferol biosynthesis, FPP => e...
M00129	75%	9	no species-specific	Ascorbate biosynthesis, animals, gluc...

Module	Coverage	Reactions	Reason	Name
			KEGG submap	
M00133	75%	4	no species-specific KEGG submap	Polyamine biosynthesis, arginine => a...
M00140	100%	4	no species-specific KEGG submap	C1-unit interconversion, prokaryotes
M00144	100%	1	no species-specific KEGG submap	NADH:quinone oxidoreductase, prokaryotes
M00145	100%	1	no species-specific KEGG submap	NAD(P)H:quinone oxidoreductase, chlor...
M00149	100%	1	no species-specific KEGG submap	Succinate dehydrogenase, prokaryotes
M00150	100%	1	no species-specific KEGG submap	Fumarate reductase, prokaryotes
M00157	100%	1	no species-specific	F-type ATPase, prokaryotes and chloro...

Module	Coverage	Reactions	Reason	Name
			KEGG submap	
M00159	100%	1	no species-specific KEGG submap	V/A-type ATPase, prokaryotes
M00165	71%	14	no species-specific KEGG submap	Reductive pentose phosphate cycle (Ca...
M00171	75%	6	no species-specific KEGG submap	C4-dicarboxylic acid cycle, NAD - mal...
M00344	75%	4	no species-specific KEGG submap	Formaldehyde assimilation, xylulose m...
M00346	70%	9	no species-specific KEGG submap	Formaldehyde assimilation, serine pat...
M00364	100%	4	no species-specific KEGG submap	C10-C20 isoprenoid biosynthesis, bact...
M00365	100%	4	no species-specific	C10-C20 isoprenoid biosynthesis, archaea

Module	Coverage	Reactions	Reason	Name
			KEGG submap	
M00366	100%	4	no species-specific KEGG submap	C10-C20 isoprenoid biosynthesis, plants
M00532	83%	12	no species-specific KEGG submap	Photorespiration
M00843	83%	6	no species-specific KEGG submap	L-threo-Tetrahydrobiopterin biosynthe...
M00881	100%	4	no species-specific KEGG submap	Lipoic acid biosynthesis, plants and ...
M00922	67%	3	no species-specific KEGG submap	CMP-Neu5Ac biosynthesis, bacteria, UD...
M00926	67%	9	no species-specific KEGG submap	Heme biosynthesis, bacteria, glutamyl...
M00936	75%	4	no species-specific	Melatonin biosynthesis, plants, trypt...

Module	Coverage	Reactions	Reason	Name
			KEGG submap	
M00954	67%	3	no species-specific KEGG submap	CMP-KDN biosynthesis, Man-6P => CMP-KDN
M00997	67%	3	no species-specific KEGG submap	UDP-Xyl/L-Ara biosynthesis, UDP-Glc =...
M01006	80%	5	no species-specific KEGG submap	GDP-D-Rha4N biosynthesis, Fru-6P => G...