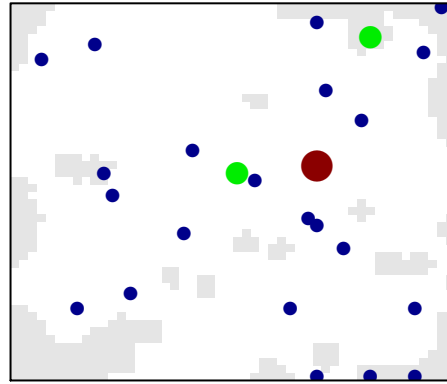


# Vitamin digestion and absorption

all genes



maximum = 3





Vitamin digestion  
and absorption  
MPI=001

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

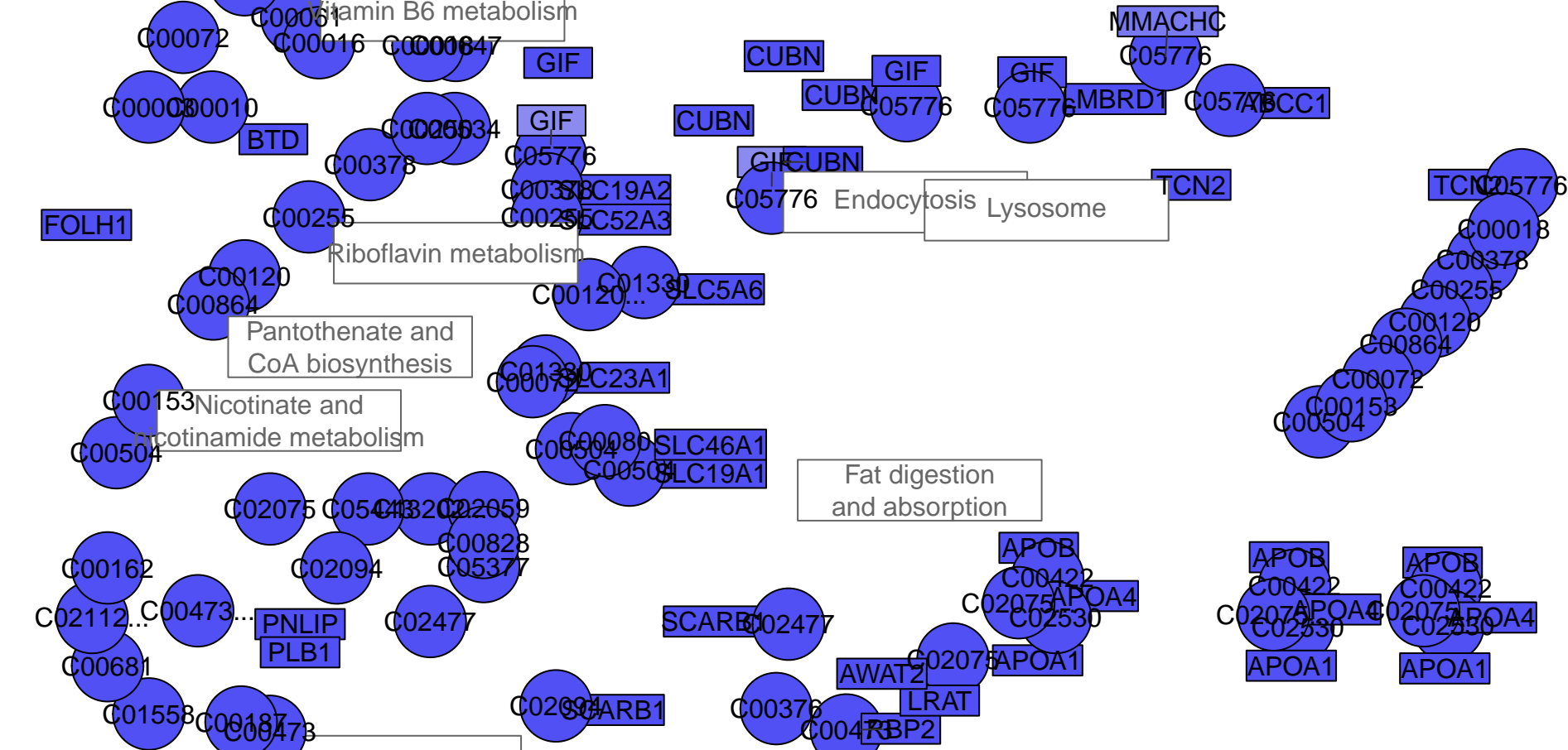
Retinol metabolism

Bile secretion

Endocytosis

Lysosome

Fat digestion and absorption





Vitamin digestion  
and absorption  
MPI=003

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C00072 C00016 C000647  
C00008 C00010  
BTD

CUBN GIF GIF GIF  
CUBN CUBN C05776 C05776 MBRD1 C05776 BCC1

MMACHC

FOLH1

C00255 C00378 C0025634  
C00378 C05776  
C00378 C19A2  
C00256 C52A3

C05776 Endocytosis Lysosome  
TCN2

Riboflavin metabolism

C00120 C00864  
C00120... SLC5A6

Pantothenate and  
CoA biosynthesis

C00138 SLC23A1  
C00079

C00153 Nicotinate and  
nicotinamide metabolism

C00080 SLC46A1  
C00504 SLC19A1

Fat digestion  
and absorption

TCN2 C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504

C02075 C05413 C022059  
C00828  
C05377

C00162 C02094 C02477  
C02112... C00473...  
PNLIP PLB1

SCARB1

APOB C00422  
C02075 APOA4  
C02530

APOB C00422  
C02075 APOA4  
C02530  
APOA1

Bile secretion

Retinol metabolism

C02094 SCARB1

C00378 C00473  
AWAT2 LRAT  
C02075 APOA1  
C00473 BFP2

Vitamin digestion and absorption  
MPI=005

Tight junction

Folate biosynthesis  
Biotin metabolism  
Taurine metabolism  
C05776

C05552 C00068

Vitamin B6 metabolism  
C00072 C00061 C00016 C000647

C00008 C00010  
BTD  
C00255  
C00378  
C005634  
GIF  
C05776

CUBN

GIF

MMACHC

C05776

CUBN

CUBN

C05776

GIF

C05776

MBRD1

C05776

BCC1

GIF

C05776

CUBN

C05776

Endocytosis

Lysosome

TCN2

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

Riboflavin metabolism  
C00120 C00864

C00120...

SLC5A6

Pantothenate and CoA biosynthesis  
C00130

C00130

SLC23A1

Nicotinate and nicotinamide metabolism  
C00153 C00504

C00080

SLC46A1

C00504

SLC19A1

Fat digestion and absorption

C02075 C05413 C022059

C00828

C05377

C02094

C02477

C00681

C01558

C00187

C00473

Bile secretion

Retinol metabolism

C02094

SCARB1

SCARB1

C02477

C00378

C00473

RBP2

AWAT2

LRAT

C02075

APOA1

APOB

C00422

APOA4

C02075

C02530

APOB

C00422

APOA4

C02075

C02530

APOA1

APOB

C00422

APOA4

C02075

C02530

APOA1

Vitamin digestion and absorption  
MPI=006

Tight junction

Folate biosynthesis  
Biotin metabolism  
Taurine metabolism

C05552 C00068 C05776

Vitamin B6 metabolism  
C00072 C00061 C00016 C000647

C00008 C00010

BTD

C00255 C00378 C00256 C00378 C00378 C00255 C00255 C00255

FOLH1

C00120 C00864

Riboflavin metabolism

C00120... SLC5A6

Pantothenate and CoA biosynthesis

C00138 SLC23A1

C00153 Nicotinate and nicotinamide metabolism  
C00504

C00080 SLC46A1  
C00504 SLC19A1

Fat digestion and absorption

C02075 C05413 C022059

C00162 C02112... C00473... C00681

PNLIP  
PLB1

C02094 C02477

SCARB1 C02477

APOB C00422 APOA4 C02075 C02530

APOB C00422 APOA4 C02075 C02530

APOB C00422 APOA4 C02075 C02530

C01558 C00187 C00473

Bile secretion

Retinol metabolism

C02094 SCARB1

C00378 C00473  
AWAT2 LRAT RBP2

APOA1

APOA1

APOA1

MMACHC

CUBN

GIF

GIF

C05776

CUBN

CUBN

C05776

C05776

MBRD1

C05776

BCC1

GIF

C05776

Endocytosis Lysosome

TCN2

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504









Vitamin digestion  
and absorption  
MPI-027

Tight junction

Folate biosynthesis

Biotin metabolism  
Thiamine metabolism  
Vitamin B6 metabolism

MMACHC

C00008  
C00010

GIF

CUBN

GIF

GIF

MBRD1

C05776

C05776

BTD

C00255

C00255

GIF

CUBN

CUBN

C05776

C05776

C05776

C05776

C05776

FOLH1

C00255

Riboflavin metabolism

C00378

C00378

C00255

C00120...

C00120...

C00120...

C00120...

C00120...

C00120...

C00120...

C00120...

C00120...

C00120...

C00120...

C00120...

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C00120...

C00120...

C00120...

C00120...

C00120...

C00120...

C00120...

C05776

Endocytosis  
Lysosome

TCN2

TCN2

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

Pantothenate and  
CoA biosynthesis

C00138

C00072

C00080

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

Nicotinate and  
nicotinamide metabolism

C00504

C02075 C05413 C022059

C00162

C02094

C00828

C05377

C02112...

C00473

C02477

C02477

C02477

C02477

C02477

C02477

C02477

C02477

C02477

C02477

C02477

C02477

Bile secretion

Retinol metabolism

C01558

C00187

C00473

C00473

C00473

C00473

C00473

C00473

C00473

C02094

C02094

C02094

C02094

C02094

C02094

C02094

C02094

Fat digestion  
and absorption

SCARB1

C02477

C02477

C02477

C02477

C02477

C02477

C02477

C02477

C02477

C02477

C02477

AWAT2

C02075

C02075

C02075

C02075

C02075

C02075

C02075

C02075

C02075

LRAT

C00378

C00473

C00473

C00473

C00473

C00473

C00473

C00473

APOB

C00422

C02075

C02530

C02530

C02530

C02530

C02530

C02530

C02530

C02530

C02530

C02530

C02530

APOB

C00422

C02075

C02530

C02530

C02530

C02530

C02530

C02530

C02530

C02530

C02530

C02530

C02530

APOB

C00422

C02075

C02530

C02530

C02530

C02530

C02530

C02530

C02530

C02530

C02530

C02530

C02530

APOA1

C02075

C02530

C02530

C02530

C02530

C02530

C02530

C02530

C02530

C02530

C02530

APOA1

C02075

C02530

C02530

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C02530

C02530







Vitamin digestion and absorption  
MPI-033

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

MMACHC

C00008  
C00010

GIF

CUBN

GIF

GIF

C05776

MBRD1

C05776

BTD

C00255

GIF

CUBN

CUBN

C05776

C05776

C05776

BCC1

C00378

C05776

GIF

CUBN

C05776

C05776

TCN2

FOLH1

C00255

C00378

C00378

C05776

C05776

Endocytosis

Lysosome

TCN2

TCN2

C05776

C00120

Riboflavin metabolism

C00120...

C01330

SLC5A6

C00018

C00378

C00255

C00120

C00864

C00072

C00072

C00153

C00153

C00504

Pantothenate and CoA biosynthesis

C01330

C00072

SLC23A1

C00504

C00072

C00153

Nicotinate and nicotinamide metabolism

C00153

C00504

C00072

C00080

SLC46A1

Fat digestion and absorption

C00504

C00504

SLC19A1

C02075 C05413 C022059

C00504

C00504

SLC19A1

Fat digestion and absorption

C00162 C02094 C00828 C05377

C00504

C00504

SLC19A1

Fat digestion and absorption

C02112...

C00473

C00681

C01558

C00187

C00473

C02477

C02094

SCARB1

C00378

C00473

C02075

APOA1

APOA4

APOB

C00422

C02075

APOA4

APOB

C00422

C02075

APOA4

Bile secretion

Retinol metabolism

C01558

C00187

C00473

C02094

SCARB1

C00378

C00473

C02075

APOA1

APOA4

APOB

C00422

C02075

APOA4

APOB

C00422

C02075

APOA4





Vitamin digestion  
and absorption  
MPI-043

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

MMACHC

C00008 C00010

CUBN GIF CUBN GIF MBRD1 C05776 C05776 BCC1

BTD

C00255 C00378 C005634 C00378 C00378 C00255 C00255 C00255

CUBN GIF CUBN C05776 Endocytosis Lysosome TCN2

FOLH1

Riboflavin metabolism  
C00120 C00864 C00120... SLC5A6

TCN2

C00018 C00378 C00255 C00120 C00864 C00072 C00153 C00504

Pantothenate and  
CoA biosynthesis

C00138 SLC23A1 C00072 C00080 SLC46A1 C00504 SLC19A1

Nicotinate and  
nicotinamide metabolism

C02075 C05413 C022059 C00828 C05377 C02094 C02477

Fat digestion  
and absorption

APOB C00422 APOA4 C02075 C02530

APOB C00422 APOA4 C02075 APOA4 C02530 APOA1

C00162 C02112... C00473... C00681 C01558 C00187 C00473

PNLIP PLB1

SCARB1 C02477 SCARB1 C00378 C00473 AWAT2 LRAT

Bile secretion

Retinol metabolism



Vitamin digestion  
and absorption  
MPI-048

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

Bile secretion

Retinol metabolism

CUBN

CUBN

CUBN

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CUBN

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CUBN

Endocytosis

Lysosome

Fat digestion  
and absorption

MMACHC

C05776

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Vitamin digestion  
and absorption  
MPI-055

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

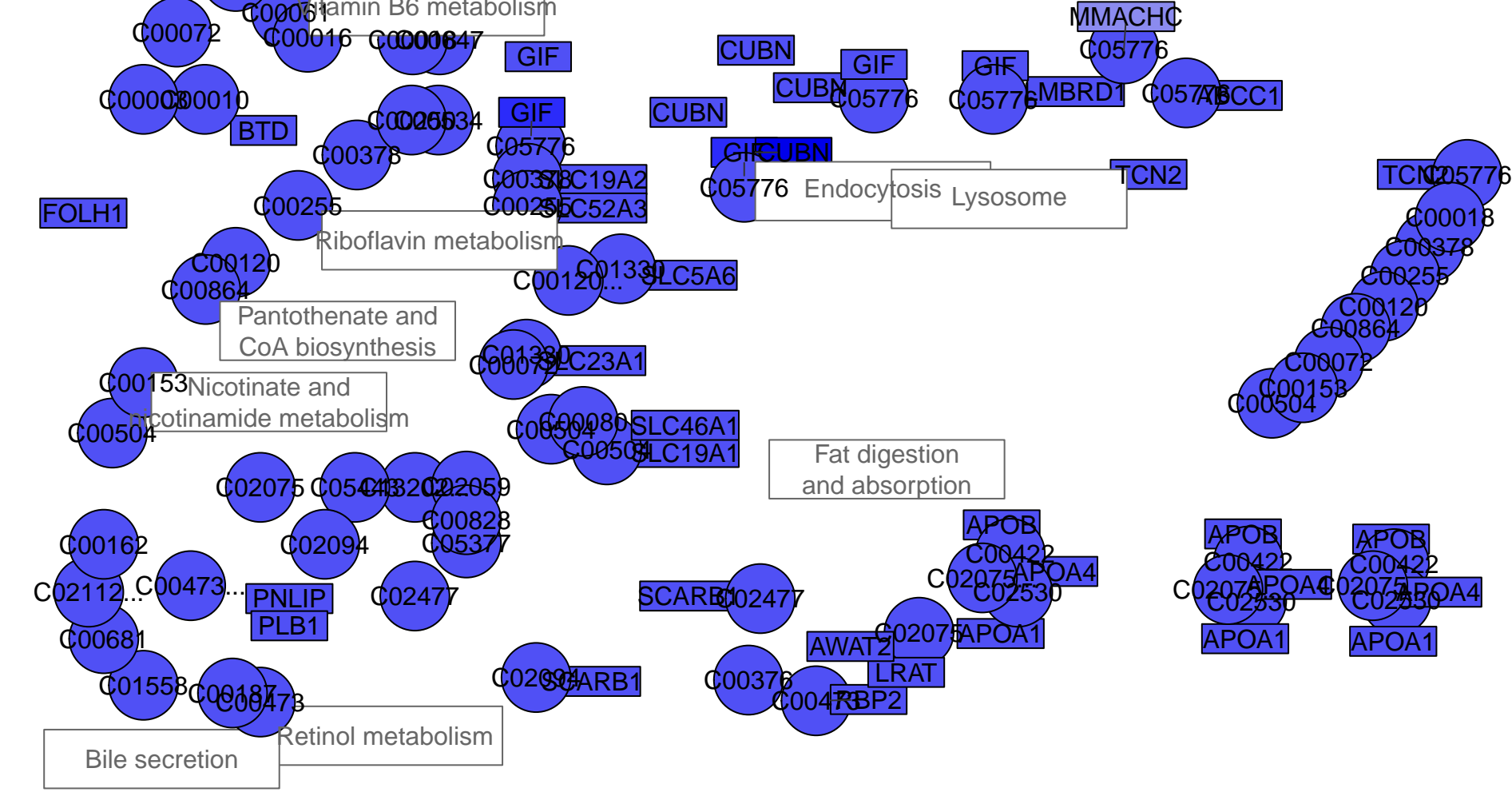
Bile secretion

Retinol metabolism

Endocytosis

Lysosome

Fat digestion and absorption



Vitamin digestion  
and absorption  
MPI-065

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

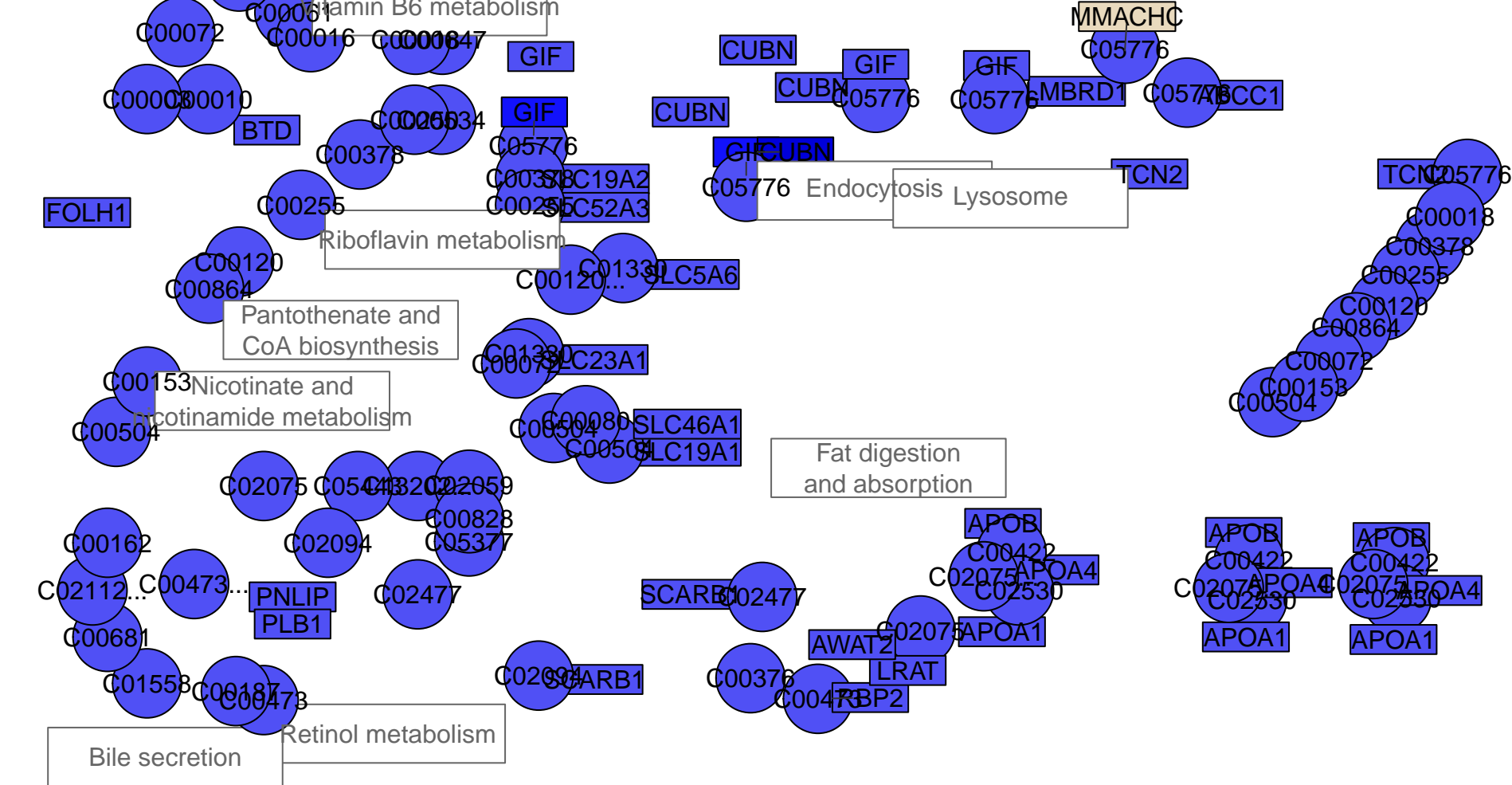
Bile secretion

Retinol metabolism

Endocytosis

Lysosome

Fat digestion and absorption



Vitamin digestion  
and absorption  
MPI-071

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C00072 C00010  
C00008 C00016  
C00061 C000647  
BTD GIF  
C00255 C00378  
C00120 C00864  
C00153 C00504  
C00162 C00473  
C02112... C00681  
C01558 C00187  
C00473

Riboflavin metabolism

Pantothenate and  
CoA biosynthesis

Nicotinate and  
nicotinamide metabolism

Bile secretion

Retinol metabolism

C05776  
C05552 C00068  
C00061  
C00016 C000647  
GIF  
C0025534  
C00378 C05776  
C00378 C19A2  
C00255 C52A3

C01380  
C00079 SLC23A1  
C00080 SLC46A1  
C00504 SLC19A1

C02075 C05413 C022059  
C00828 C05377  
C02094 C02477

C02094 SCARB1

CUBN GIF  
CUBN GIF  
C05776 C05776  
CUBN MBRD1 C05776  
GIF CUBN  
C05776 Endocytosis Lysosome  
TCN2

Fat digestion  
and absorption

SCARB1 C02477  
C00378 C00473  
AWAT2 LRAT  
C02075 APOA1  
C00422 APOA4  
C02075 APOA4  
C02530

MMACHC  
C05776  
C05776  
MBRD1 C05776  
BCC1

TCN2 C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504

APOB C00422  
C02075 APOA4  
C02530 APOA1  
APOB C00422  
C02075 APOA4  
C02530 APOA1



Vitamin digestion  
and absorption  
MPI-075

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

C00003 C00010 GIF

BTD C0025534 GIF

C00378 C05776

C00255 C00378 C19A2

C00120 C00864 C01330

Pantothenate and  
CoA biosynthesis

Nicotinate and  
nicotinamide metabolism

C02075 C05413 C022059

C00162 C02094 C00828 C05377

C02112... C00473... PNLIP PLB1 C02477

C00681 C01558 C00187 C00473

Bile secretion

Retinol metabolism

C05776

C00068

C00061

C00016

C000647

GIF

GIF

C05776

C00378

C00255

C00120...

SLC5A6

C01330

C00072

SLC23A1

C00080

C05504

SLC46A1

C00508

SLC19A1

C00828

C05377

C02477

C02094

SCARB1

CUBN

GIF

CUBN

C05776

CUBN

GIF

C05776

MMACHC

C05776

GIF

C05776

MBRD1

C05776

TCN2

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

Fat digestion  
and absorption

APOB

C00422

APOA4

C02075

C02530

APOA1

APOB

C00422

APOA4

C02075

C02530

APOA1

APOB

C00422

APOA4

C02075

C02530

APOA1

CUBN

GIF

CUBN

C05776

Endocytosis

Lysosome

TCN2

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

SCARB1

C00378

C00473

LRAT

RBP2

AWAT2

C02075

APOA1

APOA1

APOA1

Vitamin digestion  
and absorption  
MPI-077

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

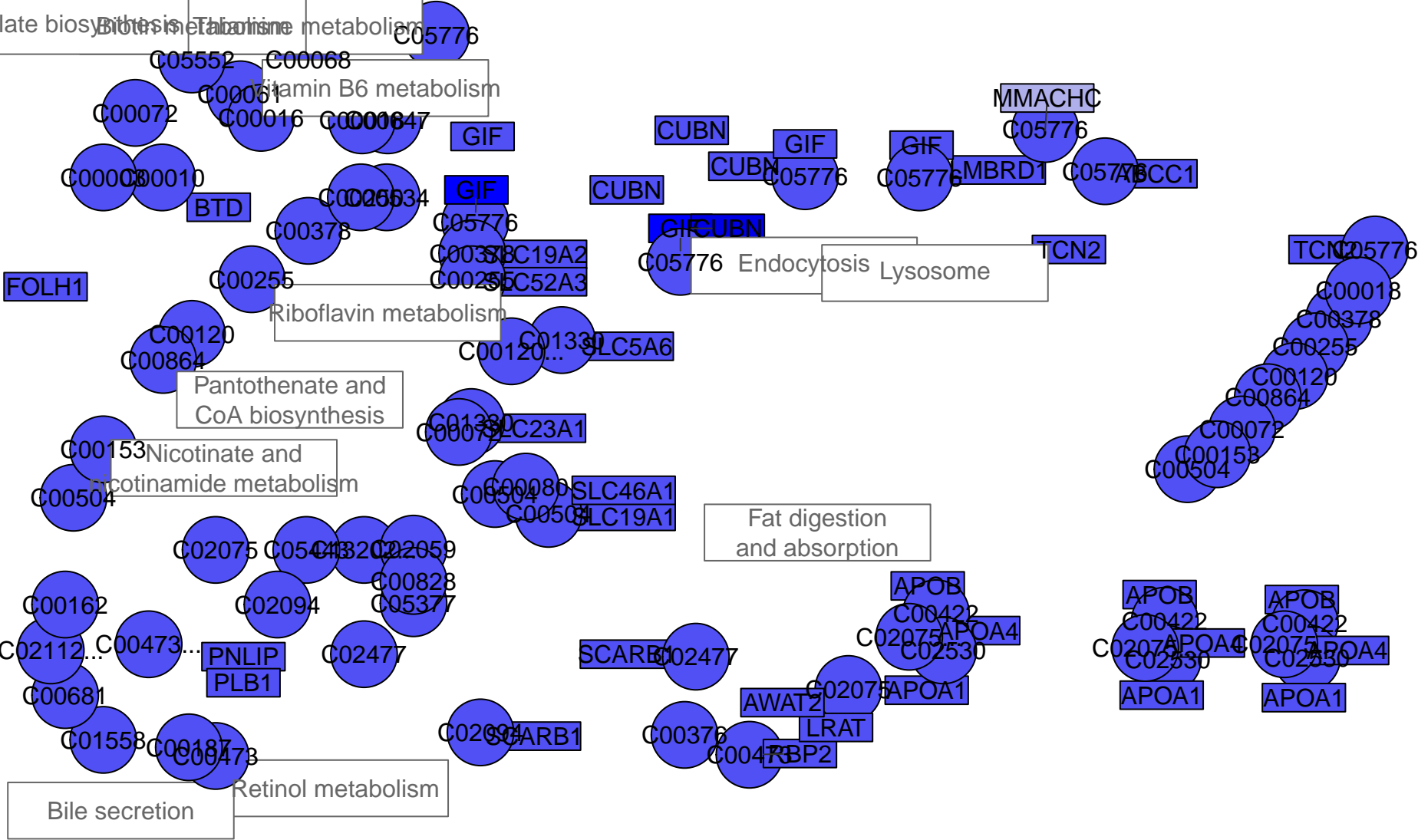
Nicotinate and nicotinamide metabolism

Bile secretion

Retinol metabolism

Fat digestion  
and absorption

Endocytosis  
Lysosome







Vitamin digestion  
and absorption  
MPI-079

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

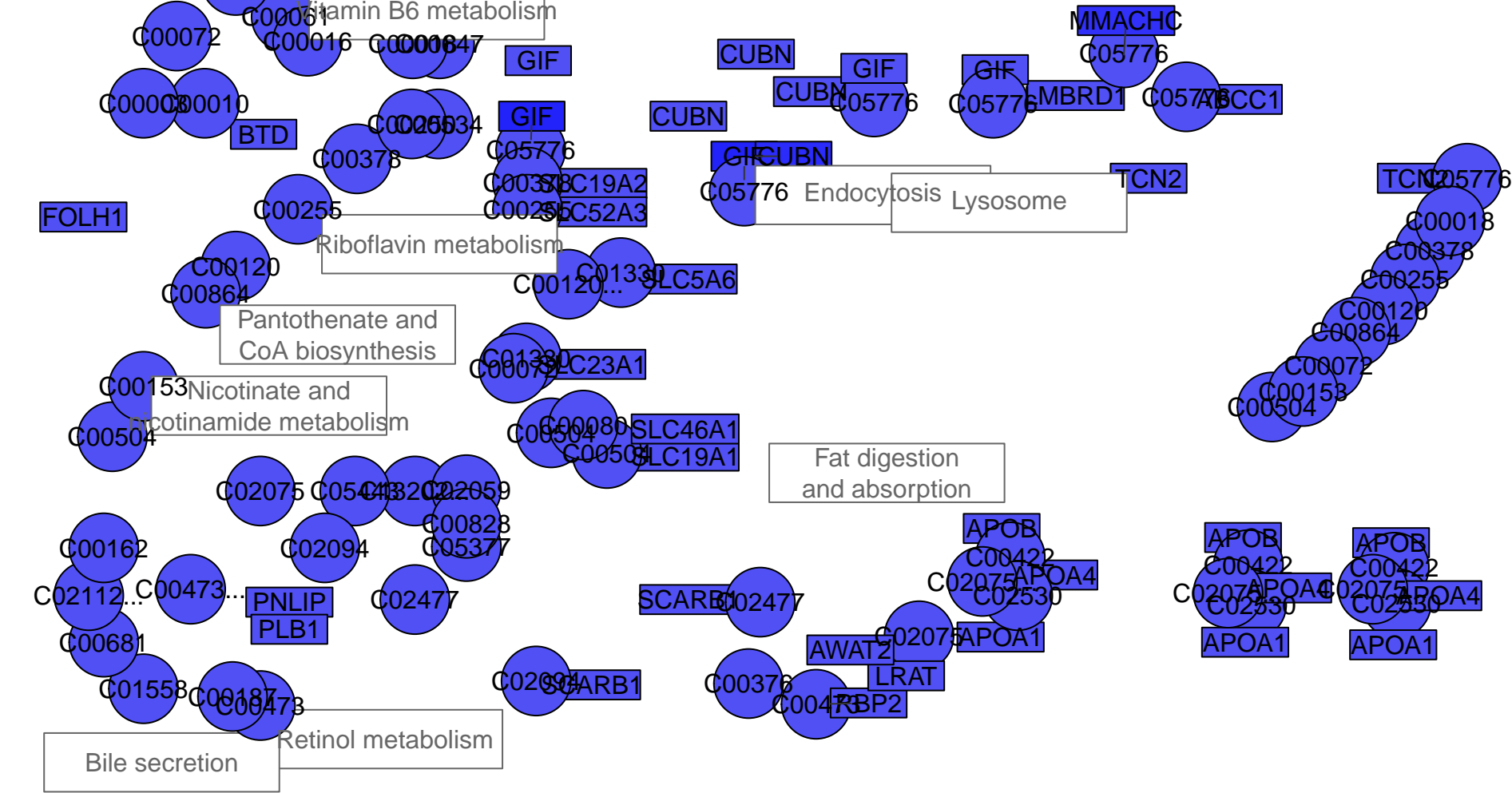
Retinol metabolism

Bile secretion

Endocytosis

Lysosome

Fat digestion and absorption









Vitamin digestion  
and absorption  
MPI-084

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

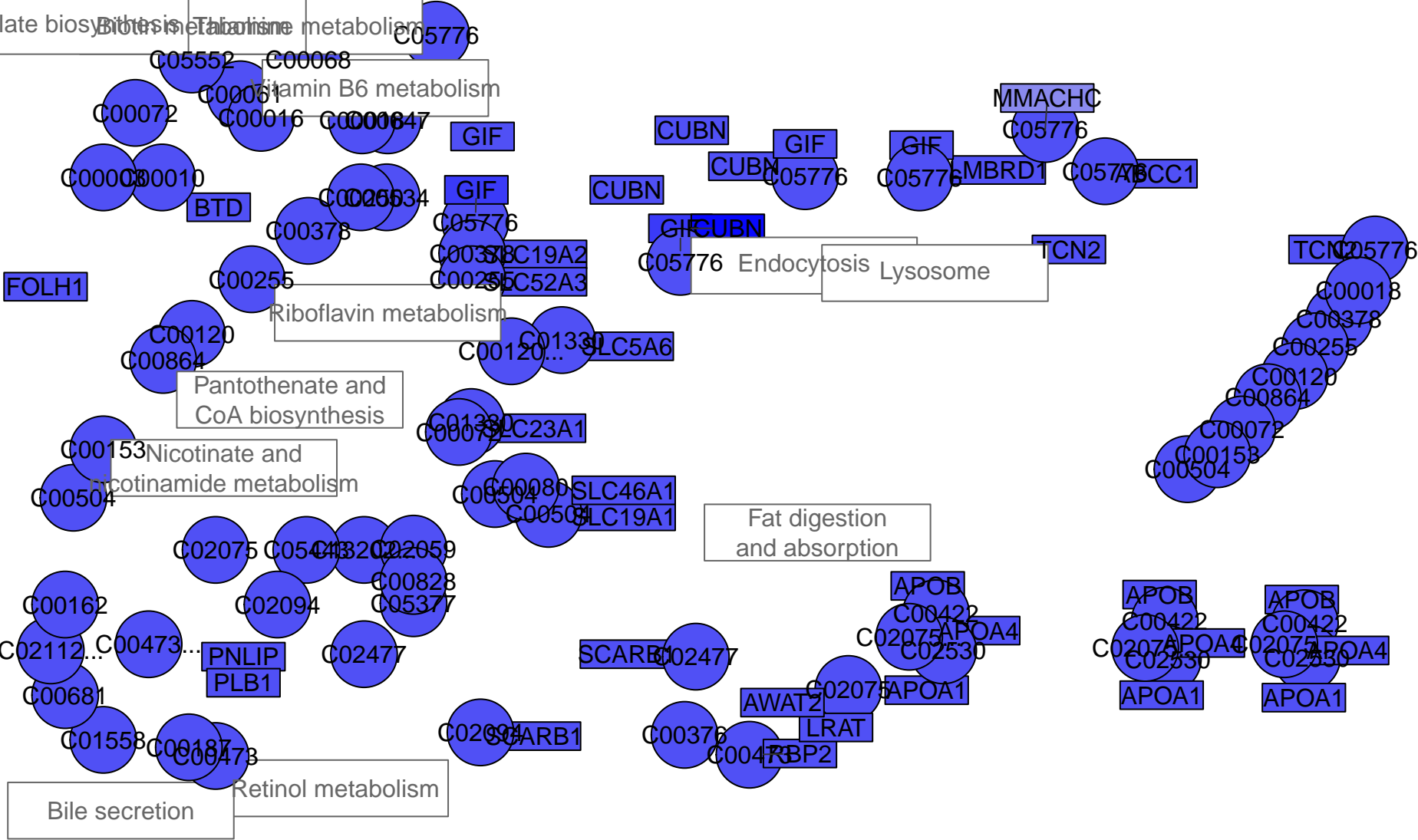
Nicotinate and nicotinamide metabolism

Bile secretion

Retinol metabolism

Fat digestion  
and absorption

Endocytosis  
Lysosome







Vitamin digestion  
and absorption  
MPI-086

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

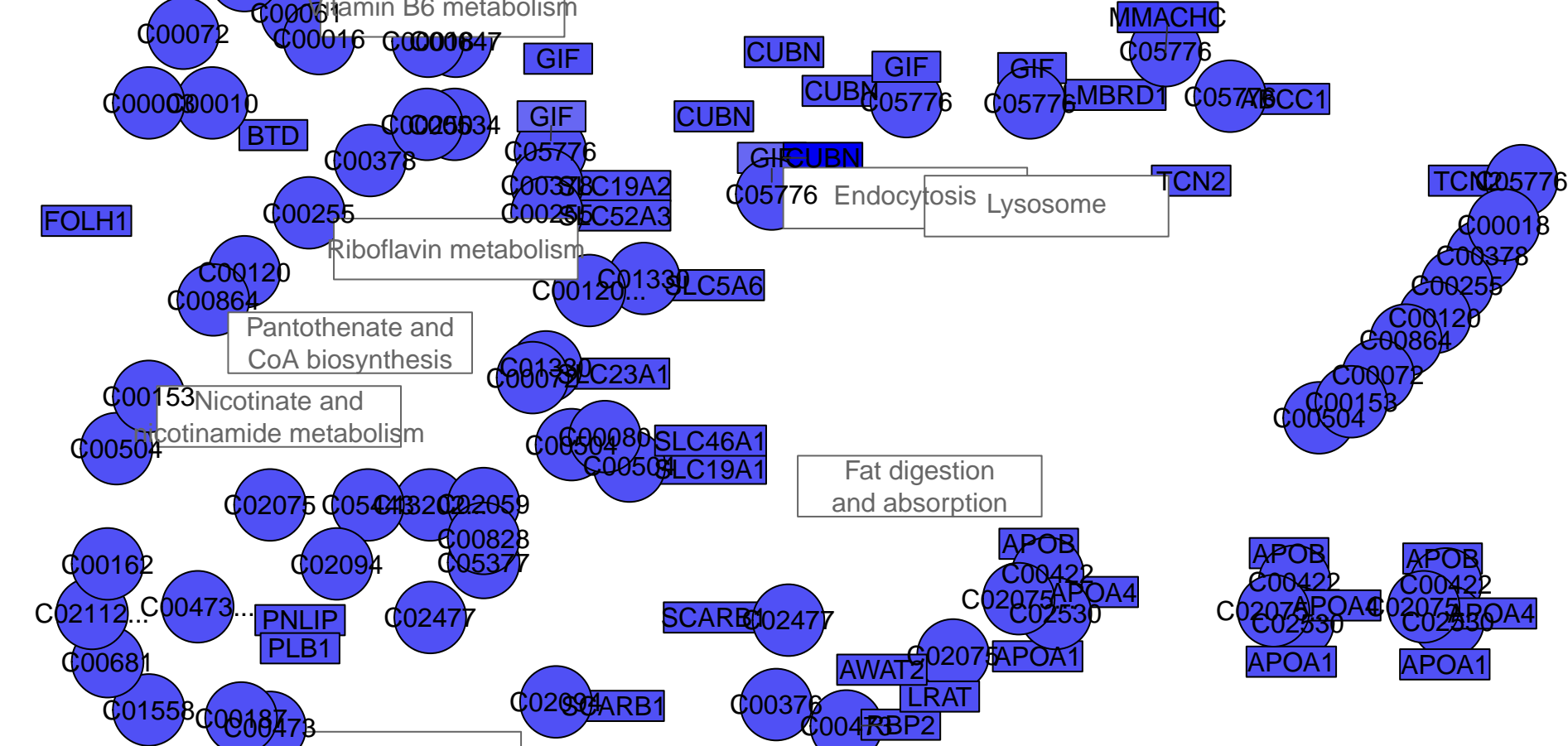
Bile secretion

Retinol metabolism

Endocytosis

Lysosome

Fat digestion and absorption





Vitamin digestion  
and absorption  
MPI-087

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

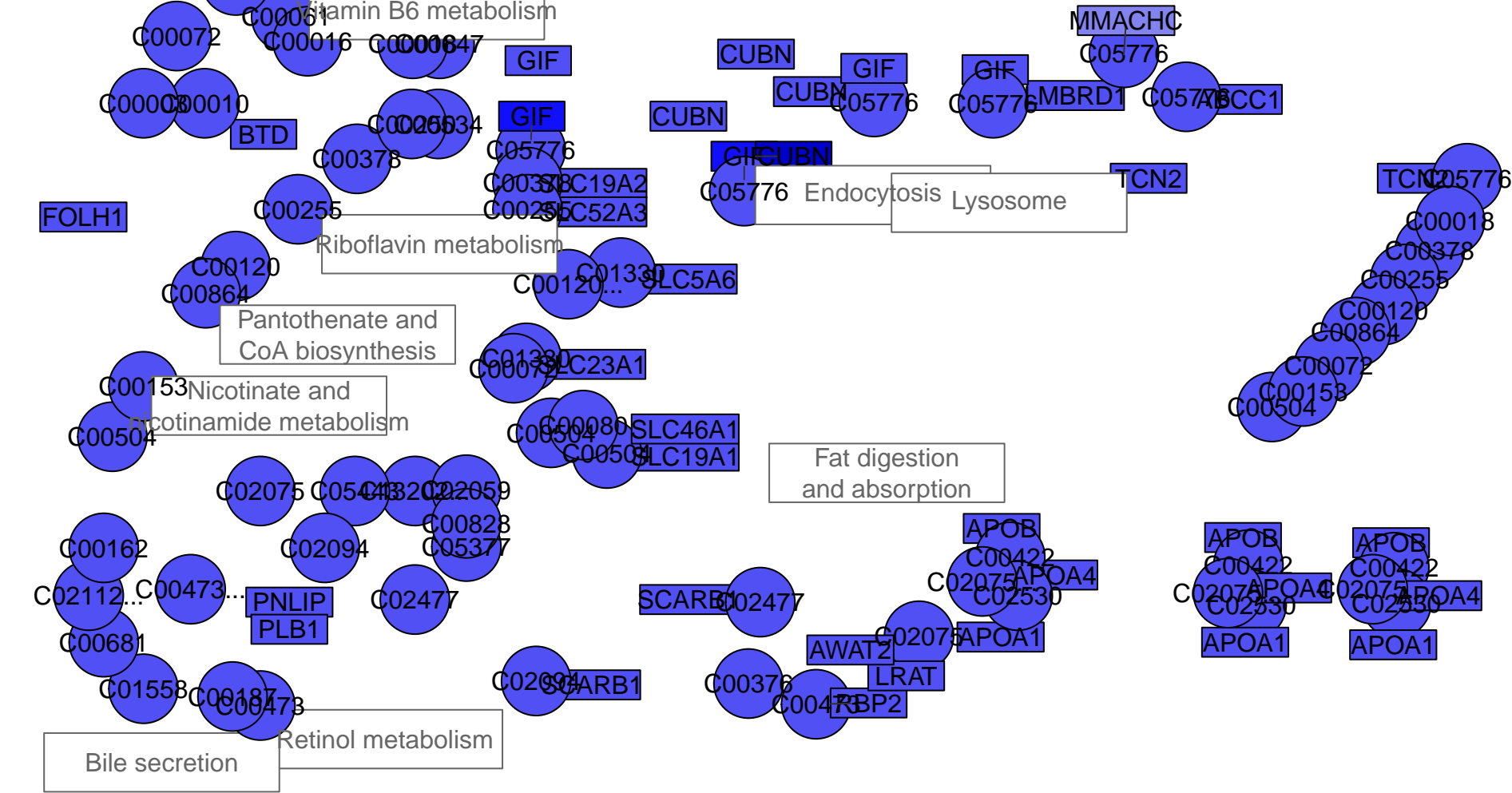
Retinol metabolism

Bile secretion

Endocytosis

Lysosome

Fat digestion and absorption



Vitamin digestion  
and absorption  
MPI-089

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

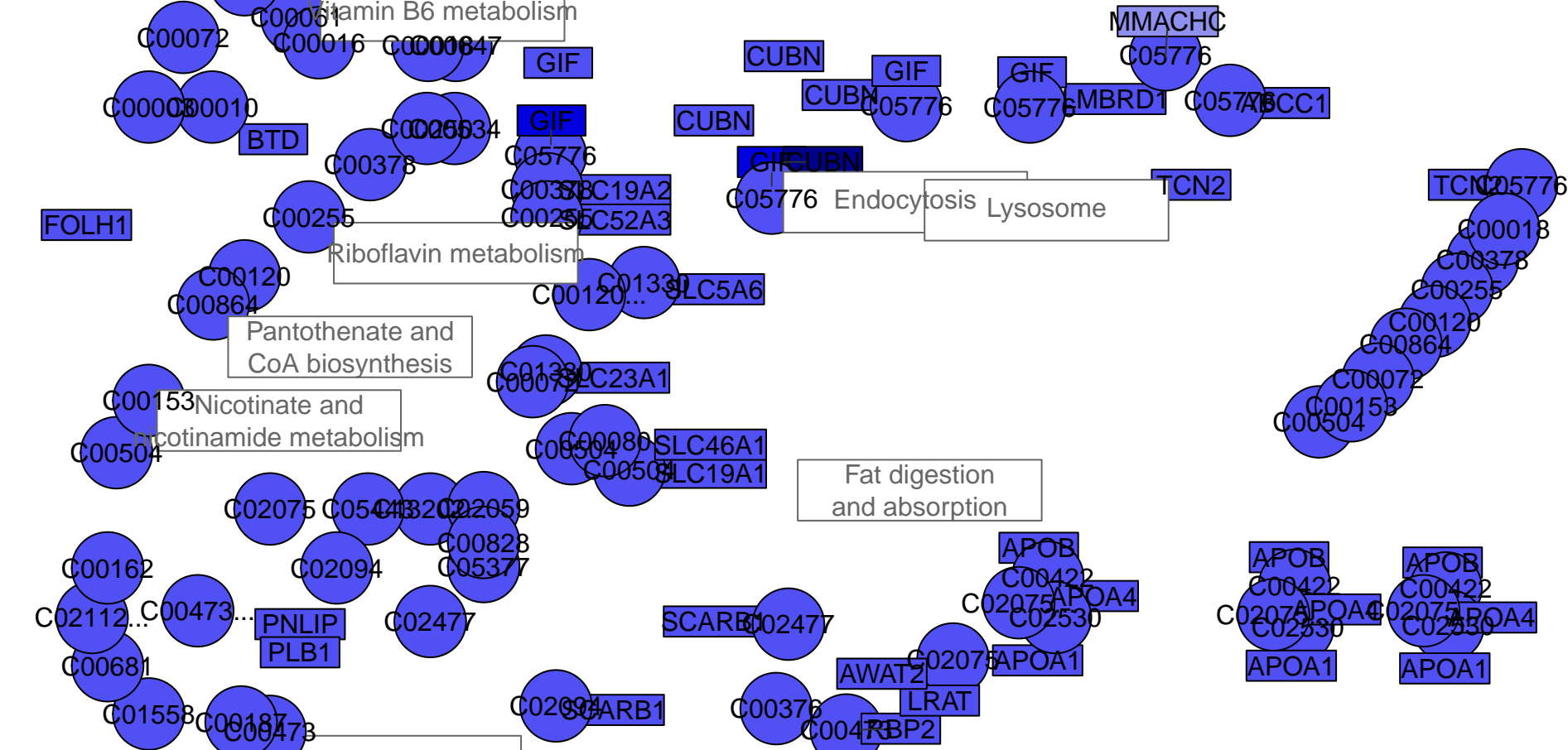
Bile secretion

Retinol metabolism

Endocytosis

Lysosome

Fat digestion and absorption



Vitamin digestion  
and absorption  
MPI-090

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

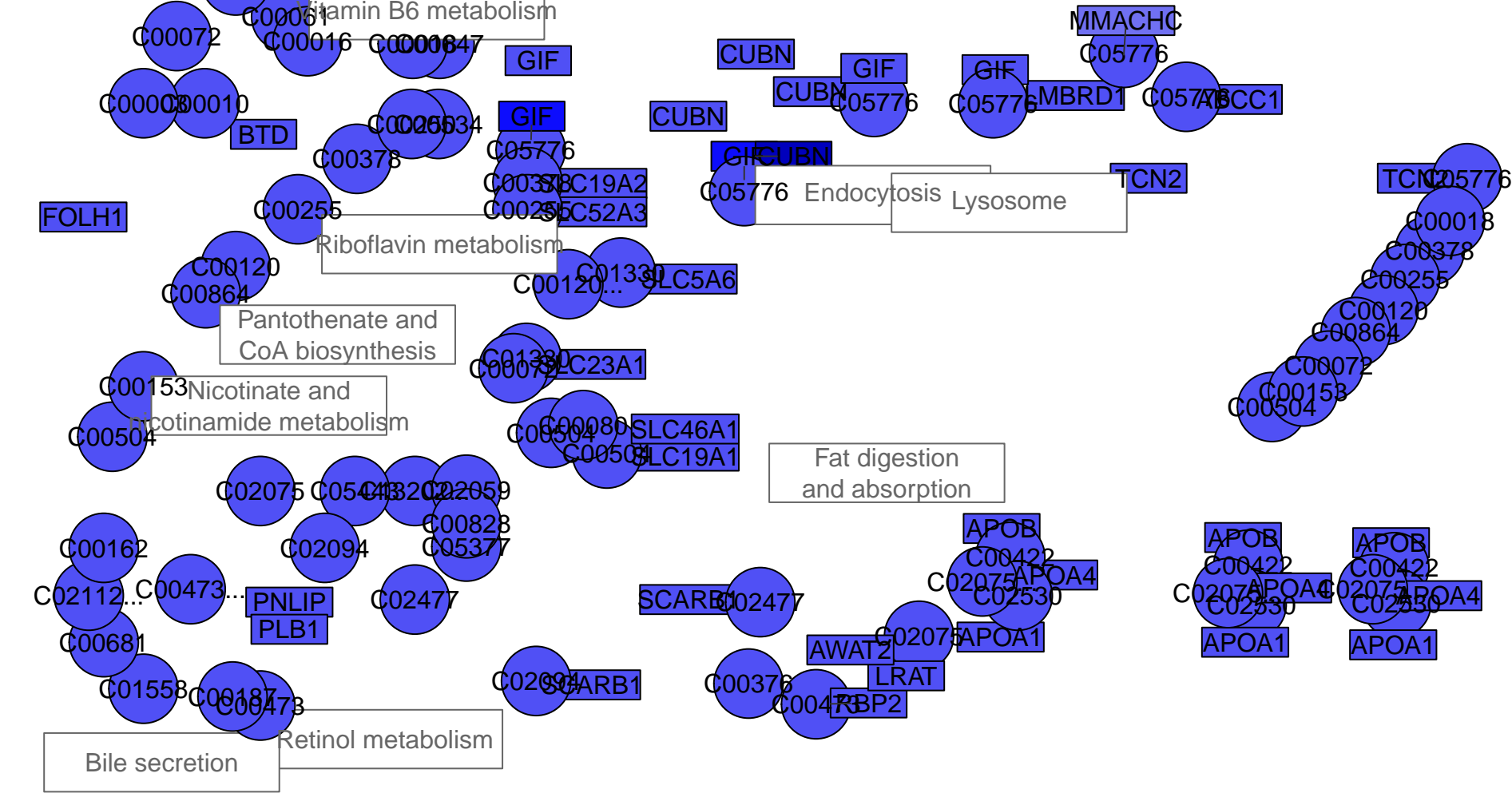
Retinol metabolism

Bile secretion

Endocytosis

Lysosome

Fat digestion and absorption





Vitamin digestion  
and absorption  
MPI-095

Tight junction

Folate biosynthesis

Biotin metabolism  
Thiamine metabolism  
Vitamin B6 metabolism

MMACHC

C00008  
C00010

GIF

CUBN

GIF

GIF

C05776

MBRD1

C05776

BTD

C00255  
C00378

GIF

CUBN

GIF  
CUBN

C05776

C05776

C05776

BCC1

FOLH1

C00255

GIF

GIF  
CUBN

Endocytosis  
Lysosome

TCN2

TCN2

Riboflavin metabolism

C00120  
C00864

C00120...  
SLC5A6

C05776

Endocytosis  
Lysosome

TCN2

TCN2

Pantothenate and  
CoA biosynthesis

C00138  
C00079

SLC23A1

C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504

Nicotinate and  
nicotinamide metabolism

C00504

C00080  
C00504

SLC46A1  
SLC19A1

Fat digestion  
and absorption

C02075  
C05413  
C022059

C00828  
C05377

SCARB1

C02477

APOB  
C00422  
APOA4

APOB  
C00422  
APOA4

APOB  
C00422  
APOA4

C00162

C02112...  
C00473

PNLIP  
PLB1

C02094  
C02477

SCARB1

C02477

APOB  
C00422  
APOA4

APOB  
C00422  
APOA4

APOB  
C00422  
APOA4

C00681

C01558  
C00187

C00473

Retinol metabolism

C02094  
SCARB1

C00378  
C00473

AWAT2  
LRAT

C02075  
APOA1

APOA1

APOA1

Bile secretion

Bile secretion

Retinol metabolism

C02094  
SCARB1

C00378  
C00473

AWAT2  
LRAT

C02075  
APOA1

APOA1

APOA1

Vitamin digestion  
and absorption  
MPI-101

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

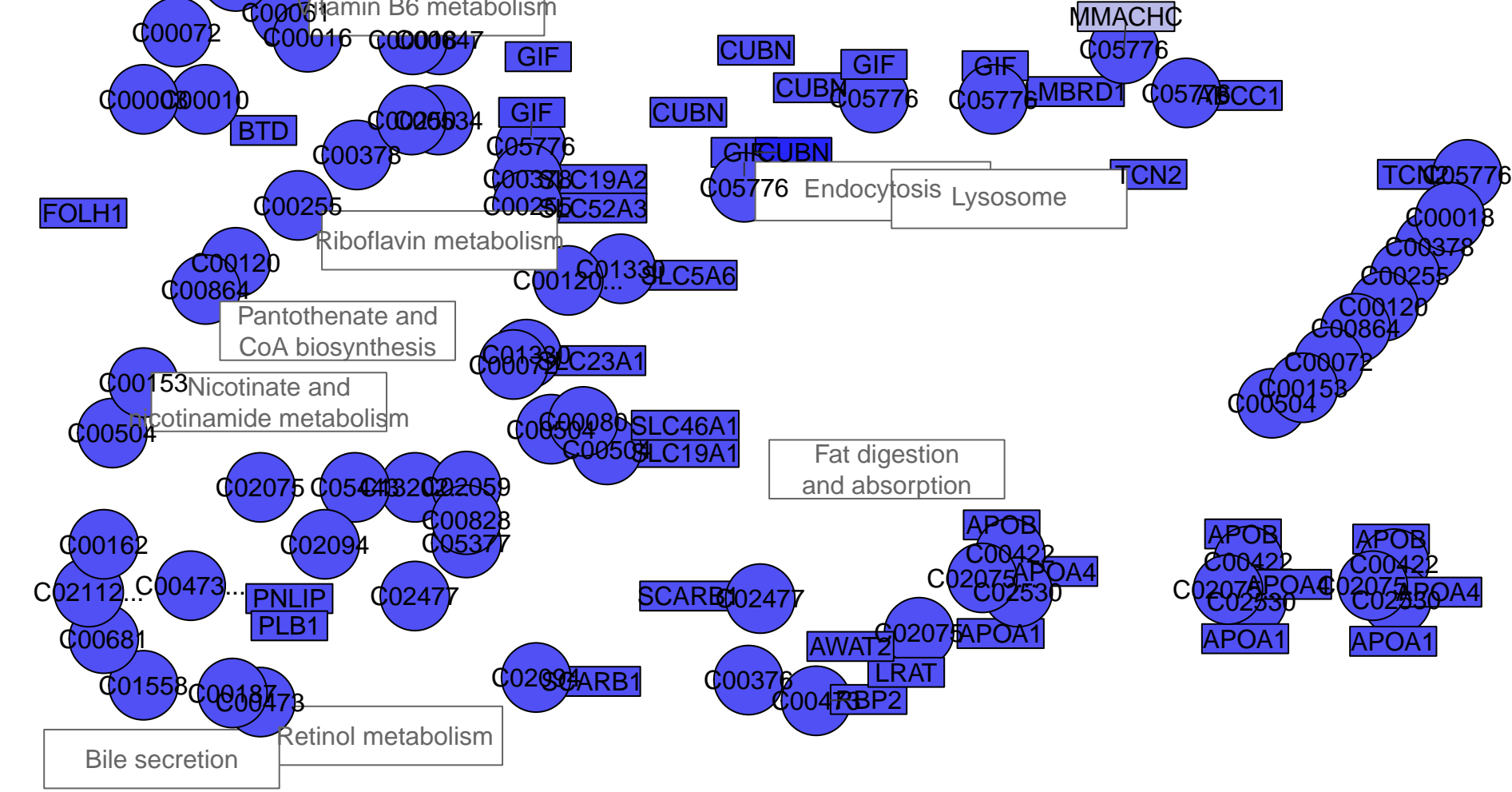
Bile secretion

Retinol metabolism

Endocytosis

Lysosome

Fat digestion and absorption





Vitamin digestion  
and absorption  
MPI-114

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

Bile secretion

Retinol metabolism

Fat digestion  
and absorption

Endocytosis  
Lysosome

FOLH1

BTD

GIF

CUBN

GIF

GIF

MMACHC

C05776

MBRD1

C05776

BCC1

GIF

CUBN

CUBN

GIF

C05776

TCN2

TCN2

C00120

C00864

C00504

C00162

C02112...

C00681

C00473

C00187

C00473

C01558

C00473

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Vitamin digestion  
and absorption  
MPI-123

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C00072 C00016 C000647  
C00003 C00010  
BTD

CUBN GIF GIF GIF  
CUBN CUBN C05776 C05776  
MBRD1 C05776 BCC1

MMACHC

C05776

C05776

C05776

C00255 C00378 C005634  
C00378 C05776  
C00378 C19A2  
C00255 C52A3

CUBN GIF CUBN  
C05776 Endocytosis Lysosome

TCN2

TCN2

FOLH1

Riboflavin metabolism  
C00120 C00864  
C00120... SLC5A6

GIF CUBN

C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504

Pantothenate and  
CoA biosynthesis

C00138 C23A1  
C00072 C00080  
C00504 SLC46A1  
C00504 SLC19A1

Fat digestion  
and absorption

Nicotinate and  
nicotinamide metabolism

C00153 C00504  
C02075 C05413 C022059  
C00828 C05377  
C00162 C02094 C02477

APOB  
C00422  
C02075 APOA4  
C02530

APOB  
C00422  
C02075 APOA4  
C02530

APOB  
C00422  
C02075 APOA4  
C02530

C02112... C00473...  
C00681  
C01558 C00187  
C00473

PNLIP  
PLB1

SCARB1 C02477  
C00378  
C00473 BFP2  
AWAT2 C02075  
LRAT

APOA1

APOA1

APOA1

Bile secretion

Retinol metabolism

SCARB1

C00378

C00473

LRAT

APOA1

C02075 APOA4  
C02530

C02075 APOA4  
C02530



Vitamin digestion  
and absorption  
MPI-138

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C05552 C00068  
C00072 C00061  
C00016 C000647  
C00008 C00010  
C00003 BTD  
C00255  
C00378  
C00255  
C00120  
C00864

FOLH1

Pantothenate and  
CoA biosynthesis

Nicotinate and  
nicotinamide metabolism

C00153  
C00504  
C02075 C05413 C022059  
C00162 C02094 C00828  
C02112... C00473... C05377  
C00681 C02477  
C01558 C00187  
C00473

PNLIP  
PLB1

Bile secretion

Retinol metabolism

Riboflavin metabolism

C01380  
C00079  
C00080  
C00504  
C00508  
SLC23A1  
SLC46A1  
SLC19A1

SCARB1

CUBN  
GIF  
CUBN  
C05776  
C05776  
C05776  
CUBN  
C05776  
C05776  
MBRD1  
C05776  
BCC1  
TCN2  
TCN2  
C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504

Endocytosis  
Lysosome

Fat digestion  
and absorption

SCARB2

AWAT2  
LRAT  
RBP2

APOB  
C00422  
APOA4  
C02075  
C02530  
APOA1

APOB  
C00422  
APOA4  
C02075  
C02530  
APOA1  
APOB  
C00422  
APOA4  
C02075  
C02530  
APOA1

MMACHC

C05776

GIF

C05776

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

Vitamin digestion  
and absorption  
MPI-139

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

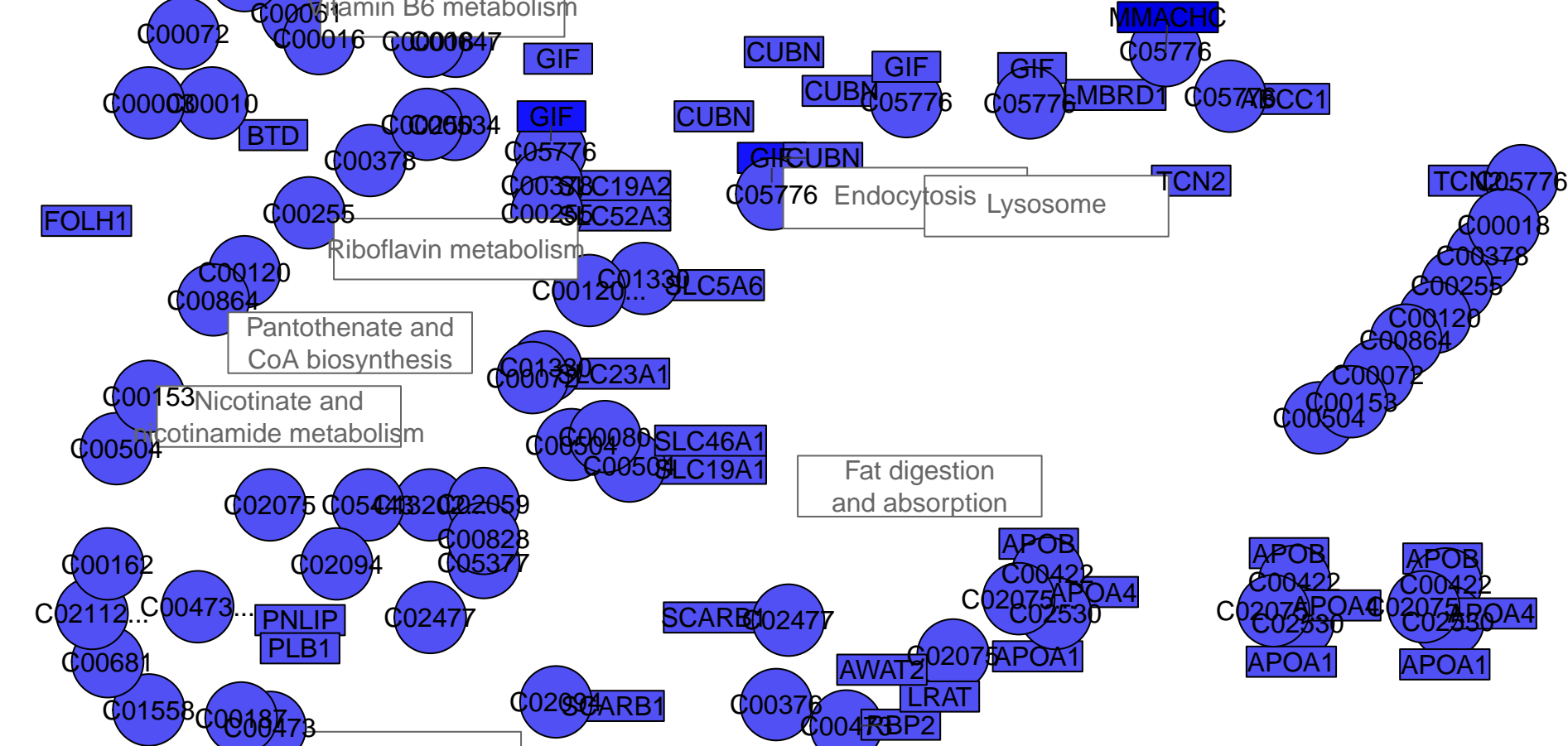
Bile secretion

Retinol metabolism

Endocytosis

Lysosome

Fat digestion and absorption





Vitamin digestion  
and absorption  
MPI-144

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

C00008 C00010 C000647 GIF

BTD C0025534 GIF

C00378 C05776

C00255 C00378 C0378C19A2

C00255 C52A3

Riboflavin metabolism

C00120 C00864 C00120...

Pantothenate and CoA biosynthesis

C00153 C00072 SLC23A1

Nicotinate and nicotinamide metabolism

C00504 C00080 SLC46A1

C02075 C05413 C022059 C00828 C05377

C00162 C02094 C02477

C02112... C00473... PNLIP PLB1

C00681 C02477

C01558 C00187 C00473

C00473

C02094 SCARB1

C00473

C00473

Retinol metabolism

Bile secretion

CUBN

CUBN

CUBN

GIF

C05776

C05776

C05776

C05776

C05776

C05776

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C05776

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C05776

Endocytosis

Lysosome

Fat digestion  
and absorption

MMACHC

C05776

C05776

C05776

MBRD1

C05776

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C05776

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

APOB

C00422

C02075

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOA1

APOB

C00422

C02075

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOA1

APOB

C00422

C02075

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOA1

SCARB1

C02477

C00378

C00473

C00473

C00473

C00473

C00473

C00473

C00473

AWAT2

C02075

LRAT

C00473

C00473

C00473

C00473

C00473

C00473

APOB

C00422

C02075

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOA1

APOB

C00422

C02075

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOA1

APOB

C00422

C02075

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOA1

Vitamin digestion  
and absorption  
MPI-147

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

C00008 C00010 GIF

BTD C0025534 GIF

C00378 C05776

C00255 C00378 C19A2

Riboflavin metabolism

C00120 C00864

Pantothenate and  
CoA biosynthesis

C00153 Nicotinate and  
nicotinamide metabolism

C01380 SLC23A1

C00080 SLC46A1

C00504 SLC19A1

C02075 C05413 C022059

C00162 C02094 C00828 C05377

C02112... C00473... PNLIP PLB1

C02477

SCARB1 C02477

C00681 C01558 C00187 C00473

Bile secretion

Retinol metabolism

C02094 SCARB1

C00378 C00473 RBP2

AWAT2

LRAT

Fat digestion  
and absorption

APOB

C00422 APOA4

C02075 APOA4

C02530 APOA1

APOB

C00422 APOA4

C02075 APOA4

C02530 APOA1

APOB

C00422 APOA4

C02075 APOA4

C02530 APOA1

CUBN

GIF

GIF

MMACHC

C05776

CUBN

C05776

C05776

MBRD1

C05776

BCC1

CUBN

GIF CUBN

C05776

Endocytosis Lysosome

TCN2

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

C05776

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

Vitamin digestion  
and absorption  
MPI-171

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

MMACHC

C05552 C00068 C00072 C00061 C00016 C000647

C00003 C00010 C000647 GIF C000647

CUBN GIF CUBN GIF CUBN MBRD1 C05776 C05776 C05776

FOLH1

BTD C00255 C00378 C00255 C00378 C00378 C19A2 C00255 C52A3

GIF CUBN C05776 Endocytosis Lysosome TCN2

Riboflavin metabolism

C00120 C00864 C00120... SLC5A6

TCN2

C05776 C00018 C00378 C00255 C00120 C00864 C00072 C00153 C00504

Pantothenate and  
CoA biosynthesis

C00138 C00072 SLC23A1

C00153 Nicotinate and  
nicotinamide metabolism

C00080 SLC46A1 C00504 SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059

C00162 C02094 C00828 C05377

SCARB1 C02477 APOB C00422 APOA4 C02075 APOA4 C02530

APOB C00422 APOA4 C02075 APOA4 C02530 APOA1 APOA1

C02112... C00473... PNLIP PLB1 C02477

AWAT2 C02075 APOA1 C00378 C00473 RBP2

Bile secretion

Retinol metabolism

C01558 C00187 C00473 C02094 SCARB1



Vitamin digestion  
and absorption  
MPI-172

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C00072 C00010  
C00008 C00016  
C00061 C00064  
C00068 C00067

BTD

GIF

CUBN

GIF

GIF

MMACHC

C05776

MBRD1

C05776

BCC1

GIF

CUBN

GIF CUBN

TCN2

FOLH1

C00255

C00378 C19A2  
C00255 C52A3

C05776 Endocytosis Lysosome

TCN2 C05776

Riboflavin metabolism

C00120  
C00864

C00120... SLC5A6

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

Pantothenate and  
CoA biosynthesis

C00138 SLC23A1

Nicotinate and  
nicotinamide metabolism

C00153  
C00504

C00080 SLC46A1  
C00504 SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059

C02094

C00828  
C05377

C02477

SCARB1 C02477

APOB C00422

C02075 APOA4  
C02530

APOB C00422

C02075 APOA4  
C02530

APOB C00422

C02075 APOA4  
C02530

APOA1

APOA1

C00162

C02112... C00473

PNLIP  
PLB1

C00681

C01558

C00187  
C00473

Retinol metabolism

C02094 SCARB1

C00378

AWAT2

LRAT

C02075 APOA1

C00473 RBP2

Bile secretion







Vitamin digestion  
and absorption  
MPI-024

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

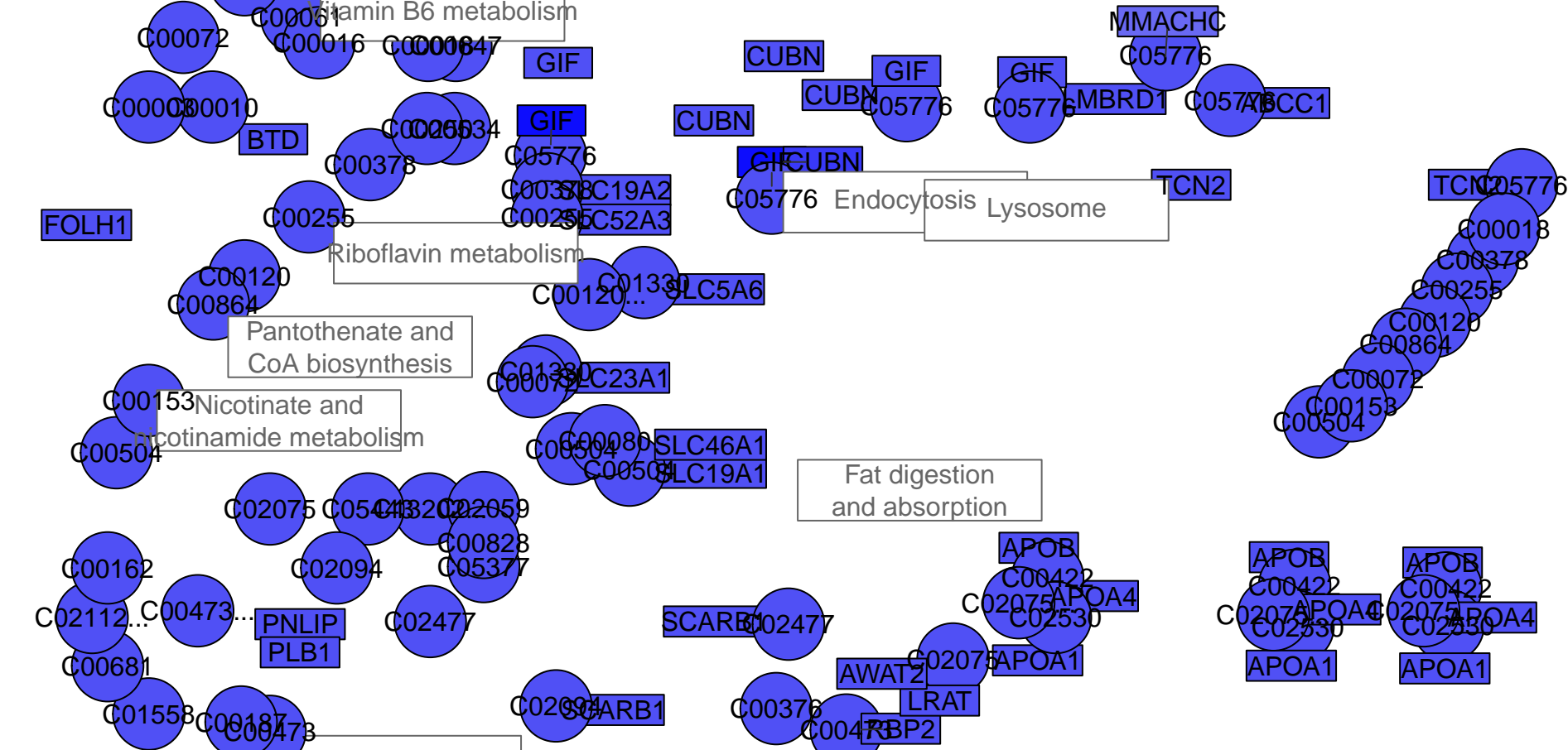
Retinol metabolism

Bile secretion

Endocytosis

Lysosome

Fat digestion and absorption



Vitamin digestion  
and absorption  
MPI-026

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

C00003 C00010 C000647 GIF

BTD C0025534 GIF

C00378 C05776

C00255 C00378 C19A2

Riboflavin metabolism

C00120 C00864

Pantothenate and  
CoA biosynthesis

C01380 SLC23A1

Nicotinate and  
nicotinamide metabolism

C00504 C00072 C00080 SLC46A1

C02075 C05413 C022059

C00162 C02094 C00828 C05377

C02112... C00473... PNLIP PLB1 C02477

C00681 C02477

C01558 C00187 C00473

Bile secretion Retinol metabolism

CUBN GIF

CUBN CUBN C05776

CUBN GIF CUBN

C05776 Endocytosis Lysosome

C05776

MMACHC

C05776

GIF MBRD1 C05776

C05776

TCN2

TCN2 C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

Fat digestion  
and absorption

SCARB1 C02477

C00378 C00473

AWAT2 LRAT

C02075 APOA1

APOB C00422

C02075 APOA4 C02530

APOA1

APOB C00422

C02075 APOA4 C02530

APOA1

APOB C00422

C02075 APOA4 C02530

APOA1

Vitamin digestion  
and absorption  
MPI-036

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00016 C000647

C00003 C00010

C00003 C00010

C00003 C00010

C00003 C00010

C00003 C00010

C00003 C00010

C00003 C00010

C00003 C00010

C00003 C00010

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C00003 C00010

C05776

C05552

C00068

C00061

C00016

C000647

GIF

CUBN

GIF

GIF

MMACHC

C05776

C05776

C05776

CUBN

CUBN

C05776

C05776

MBRD1

C05776

BCC1

BTD

C00255

C00255

C00255

C00255

C00255

C00255

C00255

C00255

C00255

C00255

C00255

C00255

C00255

C00255

C00255

C00255

C00255

C00255

C00255

C00255

C00255

C00255

C00255

C00255

C00255

CUBN

CUBN

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

Endocytosis Lysosome

TCN2

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

Pantothenate and  
CoA biosynthesis

Nicotinate and  
nicotinamide metabolism

C00153

C00504

C00162

C02112...

C00473

C00681

C01558

C00187

C00473

C00473

C00473

C00473

C00473

C00473

C02075 C05413 C022059

C00828 C05377

C02094

C02477

C02477

C02477

C02477

C02477

C02477

C02477

C02477

C02477

C02477

C01380

C00072

C00080

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C01380

C00072

C00080

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C01380

C00072

C00080

C00504

C00504

C00504

C00504

C00504

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C00504

C00504

C00504

C00504

C00504

C00504

C00504

C01380

C00072

C00080

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C01380

C00072

C00080

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C01380

C00072

C00080

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C01380

C00072

C00080

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C01380

C00072

C00080

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C01380

C00072

C00080

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C01380

C00072

C00080

C00504

C00504

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C00504

C00504

C00504

C00504

C00504

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C00504

C00504

C00504

C00504

Vitamin digestion  
and absorption  
MPI-037

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

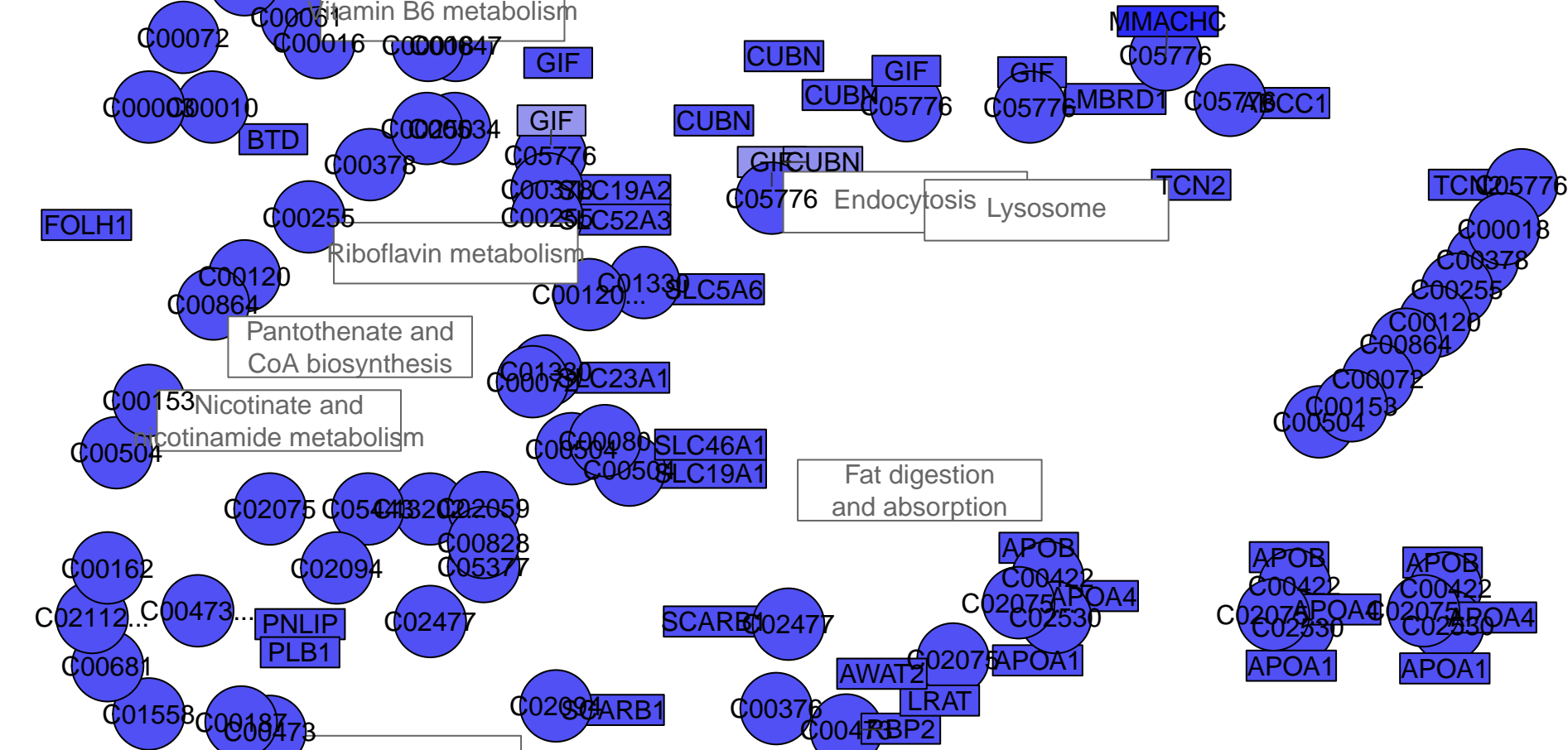
Retinol metabolism

Bile secretion

Endocytosis

Lysosome

Fat digestion and absorption





Vitamin digestion  
and absorption  
MPI-038

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

MMACHC

C00008  
C00010

BTD

GIF

CUBN

GIF

GIF

MBRD1

BCC1

C00255  
C00378  
C005634

GIF

CUBN

GIF  
CUBN

Endocytosis  
Lysosome

TCN2

TCN2

FOLH1

Riboflavin metabolism

C00120...  
SLC5A6

C00120  
C00864

Pantothenate and  
CoA biosynthesis

C00138  
SLC23A1

Nicotinate and  
nicotinamide metabolism

C00080  
SLC46A1  
C00508  
SLC19A1

Fat digestion  
and absorption

C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504

C02075  
C05413  
C022059

C00162  
C02112...  
C00473...

PNLIP  
PLB1

C02094  
C02477

SCARB1  
C02477

APOB  
C00422  
APOA4  
C02075  
C02530

APOB  
C00422  
APOA4  
C02075  
C02530

APOB  
C00422  
APOA4  
C02075  
C02530

C00681  
C01558  
C00187  
C00473

Bile secretion

Retinol metabolism

C02094  
SCARB1

C00378  
C00473  
RBP2

AWAT2  
LRAT

C02075  
APOA1

APOA1

APOA1







Vitamin digestion  
and absorption  
MPI-050

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C05776 C05552 C00068 C00072 C00061 C00016 C000647

C00008 C00010 GIF

C00008 C00010 BTD C0025534 GIF

C00378 C05776 C00378 C19A2

C00255 C00255 C52A3

Riboflavin metabolism

C00120 C00864 C01330 SLC5A6

C00120...

Pantothenate and CoA biosynthesis

C00138 SLC23A1

C00079

Nicotinate and nicotinamide metabolism

C00504 C00080 SLC46A1 C00504 SLC19A1

C02075 C05413 C022059

C00828 C05377

C00162 C02094 C02477

C02112... C00473... PNLIP PLB1

C00681 C02477

C01558 C00187 C00473

C02094 SCARB1

Retinol metabolism

Bile secretion

CUBN GIF

CUBN GIF C05776

CUBN GIF C05776

CUBN GIF C05776

C05776 Endocytosis Lysosome

C05776

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

MMACHC

C05776

C05776

MBRD1 C05776

C05776

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

Fat digestion  
and absorption

APOB

C00422

APOA4

C02075

C02530

APOA1

APOA1

APOA1

APOB

C00422

APOA4

C02075

C02530

APOA1

APOA1

APOA1

APOB

C00422

APOA4

C02075

C02530

APOA1

APOA1

APOA1

C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504









Vitamin digestion  
and absorption  
MPI-060

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

MMACHC

C00003  
C00010

BTD

GIF

CUBN

GIF

GIF

MBRD1

C05776

C05776

C00378

C05776

CUBN

CUBN

CUBN

TCN2

TCN2

FOLH1

C00255

C00378

C00255

C05776

Endocytosis

Lysosome

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

Pantothenate and  
CoA biosynthesis

C00138

C00072

C00138

C00080

SLC23A1

SLC46A1

SLC19A1

Nicotinate and  
nicotinamide metabolism

C00504

C00504

C00504

Fat digestion  
and absorption

C02075 C05413 C022059

C00828

C05377

APOB

C00422

APOA4

C02075

C02530

APOB

C00422

APOA4

C02075

C02530

APOB

C00422

APOA4

C02075

C02530

C00162

C02094

C02477

SCARB1

C02477

APOA1

APOA1

APOA1

C02112...

C00473

PNLIP

PLB1

AWAT2

C02075

APOA1

APOA1

APOA1

C00681

C01558

C00187

C00473

C02094

C00378

C00473

LRAT

C02075

APOA1

APOA1

Bile secretion

Retinol metabolism



Vitamin digestion  
and absorption  
MPI-061

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00016 C000647

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C05776

C05552 C00068

C00061

C00016 C000647

GIF

GIF

C0025534

C00378 C05776

C00378 C19A2

C00255 C52A3

C00120... SLC5A6

C00138 SLC23A1

C00079

C00080 SLC46A1

C00504 SLC19A1

C02075 C05413 C022059

C00828 C05377

C02094 C02477

C02094

C02094

C02094

C02094

C02094

C02094

C02094

C02094

C02094

C02094

CUBN

CUBN

CUBN

CUBN

C05776

C05776

C05776

C05776

C05776

C05776

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C05776

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C05776

C05776

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C05776

C05776

C05776

C05776

C05776

MMACHC

C05776

C05776

C05776

C05776

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C05776

MBRD1

C05776

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BCC1

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TCN2

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C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

Endocytosis

Lysosome

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

Fat digestion  
and absorption

APOB

C00422

APOA4

C02075

C02530

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOA1

APOB

C00422

APOA4

C02075

C02530

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOB

C00422

APOA4

C02075

C02530

APOA1

C02075

APOA1

C02075

APOA1

C02075

FOLH1

BTD

GIF

CUBN

GIF

CUBN

TCN2

Pantothenate and  
CoA biosynthesis

C00153

Nicotinate and  
nicotinamide metabolism

C00504

C02075 C05413 C022059

C00828 C05377

C02094 C02477

C02112... C00473

C00681

C01558 C00187

C00473

C02094

SCARB1

C00378

C00473

C00473

C00473

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00016 C000647

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

C00008 C00010

Riboflavin metabolism

C00120

C00864

C00138

SLC23A1

C00079

C00080

SLC46A1

C00504

SLC19A1

C02075 C05413 C022059

C00828 C05377

C02094 C02477

C02112... C00473

C00681

C01558 C00187

C00473

C02094

SCARB1

C00378

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00016 C000647

C00008 C00010

C00008 C00010

C00008 C00010



Vitamin digestion  
and absorption  
MPI-070

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

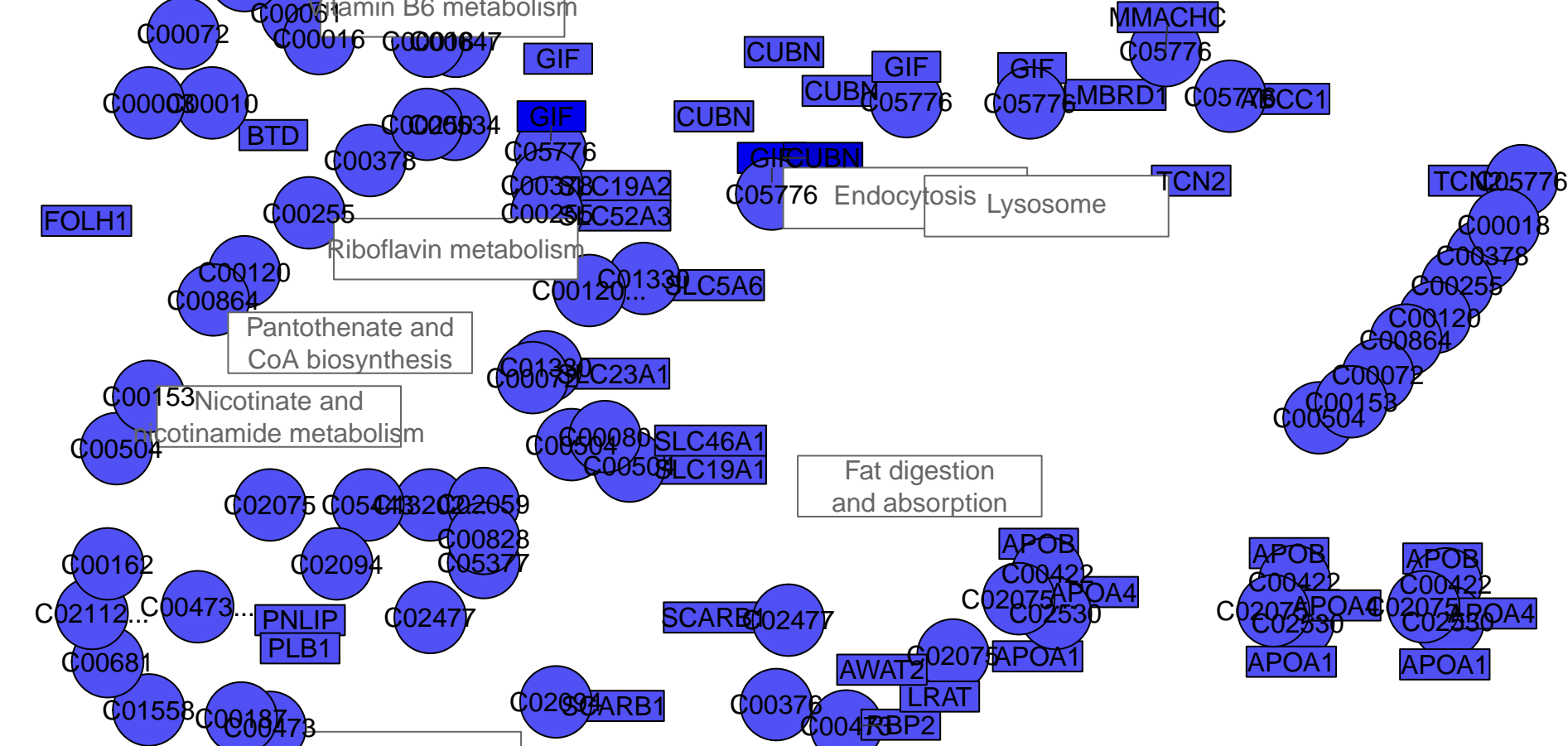
Bile secretion

Retinol metabolism

Endocytosis

Lysosome

Fat digestion and absorption



Vitamin digestion  
and absorption  
MPI-072

Tight junction

Folate biosynthesis  
Biotin metabolism  
Taurine metabolism

C05776  
C05552 C00068  
C00072 C00061  
C00016 C000647  
Vitamin B6 metabolism

C00008 C00010  
BTD  
C00255  
C00378  
C005634  
GIF  
GIF  
C05776  
C00378 C19A2  
C00255 C52A3

FOLH1  
C00120  
C00864  
Riboflavin metabolism  
C00120...  
SLC5A6  
C00138  
C00079  
SLC23A1

C00153  
C00504  
Nicotinate and  
nicotinamide metabolism  
C02075 C05413 C022059  
C00828  
C05377

C00162  
C02112...  
C00473...  
C00681  
C01558  
C00187  
C00473  
PNLIP  
PLB1  
C02094  
C02477  
C02094  
SCARB1

Bile secretion  
Retinol metabolism

CUBN  
GIF  
CUBN  
C05776  
C05776  
MBRD1  
C05776  
BCC1  
GIF  
CUBN  
GIF  
CUBN  
C05776  
Endocytosis  
Lysosome  
TCN2

C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504

Fat digestion  
and absorption

SCARB1  
C02477  
C00378  
C00473  
C02075  
AWAT2  
LRAT  
APOB  
C00422  
C02075  
APOA4  
C02530  
APOA1

C02075  
APOA1  
APOB  
C00422  
C02075  
APOA4  
C02530  
APOA1

TCN2  
C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504











Vitamin digestion  
and absorption  
MPI-104

Tight junction

Folate biosynthesis  
Biotin metabolism  
Thiamine metabolism

Vitamin B6 metabolism

MMACHC

C00072 C00016 C000647  
C00003 C00010  
BTD  
C00378  
C00255  
C00120  
C00864

GIF

CUBN

GIF

GIF

C05776

MBRD1 C05776

C00003 C00010

BTD

C00255

GIF

CUBN

CUBN

C05776

C05776

MBRD1

C05776

C00378

C05776

GIF CUBN

Endocytosis Lysosome

TCN2

FOLH1

Riboflavin metabolism

C00378

C00255

C05776

TCN2

C00120

Pantothenate and  
CoA biosynthesis

C00120...

SLC5A6

C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504

Nicotinate and  
nicotinamide metabolism

C00153

C00504

C00138  
SLC23A1

C00080  
SLC46A1

C00504  
SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059

C00162

C02094

C00828  
C05377

SCARB1

C02477

APOB

C00422  
APOA4

C02075  
C02530

APOB

C00422  
APOA4

C02075  
C02530

APOB

C00422  
APOA4

C02075  
C02530

C02112...

C00473

PNLIP  
PLB1

C02477

AWAT2

C02075  
APOA1

APOA1

APOA1

C00681

C01558

C00187  
C00473

C02094  
SCARB1

C00378

C00473  
RBP2

Bile secretion

Retinol metabolism

Vitamin digestion  
and absorption  
MPI-107

Tight junction

Folate biosynthesis

Biotin metabolism  
Thiamine metabolism  
Vitamin B6 metabolism

C05776

C05552 C00068

C00072 C00061

C00016 C000647

GIF

C00003 C00010

BTD

C0025634

GIF

CUBN

GIF

MMACHC

C05776

CUBN

CUBN

C05776

GIF

C05776

MBRD1

C05776

BCC1

C00378

C05776

CUBN

GIF CUBN

C05776

GIF

C05776

TCN2

Endocytosis Lysosome

TCN2

FOLH1

C00255

C00378 C19A2

C00255 C52A3

Riboflavin metabolism

C00120... SLC5A6

C00120 C00864

Pantothenate and  
CoA biosynthesis

C00138 SLC23A1

Nicotinate and  
nicotinamide metabolism

C00080 SLC46A1

C00504 SLC19A1

Fat digestion  
and absorption

C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504

C02075 C05413 C022059

C00828 C05377

C00162

C02094

C02477

C02112... C00473

C00681

PNLIP PLB1

SCARB1 C02477

APOB C00422

C02075 APOA4 C02530

APOB C00422

C02075 APOA4 C02530

APOB C00422

C02075 APOA4 C02530

C01558

C00187 C00473

C02094 SCARB1

C00378

AWAT2 C02075

APOA1

APOA1

APOA1

Bile secretion

Retinol metabolism

C00473 RBP2

LRAT





Vitamin digestion  
and absorption  
MPI-117

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

C00003 C00010 C000647 GIF

BTD C0025534 GIF

C00378 C05776

C00255 C00378 C19A2 C00255 C52A3

FOLH1

C00120 C00864

Riboflavin metabolism

C00120... SLC5A6

Pantothenate and  
CoA biosynthesis

C00138 SLC23A1

C00153 Nicotinate and  
nicotinamide metabolism

C00080 SLC46A1  
C00504 SLC19A1

C02075 C05413 C022059

Fat digestion  
and absorption

C00162 C02094 C00828 C05377

C02112... C00473... PNLIP PLB1 C02477

SCARB1 C02477

APOB C00422 APOA4

APOB C00422 APOA4

APOB C00422 APOA4

C00681 C01558 C00187 C00473

Bile secretion

Retinol metabolism

C02094 SCARB1

C00378 C00473 RBP2

AWAT2 C02075 APOA1

APOA1

APOA1

CUBN

GIF

GIF

MMACHC

C05776

MBRD1

C05776

CUBN

CUBN

GIF CUBN

C05776

Endocytosis Lysosome

TCN2

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

C02075 APOA1

C02075 APOA4

C02075 APOA4

LRAT





Vitamin digestion  
and absorption  
MPI-121

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C00072 C00010  
C00008 C00016 C000647  
BTD GIF  
C00255 C00378 C0025634  
C00120 C00864 C001330  
C00153 C00504 C001380  
C00162 C02112... C00473...  
C00681 C01558 C00187 C00473

Riboflavin metabolism  
Pantothenate and  
CoA biosynthesis  
Nicotinate and  
nicotinamide metabolism

C02075 C05413 C022059  
C00828 C05377  
C02094 C02477  
PNLIP PLB1  
C02094 SCARB1

Bile secretion  
Retinol metabolism

CUBN GIF  
CUBN GIF  
C05776 MBRD1 C05776  
CUBN GIF  
C05776 Endocytosis Lysosome  
TCN2

Fat digestion  
and absorption

SCARB1 AWAT2 LRAT  
C00378 C00473  
APOB APOA4  
C00422 C02075 APOA1  
C02530

MMACHC  
C05776  
C05776 BCC1

TCN2  
C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504

APOB APOB APOB  
C00422 C00422 C00422  
C02075 APOA4 C02075 APOA4  
C02530 C02530  
APOA1 APOA1



Vitamin digestion  
and absorption  
MPI-124

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

Bile secretion

Retinol metabolism

CUBN

CUBN

CUBN

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CUBN

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CUBN

CUBN

CUBN

CUBN

CUBN

CUBN

MMACHC

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

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C05776

Endocytosis

Lysosome

Fat digestion  
and absorption

APOB

C00422

C02075

C02530

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOA1

APOB

C00422

C02075

C02530

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOA1

APOB

C00422

C02075

C02530

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOA1

FOLH1

BTD

GIF

GIF

GIF

GIF

GIF

GIF

GIF

GIF

GIF

GIF

GIF

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CUBN

MMACHC

C05776

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MBRD1

C05776

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BCC1

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C05776

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C05776

C05776

C05776

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00158

C00504

C00072

C00158

C00504

C00072

C00158

C00504

C00072

C00158

C00504

C00072

Bile secretion

Retinol metabolism

C00162

C02112...

C00681

C01558

C00187

C00473

C00473

C00473

C00473

C00473

C00473

C02075

C05413

C02094

C02477

C02477

C02477

C02477

C02477

C02477

C02477

C02477

C02477

C05413

C022059

C00828

C05377

C02477

C02477

C02477

C02477

C02477

C02477

C02477

C02477

C022059

C00828

C05377

C02477

C02477

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C02477

C01380

C00072

C00072

C00072

C00072

C00072

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C00072

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C00072

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C00072

C00072

C00072

C00072

SLC23A1

C00072

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C00072

C00072</



Vitamin digestion  
and absorption  
MPI-131

Tight junction

Folate biosynthesis

Biotin metabolism  
Thiamine metabolism  
Vitamin B6 metabolism

C05776

C05552 C00068

C00072

C00061

C00016

C000647

GIF

CUBN

GIF

MMACHC

C05776

C00003

C00010

BTD

C0025634

GIF

CUBN

CUBN

C05776

GIF

C05776

MBRD1

C05776

BCC1

C00378

C05776

GIF

C05776

Endocytosis Lysosome

TCN2

TCN2

FOLH1

C00255

C00378

C00378

C00378

C00378

C00378

C00378

C00378

C00378

C00378

C00378

C00378

Riboflavin metabolism

C00120

C00864

C00120...

SLC5A6

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

Pantothenate and  
CoA biosynthesis

C00138

C00072

SLC23A1

Fat digestion  
and absorption

C00153

C00504

Nicotinate and  
nicotinamide metabolism

C00080

C00504

C00504

C00072

C00080

C00504

C00072

C00080

C00504

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C00072

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C00072

C00080

C00504

C02075 C05413 C022059

C00162

C02094

C00828

C05377

C02112...

C00473

C02094

C02477

C02477

SCARB1

C02477

APOB

C00422

APOA4

C02075

APOB

C00422

APOA4

C00681

C01558

C00187

C00473

C02094

C00378

AWAT2

C02075

APOA1

C02075

APOA4

C02075

APOA4

APOA1

APOA1

Bile secretion

Retinol metabolism

APOB

C00422

APOA4

C02075

APOB

C01558

C00187

C00473

C00473

C00473

C00473

C00473

C00473

C00473

C00473

C00473

C00473

C00473

C00473

C00473

C00473

C01558

C00187

C00473

C00473

C00473

C00473

C00473

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C00473

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C00473

C01558

C00187

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C01558

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C01558

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C01558

C00187

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C01558

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Vitamin digestion  
and absorption  
MPI-143

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

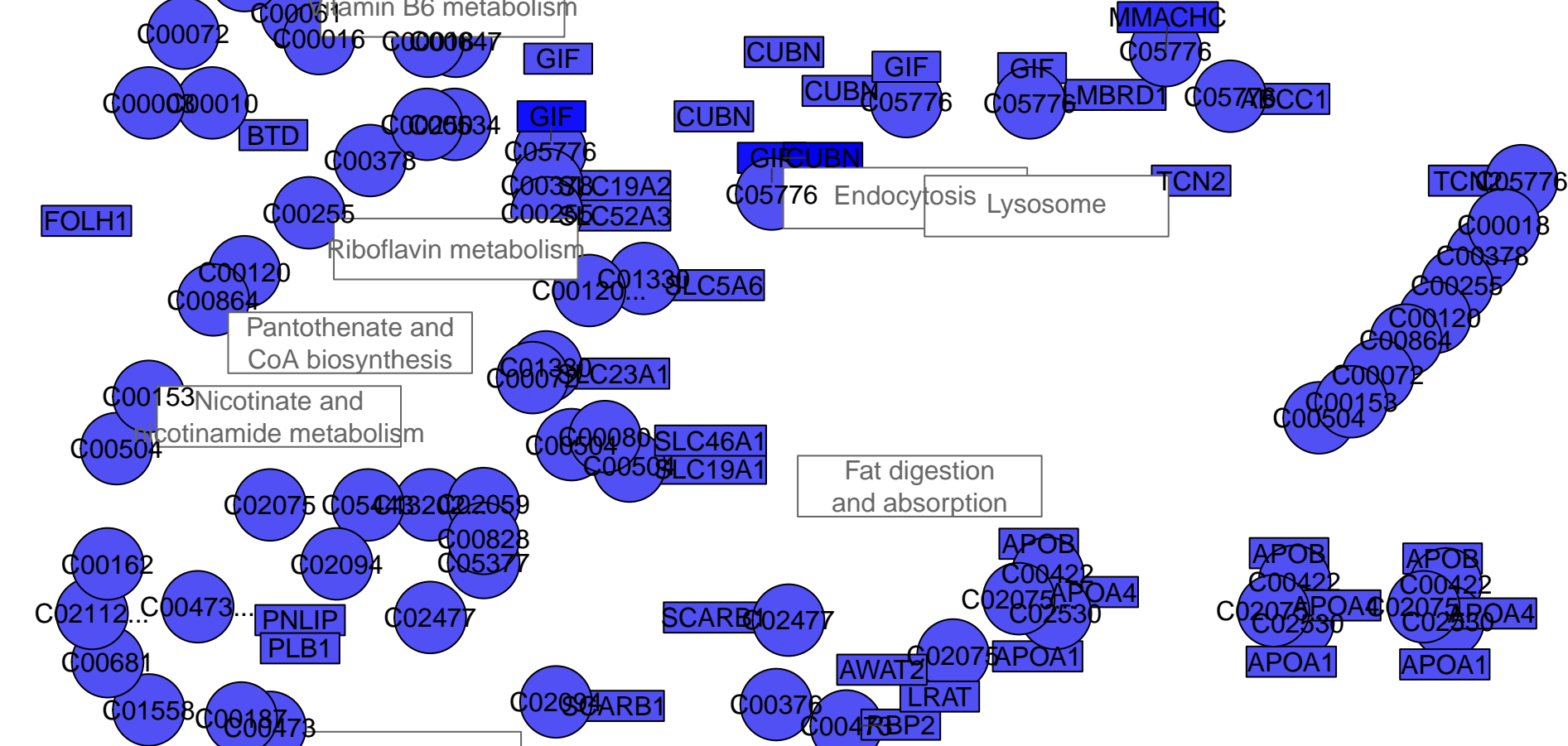
Bile secretion

Retinol metabolism

Endocytosis

Lysosome

Fat digestion and absorption









Vitamin digestion  
and absorption  
MPI-162

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

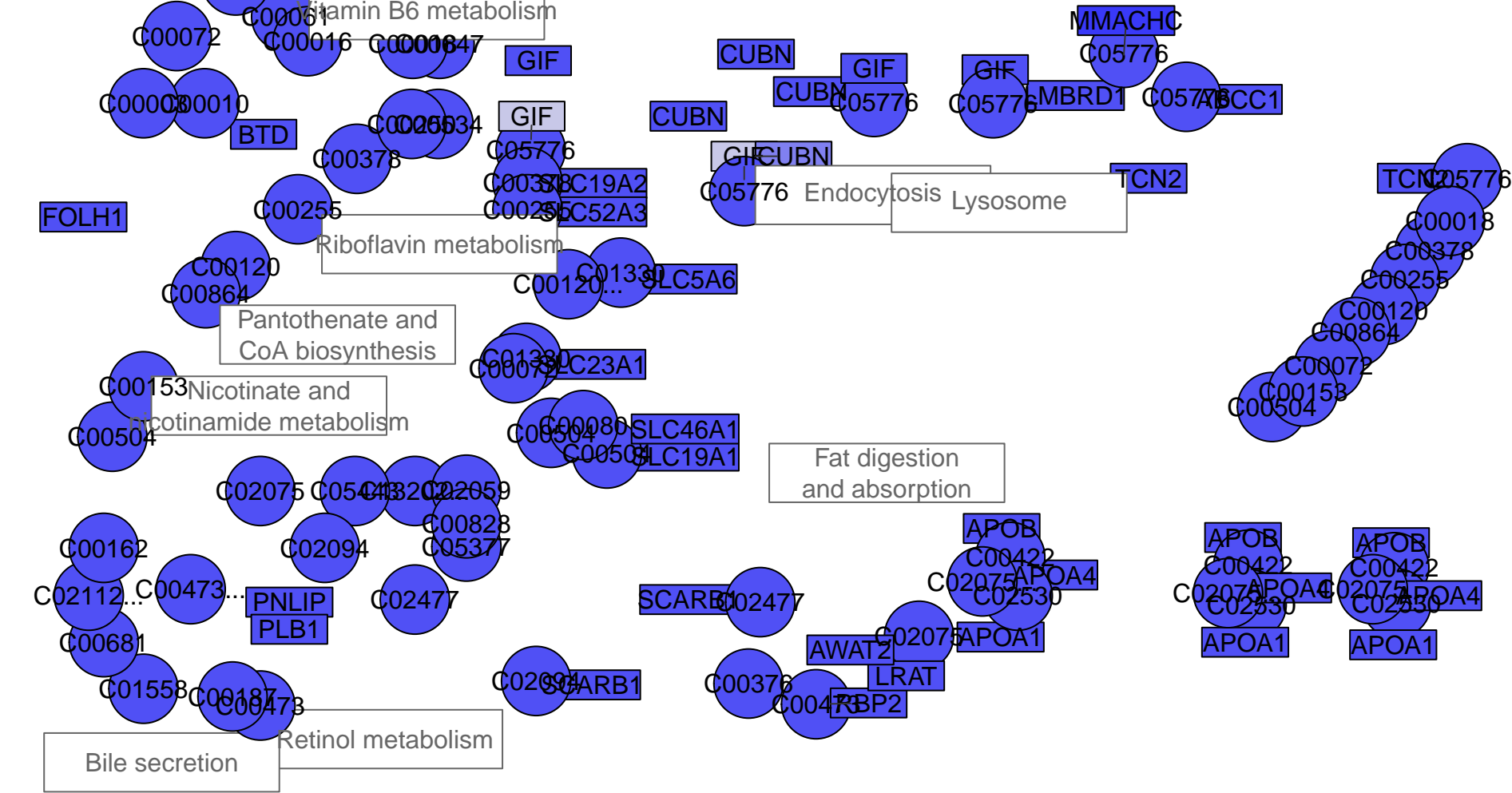
Bile secretion

Retinol metabolism

Endocytosis

Lysosome

Fat digestion and absorption





Vitamin digestion  
and absorption  
MPI-165

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and  
CoA biosynthesis

Nicotinate and  
nicotinamide metabolism

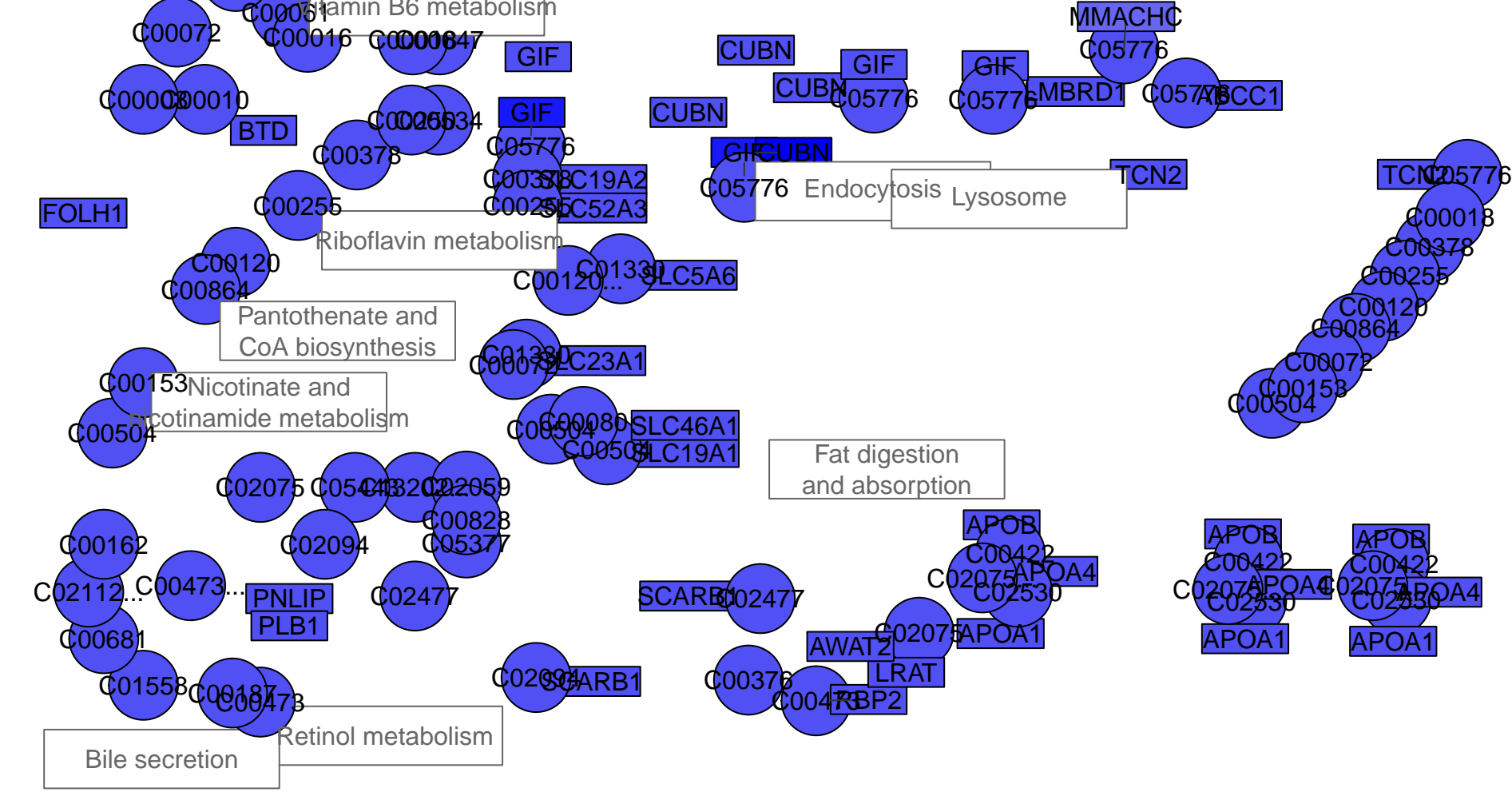
Bile secretion

Retinol metabolism

Endocytosis

Lysosome

Fat digestion  
and absorption





Vitamin digestion  
and absorption  
MPI-175

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00016 C000647

C00003 C00010 GIF

BTD C0025534 GIF

C00378 C05776

C00255 C00378 C19A2

Riboflavin metabolism

C00120 C00864

Pantothenate and  
CoA biosynthesis

Nicotinate and  
nicotinamide metabolism

C00153 C00504

C02075 C05413 C022059

C00162 C02094 C00828 C05377

C02112... C00473... PNLIP PLB1 C02477

C00681 C01558 C00187 C00473

Bile secretion

Retinol metabolism

C05776

C00068

C00061

C00016

C000647

GIF

GIF

C05776

C00378

C00255

C00120...

SLC5A6

C00138

SLC23A1

C00079

C00080

SLC46A1

C00504

SLC19A1

C00828

C05377

C02477

C02094

SCARB1

CUBN

CUBN

CUBN

GIF

C05776

Endocytosis

Lysosome

C05776

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

CUBN

CUBN

CUBN

GIF

C05776

Endocytosis

Lysosome

C05776

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

GIF

C05776

Endocytosis

Lysosome

C05776

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

GIF

C05776

Endocytosis

Lysosome

C05776

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

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TCN2

TCN2

MMACHC

C05776

MBRD1

C05776

TCN2

TCN2

TCN2

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TCN2

C05776

MBRD1

C05776

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C05776

MBRD1

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C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

APOB

C00422

APOA4

C02075

APOA1

APOA1

APOA1

APOA1

APOA1

APOA1

Fat digestion  
and absorption

APOB

C00422

APOA4

C02075

APOA1

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APOB

C00422

APOA4

C02075

APOA1

APOA1

APOA1

APOA1

APOA1

APOA1

APOA1

APOB

C00422

APOA4

C02075

APOA1

APOA1

APOA1

APOA1

APOA1

APOA1

APOA1

SCARB1

C02477

C00378

C00473

LRAT

AWAT2

C02075

APOA1

APOA1

APOB

C00422

APOA4

C02075

APOA1

APOA1

APOA1

APOA1

APOA1

APOA1

APOA1

APOB

C00422

APOA4

C02075

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Vitamin digestion  
and absorption  
MPI-187

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

Bile secretion

Retinol metabolism

CUBN

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Endocytosis

Lysosome

Fat digestion  
and absorption

MMACHC

C05776

C05776

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Vitamin digestion  
and absorption  
MPI-193

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

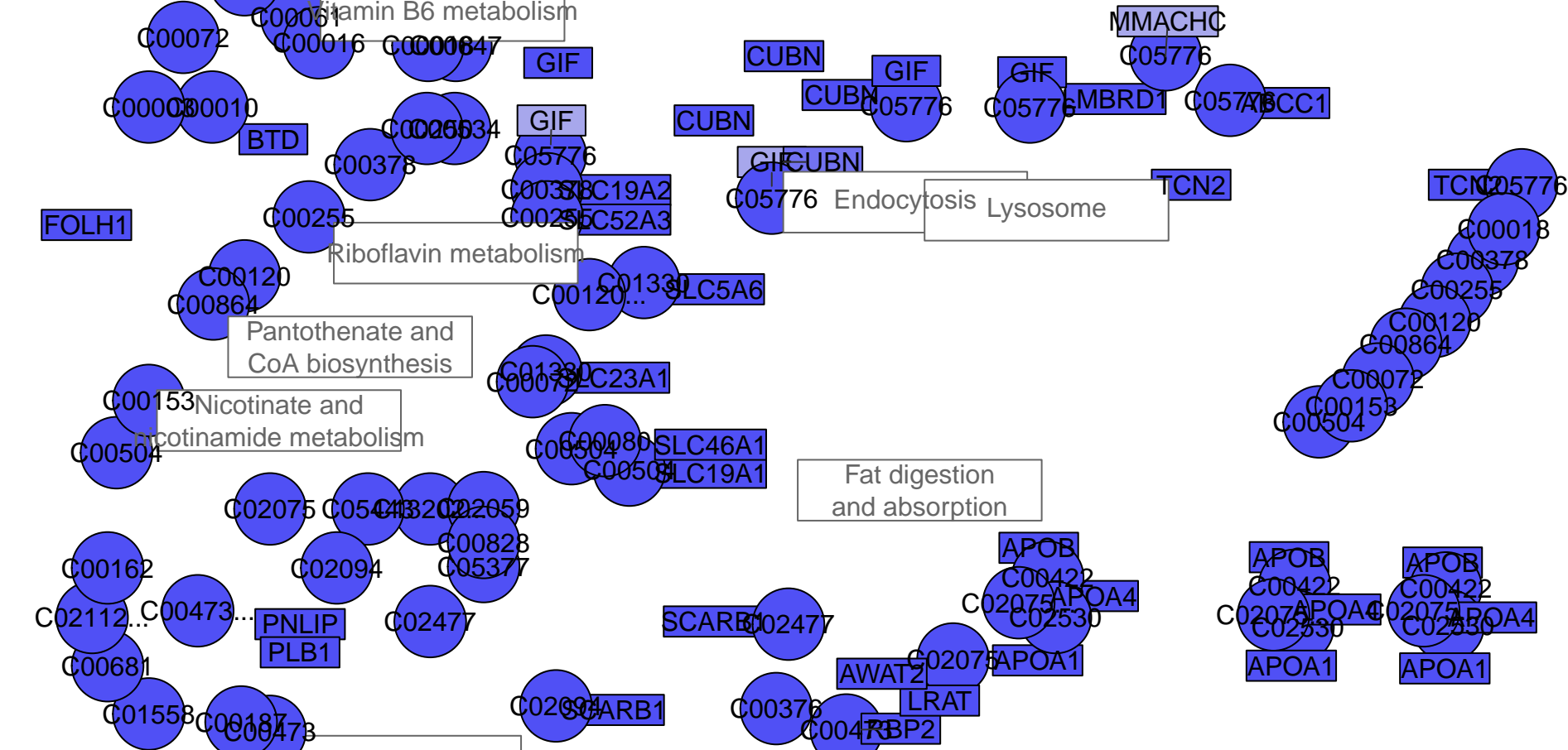
Retinol metabolism

Bile secretion

Endocytosis

Lysosome

Fat digestion and absorption



Vitamin digestion  
and absorption  
MPI-216

Tight junction

Folate biosynthesis

Biotin metabolism  
Thiamine metabolism  
Vitamin B6 metabolism

MMACHC

C00008  
C00010

BTD

C00016  
C000647  
C0025634

GIF

CUBN

GIF

GIF

MBRD1

C05776

BCC1

FOLH1

C00255

C00378  
C00378C19A2  
C00255C52A3

GIF

CUBN

GIF  
CUBN

Endocytosis  
Lysosome

TCN2

TCN2

Riboflavin metabolism

C00120  
C00864

C00120...  
SLC5A6

Pantothenate and  
CoA biosynthesis

C00138  
C00079  
SLC23A1

Nicotinate and  
nicotinamide metabolism

C00153  
C00504

C00080  
C00504  
SLC46A1  
SLC19A1

Fat digestion  
and absorption

C02075  
C05413  
C022059

C00828  
C05377

C00162  
C02112...

C00473

C02094

C02477

SCARB1  
C02477

APOB  
C00422  
APOA4  
C02075  
C02530

APOB  
C00422  
APOA4  
C02075  
C02530

APOB  
C00422  
APOA4  
C02075  
C02530

PNLIP  
PLB1

C00681

C01558

C00187  
C00473

C02094  
SCARB1

C00378  
C00473

AWAT2  
LRAT

C02075  
APOA1

APOA1

APOA1

Bile secretion

Retinol metabolism

C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504



Vitamin digestion  
and absorption  
MPI-222

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

C00003 C00010 C000647 GIF

C00003 C00010 BTD C0025534 GIF

C00378 C05776

C00255 C00378 C00378 C19A2

C00255 C52A3

Riboflavin metabolism

C00120 C00864

Pantothenate and CoA biosynthesis

C00153 C00504

Nicotinate and nicotinamide metabolism

C02075 C05413 C022059

C00162 C02094 C00828 C05377

C02112... C00473... PNLIP PLB1 C02477

C00681 C01558 C00187 C00473

C02094 SCARB1

C00378 C00473

C02075 APOA1

C00422 APOA4

C02075 APOA4

C02075 APOA4

C02075 APOA4

C02075 APOA4

C02075 APOA4

C02075 APOA4

C02075 APOA4

C02075 APOA4

CUBN GIF

CUBN GIF C05776

CUBN GIF C05776

CUBN GIF C05776

C05776 Endocytosis Lysosome

C05776

C05776

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MMACHC

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MBRD1 C05776

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C05776

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C05776

C05776

C05776

C05776

C05776

C05776

C05776

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

C00504

Fat digestion  
and absorption

APOB

C00422

APOA4

C02075

C02530

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOA1

APOB

C00422

APOA4

C02075

C02530

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOA1

APOB

C00422

APOA4

C02075

C02530

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOA1

FOLH1

BTD

GIF

CUBN

CUBN

TCN2

C00120... SLC5A6

C00138 SLC23A1

C00080 SLC46A1

C00504 SLC19A1

SCARB1

SCARB1

AWAT2

LRAT

LRAT

LRAT

LRAT

LRAT

LRAT

LRAT

LRAT

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

Riboflavin metabolism

Endocytosis Lysosome

Retinol metabolism

Bile secretion







Vitamin digestion  
and absorption  
MPI-245

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C00072 C00010  
C00008 C00016  
C00061 C00064  
C00068 C00067

BTD

GIF

CUBN

GIF

GIF

MMACHC

C05776

MBRD1

C05776

BCC1

GIF

CUBN

GIF CUBN

TCN2

FOLH1

C00255

Riboflavin metabolism

C05776

C00378

C05776

Endocytosis Lysosome

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

Pantothenate and  
CoA biosynthesis

C01380

SLC23A1

Nicotinate and  
nicotinamide metabolism

C00504

C00072

C00080

SLC46A1

C00504

C00504

SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059

C00162

C02094

C00828

C05377

C02112...

C00473

PNLIP

PLB1

C02477

SCARB1

C02477

APOB

C00422

APOA4

C02075

C02530

APOA4

C02075

APOA4

C00681

C01558

C00187

C00473

SCARB1

C02094

C00378

C00473

LRAT

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOA1

Bile secretion

Retinol metabolism



Vitamin digestion  
and absorption  
MPI-249

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C00072 C00010  
C00008 C00016  
C00061 C000647  
C00068 C000647  
GIF

CUBN GIF  
CUBN GIF  
C05776 C05776  
CUBN MBRD1 C05776  
CUBN GIF  
C05776

MMACHC  
C05776  
C05776  
BCC1

FOLH1

BTD

C00255

C00120  
C00864  
Riboflavin metabolism

Pantothenate and  
CoA biosynthesis

C00153  
C00504  
Nicotinate and  
nicotinamide metabolism

C00138  
C00079  
C00080  
C00504  
C00504  
SLC5A6  
SLC23A1  
SLC46A1  
SLC19A1

Fat digestion  
and absorption

TCN2  
C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504

C02075 C05413 C022059  
C00828  
C05377

C00162  
C02112...  
C00473...  
C00681  
C01558  
C00187  
C00473  
PNLIP  
PLB1  
C02477

C02094  
SCARB1

SCARB1  
C02477  
C00378  
C00473  
BFP2

AWAT2  
LRAT  
C02075  
APOA1

APOB  
C00422  
APOA4  
C02075  
C02530

APOB  
C00422  
APOA4  
C02075  
APOA1  
C02530

APOB  
C00422  
APOA4  
C02075  
APOA1  
C02530

Bile secretion

Retinol metabolism











Vitamin digestion  
and absorption  
MPI-010

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C00072 C00016 C000647  
C00003 C00010  
BTD

CUBN GIF GIF GIF  
CUBN CUBN C05776 C05776 MBRD1 C05776 BCC1

MMACHC

C05776

C05776

C00255 C00378 C0025634  
C00378 C05776  
C00378 C19A2  
C00256 C52A3

CUBN CUBN C05776  
Endocytosis Lysosome

TCN2

TCN2

FOLH1

Riboflavin metabolism  
C00120 C00864  
C00120... SLC5A6

CUBN

C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504

Pantothenate and  
CoA biosynthesis

C00138 SLC23A1  
C00072

Nicotinate and  
nicotinamide metabolism  
C00153 C00504

C00080 SLC46A1  
C00504 SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059  
C00828 C05377

SCARB1 C02477

APOB C00422  
C02075 APOA4  
C02530

APOB C00422  
C02075 APOA4  
C02530

APOB C00422  
C02075 APOA4  
C02530

C00162 C00473...  
C02112... C00681  
C01558 C00187  
C00473

C02094 C02477  
PNLIP  
PLB1

AWAT2 C02075 APOA1  
LRAT  
C00378 C00473 BFP2

C02094 SCARB1

Bile secretion

Retinol metabolism

Vitamin digestion  
and absorption  
MPI-012

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

Bile secretion

Retinol metabolism

Endocytosis

Lysosome

Fat digestion and absorption

MMACHC

C05776

C05776

MBRD1

C05776

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

APOB

C00422

C02075

APOA4

C02530

APOA1

APOA1

APOA1

C05776

C05552

C00068

C00072

C00016

C000647

C00003

C00010

C00008

C00072

C000120

C00864

C00153

C00504

C00162

C02112...

C00473

C00681

C01558

C00187

C00473

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C00473

C00473

C00473

C05552

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C00016

C000647

C00003

C00010

C00008

C00072

C000120

C00864

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C00864

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C05776

C00068

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C00864

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C02112...

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C05776

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C00864

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C00162

C02112...

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C01558

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C00473

C00473

C00473

C05776

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C00016

C000647

C00003

C00010

C00008

C00072

C000120

C00864

C00153

C00504

C00162

C0211



Vitamin digestion  
and absorption  
MPI-014

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

C00003 C00010 C000647 GIF

C00003 C00010 BTD C0025534 GIF

C00378 C005776 C00378 C19A2

C00255 C00255 C52A3

C00120 C00864 Riboflavin metabolism

C00120... SLC5A6

C00138 SLC23A1

C00072 SLC46A1

C00153 Nicotinate and nicotinamide metabolism

C00504 C00080 SLC19A1

C02075 C05413 C022059

C00162 C02094 C00828 C05377

C02112... C00473... PNLIP PLB1 C02477

C00681 C02477

C01558 C00187 C00473

C02094 SCARB1

C00378 C00473 RBP2

C00473

Bile secretion Retinol metabolism

CUBN GIF

CUBN GIF C05776

CUBN GIF CUBN

C05776 Endocytosis Lysosome

C05776

C00120... SLC5A6

C00072 SLC46A1

C00504 SLC19A1

C02075 C05413 C022059

C00162 C02094 C00828 C05377

C02112... C00473... PNLIP PLB1 C02477

C00681 C02477

C01558 C00187 C00473

C02094 SCARB1

C00378 C00473 RBP2

C00473

Bile secretion Retinol metabolism

MMACHC

C05776

C05776 MBRD1 C05776

C05776

TCN2

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

Fat digestion and absorption

APOB

C00422 APOA4

C02075 APOA4 C02530

APOA1

C02075 APOA1

C00422

C02075 APOA4 C02530

APOA1

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

Fat digestion and absorption

APOB

C00422 APOA4

C02075 APOA4 C02530

APOA1

C02075 APOA1

C00422

C02075 APOA4 C02530

APOA1





Vitamin digestion  
and absorption  
MPI-021

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

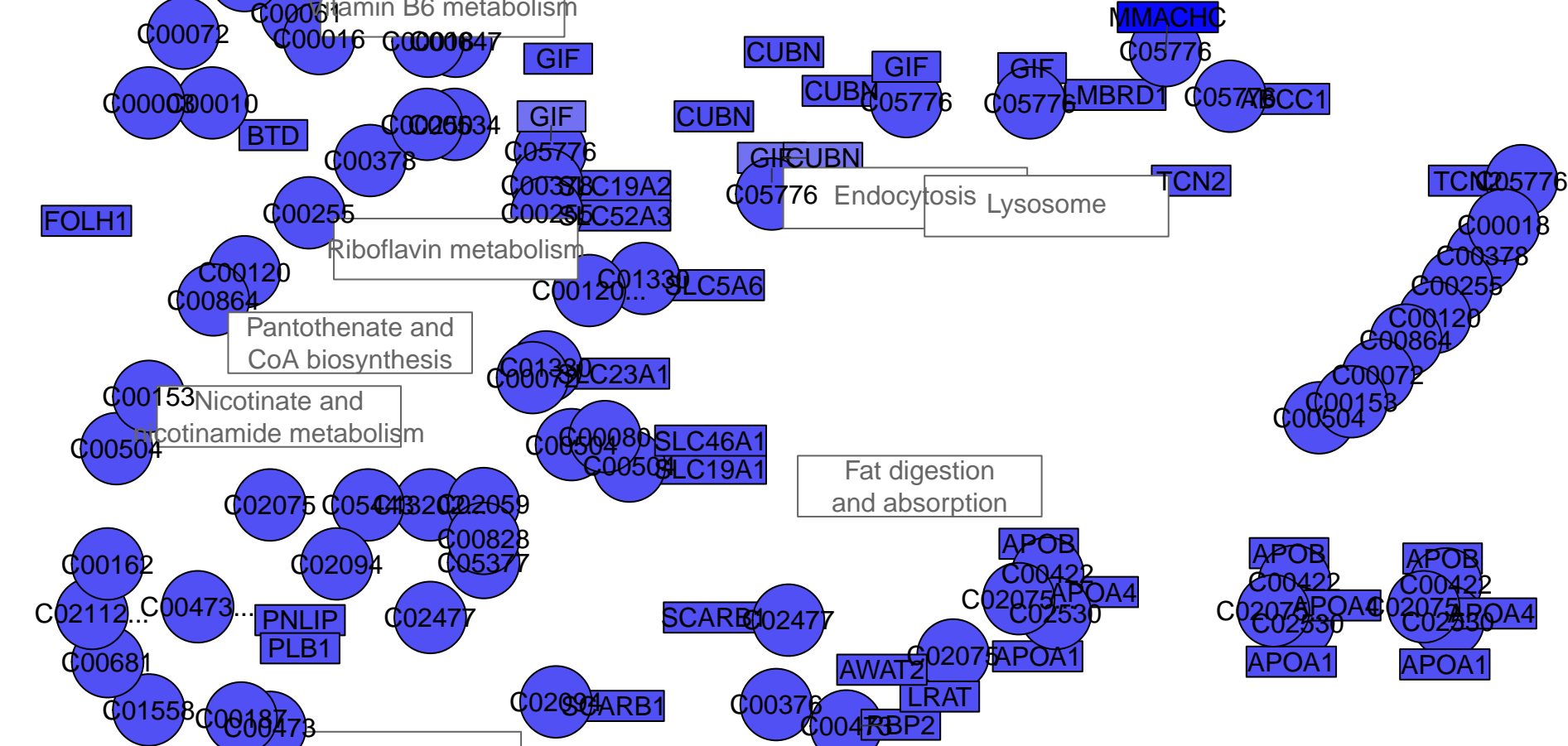
Retinol metabolism

Bile secretion

Endocytosis

Lysosome

Fat digestion and absorption





Vitamin digestion  
and absorption  
MPI-022

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C00072 C00010  
C00008 C00016  
C00061 C00064  
C00068 C00067

BTD

GIF

CUBN

GIF

GIF

MMACHC

C05776

MBRD1

C05776

BCC1

GIF

CUBN

GIF

CUBN

TCN2

Endocytosis Lysosome

TCN2

FOLH1

C00255

Riboflavin metabolism

C00378

C00378

C00378

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

C00120

C00864

Pantothenate and  
CoA biosynthesis

C00138

C00138

C00072

C00072

C00080

C00080

C00504

C00504

C00153

C00504

Nicotinate and  
nicotinamide metabolism

C00080

C00080

C00504

C00504

Fat digestion  
and absorption

SCARB1

C02477

AWAT2

LRAT

APOA1

APOA1

APOA1

C02075

C05413

C022059

C00828

C05377

C00162

C02112...

C00473

C02094

C02477

SCARB1

C02477

AWAT2

LRAT

APOA1

APOA1

APOA1

C02112...

C00681

C00473

C02477

C02094

C02477

C00378

C00473

C02075

C02530

C02075

C02530

C02075

C02530

C01558

C00187

C00473

C02094

SCARB1

C00378

C00473

C02075

C02530

C02075

C02530

C02075

C02530

Bile secretion

Retinol metabolism

Vitamin digestion  
and absorption  
MPI-025

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

C00003 C00010 C000647 GIF

BTD C0025534 GIF

C00378 C05776

C00255 C00378 C19A2

Riboflavin metabolism

C00120 C00864 C01330

Pantothenate and  
CoA biosynthesis

C01380 SLC23A1

Nicotinate and  
nicotinamide metabolism

C00504 C00080 SLC46A1 C0508 SLC19A1

C02075 C05413 C022059

C00162 C02094 C00828 C05377

C02112... C00473... PNLIP PLB1 C02477

C00681 C02477

C01558 C00187 C00473

Bile secretion Retinol metabolism

CUBN

GIF

CUBN

CUBN C05776

GIF CUBN

C05776 Endocytosis Lysosome

MMACHC

C05776

C05776 MBRD1 C05776

TCN2

TCN2 C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

Fat digestion  
and absorption

SCARB1 C02477

C00378

C00473 RBP2

AWAT2

LRAT

APOB

C00422 APOA4

C02075 APOA1

C02530

APOB

C00422 APOA4

C02075 APOA1

C02530

APOB

C00422 APOA4

C02075 APOA1

C02530







Vitamin digestion  
and absorption  
MPI-039

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

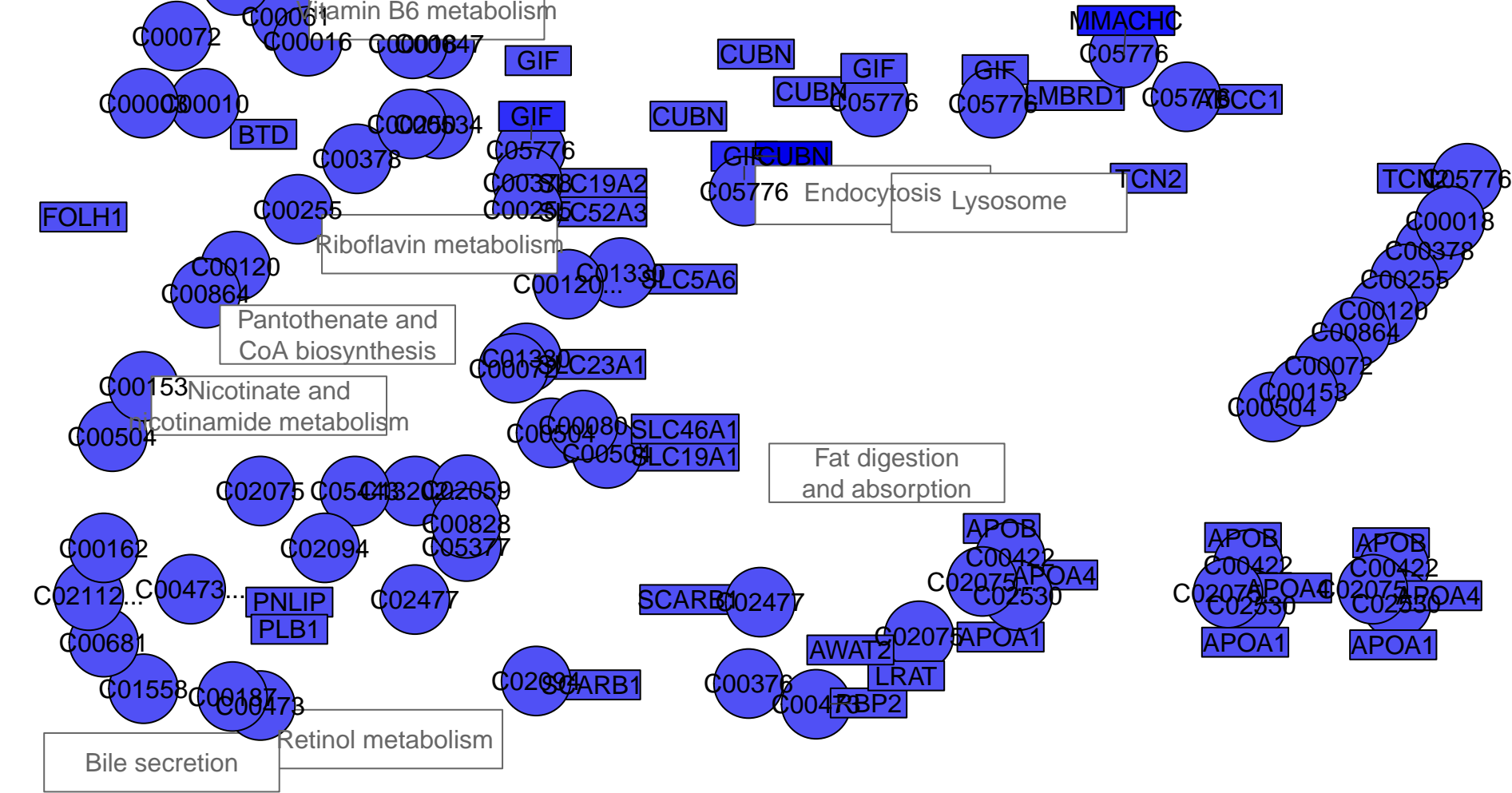
Bile secretion

Retinol metabolism

Endocytosis

Lysosome

Fat digestion and absorption









Vitamin digestion  
and absorption  
MPI-045

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

Bile secretion

Retinol metabolism

Endocytosis

Lysosome

Fat digestion and absorption

MMACHC

C05776

C05776

MBRD1

C05776

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

APOB

C00422

C02075

APOA4

C02530

APOA1

APOA1

APOA1

C05776

C05552

C00068

C00072

C00061

C00016

C000647

C00003

C00010

BTD

C00255

C00378

C00255

C00120

C00864

C00153

C00504

C00162

C02112...

C00473

C00681

C01558

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C00010

BTD

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C00061

C00016

C000647

C00003

C00010

BTD

C00255

C00378

C00255

C00120

C00864

C00153

Vitamin digestion  
and absorption  
MPI-047

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

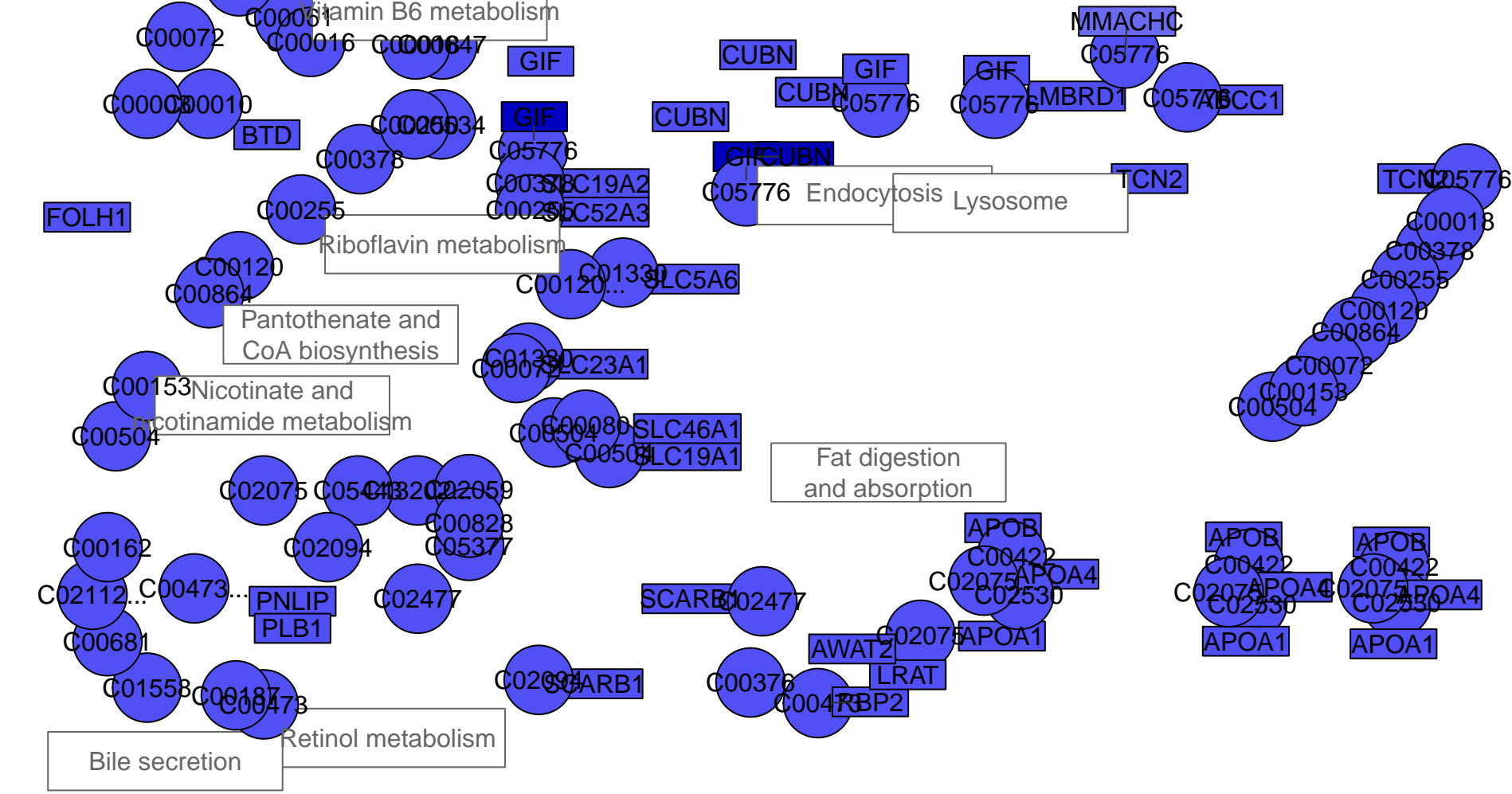
Bile secretion

Retinol metabolism

Endocytosis

Lysosome

Fat digestion and absorption



Vitamin digestion  
and absorption  
MPI-053

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

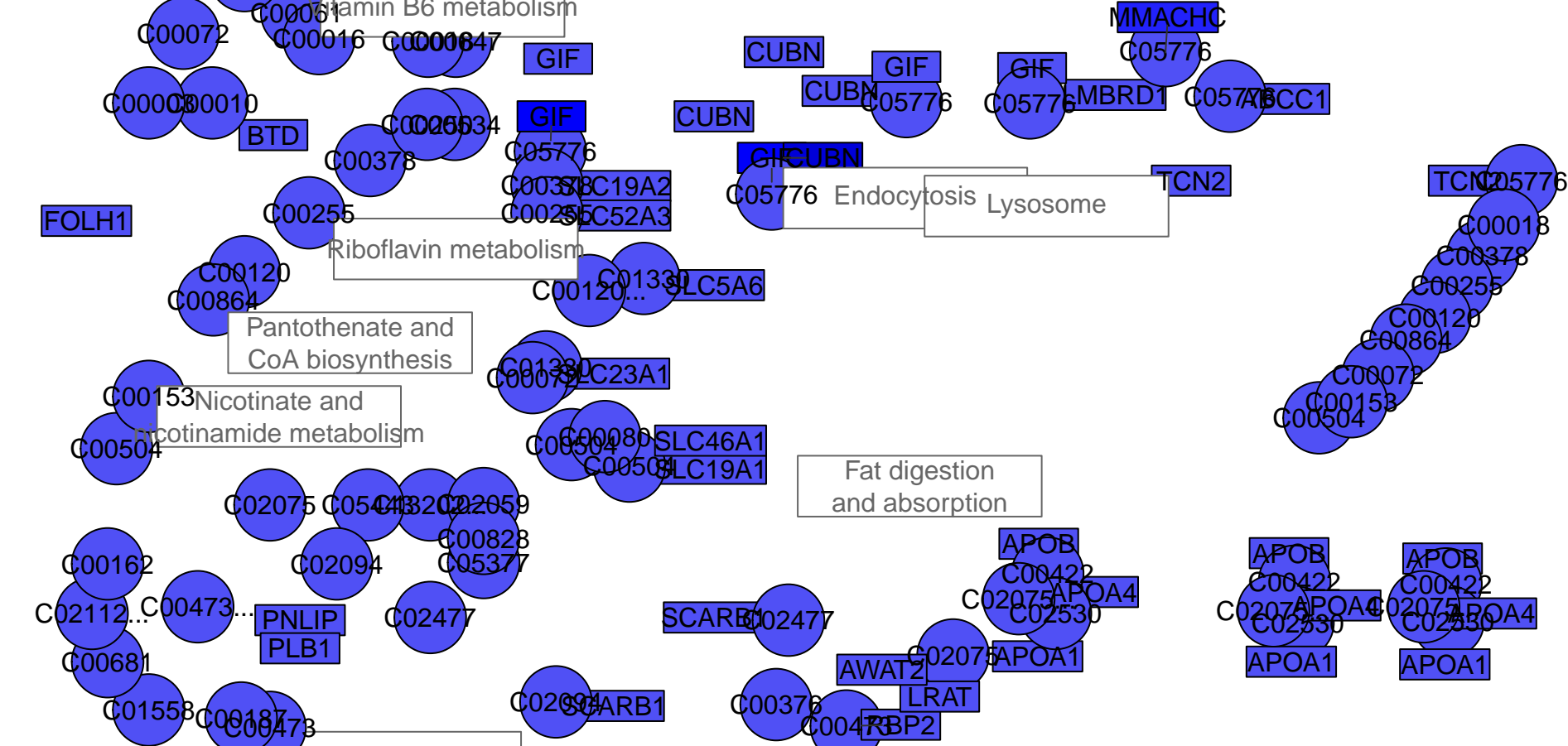
Bile secretion

Retinol metabolism

Endocytosis

Lysosome

Fat digestion and absorption



Vitamin digestion  
and absorption  
MPI-062

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

C05776

C05552 C00068

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

C00008 C00010 C000534 GIF

BTD C00378 C00255

FOLH1

Riboflavin metabolism

C00120 C00864 C00120... SLC5A6

Pantothenate and  
CoA biosynthesis

C01380 SLC23A1

Nicotinate and  
nicotinamide metabolism

C00153 C00504 C00080 SLC46A1 C00504 SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059

C00162 C02094 C00828 C05377

C02112... C00473... PNLIP PLB1 C02477

SCARB1

APOB C00422 APOA4 C02075 C02530

APOB C00422 APOA4 C02075 APOA4 C02530

Bile secretion

Retinol metabolism

C01558 C00187 C00473

C02094 SCARB1

C00378 C00473 RBP2

AWAT2 LRAT

APOA1 APOA1

MMACHC

C05776

CUBN

GIF

CUBN

C05776

CUBN

GIF

C05776

MBRD1

C05776

BCC1

GIF CUBN

C05776

Endocytosis Lysosome

TCN2

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

C02477

C02075

APOA1

C00378

C00473

RBP2

AWAT2

LRAT

C02075

APOA4

C02075

APOA4

C02530

APOA1

C02530

APOA1



Vitamin digestion  
and absorption  
MPI-069

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

C05776

C05552 C00068

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

GIF

CUBN

GIF

MMACHC

C05776

C00008 C00010

BTD

C0025634

GIF

CUBN

CUBN

C05776

GIF

C05776

MBRD1

C05776

BCC1

C00378

C05776

GIF

CUBN

CUBN

Endocytosis

Lysosome

TCN2

TCN2

FOLH1

C00255

C00378

C00378

BC19A2

C00255

BC52A3

Riboflavin metabolism

C001330

C001330

SLC5A6

C00120

C00864

C00120...

C00120...

Pantothenate and  
CoA biosynthesis

C001380

C00079

SLC23A1

Nicotinate and  
nicotinamide metabolism

C00153

C00504

C00080

C00504

SLC46A1

SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059

C00162

C02094

C00828

C05377

C02112...

C00473

PNLIP

PLB1

C02477

SCARB1

C02477

APOB

C00422

APOA4

C02075

C02530

APOB

C00422

APOA4

C02075

C02530

APOB

C00422

APOA4

C02075

C02530

APOA1

APOA1

Bile secretion

Retinol metabolism

C01558

C00187

C00473

C02094

SCARB1

C00378

C00473

AWAT2

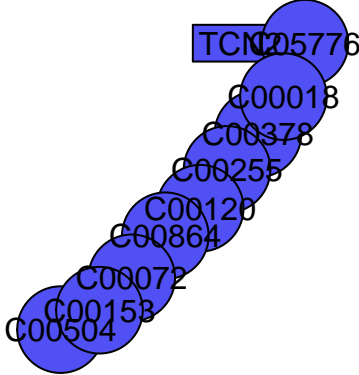
LRAT

C02075

APOA1

APOA1

APOA1





Vitamin digestion  
and absorption  
MPI-073

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

Bile secretion

Retinol metabolism

Endocytosis

Lysosome

Fat digestion and absorption

C00072

C00008

C00010

C00003

FOLH1

C00120

C00864

C00153

C00504

C00162

C02112...

C00681

C01558

C00187

C00473

C00473

C05552

C00068

C00061

C00016

C000647

BTD

C00378

C00255

C00120

C00864

C00153

C00504

C00162

C02112...

C00681

C01558

C00187

C00473

C00473

C00068

C00061

C00016

C000647

C0025534

C00378

C00255

C00120

C00864

C00153

C00504

C00162

C02112...

C00681

C01558

C00187

C00473

C00473

C05776

C00068

C00061

C00016

C000647

C0025534

C00378

C00255

C00120

C00864

C00153

C00504

C00162

C02112...

C00681

C01558

C00187

C00473

C00473

C05776

C00068

C00061

C00016

C000647

C0025534

C00378

C00255

C00120

C00864

C00153

C00504

C00162

C02112...

C00681

C01558

C00187

C00473

C00473

C05776

C00068

C00061

C00016

C000647

C0025534

C00378

C00255

C00120

C00864

C00153

C00504

C00162

C02112...

C00681

C01558

C00187

C00473

C00473

C05776

C00068

C00061

C00016

C000647

C0025534

C00378

C00255

C00120

C00864

C00153

C00504

C00162

C02112...

C00681

C01558

C00187

C00473

C00473

CUBN

CUBN

CUBN

CUBN

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C00068

C00061

C00016

C000647

C0025534

C00378

C00255

C00120

C00864

C00153

C00504

C00162

C02112...

C00681

C01558

C00187

C00473

C00473

C05776

C00068

C00061

C00016

C000647

C0025534

C00378

C00255

C00120

C00864

C00153

C00504

C00162

C02112...

C00681

C01558

C00187

C00473

C00473

C05776

C00068

C00061

C00016

C000647

C0025534

C00378

C00255

C00120

C00864

C00153

C00504

C00162

C02112...

C00681

C01558

C00187

C00473

C00473

C05776

C00068

C00061

C00016

C000647

C0025534

C00378

C00255

C00120

C00864

C00153

C00504

C00162

C02112...

C00681

C01558

C00187

C00473

C00473

C05776

C00068

C00061

C00016

C000647

C0025534

C00378

C00255

C00120

C00864

C00153

C00504

C00162

C02112...

C00681

C01558

C00187

C00473

C00473

C05776

C00068

C00061

C00016

C000647

C0025534

C00378

C00255

C00120

C00864

C00153

C00504

C00162

C02112...

C00681

C01558

C00187

C00473

C00473

C05776

C00068

C00061

C00016

C000647

C0025534

C00378

C00255

C00120

C00864

C00153

C00504

C00162

C02112...

C00681

C01558

C00187

C00473

C00473

C05776

C00068

C00061

C00016

C000647

C0025534

C00378

C00255

C00120

C00864

C00153

C00504

C00162

C02112...

C00681

C01558

C00187

C00473

C00473

C05776

C00068

C00061

C00016

C000647

C0025534



Vitamin digestion  
and absorption  
MPI-074

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

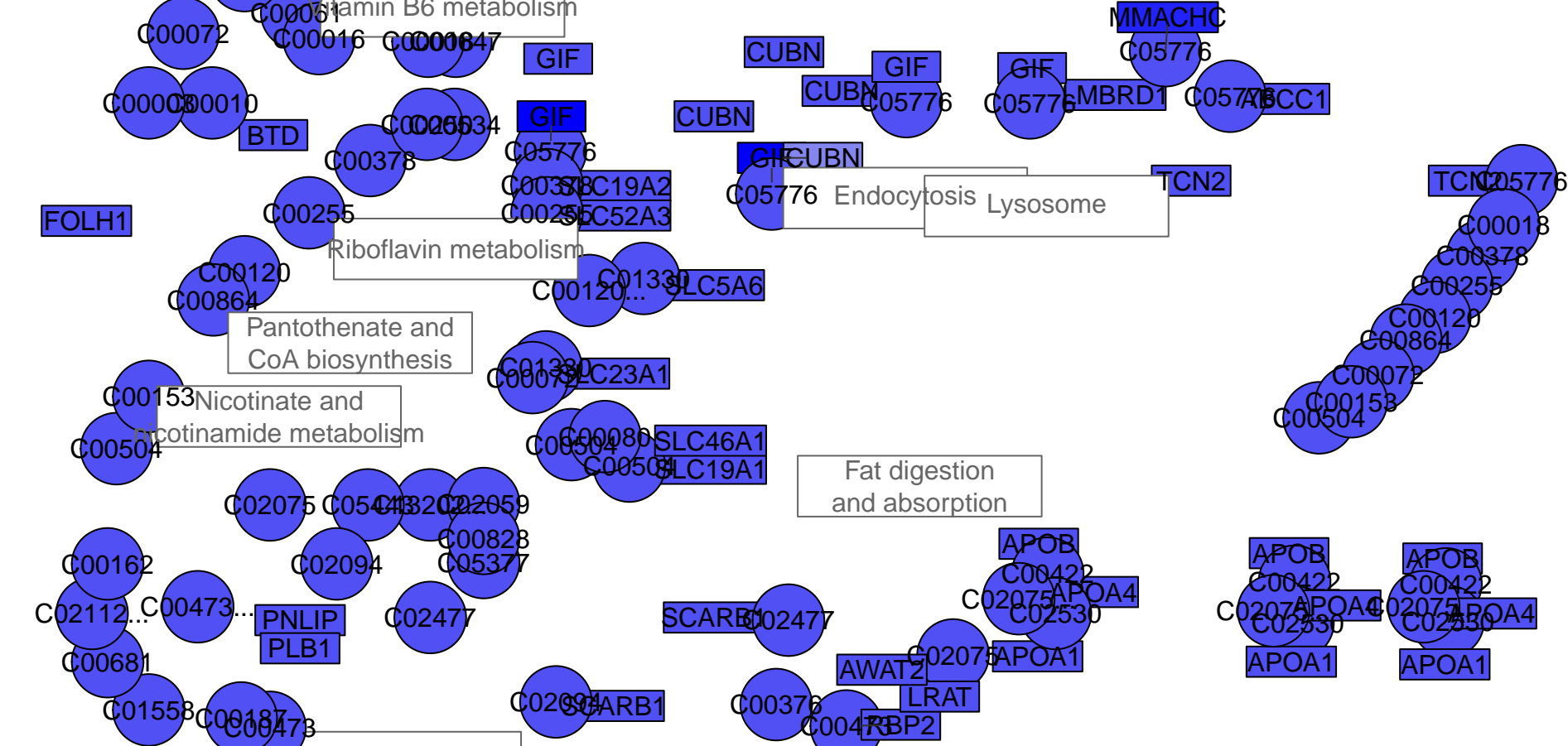
Bile secretion

Retinol metabolism

Endocytosis

Lysosome

Fat digestion and absorption



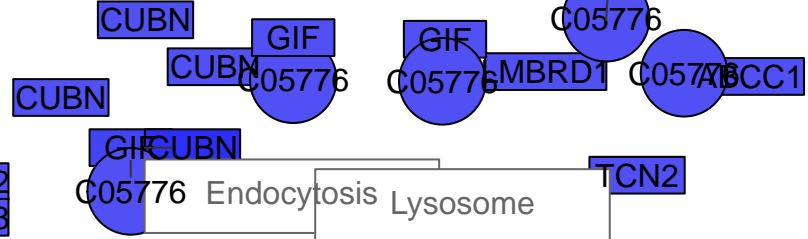
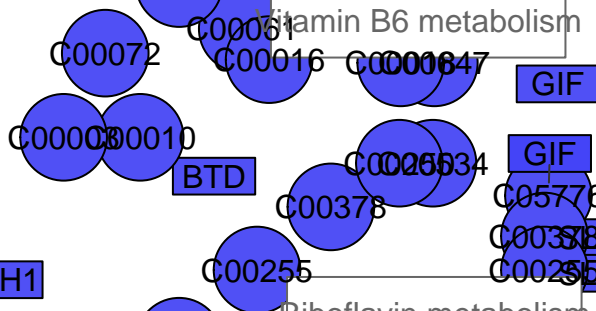


Vitamin digestion  
and absorption  
MPI-083

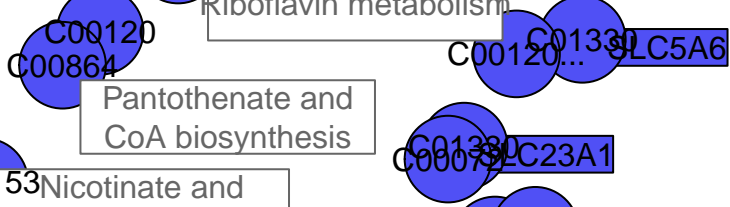
Tight junction

Folate biosynthesis

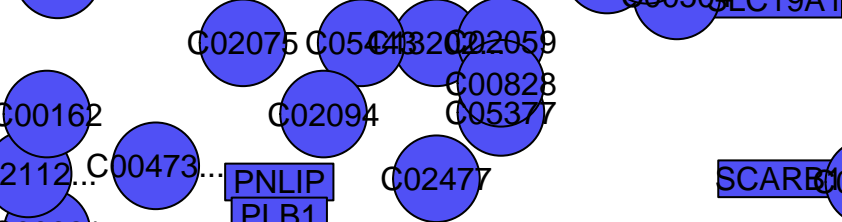
Biotin metabolism  
Vitamin B6 metabolism



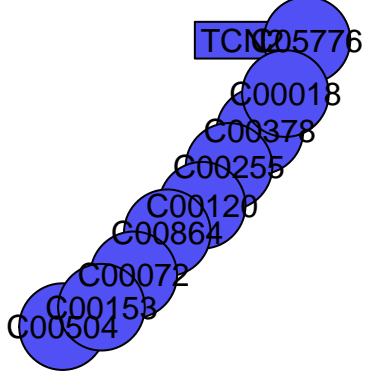
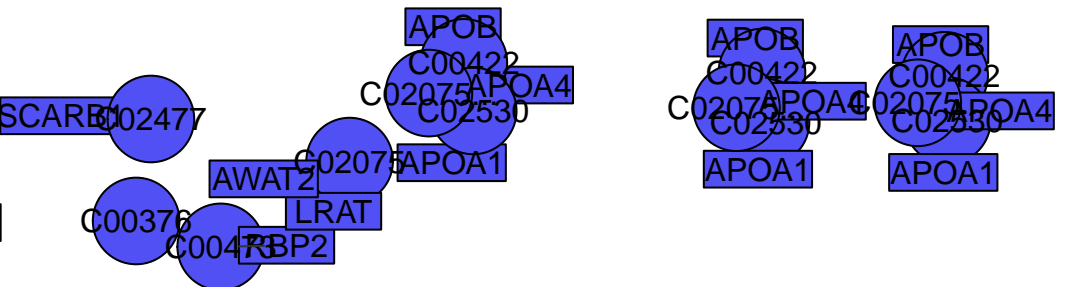
Riboflavin metabolism



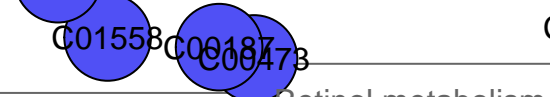
Nicotinate and  
nicotinamide metabolism



Fat digestion  
and absorption



Bile secretion



Vitamin digestion  
and absorption  
MPI-088

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

C00008 C00010

BTD

C00255 C00378 C00256

GIF

CUBN

CUBN

GIF

GIF

MMACHC

C05776

MBRD1

C05776

FOLH1

C00255

C00378 C19A2

GIF

CUBN

C05776

Endocytosis

Lysosome

TCN2

TCN2

Riboflavin metabolism

C00120 C00864

C00120... SLC5A6

Pantothenate and  
CoA biosynthesis

C00138 SLC23A1

Nicotinate and  
nicotinamide metabolism

C00153 C00504

C00080 SLC46A1

C00504 SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059

C02094

C00828 C05377

C00162

C02112... C00473

PNLIP

PLB1

C02477

SCARB1

C02477

APOB

C00422

APOA4

C02075

APOA1

APOB

C00422

APOA4

C02075

APOA1

APOB

C00422

APOA4

C02075

APOA1

C00681

C01558 C00187

C00473

Bile secretion

Retinol metabolism

C02094 SCARB1

C00378

C00473

AWAT2

LRAT

C02075

APOA1

C02075

APOA1

C02075

APOA1

C05776 C00018 C00378 C00255 C00120 C00864 C00072 C00153 C00504

Vitamin digestion  
and absorption  
MPI-092

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

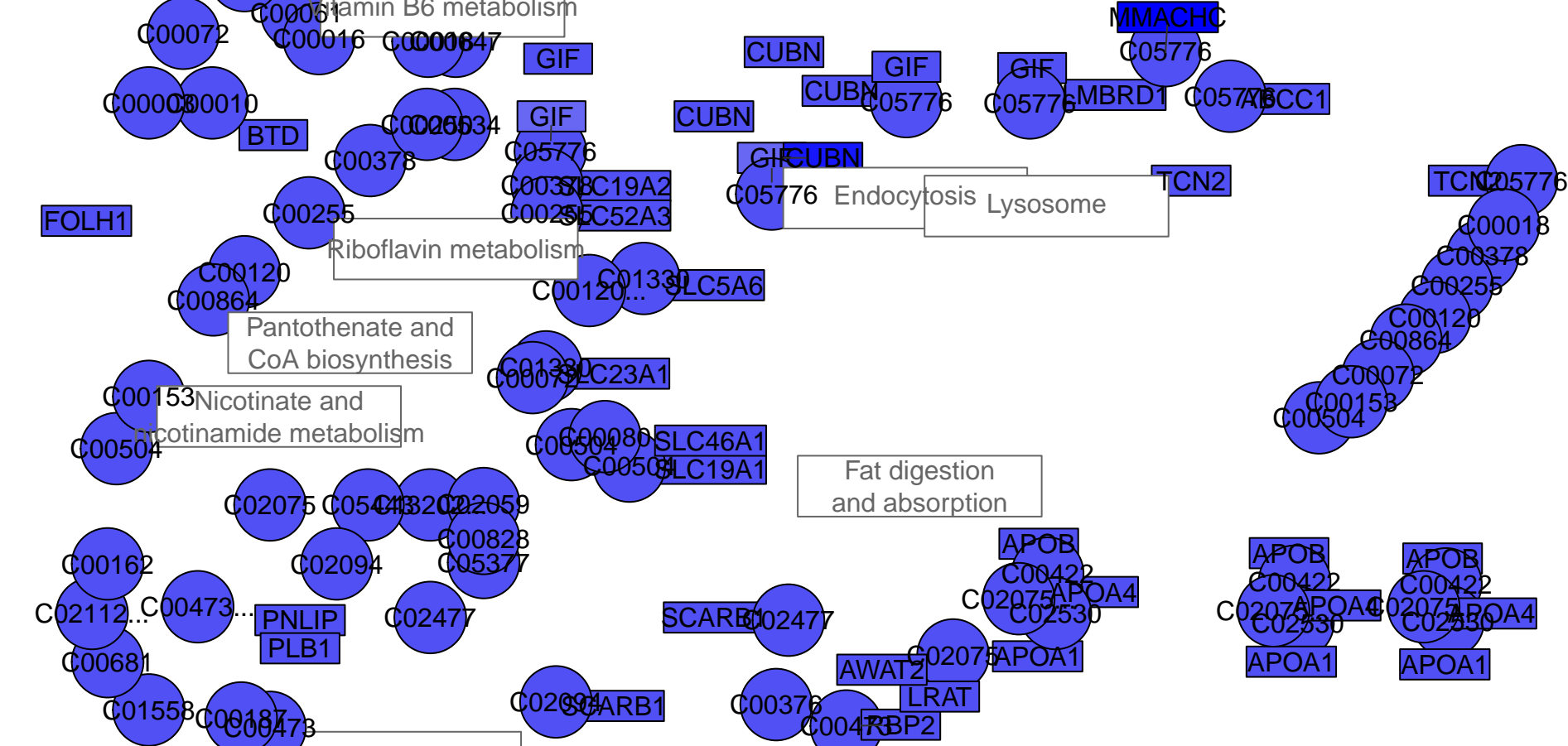
Bile secretion

Retinol metabolism

Endocytosis

Lysosome

Fat digestion  
and absorption



Vitamin digestion  
and absorption  
MPI-096

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

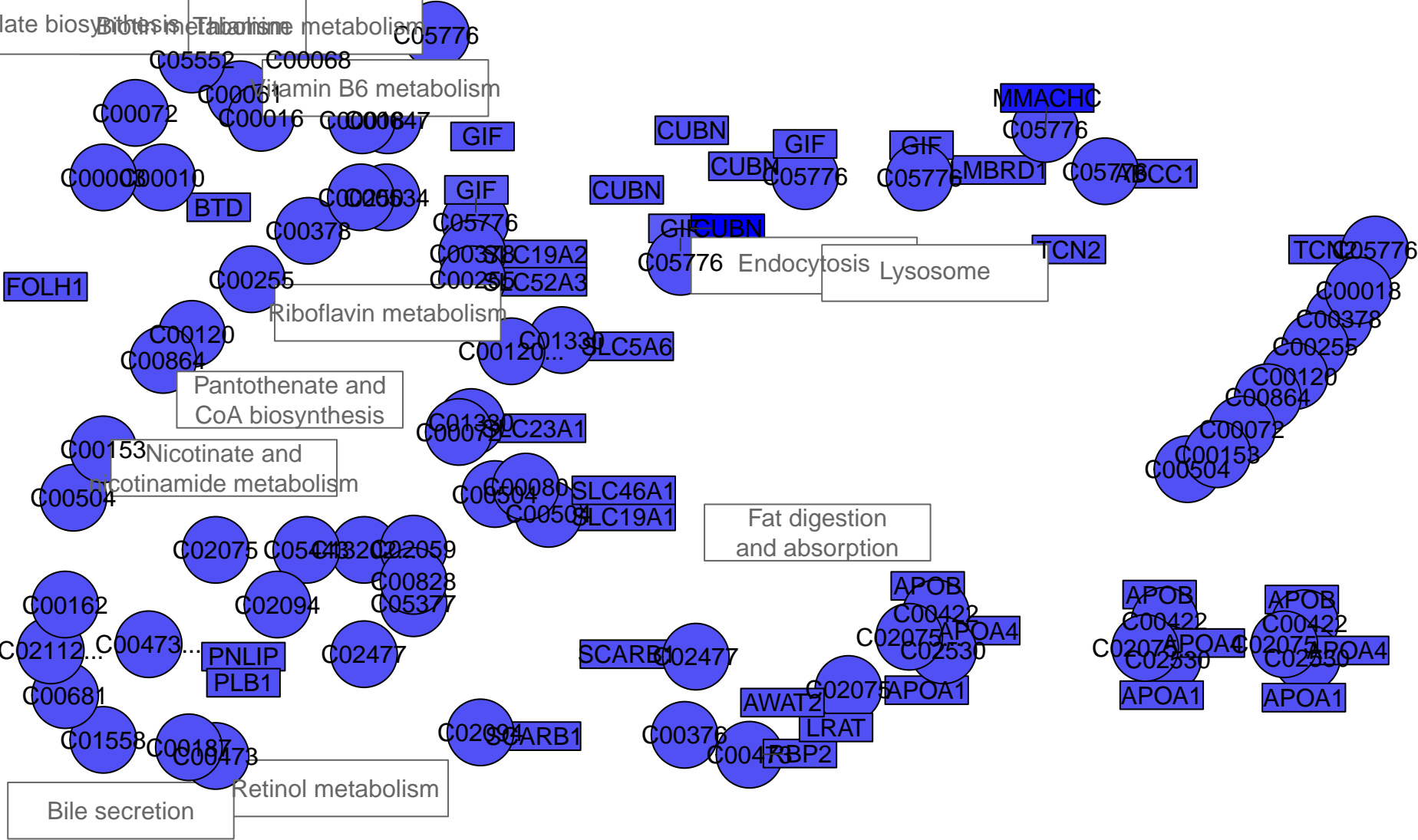
Nicotinate and nicotinamide metabolism

Bile secretion

Retinol metabolism

Fat digestion  
and absorption

Endocytosis  
Lysosome









Vitamin digestion  
and absorption  
MPI=100

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C00072 C00016 C000647  
C00003 C00010  
BTD

CUBN GIF GIF GIF  
CUBN CUBN C05776 C05776 MBRD1 C05776 BCC1

MMACHC

C05776

C05776

C05776

C00255 C00378 C005634  
C00378 C05776  
C00378 C19A2  
C00255 C52A3

C05776 CUBN CUBN  
C05776 Endocytosis Lysosome TCN2

FOLH1

Riboflavin metabolism  
C00120 C00864  
C00120... SLC5A6

TCN2 C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504

Pantothenate and  
CoA biosynthesis

C00138 C23A1  
C00072

Nicotinate and  
nicotinamide metabolism  
C00153 C00504

C00080 SLC46A1  
C00504 SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059  
C00828 C05377

APOB C00422  
C02075 APOA4  
C02530

C00162 C02094 C02477  
C02112... C00473...  
PNLIP PLB1

SCARB1 C02477  
AWAT2 C02075 APOA1

APOB C00422  
C02075 APOA4  
C02530 APOA1

Bile secretion

Retinol metabolism

C00681 C01558 C00187 C00473  
C02094 SCARB1

C00378 C00473  
LRAT RBP2

Vitamin digestion  
and absorption  
MPI=105

Tight junction

Folate biosynthesis

Vitamin B6 metabolism

C00072

C00010

C00016

C000647

GIF

CUBN

GIF

C05776

MMACHC

C05776

C05776

C05776

C00003

C00010

BTD

C0025534

GIF

CUBN

CUBN

C05776

C05776

MBRD1

C05776

BCC1

FOLH1

C000255

C00378

C005776

C00378

CUBN

C05776

Endocytosis

Lysosome

TCN2

C05776

TCN2

C00120

C00864

C00255

C00120...

SLC5A6

C00120...

C00120...

C00120...

C00120...

C00120...

C00120...

C00864

C00120

C00864

C00120

C00120

C00120

C00120

C00120

C00120

C00120

C00120

C00153

C00504

C00072

C001380

SLC23A1

C00072

C00072

C00072

C00072

C00072

C00072

C00504

C00153

C00504

C00153

C00504

C00153

C00504

C00153

C00504

C00153

C00504

C02075

C05413

C022059

C00828

C05377

C00828

C05377

C02075

C05413

C022059

C00828

C00162

C02094

C02477

C02094

C02477

C02094

C02477

C02094

C02477

C02094

C02477

C02112...

C00473

C00681

C01558

C00187

C00473

C02094

SCARB1

C00378

C00473

C00473

C00681

C01558

C00187

C00473

C02094

SCARB1

C00378

C00473

C00473

C00473

C00473

C01558

C00187

C00473

C02094

SCARB1

C00378

C00473

C00473

C00473

C00473

C00473

C00473

C00187

C00473

C02094

SCARB1

C00378

C00473

C00473

C00473

C00473

C00473

C00120

C00864

C00120

C00864

C00120

C00864

C00120

C00864

C00120

C00864

C00120

C00864

C00153

C00504

C00153

C00504

C00153

C00504

C00153

C00504

C00153

C00504

C00153

C00504

C02075

C05413

C022059

C00828

C05377

C00828

C05377

C02075

C05413

C022059

C00828

C05377

C00162

C02094

C02477

C02094

C02477

C02094

C02477

C02094

C02477

C02094

C02477

C02094

C02112...

C00473

C00681

C01558

C00187

C00473

C02094

SCARB1

C00378

C00473

C00473

C00473

C00681

C01558

C00187

C00473

C02094

SCARB1

C00378

C00473

C00473

C00473

C00473

C00473

C01558

C00187

C00473

C02094

SCARB1

C00378

C00473

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SCARB1

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SCARB1

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SCARB1

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C00473

C02094

SCARB1

C00378

C00473

C00473

C00473

C00473

C00473

C00473

C00473

C00187

C00473

C02094

SCARB1

C00378

C00473

C00473

C00473

C00473

C00473

C00473

C00473

C00187

Vitamin digestion  
and absorption  
MPI-106

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

C00003 C00010 GIF

C00003 C00010 BTD C0025534

C00378 C05776

C00255 C00378 C00378 C19A2

Riboflavin metabolism

C00120 C00864 C00120...

Pantothenate and  
CoA biosynthesis

C00138 SLC23A1

C00153 Nicotinate and  
nicotinamide metabolism

C00079 C00080 SLC46A1

C00504 C00504 SLC19A1

C02075 C05413 C022059

C00162 C02094 C00828 C05377

C02112... C00473... PNLIP PLB1

C02477

SCARB1 C02477

C00681 C01558 C00187 C00473

C02094 SCARB1

C00378 C00473 RBP2

AWAT2 C02075 APOA1

APOB C00422

C02075 APOA4 C02530

APOA1

APOB C00422

C02075 APOA4 C02530

APOA1

MMACHC

C05776

CUBN

GIF

CUBN

C05776

CUBN

GIF CUBN

GIF

C05776

MBRD1

C05776

BCC1

TCN2

Endocytosis Lysosome

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

Fat digestion  
and absorption

APOB

C00422

C02075 APOA4

C02530

AWAT2

C02075

APOA1

APOB

C00422

C02075 APOA4

C02530

APOA1

APOB

C00422

C02075 APOA4

C02530

APOA1

FOLH1

Bile secretion

Retinol metabolism

Vitamin digestion and absorption  
MPI-108

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

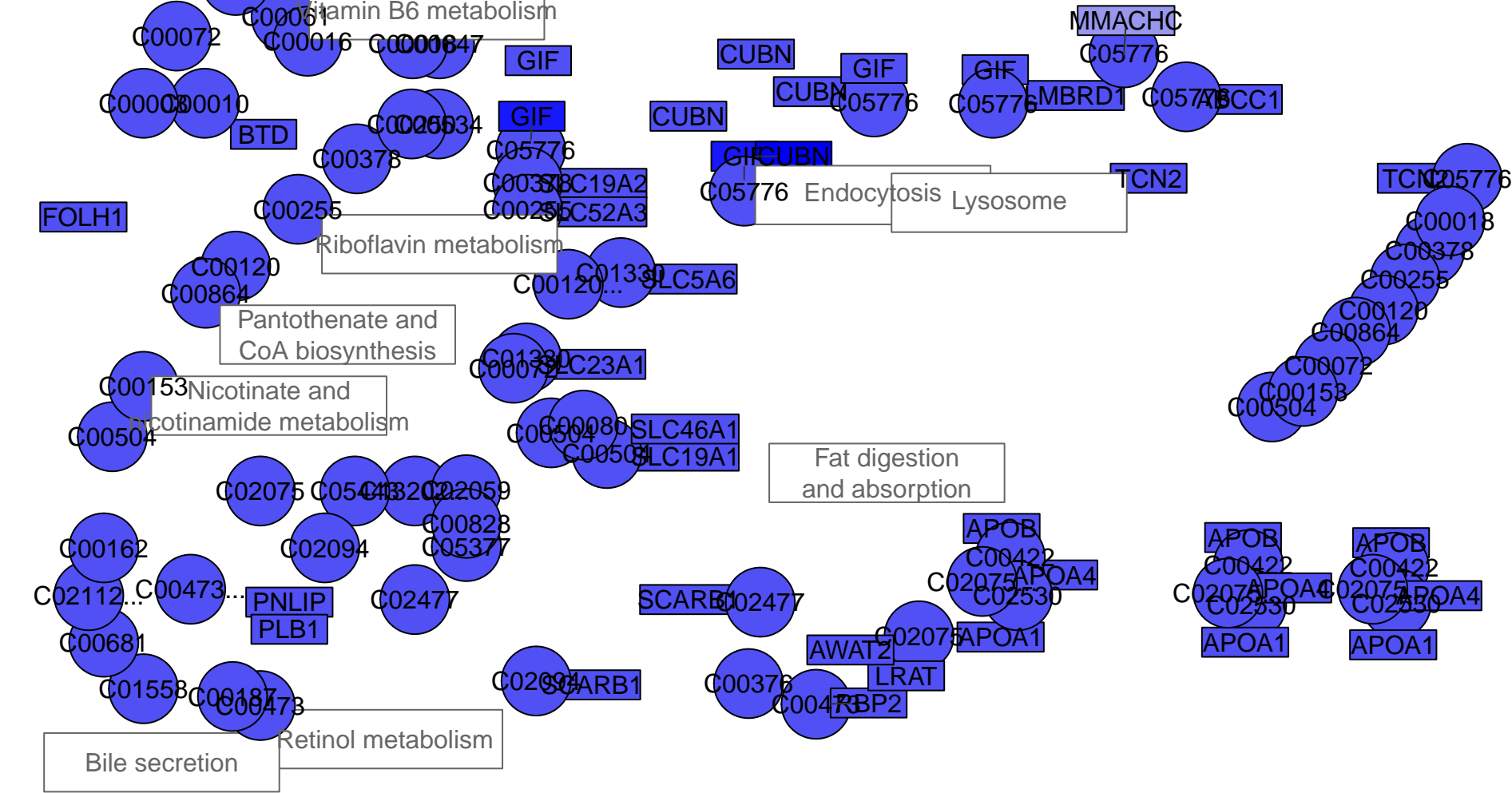
Retinol metabolism

Bile secretion

Endocytosis

Lysosome

Fat digestion and absorption



Vitamin digestion  
and absorption  
MPI-109

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

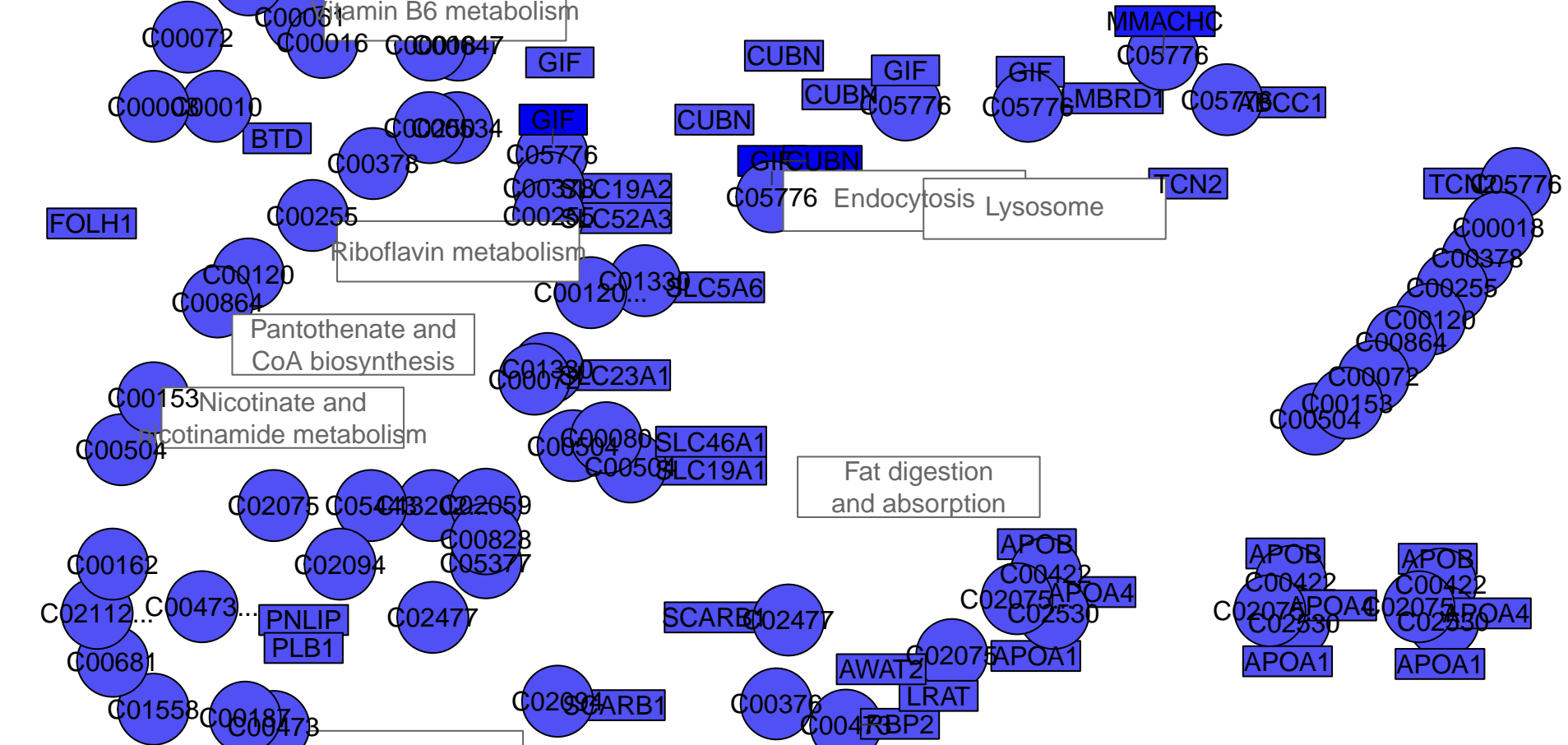
Retinol metabolism

Bile secretion

Endocytosis

Lysosome

Fat digestion and absorption



Vitamin digestion  
and absorption  
MPI-110

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C00072 C00010  
C00008 C00016 C000647  
BTD GIF

CUBN GIF  
CUBN GIF  
C05776 MBRD1 C05776  
CUBN GIF CUBN

MMACHC  
C05776  
C05776 BCC1

FOLH1

C00255  
C00378 C0025634  
C00378 C05776  
C00378 C19A2  
C00255 C52A3

C05776 Endocytosis Lysosome  
TCN2

Riboflavin metabolism  
C00120 C00864  
C00120... SLC5A6

Pantothenate and  
CoA biosynthesis

C00138 SLC23A1  
C00079 SLC46A1  
C00080 SLC19A1  
C00504 SLC19A1

TCN2 C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504

C00153 Nicotinate and  
nicotinamide metabolism  
C00504

C00080 SLC46A1  
C00504 SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059  
C00828 C05377  
C02094 C02477

SCARB1 C02477  
C00378 C00473  
AWAT2 C02075 LRAT  
C00473 RBP2

APOB C00422  
C02075 APOA4  
C02530  
APOA1

APOB C00422  
C02075 APOA4  
C02530  
APOA1

C00162 C00473...  
C02112... C00681  
C01558 C00187  
C00473

PNLIP  
PLB1

Bile secretion

Retinol metabolism

C02094 SCARB1

C02075 APOA1

APOA1

APOA1







Vitamin digestion  
and absorption  
MPI-113

Tight junction

Folate biosynthesis  
Biotin metabolism  
Taurine metabolism  
C05776

Vitamin B6 metabolism  
C00072 C00061 C00016 C000647  
C00003 C00010

C00003 C00010  
BTD C00255 C00378 C00255  
C00120 C00864

FOLH1

Riboflavin metabolism  
C00120 C00864 C00120... SLC5A6

Pantothenate and  
CoA biosynthesis  
C00138 C00079 SLC23A1

Nicotinate and  
nicotinamide metabolism  
C00153 C00504 C00080 SLC46A1  
C00504 C00504 SLC19A1

C02075 C05413 C022059  
C00828 C05377  
C02094 C02477

C00162 C02112... C00473...  
C00681 C01558 C00187 C00473

Bile secretion

Retinol metabolism

C02094 SCARB1

SCARB1 C02477

C00378 C00473  
AWAT2 LRAT  
C02075 APOA1

Fat digestion  
and absorption

APOB C00422  
C02075 APOA4  
C02530

APOB C00422  
C02075 APOA4  
C02530  
APOA1

CUBN GIF CUBN GIF  
C05776 C05776  
CUBN GIF CUBN  
C05776 C05776  
MBRD1 C05776  
TCN2

Endocytosis  
Lysosome

MMACHC

C05776

C05776 MBRD1 C05776

TCN2 C05776

C00018 C00378  
C00255 C00120  
C00864 C00072  
C00153 C00504

Vitamin digestion  
and absorption  
MPI-115

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

C05776

C05552 C00068

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

C00008 C00010

BTD

C00255 C00378 C0025634

GIF

CUBN

CUBN

GIF

GIF

MMACHC

C05776

MBRD1

C05776

BCC1

GIF CUBN

C05776

Endocytosis Lysosome

TCN2

TCN2

FOLH1

C00255

C00378 C19A2

C00255 C52A3

Riboflavin metabolism

C00120

C00864

C00120...

SLC5A6

Pantothenate and  
CoA biosynthesis

C00138 C23A1

C00079

Nicotinate and  
nicotinamide metabolism

C00153

C00504

C00080 SLC46A1

C00504 SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059

C00162

C02094

C00828

C05377

C02112...

C00473

PNLIP

PLB1

C02477

SCARB1

C02477

APOB

C00422

C02075 APOA4

C02530

APOB

C00422

C02075 APOA4

APOA1

APOB

C00422

C02075 APOA4

APOA1

C00681

C01558

C00187

C00473

Retinol metabolism

C02094

SCARB1

C00378

C00473

AWAT2

LRAT

C02075 APOA1

C02075 APOA4

APOA1

C02075 APOA4

APOA1

Bile secretion

Vitamin digestion  
and absorption  
MPI-118

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

C00003 C00010 C000647 GIF

C00003 C00010 BTD C0025534 GIF

C00378 C05776 C00378 C19A2

C00255 C00255 C52A3

C00120 C00864 Riboflavin metabolism

C00120... SLC5A6

C00138 SLC23A1

C00072 SLC46A1

C00153 Nicotinate and  
nicotinamide metabolism

C00504 C00080 SLC19A1

C02075 C05413 C022059

C00162 C02094 C00828 C05377

C02112... C00473... PNLIP PLB1 C02477

C00681 C02477

C01558 C00187 C00473

C02094 SCARB1

C00378 C00473 RBP2

C00473

Bile secretion Retinol metabolism

CUBN

GIF

GIF

MMACHC

C05776

CUBN

CUBN

C05776

C05776

MBRD1

C05776

BCC1

GIF

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

Endocytosis Lysosome

TCN2

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

Fat digestion  
and absorption

APOB

C00422

APOA4

C02075

C02530

APOA1

APOB

C00422

APOA4

C02075

C02530

APOA1

APOB

C00422

APOA4

C02075

C02530

APOA1

SCARB1

C02477

C00378

C00473

RBP2

AWAT2

C02075

LRAT

APOA1

APOB

C00422

APOA4

C02075

C02530

APOA1

APOB

C00422

APOA4

C02075

C02530

APOA1

Vitamin digestion  
and absorption  
MPI-119

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

C00003 C00010 C000647 GIF

C00003 C00010 BTD C0025534 GIF

C00378 C005776 C00378 C19A2

C00255 C00255 C52A3

C00120 C00864 Riboflavin metabolism

C00120... SLC5A6

C00138 SLC23A1

C00072 SLC46A1

C00153 Nicotinate and  
nicotinamide metabolism

C00504 C00080 SLC19A1

C02075 C05413 C022059

C00162 C02094 C00828 C05377

C02112... C00473... PNLIP PLB1 C02477

C00681 C02477

C01558 C00187 C00473

C02094 SCARB1

C00378 C00473 RBP2

C00473 Retinol metabolism

Bile secretion

CUBN GIF

CUBN GIF C05776

CUBN GIF CUBN

C05776 Endocytosis Lysosome

C05776

C00120... SLC5A6

C00072 SLC46A1

C00504 SLC19A1

C02075 C05413 C022059

C00162 C02094 C00828 C05377

C02112... C00473... PNLIP PLB1 C02477

C00681 C02477

C01558 C00187 C00473

C02094 SCARB1

C00378 C00473 RBP2

C00473 Retinol metabolism

Bile secretion

Fat digestion  
and absorption

SCARB1

C00378 C00473 RBP2

C00473 Retinol metabolism

Bile secretion

MMACHC

C05776

C05776 MBRD1 C05776

C05776

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

APOB

C00422

C02075 APOA4

C02530

APOA1

APOB

C00422

C02075 APOA4

C02530

APOA1

C05776

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C05776

C05776

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

APOB

C00422

C02075 APOA4

C02530

APOA1

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C02075 APOA4

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C00864

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APOB

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C02075 APOA4

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APOB

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C02075 APOA4

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C00378

C00255

C00120

C00864

C00072

C00153

C00504

APOB

C00422

C02075 APOA4

C02530

APOA1

APOB

C00422

C02075 APOA4

C02530

APOA1

















Vitamin digestion  
and absorption  
MPI-133

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

C00008 C00010 GIF

C00008 C00010 BTD C0025534 GIF

C00008 C00010 C00378 C05776

C00008 C00010 C00378 C19A2 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

C00008 C00010 C00255 C52A3 C05776

CUBN GIF

CUBN GIF

CUBN GIF

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CUBN GIF

CUBN GIF

MMACHC

C05776

C05776

C05776

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MMACHC

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C05776

C05776 Endocytosis Lysosome

TCN2

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00158

C00504

C00504

C00504

C00504

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C00504

MMACHC

C05776

C05776

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C05776

Fat digestion  
and absorption

APOB

C00422

C02075

C02530

APOA1

C02075

C02530

APOA1

C02075

C02530

APOA1

C02075

C02530

APOA1

C02075

APOB

C00422

C02075

C02530

APOA1

C02075

C02530

APOA1

C02075

C02530

APOA1

C02075

C02530

APOA1

C02075

APOB

C00422

C02075

C02530

APOA1

C02075

C02530

APOA1

C02075

C02530

APOA1

C02075

C02530

APOA1

C02075

SCARB1

C02477

C00378

C00478

C00478

C00478

C00478

C00478

C00478

C00478

C00478

C00478

C00478

SCARB1

C02477

C00378

C00478

C00478

C00478

C00478

C00478

C00478

C00478

C00478

C00478

C00478

AWAT2

C02075

C02530

APOA1

C02075

C02530

APOA1

C02075

C02530

APOA1

C02075

AWAT2

C02075

C02530

APOA1

C02075

C02530

APOA1

C02075

C02530

APOA1

C02075

AWAT2

C02075

C02530

APOA1

C02075

C02530

APOA1

C02075

C02530

APOA1

C02075

AWAT2

C020



Vitamin digestion and absorption  
MPI-135

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00016 C000647

C00008 C00010 GIF

C00008 C00010 BTD

C00008 C00010 C00255 C00378 C00534

C000120 C00864 C00255 C00378 C05776

C00120 C00864 C00255 C00378 C05776

C00120 C00864 C00255 C00378 C05776

C00120 C00864 C00255 C00378 C05776

C00120 C00864 C00255 C00378 C05776

C00120 C00864 C00255 C00378 C05776

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C00120 C00864 C00255 C00378 C05776

CUBN GIF

CUBN GIF

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CUBN GIF

CUBN GIF

CUBN GIF

CUBN GIF

CUBN GIF

CUBN GIF

CUBN GIF

CUBN GIF

CUBN GIF

CUBN GIF

MMACHC

C05776

C05776

C05776

C05776

C05776

C05776

C05776

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C05776

C05776

C05776

C05776

FOLH1

BTD

GIF

CUBN

CUBN

GIF

GIF

MBRD1

C05776

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00158

C00504

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

C00504

C02075 C05413 C022059

C00162 C02094 C00828 C05377

C02112... C00473...

C00681 C02477

C01558 C00187 C00473

C02094

C02094

C02094

C02094

C02094

C02094

C02094

C02094

C02094

C02094

Fat digestion and absorption

SCARB1

C02477

AWAT2

C02075

APOA1

C02530

SCARB1

C00378

LRAT

C00473

LRAT

C00473

LRAT

C00473

LRAT

C00473

LRAT

C00473

LRAT

C00473

LRAT

C00473

APOB

C00422

APOA4

C02075

APOA1

C02530

APOB

C00422

APOA4

C02075

APOA1

C02530

APOB

C00422

APOA4

C02075

APOA1

C02530

APOB

C00422

APOA4

C02075

APOA1

C02530

APOB

C00422

Bile secretion

Retinol metabolism



Vitamin digestion  
and absorption  
MPI=136

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00016 C000647

C00003 C00010 C000647 GIF

BTD C0025534 GIF

C00378 C05776

C00255 C00378 C00378 C19A2

Riboflavin metabolism

C00120 C00864 C00120... SLC5A6

Pantothenate and  
CoA biosynthesis

C00153 C00504 C00138 SLC23A1

Nicotinate and  
nicotinamide metabolism

C02075 C05413 C022059 C00828 C05377

C00162 C02094 C02477 C02112... C00473... PNLIP PLB1

C00681 C02477

C01558 C00187 C00473 SCARB1

Bile secretion Retinol metabolism

CUBN GIF

CUBN CUBN C05776 GIF

CUBN CUBN C05776

C05776 Endocytosis Lysosome

MMACHC

C05776

C05776 MBRD1 C05776

TCN2

TCN2

C00018 C00378 C00255 C00120 C00864 C00072 C00153 C00504

C00072 C00153 C00504

C00072 C00153 C00504

C00072 C00153 C00504

C00072 C00153 C00504

C00072 C00153 C00504

C00072 C00153 C00504

C00072 C00153 C00504

C00072 C00153 C00504

C00072 C00153 C00504

C00072 C00153 C00504

C00072 C00153 C00504

C00072 C00153 C00504

C00072 C00153 C00504

Fat digestion  
and absorption

SCARB1 C02477

C00378 C00473

C00473

AWAT2 LRAT

C02075 APOA1

C02075 APOA4

C02075 APOA4

APOB

C00422 APOA4

C02075 APOA4

C02530

APOA1

APOB

C00422

C02075 APOA4

C02530

APOA1

APOB

C00422

C02075 APOA4

C02530

APOA1

APOB

C00422

C02075 APOA4

C02530

APOA1

APOB

C00422

C02075 APOA4

C02530

APOA1

APOB

C00422

C02075 APOA4

C02530

APOA1

TCN2

C05776

C00018 C00378 C00255 C00120 C00864 C00072 C00153 C00504

C00072 C00153 C00504

C00072 C00153 C00504

C00072 C00153 C00504

C00072 C00153 C00504

C00072 C00153 C00504

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C00072 C00153 C00504

C00072 C00153 C00504

C00072 C00153 C00504

C00072 C00153 C00504



Vitamin digestion  
and absorption  
MPI-141

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

C00003 C00010 C000647 GIF

C00003 C00010 BTD C0025534 GIF

C00378 C005776 C00378 C19A2

C00255 C00255 C52A3

C00120 C00864 Riboflavin metabolism

C00120... SLC5A6

C00138 SLC23A1

C00072 SLC46A1

C00153 Nicotinate and  
nicotinamide metabolism

C00504 C00080 SLC19A1

C02075 C05413 C022059

C00162 C02094 C00828 C05377

C02112... C00473... PNLIP PLB1 C02477

C00681 C02477

C01558 C00187 C00473

C02094 SCARB1

C00378 C00473 RBP2

C00473

Retinol metabolism

Bile secretion

CUBN GIF

CUBN GIF C05776

CUBN GIF CUBN

C05776 Endocytosis Lysosome

C05776

C00120... SLC5A6

C00072 SLC46A1

C00504 SLC19A1

C02477

SCARB1

C00378 C00473 RBP2

C00473

AWAT2

LRAT

C02075 APOA1

C00422 APOA4

C02075 APOA4

C02530

APOB

C00422

C02075 APOA4

C02530

APOB

MMACHC

C05776

C05776 MBRD1

C05776

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

APOB

C00422

C02075 APOA4

C02530

APOA1

APOB

C00422

C02075 APOA4

C02530

APOA1

C05776

C05776

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

APOB

C00422

C02075 APOA4

C02530

APOA1

APOB

C00422

C02075 APOA4

C02530

APOA1

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

APOB

C00422

C02075 APOA4

C02530

APOA1

APOB

C00422

C02075 APOA4

C02530

APOA1

Vitamin digestion  
and absorption  
MPI-142

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

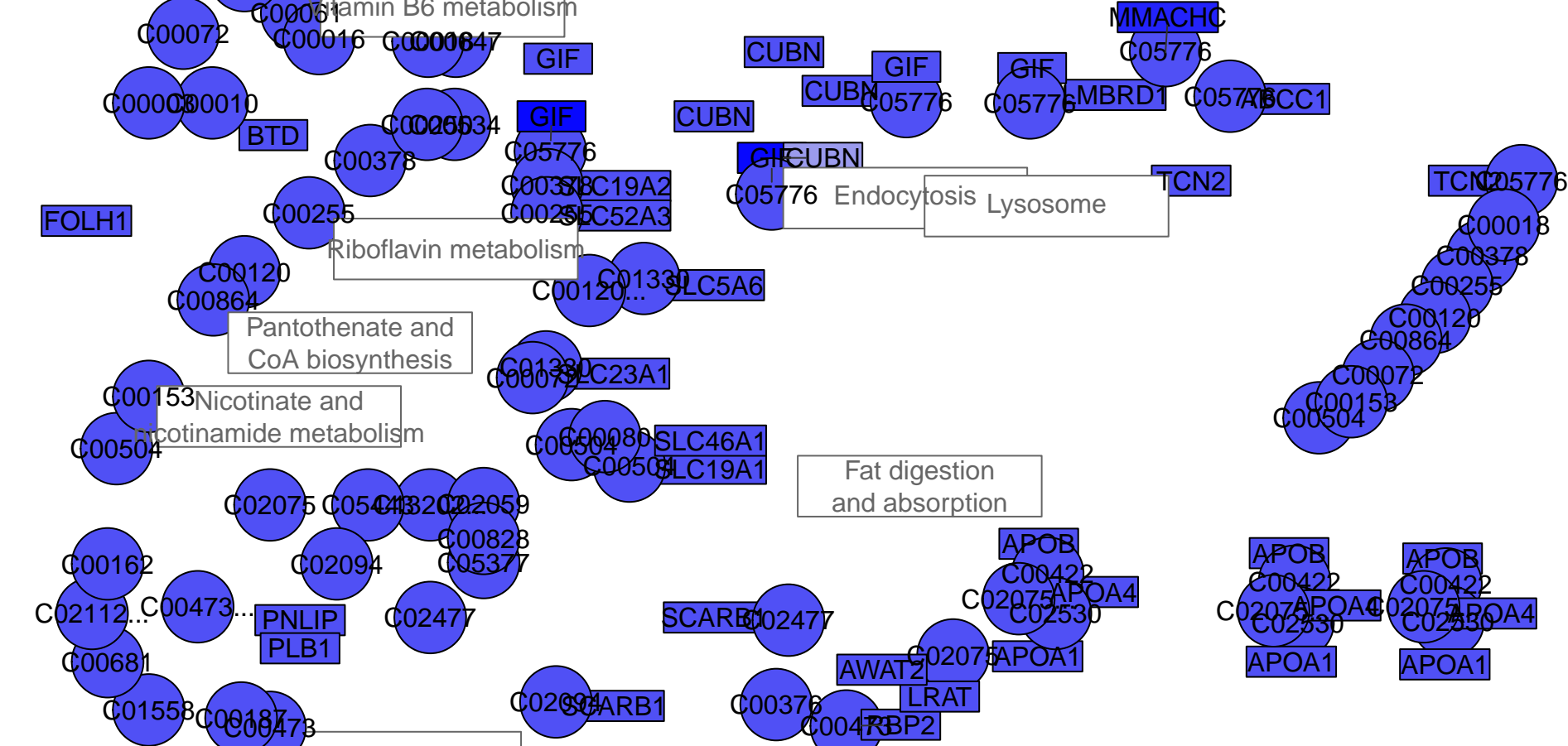
Bile secretion

Retinol metabolism

Endocytosis

Lysosome

Fat digestion and absorption



Vitamin digestion  
and absorption  
MPI-145

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C00072 C00010  
C00008 C00016 C000647  
BTD  
C00378 C00255  
C00120 C00864  
C00153 C00504  
C00162 C02112...  
C00681 C01558 C00187  
C00473

Riboflavin metabolism

Pantothenate and  
CoA biosynthesis

Nicotinate and  
nicotinamide metabolism

Bile secretion

Retinol metabolism

C05776  
C05552 C00068  
C00061  
C00016 C000647  
GIF  
C0025534  
C00378 C05776  
C00378 C19A2  
C00255 C52A3  
C00120... SLC5A6  
C01380 SLC23A1  
C00079  
C00080 SLC46A1  
C00504 SLC19A1

CUBN  
GIF  
CUBN  
C05776  
C05776  
MBRD1 C05776  
TCN2  
C05776  
Endocytosis  
Lysosome

Fat digestion  
and absorption

SCARB1  
C02477  
C00378  
C00473  
AWAT2  
LRAT  
C02075  
APOA1  
APOB  
C00422  
APOA4  
C02075  
C02530

APOB  
C00422  
APOA4  
C02075  
APOA1  
APOB  
C00422  
APOA4  
C02075  
APOA1

TCN2  
C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504



Vitamin digestion  
and absorption  
MPI-149

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

C00003 C00010 C000534 C00378 C00255 C00120 C00864

BTD

GIF

CUBN

CUBN

GIF

GIF

MMACHC

C05776

MBRD1

C05776

BCC1

FOLH1

Riboflavin metabolism

C00378 C19A2 C00255 C52A3

CUBN

C05776

Endocytosis Lysosome

TCN2

TCN2

Pantothenate and  
CoA biosynthesis

C00120... SLC5A6

Nicotinate and  
nicotinamide metabolism

C00138 SLC23A1

C00080 SLC46A1 C00504 SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059

C00162 C02094 C00828 C05377

C02112... C00473... PNLIP PLB1 C02477

SCARB1

C02477

APOB

C00422 APOA4

C02075 APOA1

APOB

C00422 APOA4

C02075 APOA1

APOB

C00422 APOA4

C02075 APOA1

Bile secretion

Retinol metabolism

C01558 C00187 C00473

C02094 SCARB1

C00378

AWAT2

C00473 RBP2

LRAT

APOA1

APOA1

C05776 C00018 C00378 C00255 C00120 C00864 C00072 C00153 C00504









Vitamin digestion  
and absorption  
MPI-152

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C00072 C00016 C000647  
C00003 C00010  
C00008 C00010

BTD

GIF

CUBN

GIF

GIF

MMACHC

C05776

MBRD1

C05776

BCC1

GIF

CUBN

CUBN

GIF

TCN2

C05776

Endocytosis

Lysosome

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

Riboflavin metabolism

C00120

C00864

C00120...

SLC5A6

Pantothenate and  
CoA biosynthesis

C00138

C00072

SLC23A1

Nicotinate and  
nicotinamide metabolism

C00504

C00080

C00504

SLC46A1

SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059

C00162

C02094

C00828

C05377

C02112...

C00473

C02477

PNLIP

PLB1

SCARB1

C02477

APOB

C00422

APOA4

C02075

APOA1

APOB

C00422

APOA4

C02075

APOA1

APOB

C00422

APOA4

C02075

APOA1

Bile secretion

Retinol metabolism

C01558

C00187

C00473

C02094

SCARB1

C00378

AWAT2

C02075

LRAT

C00473

RBP2



Vitamin digestion  
and absorption  
MPI-154

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C00072 C00010  
C00008 C00016 C000647  
BTD  
C00255  
C00120  
C00864  
FOLH1

Pantothenate and  
CoA biosynthesis

Nicotinate and  
nicotinamide metabolism

C00162 C02112... C00473...  
C00681 C01558 C00187 C00473  
PNLIP  
PLB1  
C02094 C02477  
C02094  
C00828 C05377  
C02075 C05413 C022059

Bile secretion

Retinol metabolism

Riboflavin metabolism

C00120... SLC5A6  
C01330  
C01380 SLC23A1  
C00079  
C00080 SLC46A1  
C00504 SLC19A1

Fat digestion  
and absorption

SCARB1  
C00376  
C00473  
AWAT2  
LRAT  
C02075  
APOA1  
APOB  
C00422  
APOA4  
C02075  
C02530

APOB  
C00422  
APOA4  
C02075  
APOA1  
APOB  
C00422  
APOA4  
C02075  
APOA1

TCN2  
C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504

Endocytosis  
Lysosome

CUBN  
GIF  
C05776  
C05776  
MBRD1  
C05776  
TCN2

MMACHC

C05776  
C05776  
BCC1

Vitamin digestion  
and absorption  
MPI-155

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

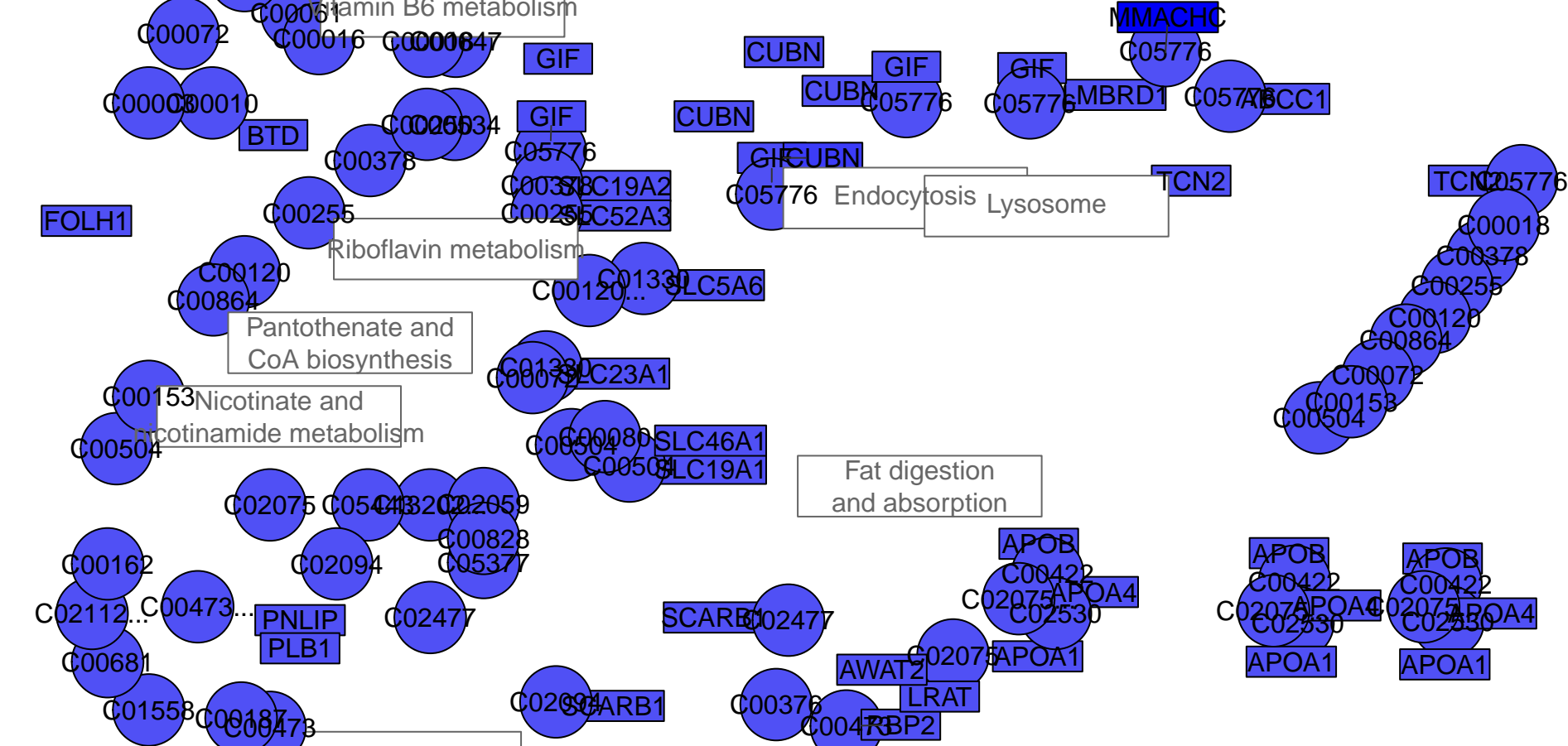
Bile secretion

Retinol metabolism

Endocytosis

Lysosome

Fat digestion and absorption













Vitamin digestion  
and absorption  
MPI-166

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C00072 C00010  
C00008 C00016  
C00061 C00064  
C00068 C00067  
BTG  
BTD  
GIF  
GIF  
GIF  
C00378  
C00255  
C00120  
C00864  
FOLH1

CUBN  
GIF  
CUBN  
GIF  
C05776  
CUBN  
GIF  
C05776  
MBRD1  
C05776  
BCC1  
TCN2  
TCN2  
C05776  
Endocytosis  
Lysosome

Riboflavin metabolism

Pantothenate and  
CoA biosynthesis

Nicotinate and  
nicotinamide metabolism

SLC5A6  
SLC23A1  
SLC46A1  
SLC19A1

Fat digestion  
and absorption

C00153  
C00504  
C00162  
C02112...  
C00473...  
C00681  
C01558  
C00187  
C00473  
C02075  
C05413  
C02094  
C02477  
PNLIP  
PLB1  
C02094  
C00828  
C05377  
C02477  
SCARB1

SCARB1  
SCARB1  
C00378  
C00473  
AWAT2  
LRAT  
C02075  
APOB  
C00422  
APOA4  
C02075  
C02530  
APOA1  
APOA1

APOB  
C00422  
APOA4  
C02075  
C02530  
APOA1  
APOA1

TCN2  
C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504

Bile secretion  
Retinol metabolism

Vitamin digestion  
and absorption  
MPI-167

Tight junction

Folate biosynthesis

Biotin metabolism  
Thiamine metabolism  
Vitamin B6 metabolism

MMACHC

C00072  
C00003  
C00010

BTD

GIF

CUBN

GIF

GIF

C05776

MBRD1

C05776

FOLH1

C00255

C00378

C002534

GIF

C05776

C00378

C002534

CUBN

GIF

C05776

CUBN

C05776

Endocytosis

Lysosome

TCN2

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

Pantothenate and  
CoA biosynthesis

Nicotinate and  
nicotinamide metabolism

C00153

C00504

C01380

C00072

SLC23A1

C00080

C00504

SLC46A1

SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059

C00162

C02094

C00828

C05377

C02112...

C00473

C02477

C00681

C01558

C00187

C00473

Bile secretion

Retinol metabolism

PNLIP

PLB1

C02094

SCARB1

SCARB1

C02477

C00378

C00473

LRAT

AWAT2

C02075

APOA1

APOB

C00422

APOA4

C02075

C02530

APOB

C00422

APOA4

C02075

C02530

APOB

C00422

APOA4

C02075

C02530





Vitamin digestion  
and absorption  
MPI-173

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C05552 C00068 C00072 C00061 C00016 C000647

C05776

C00008 C00010 C000534 C00378 C00255 C00120 C00864

BTD

GIF

CUBN

CUBN

GIF

GIF

MMACHC

C05776

MBRD1

C05776

BCC1

FOLH1

Riboflavin metabolism

C00378 C19A2 C00255 C52A3

GIF CUBN

C05776

Endocytosis Lysosome

TCN2

TCN2

Pantothenate and  
CoA biosynthesis

C00120... SLC5A6

Nicotinate and  
nicotinamide metabolism

C00153 C00504

C00138 SLC23A1

C00080 SLC46A1 C00504 SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059

C00162

C02094

C00828 C05377

C02112... C00473

PNLIP PLB1

C02477

SCARB1 C02477

APOB C00422

C02075 APOA4 C02530

APOB C00422

C02075 APOA4 C02530

APOB C00422

C02075 APOA4 C02530

C00681

C01558 C00187

C00473

Retinol metabolism

C02094 SCARB1

C00378

AWAT2 LRAT

C00473 RBP2

APOA1

APOA1

Bile secretion

C05776 C00018 C00378 C00255 C00120 C00864 C00072 C00153 C00504

Vitamin digestion  
and absorption  
MPI-174

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

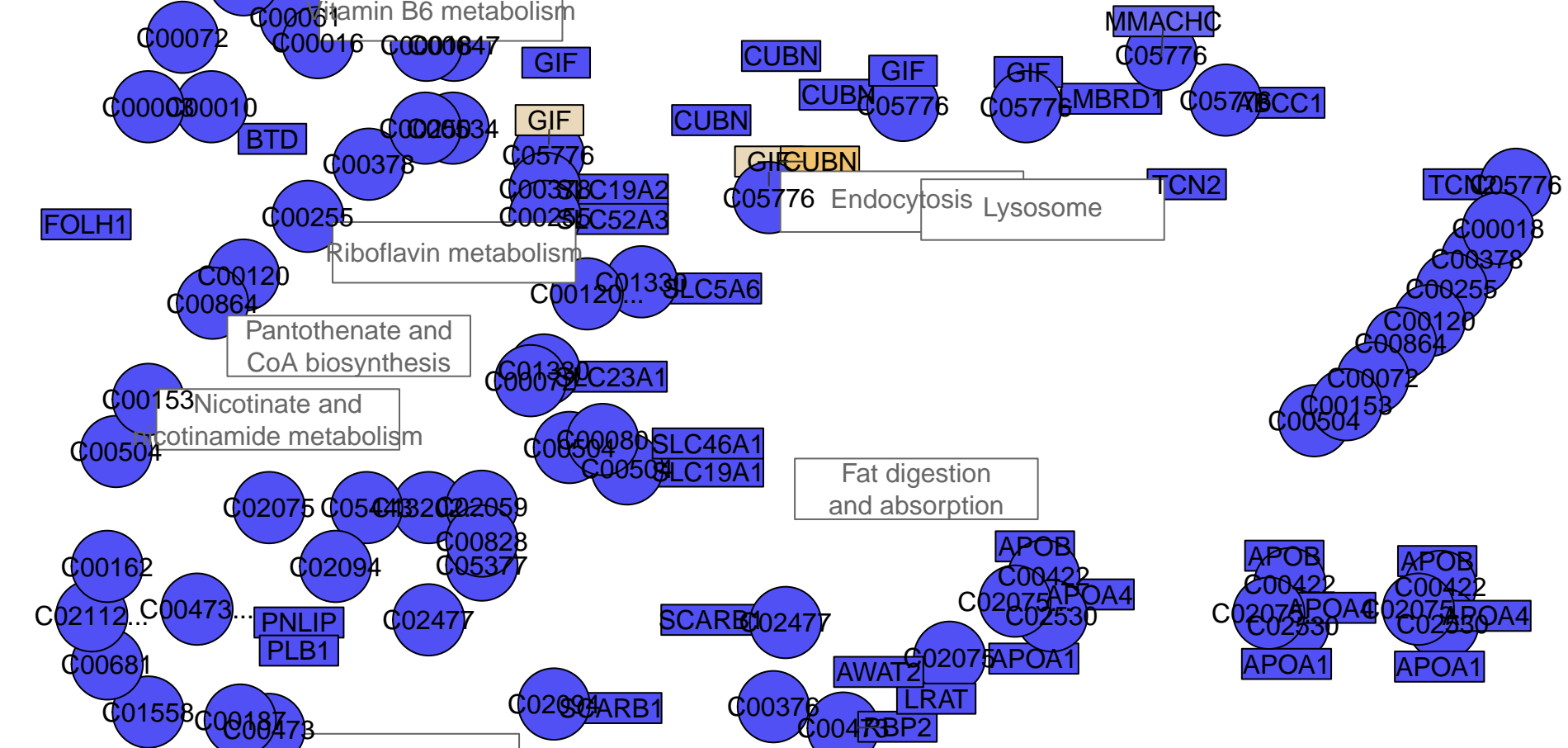
Bile secretion

Retinol metabolism

Endocytosis

Lysosome

Fat digestion and absorption





Vitamin digestion  
and absorption  
MPI-176

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

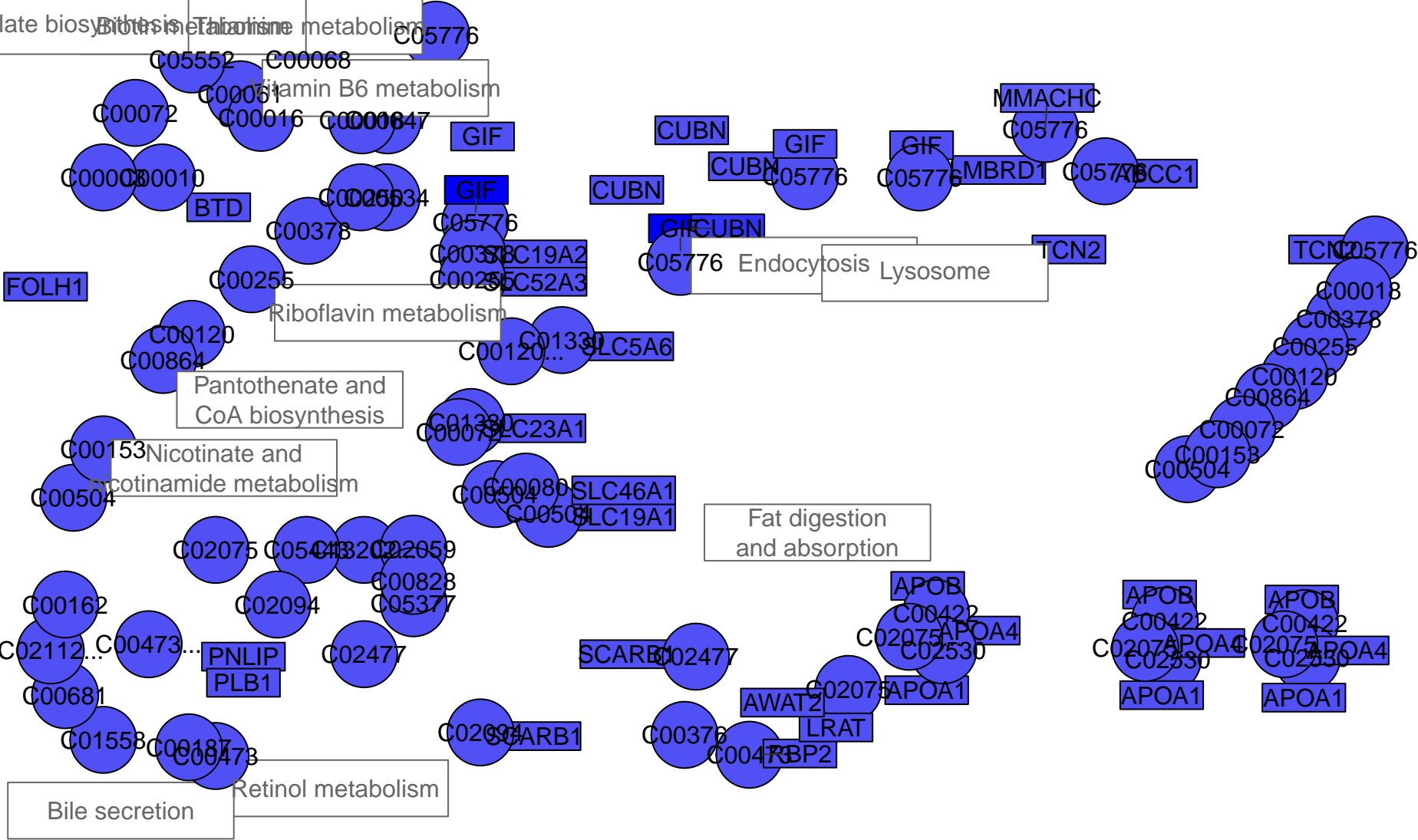
Nicotinate and nicotinamide metabolism

Bile secretion

Retinol metabolism

Fat digestion  
and absorption

Endocytosis  
Lysosome





Vitamin digestion  
and absorption  
MPI-177

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

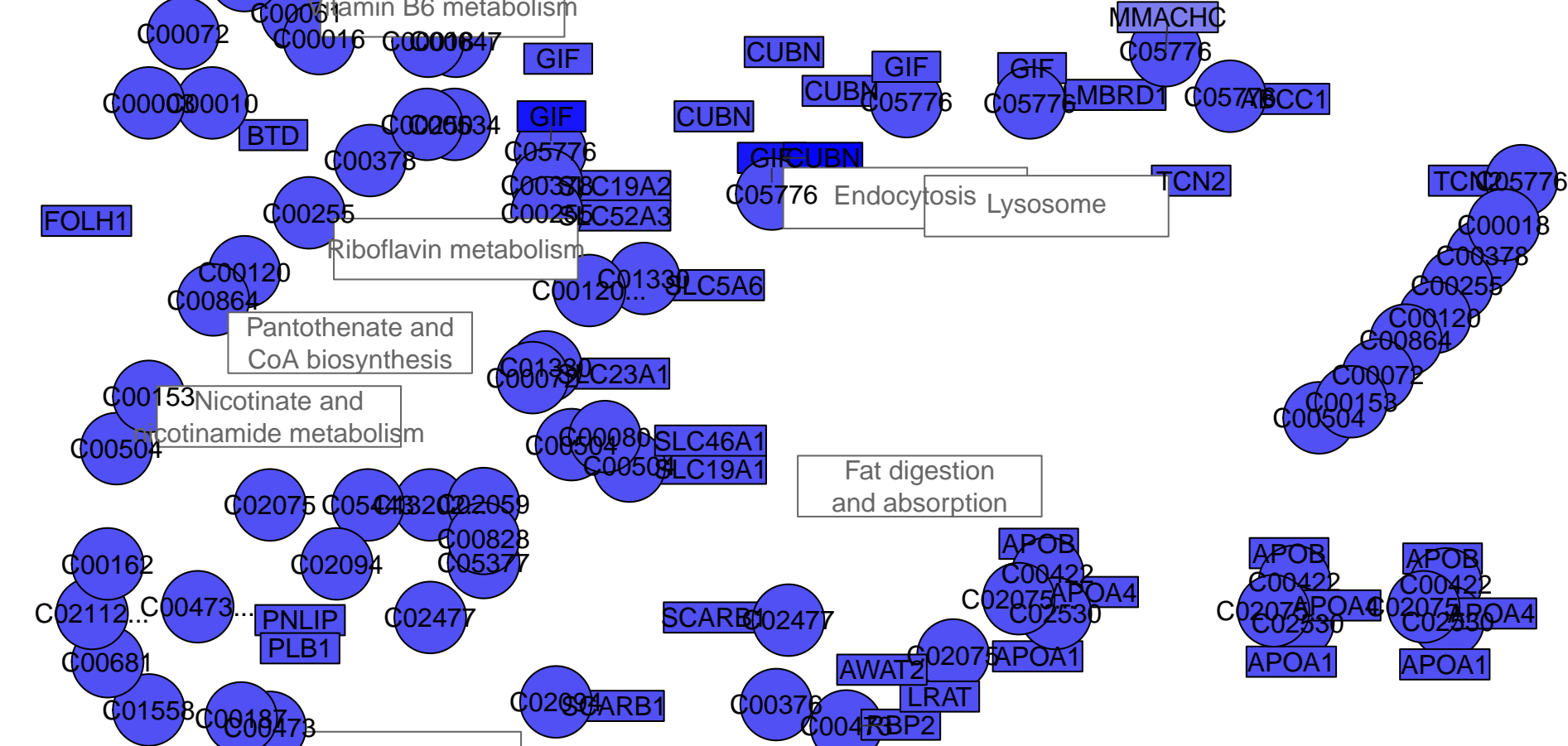
Bile secretion

Retinol metabolism

Endocytosis

Lysosome

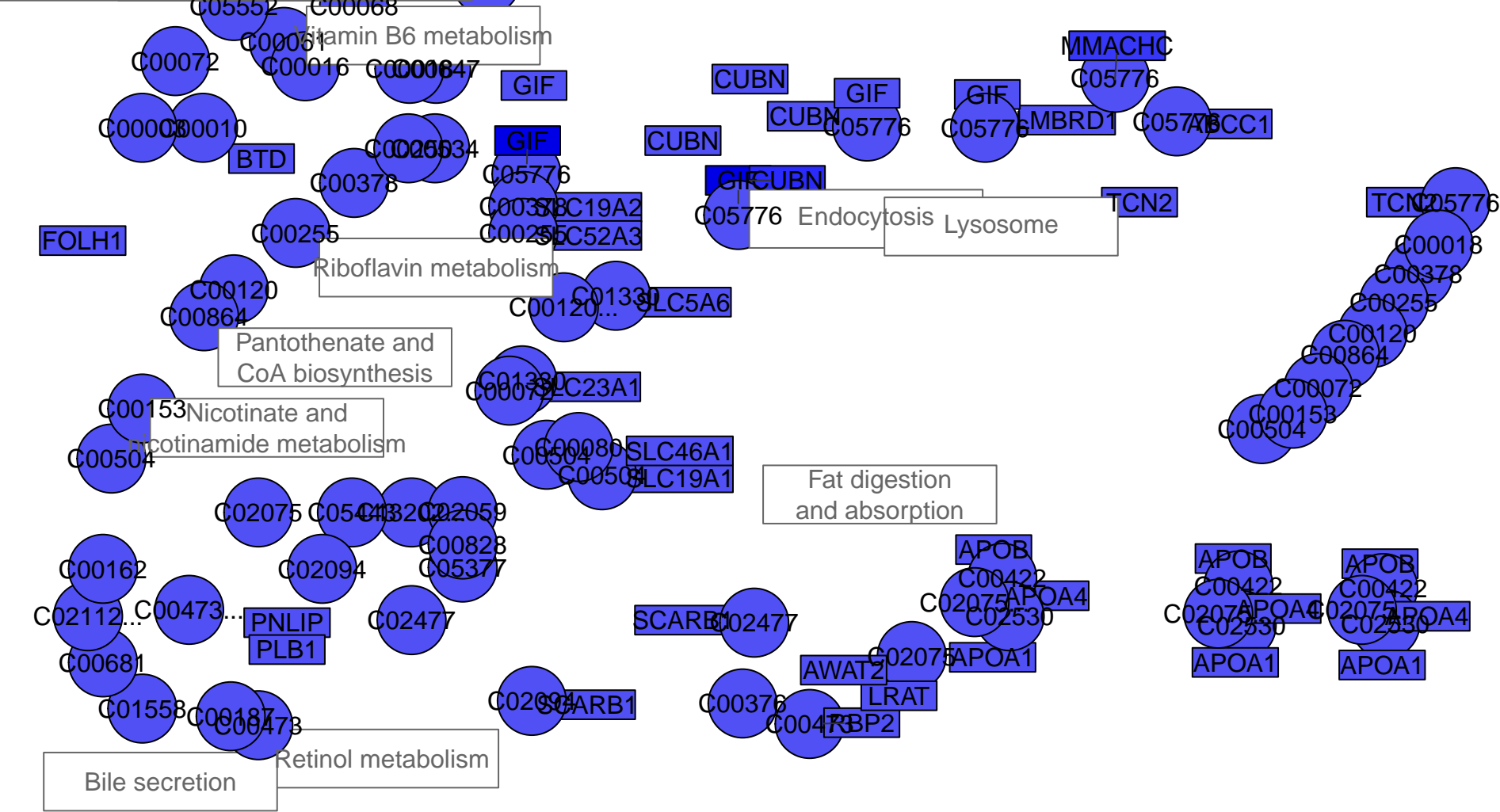
Fat digestion and absorption



Vitamin digestion  
and absorption  
MPI-178

Tight junction

Folate biosynthesis  
Biotin metabolism  
Thiamine metabolism



Vitamin digestion  
and absorption  
MPI-179

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00016 C000647

C00008 C00010

BTD

C00378

C00255

Riboflavin metabolism

C00120 C00864

Pantothenate and  
CoA biosynthesis

Nicotinate and  
nicotinamide metabolism

C00504

C02075 C05413 C022059

C00162 C02094 C00828 C05377

C02112... C00473... PNLIP PLB1 C02477

C00681 C01558 C00187 C00473

Bile secretion

Retinol metabolism

C05776

GIF

GIF

C00378

C00378

C00255

C01330

C00120...

C01380

C00079

C00080

C00504

C00828

C05377

C02477

C02094

SCARB1

CUBN

CUBN

GIF

C05776

C05776

SLC5A6

SLC23A1

SLC46A1

SLC19A1

SCARB1

SCARB1

SCARB1

SCARB1

SCARB1

SCARB1

SCARB1

SCARB1

SCARB1

SCARB1

SCARB1

SCARB1

SCARB1

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CUBN

GIF

C05776

C05776

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GIF

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MMACHC

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MBRD1

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TCN2

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C05776

Endocytosis

Lysosome

Fat digestion  
and absorption

C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504

APOB  
C00422  
APOA4  
C02075  
C02530  
APOA1

APOB  
C00422  
APOA4  
C02075  
C02530  
APOA1

APOB  
C00422  
APOA4  
C02075  
C02530  
APOA1

Vitamin digestion  
and absorption  
MPI-180

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and  
CoA biosynthesis

Nicotinate and  
nicotinamide metabolism

Retinol metabolism

Bile secretion

CUBN

GIF

MMACHC

C05776

MBRD1

C05776

BCC1

CUBN

GIF

C05776

TCN2

TCN2

Endocytosis

Lysosome

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00158

C00504

FOLH1

BTD

GIF

CUBN

C05776

C00255

C00378

C00378

C00255

C00255

C00120...

C00120...

C00138

C00072

C00120

C00864

C00153

C00504

C00162

C02112...

C00681

C01558

C00473

C00187

C00473

C02094

C02477

C02094

C00473

C00473

C00473

C00473

C00473

C00473

C00473

C05552

C00068

C00061

C00016

C000647

C0025534

C00378

C00255

C00120

C00864

C00153

C00504

C00162

C02112...

C00681

C01558

C00473

C00187

C00473

C02094

C02477

C02094

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C00473

C00473

C00473

C05776

C05552

C00068

C00061

C00016

C000647

C0025534

C00378

C00255

C00120

C00864

C00153

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C00162

C02112...

C00681

C01558

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C00473

C05776

C05552

C00068

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C00016

C000647

C0025534

C00378

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C00864

C00153

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C02112...

C00681

C01558

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C02094

C02477

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C00473

C00473

CUBN

C05776

CUBN

C05776

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C05776

C05776

C05776

MMACHC

C05776

MBRD1

C05776

BCC1

C05776

C05776

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C05776



Vitamin digestion  
and absorption  
MPI-183

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00016 C000647

C00003 C00010 GIF

C000534 GIF

C00378 C05776

C00255 C00378 C19A2

Riboflavin metabolism

C00120 C00864 C01330

Pantothenate and  
CoA biosynthesis

Nicotinate and  
nicotinamide metabolism

C00153 C00504

C02075 C05413 C022059

C00162 C02094 C00828

C02112... C00473... PNLIP PLB1 C02477

C00681 C01558 C00187 C00473

C02094 SCARB1

C00473

Retinol metabolism

Bile secretion

C05776

C00068

C00061

C00016

C000647

C000534

C05776

C00378

C00255

C00120...

C01330

C00072

C00080

C00504

C02075

C00162

C02094

C00828

C05377

C02477

C00473

C00473

C00473

C00473

C00473

C00473

CUBN

CUBN

CUBN

CUBN

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

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GIF

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GIF

GIF

GIF

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GIF

GIF

GIF

GIF

GIF

GIF

MMACHC

C05776

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TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

APOB

C00422

APOA4

C02075

APOA1

C02530

APOA1

C02075

APOA4

C02530

Fat digestion  
and absorption

SCARB1

C02477

AWAT2

C02075

LRAT

C00473

C00473

C00473

C00473

Endocytosis

Lysosome

TCN2

C05776

C05776

C05776

C05776

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C05776

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APOB

C00422

APOA4

C02075

APOA1

C02530

APOA1

C02075

APOA4

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C00422

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APOA1

C02530

APOA1

C02075

APOA4

C02530



Vitamin digestion  
and absorption  
MPI-184

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

Bile secretion

Retinol metabolism

Endocytosis

Lysosome

Fat digestion and absorption

C00072

C00008

C00010

C00003

FOLH1

C00120

C00864

C00153

C00504

C00162

C02112...

C00681

C01558

C00187

C00473

C00473

C05552

C00068

C00061

C00016

C000647

BTD

C00378

C00255

C00120

C00864

C00153

C00504

C00162

C02112...

C00681

C01558

C00187

C00473

C00473

C00068

C00061

C00016

C000647

C0025534

C00378

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C00120

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C02112...

C00681

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Vitamin digestion  
and absorption  
MPI-185

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C00072 C00010  
C00008 C00016  
C00061 C00064  
C00068 C00067

BTD

GIF

CUBN

GIF

GIF

MMACHC

C05776

MBRD1

C05776

BCC1

GIF

CUBN

CUBN

GIF

CUBN

TCN2

C05776

Endocytosis  
Lysosome

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00158

C00504

Riboflavin metabolism

C00120

C00864

C00120...

SLC5A6

Pantothenate and  
CoA biosynthesis

C00138

C00072

SLC23A1

Nicotinate and  
nicotinamide metabolism

C00504

C00080

C00504

SLC46A1

SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059

C00162

C02094

C00828

C05377

C02112...

C00473

PNLIP

PLB1

C02477

SCARB1

C02477

APOB

C00422

APOA4

C02075

APOA1

APOB

C00422

APOA4

C02075

APOA1

APOB

C00422

APOA4

C02075

APOA1

Bile secretion

Retinol metabolism

C01558

C00187

C00473

C02094

SCARB1

C00378

AWAT2

LRAT

C00473

RBP2

Vitamin digestion  
and absorption  
MPI-186

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C00072 C00010  
C00008 C00016 C000647  
BTD C00255 C00378 C005634

C05776  
GIF

C00378 C05776  
C00378 C19A2  
C00255 C52A3

FOLH1

Riboflavin metabolism

C00120  
C00864

C00120... SLC5A6

Pantothenate and  
CoA biosynthesis

C00138  
C00079 SLC23A1

Nicotinate and  
nicotinamide metabolism

C00153  
C00504

C00080 SLC46A1  
C00504 SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059  
C00828 C05377

C00162  
C02112... C00473...  
C00681

PNLIP  
PLB1

C02094  
C02477

SCARB1 C02477

APOB  
C00422  
C02075 APOA4  
C02530

APOB  
C00422  
C02075 APOA4  
C02530  
APOA1

APOB  
C00422  
C02075 APOA4  
C02530  
APOA1

Bile secretion

Retinol metabolism

C01558 C00187  
C00473

C02094  
SCARB1

C00378  
C00473  
AWAT2 LRAT  
RBP2

C002477  
C00378

C02075 APOA1

MMACHC

C05776

CUBN  
CUBN  
GIF  
C05776  
CUBN  
GIF  
C05776

GIF  
C05776  
MBRD1 C05776  
BCC1

C05776 Endocytosis  
Lysosome

TCN2

TCN2

C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504

Vitamin digestion  
and absorption  
MPI-188

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

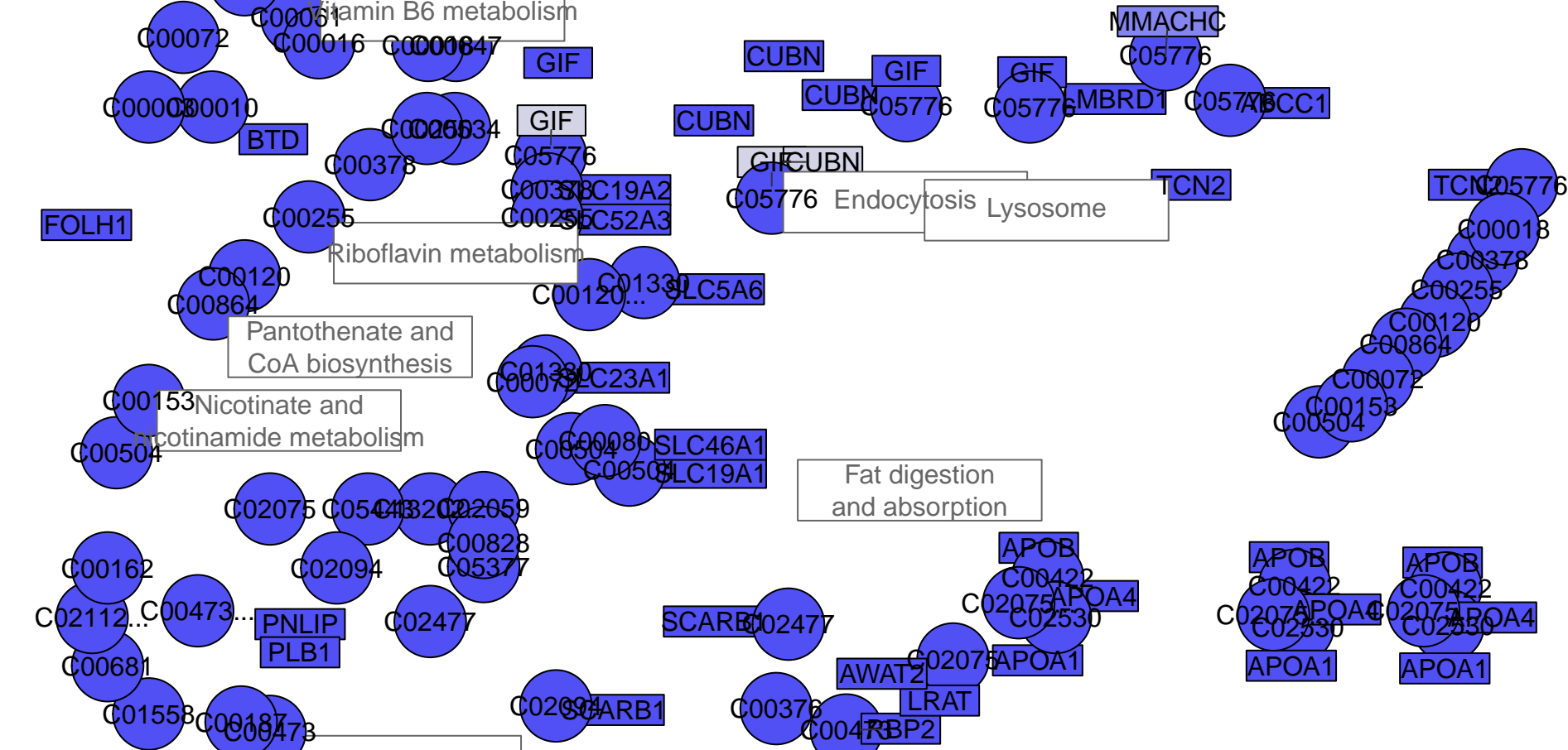
Retinol metabolism

Bile secretion

Endocytosis

Lysosome

Fat digestion and absorption



Vitamin digestion  
and absorption  
MPI-189

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C00072 C00016 C000647  
C00003 C00010 C000647  
C00003 C00010

BTD

GIF

CUBN

CUBN

GIF

GIF

MMACHC

C05776

MBRD1

C05776

BCC1

C00378 C00255

C00255

C00378 C19A2

C00255 C52A3

GIF CUBN

C05776

Endocytosis Lysosome

TCN2

TCN2

FOLH1

Riboflavin metabolism

C00120 C00864

C00120... SLC5A6

Pantothenate and  
CoA biosynthesis

C00138 SLC23A1

Nicotinate and  
nicotinamide metabolism

C00153 C00504

C00080 SLC46A1  
C00504 SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059

C00162 C02094 C00828 C05377

C02112... C00473...  
C00681

PNLIP  
PLB1

C02477

SCARB1 C02477

APOB C00422  
C02075 APOA4  
C02530

APOB C00422  
C02075 APOA4  
C02530

APOB C00422  
C02075 APOA4  
C02530

C01558 C00187 C00473  
Retinol metabolism

C02094 SCARB1

C00378 C00473  
AWAT2 LRAT  
RBP2

Bile secretion

APOA1

APOA1

C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504

Vitamin digestion  
and absorption  
MPI-190

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C00072 C00016 C000647  
C00003 C00010  
BTD

GIF

CUBN

GIF

GIF

MMACHC

C05776

MBRD1

C05776

BCC1

C00255

C00378

C0025534

GIF

CUBN

CUBN

C05776

C05776

CUBN

C05776

TCN2

Endocytosis Lysosome

TCN2

FOLH1

Riboflavin metabolism

C00120

C00864

C00120...

SLC5A6

TCN2

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

Pantothenate and  
CoA biosynthesis

C00138

C00072

SLC23A1

Nicotinate and  
nicotinamide metabolism

C00153

C00504

C00080

C00504

SLC46A1

SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059

C00162

C02094

C00828

C05377

SCARB1

C02477

APOB

C00422

APOA4

C02075

C02530

APOB

C00422

APOA4

C02075

C02530

APOB

C00422

APOA4

C02075

C02530

C02112...

C00473

PNLIP

PLB1

C02477

AWAT2

C02075

APOA1

APOA1

APOA1

C00681

C01558

C00187

C00473

C02094

C00378

C00473

LRAT

C02075

C02075

C02075

Bile secretion

Retinol metabolism

Vitamin digestion  
and absorption  
MPI-191

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

C00003 C00010 GIF

BTD C0025534 GIF

C00378 C05776

C00255 C00378 C19A2

Riboflavin metabolism

C00120 C00864

Pantothenate and  
CoA biosynthesis

C01380 SLC23A1

Nicotinate and  
nicotinamide metabolism

C00504 C00080 SLC46A1 C0508 SLC19A1

C02075 C05413 C022059

C00162 C02094 C00828 C05377

C02112... C00473... PNLIP PLB1

C02477

SCARB1 C02477

C00681 C01558 C00187 C00473

C02094 SCARB1

C00378 C00473 RBP2

AWAT2 C02075 APOA1

APOB C00422 APOA4

C02075 APOA4 C02530

APOA1

APOA1

Bile secretion

Retinol metabolism

Fat digestion  
and absorption

Endocytosis Lysosome

MMACHC

C05776

GIF

C05776

MBRD1

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TCN2

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C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

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TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

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TCN2

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C00018

C00378

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C00864

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C00153

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Vitamin digestion  
and absorption  
MPI-192

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

Bile secretion

Retinol metabolism

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Endocytosis

Lysosome

Fat digestion  
and absorption

MMACHC

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Vitamin digestion  
and absorption  
MPI-195

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

Fat digestion and absorption

Bile secretion

Retinol metabolism

Endocytosis

Lysosome

Fat digestion and absorption

Fat digestion and absorption

Fat digestion and absorption

Fat digestion and absorption

Fat digestion and absorption

Fat digestion and absorption

Fat digestion and absorption

Fat digestion and absorption

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Fat digestion and absorption

Fat digestion and absorption

Fat digestion and absorption

Fat digestion and absorption

C00072

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FOLH1

C00120

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C02112...

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C00016

C000647

GIF

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MMACHC

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MBRD1

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C05776

C05776

BCC1

C05776

C05776

C05776

C05776

C05776

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TCN2

C05776

C05776

Vitamin digestion  
and absorption  
MPI-196

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

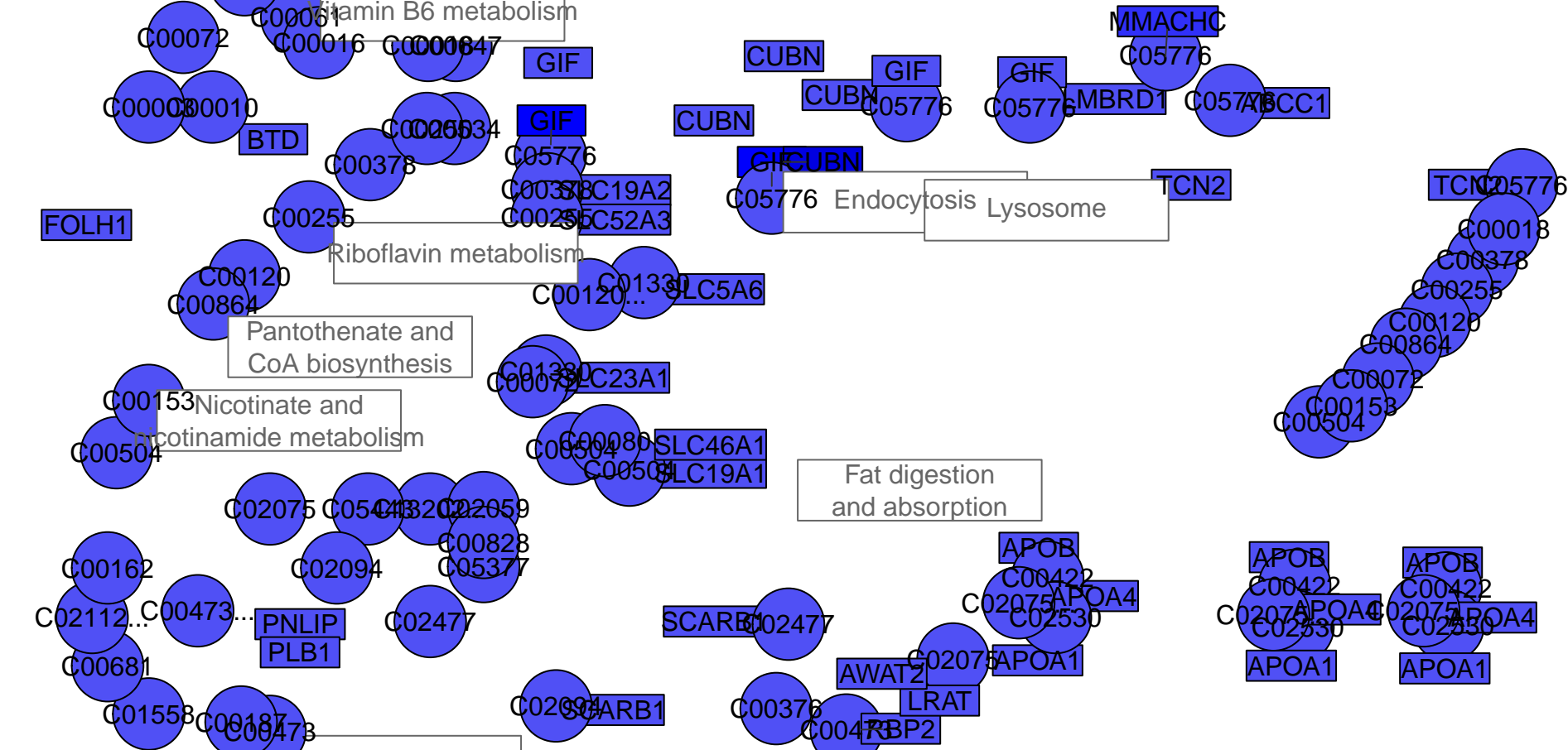
Retinol metabolism

Bile secretion

Endocytosis

Lysosome

Fat digestion and absorption



Vitamin digestion  
and absorption  
MPI-198

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

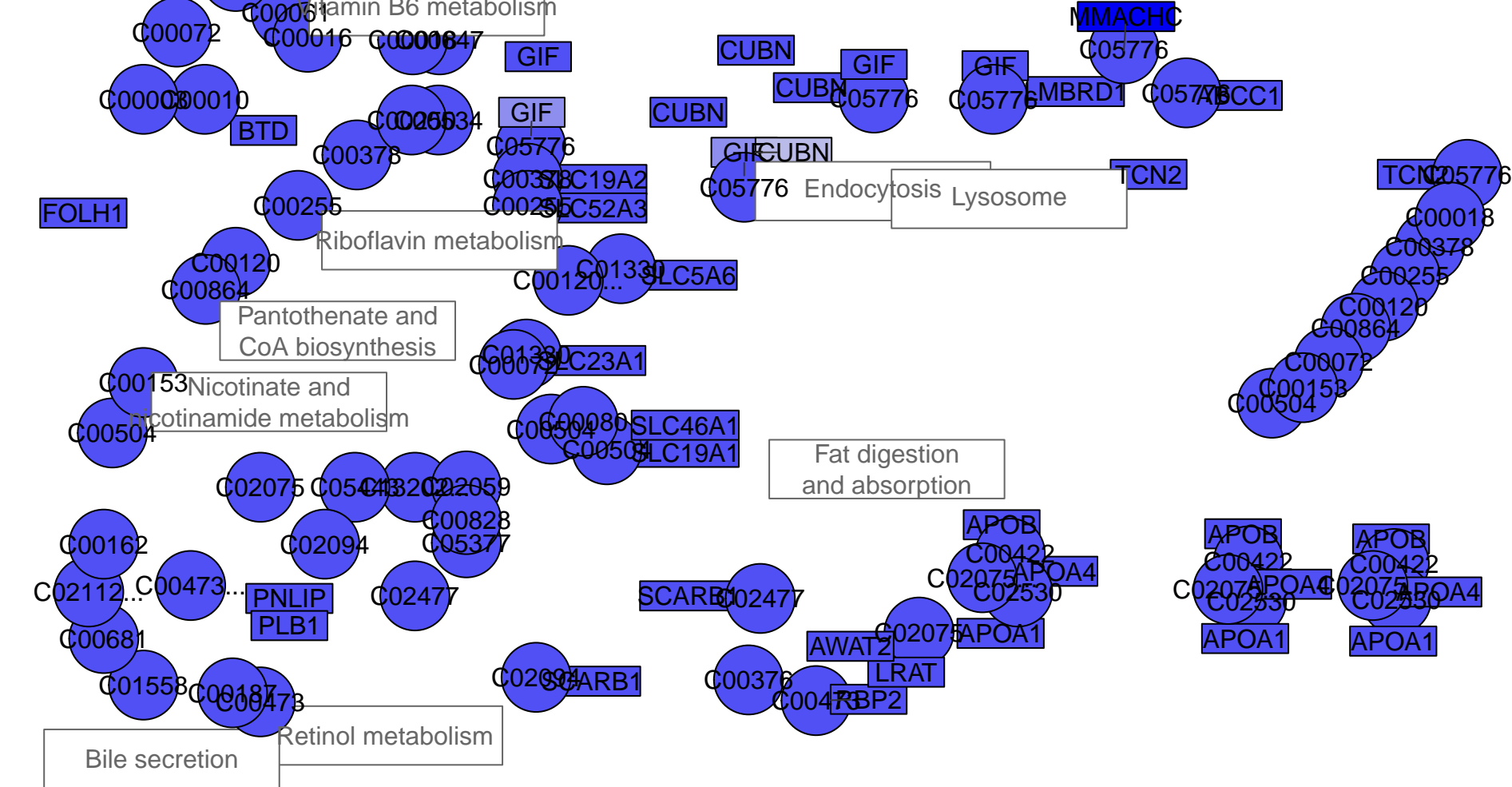
Bile secretion

Retinol metabolism

Endocytosis

Lysosome

Fat digestion and absorption



Vitamin digestion  
and absorption  
MPI-199

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

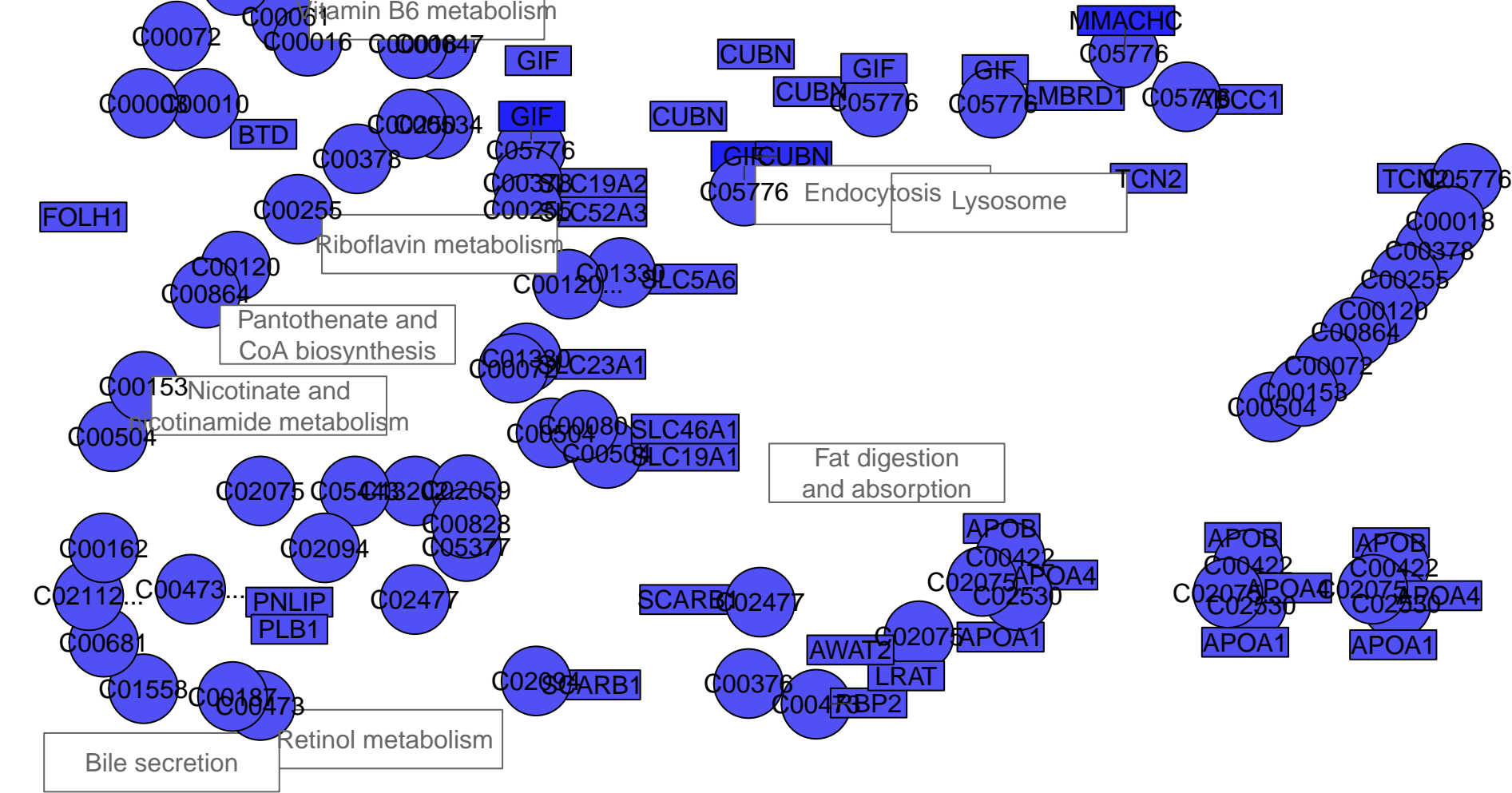
Retinol metabolism

Bile secretion

Endocytosis

Lysosome

Fat digestion and absorption



Vitamin digestion  
and absorption  
MPI-200

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C00072 C00016 C000647  
C00003 C00010  
BTD

CUBN GIF  
CUBN GIF  
C05776 MBRD1 C05776  
CUBN GIF CUBN

MMACHC  
C05776  
C05776 BCC1

FOLH1

C00378 C00255  
C00378 C19A2  
C00255 C52A3

C05776 Endocytosis Lysosome  
TCN2

Riboflavin metabolism  
C00120 C00864  
C00120... SLC5A6

TCN2 C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504

Pantothenate and  
CoA biosynthesis

C00138 SLC23A1  
C00072

Nicotinate and  
nicotinamide metabolism  
C00153 C00504

C00080 SLC46A1  
C00504 SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059  
C00828 C05377

APOB  
C00422  
C02075 APOA4  
C02530

C00162 C00473  
C02112... C00681

C02094 C02477  
PNLIP  
PLB1

SCARB1 C02477

APOB  
C00422  
C02075 APOA4  
C02530  
APOA1 APOA1

Bile secretion

Retinol metabolism

C01558 C00187  
C00473

C02094 SCARB1

C00378 C00473  
AWAT2 LRAT  
C02075 APOA1



Vitamin digestion  
and absorption  
MPI-201

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

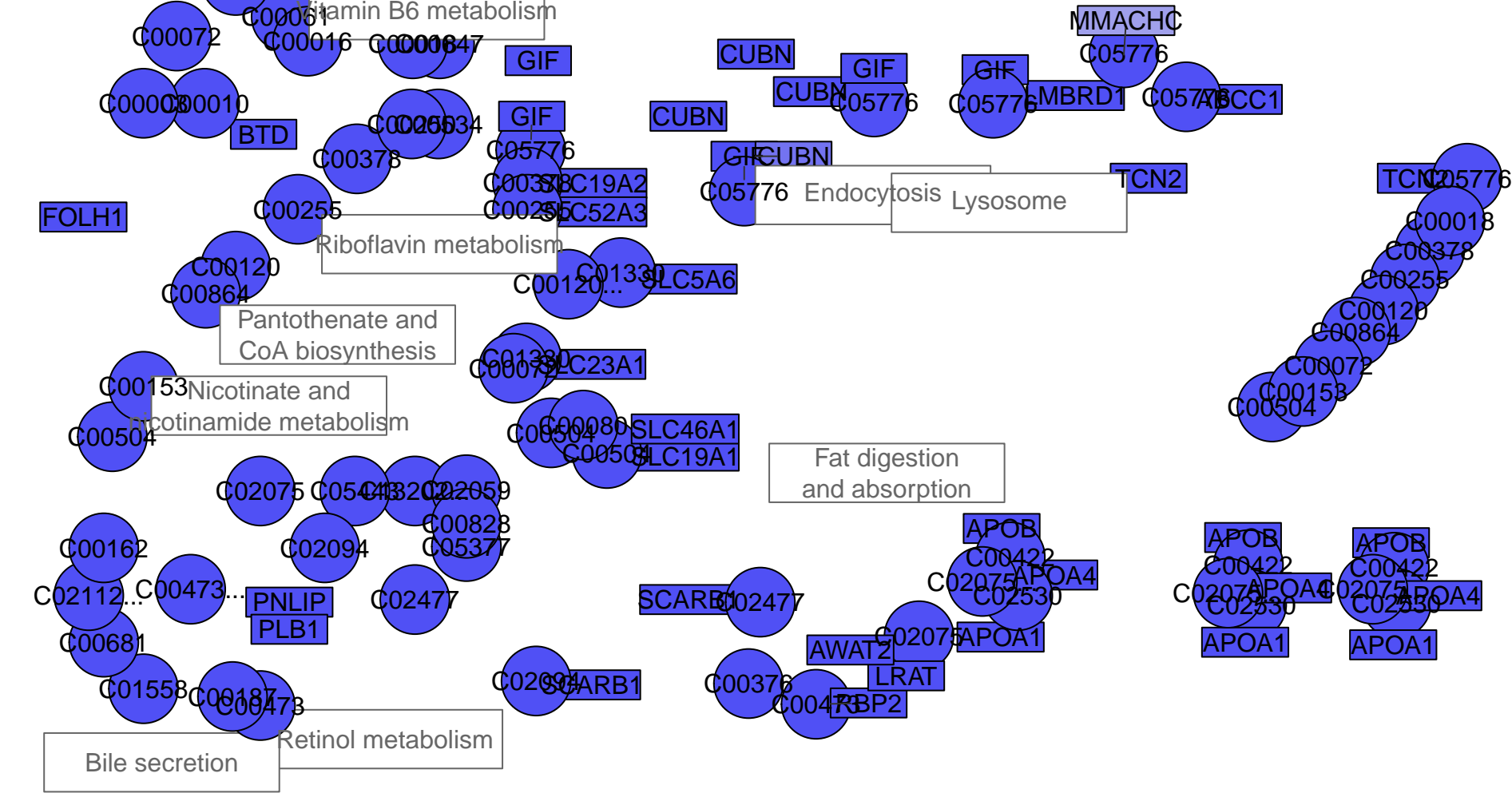
Retinol metabolism

Bile secretion

Endocytosis

Lysosome

Fat digestion and absorption



Vitamin digestion  
and absorption  
MPI-202

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C00072 C00010  
C00008 C00016  
C00061 C000647  
C00068 C000647  
GIF

CUBN GIF  
CUBN GIF  
C05776 C05776  
CUBN MBRD1 C05776  
CUBN GIF  
C05776

MMACHC  
C05776  
C05776  
BCC1

FOLH1

BTD

C00255

GIF

CUBN

GIF CUBN

C05776 Endocytosis Lysosome

TCN2

TCN2

Riboflavin metabolism

C00120  
C00864

C00120... SLC5A6

Pantothenate and  
CoA biosynthesis

C00138  
C00079 SLC23A1

C00153  
C00504 Nicotinate and  
nicotinamide metabolism

C00080 SLC46A1  
C00504 SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059

C00162 C02094 C00828  
C02112... C00473... C05377

PNLIP  
PLB1

C02477

SCARB1 C02477

APOB  
C00422  
C02075 APOA4  
C02530

APOB  
C00422  
C02075 APOA4  
C02530

APOB  
C00422  
C02075 APOA4  
C02530

C00681 C01558 C00187  
C00473

Bile secretion

Retinol metabolism

C02094 SCARB1

C00376 C00473  
AWAT2 LRAT  
C02075 APOA1  
C02530

APOA1

APOA1

C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504

Vitamin digestion  
and absorption  
MPI-203

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and  
CoA biosynthesis

Nicotinate and  
nicotinamide metabolism

Retinol metabolism

Bile secretion

Endocytosis

Lysosome

Fat digestion  
and absorption

C05776

C05552 C00068

C00072 C00061

C00008 C00016 C000647

C00003 C00010

C00255 C00378

C00120 C00864

C00153 C00504

C00162 C00473

C02112 C00681

C00158 C00187

C02075 C05413 C022059

C02094 C00828 C05377

C02112 C00473

C00681 C01558 C00473

C02094 C00473

C02094 C00473

C02094 C00473

C02094 C00473

C02094 C00473

C02094 C00473

C02094 C00473

C02094 C00473

C02094 C00473

C02094 C00473

C02094 C00473

C05776

C00068

C00016 C000647

GIF

GIF

C00255 C00378

C00120 C00864

C00153 C00504

C00162 C00473

C02112 C00681

C00158 C00187

C02075 C05413 C022059

C02094 C00828 C05377

C02112 C00473

C00681 C01558 C00473

C02094 C00473

C02094 C00473

C02094 C00473

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C02094 C00473

CUBN

CUBN

GIF

CUBN

CUBN

SLC5A6

SLC23A1

SLC46A1

SLC19A1

SCARB1

SCARB1

SCARB1

SCARB1

SCARB1

SCARB1

SCARB1

SCARB1

SCARB1

SCARB1

GIF

CUBN

GIF

CUBN

CUBN

SLC5A6

SLC23A1

SLC46A1

SLC19A1

SCARB1

SCARB1

SCARB1

SCARB1

SCARB1

SCARB1

SCARB1

SCARB1

SCARB1

SCARB1

MMACHC

C05776

GIF

C05776

MBRD1

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APOA1

APOA1

FOLH1

BTD

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FOLH1

BTD

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CUBN

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Vitamin digestion  
and absorption  
MPI-204

Tight junction

Folate biosynthesis  
Biotin metabolism  
Taurine metabolism

C05776  
C05552 C00068  
C00072 C00061  
C00016 C000647  
Vitamin B6 metabolism

C00008 C00010  
BTD  
C00255  
C00378  
C00255  
C00378  
GIF  
GIF  
GIF  
C05776  
C00378  
C00378  
C00255  
C00255  
C00120  
C00864

FOLH1

Pantothenate and  
CoA biosynthesis

C00153  
C00504  
Nicotinate and  
nicotinamide metabolism

C02075 C05413 C022059  
C00828  
C05377  
C02094  
C02477

C00162  
C02112...  
C00473...  
C00681  
C01558  
C00187  
C00473

PNLIP  
PLB1

C01380  
C00079  
C00080  
C00504  
C00504  
SLC23A1  
SLC46A1  
SLC19A1

C02094  
SCARB1

Bile secretion

Retinol metabolism

CUBN  
GIF  
CUBN  
GIF  
CUBN  
GIF  
C05776  
C05776  
C05776  
MBRD1  
C05776  
BCC1  
TCN2  
TCN2  
C05776  
Endocytosis  
Lysosome

Fat digestion  
and absorption

SCARB1  
C02477  
C00378  
C00473  
AWAT2  
LRAT  
RBP2  
APOB  
C00422  
C02075  
APOA4  
C02530  
APOA1  
C02075  
APOA4  
C02530  
APOA1

APOB  
C00422  
C02075  
APOA4  
C02530  
APOA1  
APOB  
C00422  
C02075  
APOA4  
C02530  
APOA1

TCN2  
C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504

Vitamin digestion  
and absorption  
MPI-205

Tight junction

Folate biosynthesis

Biotin metabolism  
Thiamine metabolism  
Vitamin B6 metabolism

MMACHC

C05552 C00068 C00072 C00061 C00016 C000647 C00003 C00010 C00008 C00010 BTD C00378 C00255 C00120 C00864 C00153 C00504 C00162 C02112... C00681 C01558 C00187 C00473

CUBN GIF CUBN GIF CUBN GIF MBRD1 C05776 BCC1 CUBN GIF CUBN C05776 Endocytosis Lysosome TCN2

Riboflavin metabolism

Pantothenate and  
CoA biosynthesis

Nicotinate and  
nicotinamide metabolism

Fat digestion  
and absorption

PNLIP  
PLB1

SCARB1

AWAT2

LRAT

APOA1

APOA1

Bile secretion

Retinol metabolism

C02075 C05413 C022059 C00828 C05377 C02094 C02477

SLC23A1 SLC46A1 SLC19A1

APOB C00422 APOA4 C02075 C02530

APOB C00422 APOA4 C02075 C02530

APOB C00422 APOA4 C02075 C02530

TCN2 C05776 C00018 C00378 C00255 C00120 C00864 C00072 C00153 C00504

Vitamin digestion  
and absorption  
MPI-206

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C00072  
C00010  
C00003  
C00016  
C00061  
C00068  
C00064  
GIF  
BTD  
C00255  
C00378  
C00552  
C00068  
C00064  
GIF  
C00255  
C00378  
C00552  
C00068  
C00064  
GIF

CUBN  
GIF  
CUBN  
GIF  
CUBN  
GIF  
C05776  
C05776  
C05776  
MBRD1  
C05776  
BCC1  
TCN2  
Endocytosis  
Lysosome

MMACHC

Riboflavin metabolism

C00120  
C00864  
C00138  
C00138  
C00120...  
SLC5A6  
C00138  
C00138  
C00138  
SLC23A1

Pantothenate and  
CoA biosynthesis

C00153  
C00504  
C00072  
C00080  
C00504  
C00504  
SLC46A1  
SLC19A1

Nicotinate and  
nicotinamide metabolism

Fat digestion  
and absorption

C02075  
C05413  
C022059  
C00828  
C05377  
C00162  
C02094  
C02477  
C02112...  
C00473...  
PNLIP  
PLB1  
C00681  
C01558  
C00187  
C00473  
C02094  
SCARB1  
C00378  
C00473  
SCARB1  
C02477  
C00473  
C00473  
C00473

Bile secretion

Retinol metabolism

SCARB1  
C02477  
C00378  
C00473  
C00473  
AWAT2  
LRAT  
C02075  
APOA1  
APOB  
C00422  
APOA4  
C02075  
APOA4  
C02530

APOB  
C00422  
APOA4  
C02075  
APOA4  
C02530  
APOA1  
APOB  
C00422  
APOA4  
C02075  
APOA4  
C02530  
APOA1

TCN2  
C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504





Vitamin digestion  
and absorption  
MPI-208

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C00072 C00016 C000647  
C00008 C00010  
BTD

CUBN GIF GIF GIF  
CUBN CUBN C05776 C05776 MBRD1 C05776 BCC1

FOLH1

C00255 C00378 C0025634  
C00120 C00864  
Riboflavin metabolism

C05776 Endocytosis Lysosome  
TCN2

Pantothenate and  
CoA biosynthesis

C001380 SLC23A1  
C00079

TCN2 C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504

Nicotinate and  
nicotinamide metabolism

C00080 SLC46A1  
C00504 SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059  
C00828 C05377  
C02094 C02477

SCARB1 SCARB1  
C002477  
AWAT2 LRAT  
C02075 APOA1  
C00473 BFP2

APOB C00422  
C02075 APOA4 C02530  
APOA1 APOA1

C00162 C00473  
C02112... C00681  
C01558 C00187  
C00473  
PNLIP PLB1

Bile secretion

Retinol metabolism

SCARB1

LRAT

APOA1

APOA1



Vitamin digestion  
and absorption  
MPI-210

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

Bile secretion

Retinol metabolism

CUBN

CUBN

CUBN

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CUBN

Endocytosis

Lysosome

Fat digestion  
and absorption

MMACHC

C05776

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Vitamin digestion  
and absorption  
MPI-212

Tight junction

Folate biosynthesis  
Biotin metabolism  
Taurine metabolism

C05776  
C05552 C00068  
C00072 C00061  
C00016 C000647  
Vitamin B6 metabolism

C00008 C00010  
BTD  
C00255  
C00378  
C005634  
GIF  
GIF  
GIF  
C05776  
C00378 C19A2  
C00255 C52A3

FOLH1  
C00120  
C00864  
Riboflavin metabolism  
C00120...  
SLC5A6  
C00138  
C00079  
SLC23A1

C00153  
C00504  
Nicotinate and  
nicotinamide metabolism  
C02075 C05413 C022059  
C00828  
C05377

C00162  
C02112...  
C00473...  
C00681  
C01558  
C00187  
C00473  
PNLIP  
PLB1  
C02094  
C02477  
C02477

C02094  
SCARB1  
Retinol metabolism  
Bile secretion

CUBN  
GIF  
CUBN  
C05776  
CUBN  
GIF  
C05776  
MBRD1  
C05776  
BCC1  
TCN2  
TCN2  
C05776  
Endocytosis  
Lysosome

C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504

Fat digestion  
and absorption

SCARB1  
C02477  
C00378  
C00473  
AWAT2  
LRAT  
C02075  
APOA1  
APOB  
C00422  
C02075  
APOA4  
C02530

C02075  
APOA1  
APOB  
C00422  
C02075  
APOA4  
C02530  
APOA1  
APOB  
C00422  
C02075  
APOA4  
C02530  
APOA1

TCN2  
C05776  
C00018  
C00378  
C00255  
C00120  
C00864  
C00072  
C00153  
C00504

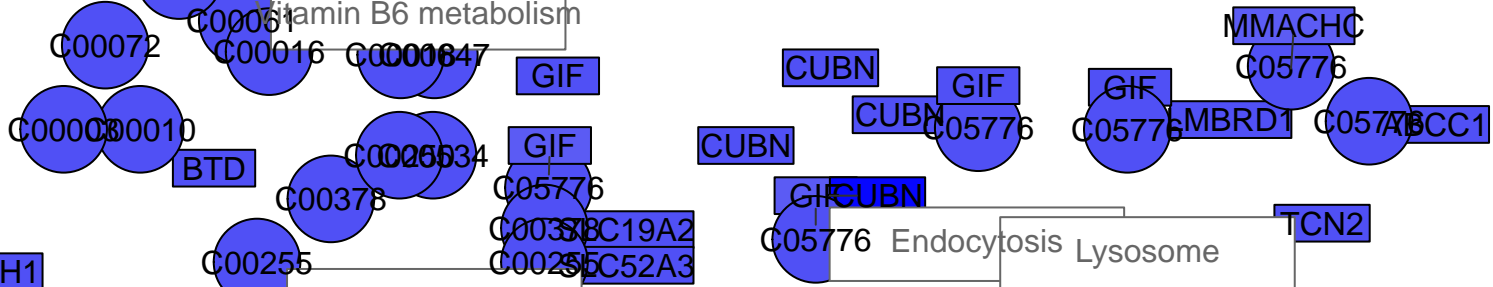
Vitamin digestion  
and absorption  
MPI-213

Tight junction

Folate biosynthesis

Biotin metabolism  
Thiamine metabolism  
Vitamin B6 metabolism

MMACHC



FOLH1

Riboflavin metabolism

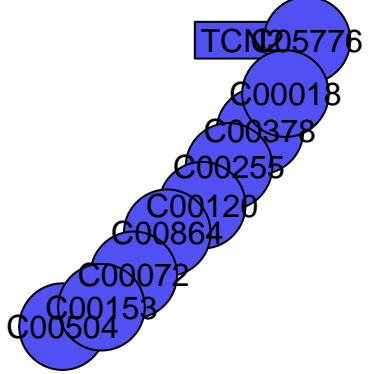
Endocytosis Lysosome

TCN2

Pantothenate and  
CoA biosynthesis

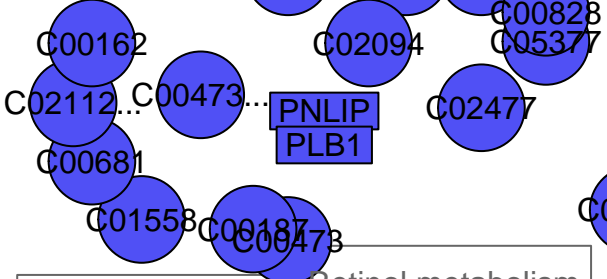
Nicotinate and  
nicotinamide metabolism

Fat digestion  
and absorption



C02075 C05413 C022059

SLC46A1  
SLC19A1



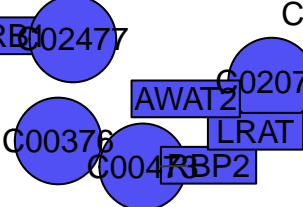
SCARB1

APOB  
APOA4

APOB  
APOA4  
APOA1

Bile secretion

Retinol metabolism



AWAT2

APOA1

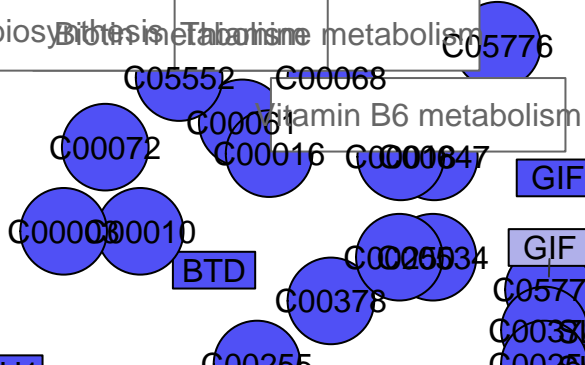
APOA1



Vitamin digestion  
and absorption  
MPI-215

Tight junction

Folate biosynthesis  
Biotin metabolism  
Taurine metabolism



Pantothenate and  
CoA biosynthesis

Nicotinate and  
nicotinamide metabolism

Riboflavin metabolism

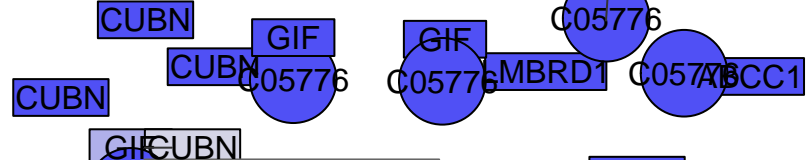
Fat digestion  
and absorption

Bile secretion

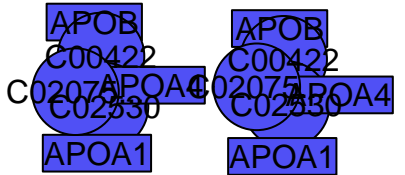
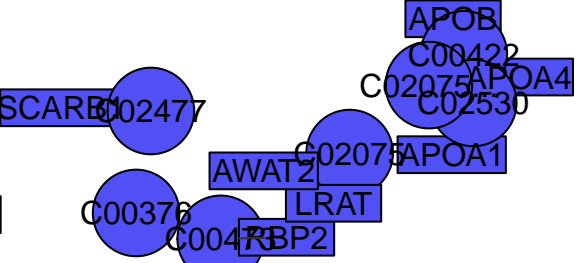
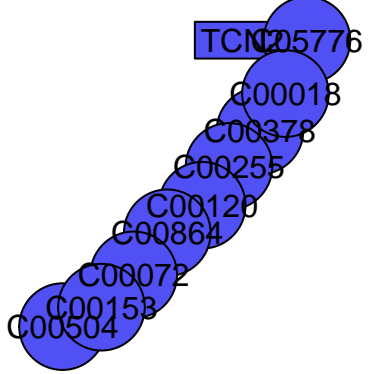
Retinol metabolism

Endocytosis  
Lysosome

MMACHC



TCN2



Vitamin digestion  
and absorption  
MPI-219

Tight junction

Folate biosynthesis

Biotin metabolism  
Thiamine metabolism  
Vitamin B6 metabolism

MMACHC

C00008 C00010

CUBN GIF CUBN GIF CUBN GIF MBRD1 C05776 BCC1

BTD

C00255 C00378 C005634 C00378 C00378 C00255 C00255 C52A3

C05776 Endocytosis Lysosome TCN2

FOLH1

Riboflavin metabolism  
C00120 C00864 C00120... SLC5A6

Pantothenate and  
CoA biosynthesis

C00138 SLC23A1 C00079

Nicotinate and  
nicotinamide metabolism  
C00153 C00504

C00080 SLC46A1 C00504 SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059 C00828 C05377

C00162 C02112... C00473... C00681 C01558 C00187 C00473

PNLIP PLB1

C02477

SCARB1 C02477

APOB C00422 C02075 APOA4 C02530

APOB C00422 C02075 APOA4 C02530

APOA1

APOA1

Bile secretion

Retinol metabolism

C02094 SCARB1

C00376 C00473 AWAT2 LRAT RBP2

APOA1

APOA1

APOA1

TCN2 C05776 C00018 C00378 C00255 C00120 C00864 C00072 C00153 C00504

Vitamin digestion  
and absorption  
MPI-221

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

C00003 C00010 GIF

BTD C0025534 GIF

C00378 C05776

C00255 C00378 C19A2

Riboflavin metabolism

C00120 C00864

Pantothenate and  
CoA biosynthesis

C01380 SLC23A1

Nicotinate and  
nicotinamide metabolism

C00504 C00080 SLC46A1

C02075 C05413 C022059 C00828 C05377

C00162 C02094 C02477

C02112... C00473... PNLIP PLB1

C00681 C02477

C01558 C00187 C00473

Bile secretion Retinol metabolism

CUBN GIF

CUBN C05776

CUBN GIF

C05776 CUBN

Endocytosis Lysosome

MMACHC

C05776

MBRD1 C05776

TCN2

TCN2

Fat digestion  
and absorption

APOB

C00422 APOA4

C02075 APOA1

AWAT2

LRAT

SCARB1

C00378 C00473

APOB

C00422 APOA4

C02075 APOA1

APOB

C00422 APOA4

C02075 APOA1

C05776 C00018 C00378 C00255 C00120 C00864 C00072 C00153 C00504



Vitamin digestion  
and absorption  
MPI-224

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

C05776

C05552 C00068

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

C00003 C00010

GIF

CUBN

GIF

MMACHC

C05776

GIF

C05776

MBRD1

C05776

C05776

BCC1

BTD

C0025534

GIF

CUBN

GIF

C05776

C05776

C05776

TCN2

C00255

C00378

C05776

C00378 C19A2

C00255 C52A3

C05776

Endocytosis

Lysosome

TCN2

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

C00072

C00153

C00504

C00072

C00153

C00504

Riboflavin metabolism

C00120

C00864

C00120...

SLC5A6

Pantothenate and  
CoA biosynthesis

C00138

C00072

C00138

C00072

C00072

C00072

C00072

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C00072

Nicotinate and  
nicotinamide metabolism

C00153

C00504

C00080

C00504

C00504

C00504

C00504

C00504

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C00504

C00504

Fat digestion  
and absorption

C02075 C05413 C022059

C00828

C05377

C02094

C02477

C02477

C02477

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C02477

C02477

C02477

C02477

SCARB1

C02477

C00378

C00473

C00473

C00473

C00473

C00473

C00473

C00473

C00473

APOB

C00422

C02075

APOA4

C02530

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOA1

APOB

C00422

C02075

APOA4

C02530

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOA1

APOB

C00422

C02075

APOA4

C02530

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOA1

Bile secretion

Retinol metabolism

C01558

C00187

C00473

C00473

C00473

C00473

C00473

C00473

C00473

C00473

C00473

C00473

C00473

C00473

C02094

SCARB1

C02094

SCARB1

C02094

SCARB1

C02094

SCARB1

C02477

C00378

C00473

C00473

C00473

C00473

C00473

C00473

C00473

AWAT2

C02075

LRAT

C02075

APOA1

C02075

APOA1

C02075

APOA1

APOB

C00422

C02075

APOA4

C02530

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOA1

APOB

C00422

C02075

APOA4

C02530

APOA1

C02075

APOA1

C02075

APOA1

C02075

APOA1

Vitamin digestion  
and absorption  
MPI-226

Tight junction

Folate biosynthesis  
Biotin metabolism  
Taurine metabolism

C05552 C00068 C05776

C00072 C00061 C00016 C000647

Vitamin B6 metabolism

C00008 C00010

BTD

C00255 C00378 C00256

GIF

CUBN

GIF

GIF

MMACHC

C05776

MBRD1

C05776

BCC1

CUBN

GIF

CUBN

C05776

C05776

Endocytosis

Lysosome

TCN2

TCN2

C05776

FOLH1

C00255

C00378 C00378 C00378

C00255 C00255 C00255

SLC19A2

C05776

C00378

C00255

C00255

C00255

C00120

C00864

C00072

C00158

C00504

Riboflavin metabolism

C00120

C00864

C00120...

SLC5A6

Pantothenate and  
CoA biosynthesis

C00138

C00072

SLC23A1

Nicotinate and  
nicotinamide metabolism

C00153

C00504

C00080

C00504

SLC46A1

SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059

C00162

C02112...

C00473

C02094

C00828

C05377

C02477

SCARB1

C02477

AWAT2

LRAT

C02075

APOA1

APOA1

APOA1

Bile secretion

Retinol metabolism

C00681

C01558

C00187

C00473

C02094

C00378

C00473

C02075

APOA4

C02530

C02075

APOA4

C02530

APOA4

C02530

APOA4











Vitamin digestion  
and absorption  
MPI-231

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

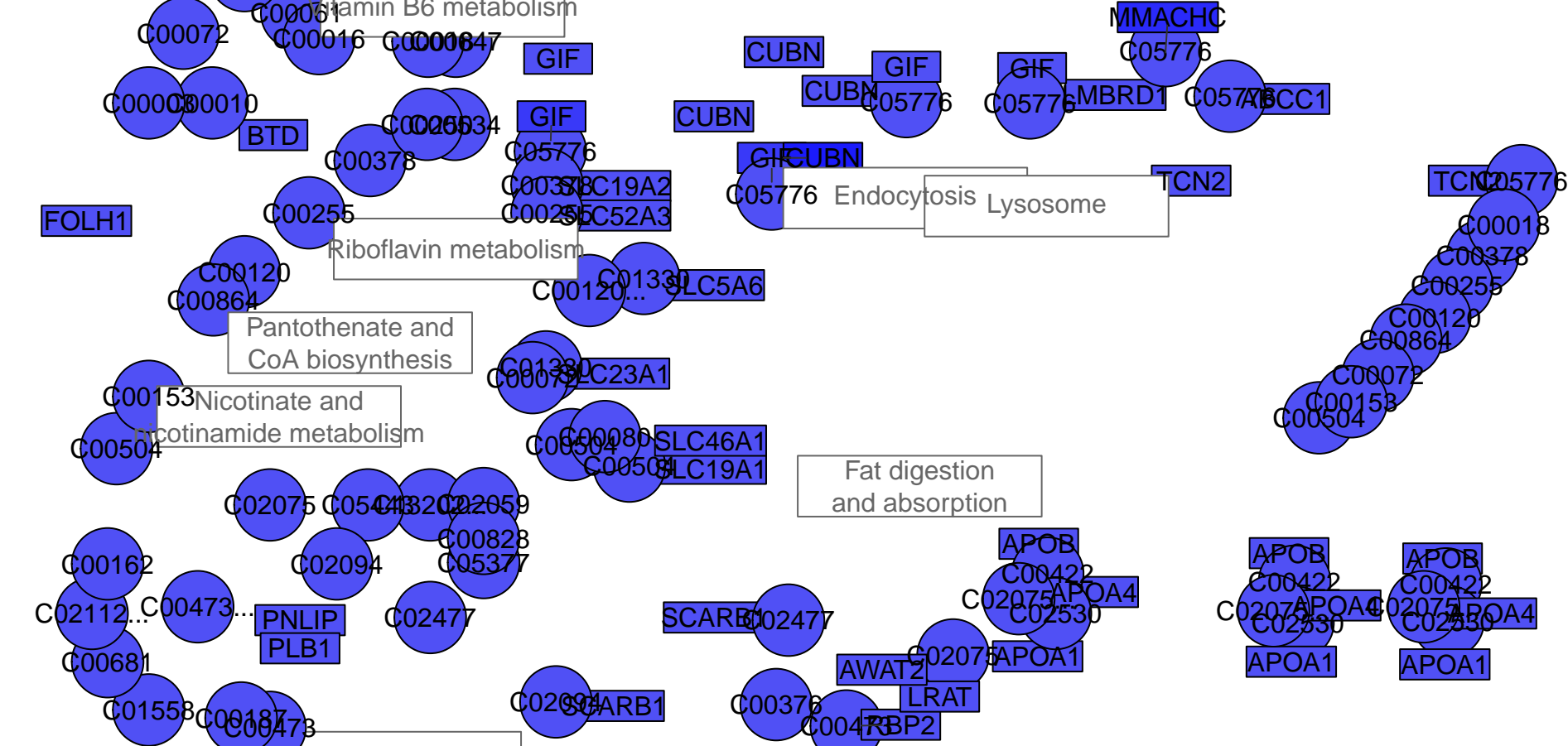
Bile secretion

Retinol metabolism

Endocytosis

Lysosome

Fat digestion and absorption







Vitamin digestion  
and absorption  
MPI-233

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

C00003 C00010 C000534 C00378 C00255

BTD GIF

FOLH1

C00120 C00864 C00255 C00120...

Pantothenate and  
CoA biosynthesis

C00153 Nicotinate and  
nicotinamide metabolism

C00504 C00138 C00079 C00080 C00504 C00504

C02075 C05413 C022059

C00162 C02094 C00828 C05377

C02112... C00473... PNLIP PLB1 C02477

C00681 C01558 C00187 C00473

Bile secretion

Retinol metabolism

C02094 SCARB1

CUBN

CUBN

GIF

C05776

Endocytosis Lysosome

SLC5A6

C00138 SLC23A1

C00080 SLC46A1

C00504 SLC19A1

Fat digestion  
and absorption

SCARB1

C00378

C00473

AWAT2

LRAT

RBP2

APOB

C00422 APOA4

C02075 APOA1

C02530

APOB

C00422 APOA4

C02075 APOA1

C02530

APOB

C00422 APOA4

C02075 APOA1

C02530

MMACHC

C05776

GIF

C05776

MBRD1

C05776

BCC1

C05776

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504



Vitamin digestion  
and absorption  
MPI-235

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

C00003 C00010 GIF

BTD C0025534 GIF

C00378 C05776

C00255 C00378 C19A2

C00120 C00864 Riboflavin metabolism

Pantothenate and  
CoA biosynthesis

Nicotinate and  
nicotinamide metabolism

C02075 C05413 C022059

C00162 C02094 C00828 C05377

C02112... C00473... PNLIP PLB1 C02477

C00681 C01558 C00187 C00473

Bile secretion

Retinol metabolism

C05776

C00068

C00061

C00016

C000647

GIF

GIF

C05776

C00378

C00255

C00120

C00864

C00153

C00504

C00162

C02094

C00828

C05377

C02112...

C00473...

C00681

C01558

C00187

C00473

C02094

C00473

C00473

C00473

C00473

C00473

C00473

C05776

C00068

C00061

C00016

C000647

GIF

GIF

C05776

C00378

C00255

C00120

C00864

C00153

C00504

C00162

C02094

C00828

C05377

C02112...

C00473...

C00681

C01558

C00187

C00473

C02094

C00473

C00473

C00473

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C00473

CUBN

CUBN

GIF

C05776

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CUBN

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GIF

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Endocytosis Lysosome

Fat digestion  
and absorption

APOB C00422 APOA4 C02075 C02530

APOA1 C02075 APOA1 C02530

AWAT2 C02075 LRAT C00473

SCARB1 C00378 C00473

SCARB1 C00378 C00473

SCARB1 C00378 C00473

SCARB1 C00378 C00473

APOB C00422 APOA4 C02075 C02530

APOA1 C02075 APOA1 C02530

APOB C00422 APOA4 C02075 C02530

APOA1 C02075 APOA1 C02530

APOB C00422 APOA4 C02075 C02530

APOA1 C02075 APOA1 C02530

APOB C00422 APOA4 C02075 C02530

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

APOB C00422

APOA4 C02075

APOA1 C02530

APOB C00422

APOA4 C02075

APOA1 C02530

APOB C00422

APOA4 C02075

APOA1 C02530

APOB C00422



Vitamin digestion and absorption  
MPI-237

Tight junction

Folate biosynthesis

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Vitamin B12 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

Nicotinate and nicotinamide metabolism

Nicotinate and nicotinamide metabolism

Nicotinate and nicotinamide metabolism

Nicotinate and nicotinamide metabolism

Nicotinate and nicotinamide metabolism

Nicotinate and nicotinamide metabolism

Nicotinate and nicotinamide metabolism

Nicotinate and nicotinamide metabolism

Nicotinate and nicotinamide metabolism

Nicotinate and nicotinamide metabolism

Nicotinate and nicotinamide metabolism

Nicotinate and nicotinamide metabolism

Nicotinate and nicotinamide metabolism

Nicotinate and nicotinamide metabolism

Nicotinate and nicotinamide metabolism

Nicotinate and nicotinamide metabolism

Nicotinate and nicotinamide metabolism

Nicotinate and nicotinamide metabolism

Nicotinate and nicotinamide metabolism

Nicotinate and nicotinamide metabolism

Nicotinate and nicotinamide metabolism

Nicotinate and nicotinamide metabolism

MMACHC

C05776

C05776

MBRD1

C05776

C05776

C05776

C05776

C05776

C05776

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Fat digestion and absorption

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C05776

C05776

C05776

Endocytosis

Endocytosis

Endocytosis

Endocytosis

Endocytosis

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Lysosome

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Lysosome

Bile secretion

Vitamin digestion  
and absorption  
MPI-239

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C00072 C00010  
C00008 C00016 C000647  
BTD C00255

CUBN GIF CUBN GIF  
C05776 C05776 C05776  
MBRD1 C05776 BCC1

FOLH1

C00378 C00378  
C00378 C19A2  
C00255 C52A3

C05776 Endocytosis Lysosome  
TCN2

Riboflavin metabolism  
C00120 C00864  
C00120... SLC5A6

Pantothenate and  
CoA biosynthesis

C00138 SLC23A1  
C00079

C00153 Nicotinate and  
nicotinamide metabolism  
C00504

C00080 SLC46A1  
C00504 SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059  
C00828 C05377

C00162 C02094 C02477  
C02112... C00473...  
PNLIP PLB1

SCARB1 C02477  
AWAT2 C02075 APOA1  
LRAT

APOB C00422 APOA4  
C02075 APOA4 C02530  
APOA1 APOA1

Bile secretion

Retinol metabolism

C00681 C01558 C00187  
C00473

C02094 SCARB1

C00378 C00473  
RBP2

MMACHC

C05776  
C05776 MBRD1 C05776  
BCC1

TCN2

C05776  
C00018 C00378  
C00255 C00120  
C00864 C00072  
C00153 C00504



Vitamin digestion  
and absorption  
MPI-241

Tight junction

Folate biosynthesis  
Biotin metabolism  
Taurine metabolism  
C05776

C05552 C00068  
C00072 C00061  
C00016 C000647  
Vitamin B6 metabolism

C00008 C00010  
BTD C0025534  
C00378 C05776  
GIF

C00255 C00378 C05776  
C00378 C19A2  
C00255 C52A3  
Riboflavin metabolism

C00120 C00864  
C00120... SLC5A6  
Pantothenate and  
CoA biosynthesis

C00153 C00504  
C00138 C23A1  
C00072  
Nicotinate and  
nicotinamide metabolism

C02075 C05413 C022059  
C00828 C05377  
C00162 C02094 C02477  
PNLIP PLB1

C02112... C00473  
C00681 C01558 C00187 C00473  
C02094 SCARB1

C00473  
Bile secretion  
Retinol metabolism

CUBN GIF  
CUBN GIF  
C05776 C05776  
CUBN GIF  
CUBN

C05776 Endocytosis  
Lysosome

TCN2

SLC46A1  
SLC19A1

Fat digestion  
and absorption

SCARB1 C02477  
C00378 C00473  
AWAT2 LRAT  
C02075 APOA1

C00473 BFP2

MMACHC

C05776

GIF

GIF

MBRD1 C05776

TCN2

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

APOB

C00422

APOA4

C02075

C02530

APOA1

APOA1

APOA1

APOA1

APOA1

APOA1

APOA1

APOA1

APOA1

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

C05776

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C05776

C05776

Vitamin digestion  
and absorption  
MPI-243

Tight junction

Folate biosynthesis

Biotin metabolism  
Vitamin B6 metabolism

C00072 C00010 C00008 C00016 C000647  
BTD GIF

CUBN GIF CUBN GIF MBRD1 C05776  
CUBN GIF CUBN

MMACHC  
C05776

FOLH1

C00378 C00255 C00378 C00378 C00255 C00255 C52A3

C05776 Endocytosis Lysosome

TCN2

TCN2

Riboflavin metabolism

C00120 C00864 C00120... SLC5A6

GIF CUBN

C00018 C00378 C00255 C00120 C00864 C00072 C00153 C00504

Pantothenate and  
CoA biosynthesis

C00138 SLC23A1 C00072

C00153 Nicotinate and  
nicotinamide metabolism

C00080 SLC46A1 C00504 SLC19A1

Fat digestion  
and absorption

C02075 C05413 C022059 C00828 C05377

C00162 C02112... C00473... C00681 C01558 C00187 C00473

PNLIP  
PLB1

C02477

SCARB1 C02477

APOB C00422 C02075 APOA4 C02530

APOB C00422 C02075 APOA4 C02530 APOA1

Bile secretion

Retinol metabolism

C02094 SCARB1

C00378 C00473 AWAT2 LRAT RBP2

APOA1

APOA1

Vitamin digestion  
and absorption  
MPI-244

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

C00003 C00010 C000647 GIF

BTD C0025534 GIF

C00378 C05776

C00255 C00378 C19A2

C00120 C00864 C01330

Pantothenate and  
CoA biosynthesis

Nicotinate and  
nicotinamide metabolism

C00153 C00504 C02075 C05413 C022059

C00162 C02094 C00828 C05377

C02112... C00473... PNLIP PLB1 C02477

C00681 C01558 C00187 C00473

Bile secretion Retinol metabolism

C05776

C0025534

C00378 C19A2

C00255 C52A3

C00120... SLC5A6

C00138 SLC23A1

C00080 SLC46A1

C00504 SLC19A1

C02094 SCARB1

CUBN

CUBN

CUBN

C05776

C05776

GIF

CUBN

C05776

GIF

C05776

MMACHC

C05776

MBRD1

C05776

BCC1

TCN2

Endocytosis Lysosome

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

Fat digestion  
and absorption

SCARB1 C02477

C00378

AWAT2

C00473 RBP2

LRAT

APOB

C00422

C02075 APOA4

C02530

APOA1

APOB

C00422

C02075 APOA4

C02530

APOA1

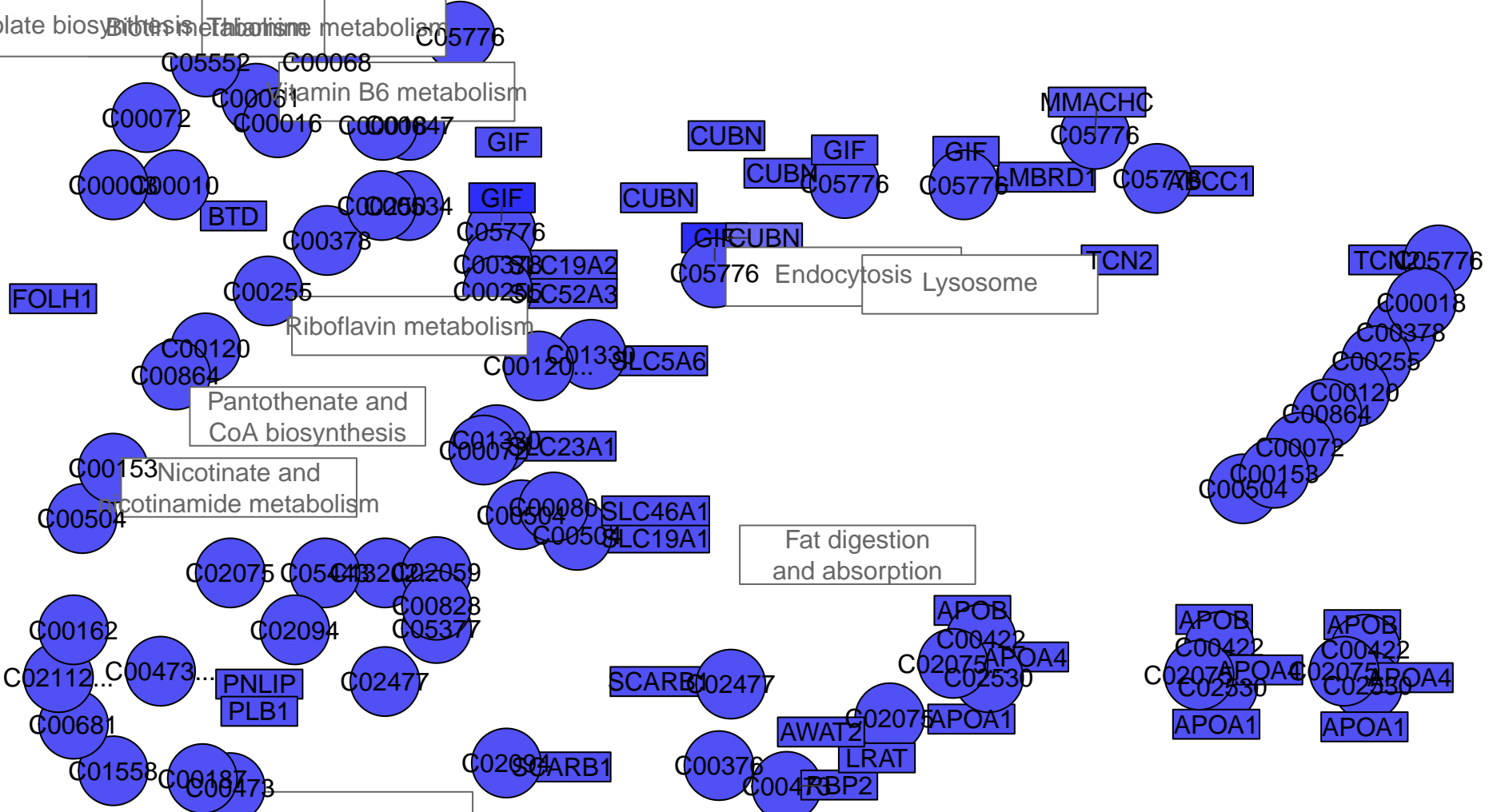
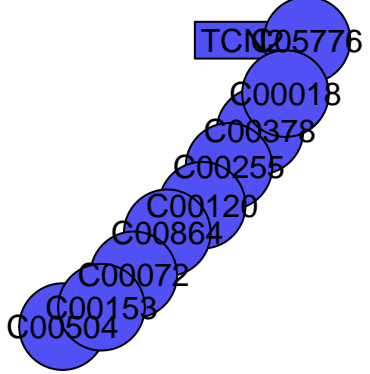
APOB

C00422

C02075 APOA4

C02530

APOA1



Vitamin digestion  
and absorption  
MPI-246

Tight junction

Folate biosynthesis

Biotin metabolism

Thiamine metabolism

Vitamin B6 metabolism

Riboflavin metabolism

Pantothenate and CoA biosynthesis

Nicotinate and nicotinamide metabolism

Retinol metabolism

Bile secretion

Endocytosis

Lysosome

Fat digestion and absorption

C00072

C00003

C00010

FOLH1

C00120

C00864

C00153

C00504

C00162

C02112...

C00681

C01558

C00072

C00010

BTD

C00120

C00864

C00153

C00504

C00162

C02112...

C00681

C01558

C00061

C00016

C00378

C00255

C00120

C00864

C02075

C00473

C00473

C00187

C00473

C00068

C000647

C0025634

C00378

C00120...

C00079

C02075

C05413

C02094

C02477

C00473

C05776

GIF

GIF

C05776

C001330

C001380

C00080

C00504

C00828

C05377

C02094

CUBN

CUBN

GIF

C05776

SLC5A6

SLC23A1

SLC46A1

SLC19A1

SCARB1

SCARB1

SCARB1

CUBN

CUBN

GIF

C05776

SLC5A6

SLC23A1

SLC46A1

SLC19A1

SCARB1

SCARB1

SCARB1

GIF

GIF

C05776

SLC5A6

SLC23A1

SLC46A1

SLC19A1

SCARB1

SCARB1

SCARB1

MMACHC

C05776

MBRD1

C05776

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

C05776

MBRD1

C05776

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

C05776

MBRD1

C05776

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

C05776

MBRD1

C05776

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

C05776

MBRD1

C05776

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

TCN2

Bile secretion

Retinol metabolism

Fat digestion  
and absorption

APOB

C00422

APOA4

C02075

C02530

APOA1

APOB

C00422

APOA4

C02075

C02530

APOA1

APOB

C00422

APOA4

C02075

C02530

APOA1

Bile secretion

Retinol metabolism

Fat digestion  
and absorption

APOB

C00422

APOA4

C02075

C02530

APOA1

APOB

C00422

APOA4

C02075

C02530

APOA1

APOB

C00422

APOA4

C02075

C02530

APOA1



Vitamin digestion  
and absorption  
MPI-251

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

C05776

C05552 C00068

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

C00008 C00010

BTD C0025534

GIF

CUBN

GIF

MMACHC

C05776

CUBN

GIF

MBRD1

C05776

BCC1

FOLH1

CUBN

GIF

CUBN

TCN2

C00378 C05776

C00378 C19A2

C05776

Endocytosis Lysosome

TCN2

C00255 C0025534

C00255 C52A3

Riboflavin metabolism

C00120... SLC5A6

C05776

C00018

C00120 C00864

C00120... SLC5A6

C05776

C00378

Pantothenate and  
CoA biosynthesis

C00120... SLC5A6

C05776

C00255

Nicotinate and  
nicotinamide metabolism

C00120... SLC5A6

C05776

C00120

C00153 C00504

C00120... SLC5A6

C05776

C00864

C02075 C05413 C022059

C00120... SLC5A6

C05776

C00072

C00162 C02112... C00473... C00681

C00120... SLC5A6

C05776

C00153

C02094 C02477

C00120... SLC5A6

C05776

C00504

C02112... C00473... C00681

C00120... SLC5A6

C05776

C00072

C02094 C02477

C00120... SLC5A6

C05776

C00153

C00681 C01558 C00187 C00473

C00120... SLC5A6

C05776

C00072

C02094 C02477

C00120... SLC5A6

C05776

C00153

C01558 C00187 C00473

C00120... SLC5A6

C05776

C00072

Retinol metabolism

C00120... SLC5A6

C05776

C00153

Bile secretion

Fat digestion  
and absorption

Endocytosis Lysosome

SCARB1

APOB

APOA4

APOB

APOA4

Bile secretion

Retinol metabolism

C00120... SLC5A6

C05776

C00153

SCARB1

APOB

APOA4

APOB

APOA4

SCARB1

APOB

APOA4

APOB

APOA4

SCARB1

APOB

APOA4

APOB

APOA4

SCARB1

APOB

APOA4

APOB

APOA4

SCARB1

APOB

APOA4

APOB

APOA4

SCARB1

APOB

APOA4

APOB

APOA4

SCARB1

APOB

APOA4

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APOA4

SCARB1

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APOA4

APOB

APOA4

SCARB1

APOB

APOA4

APOB

APOA4



Vitamin digestion  
and absorption  
MPI-255

Tight junction

Folate biosynthesis

Biotin metabolism

Taurine metabolism

Vitamin B6 metabolism

C00072 C00061 C00016 C000647

C00003 C00010 C000647 GIF

BTD C0025534 GIF

C00378 C05776

C00255 C00378 C19A2

Riboflavin metabolism

C00120 C00864 C01330

Pantothenate and  
CoA biosynthesis

Nicotinate and  
nicotinamide metabolism

C00504 C00120... SLC5A6

C02075 C05413 C022059 SLC23A1

C00162 C02094 C00828 C05377 SLC46A1

C02112... C00473... PNLIP PLB1 C02477 SLC19A1

C00681 C02094 SLC19A1

C01558 C00187 C00473 SCARB1

Bile secretion Retinol metabolism

CUBN

GIF

CUBN

CUBN

C05776

GIF

C05776

Endocytosis Lysosome

MMACHC

C05776

GIF

C05776

MBRD1

C05776

BCC1

TCN2

TCN2

C05776

C00018

C00378

C00255

C00120

C00864

C00072

C00153

C00504

Fat digestion  
and absorption

SCARB1

C02477

C00378

C00473

AWAT2

LRAT

RBP2

APOB

C00422

C02075

APOA4

C02530

APOA1

APOB

C00422

C02075

APOA4

C02530

APOA1

APOB

C00422

C02075

APOA4

C02530

APOA1

