Cell Systems

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Article

Integrative Personal Omics Profiles during Periods of Weight Gain and Loss

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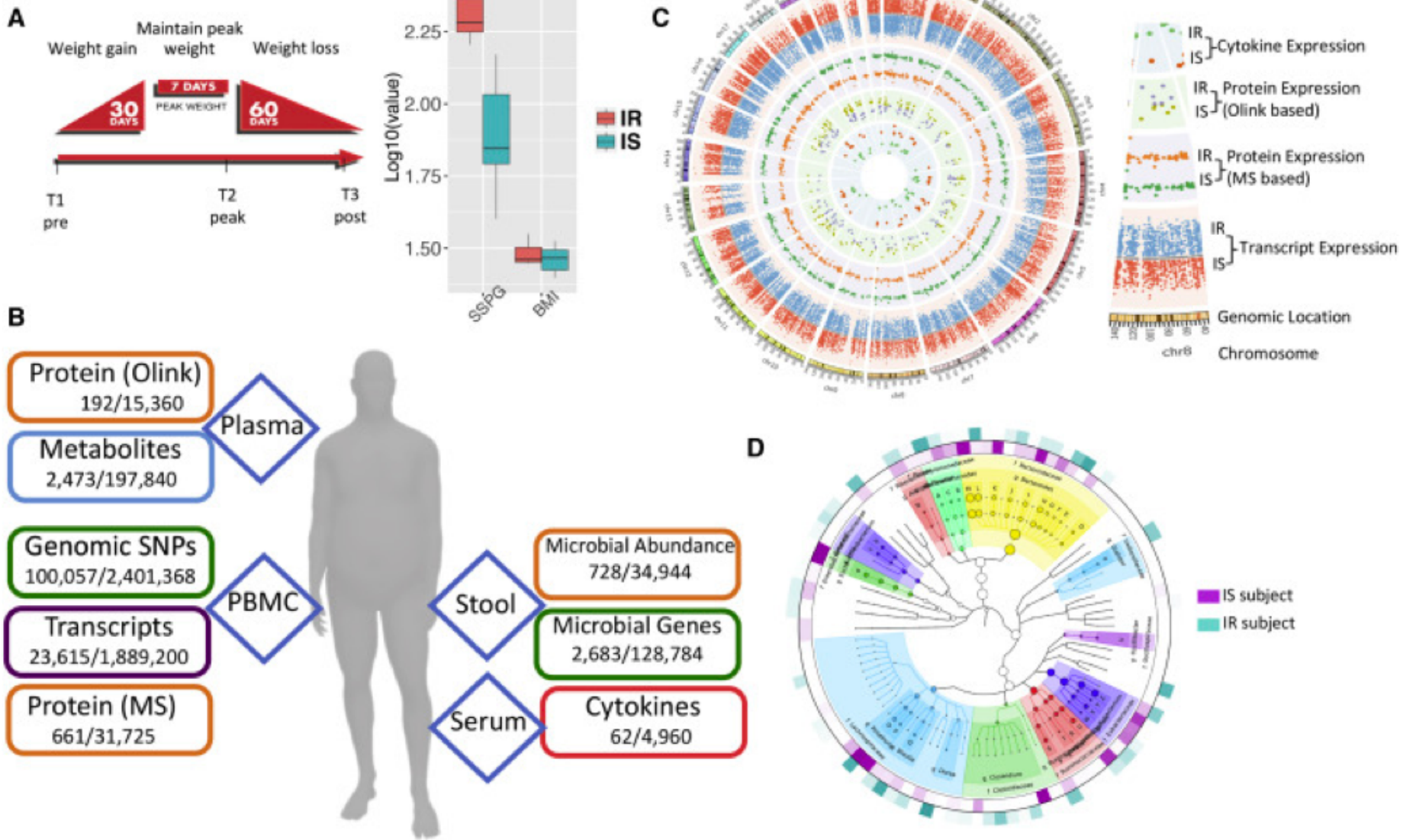
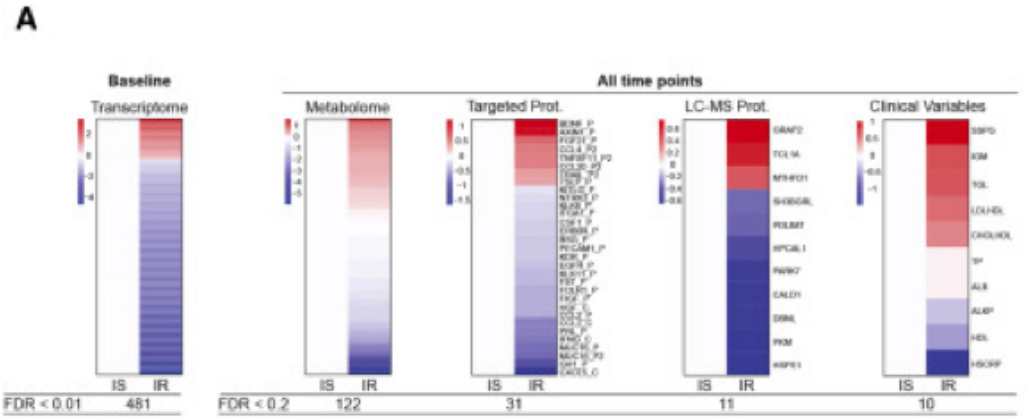
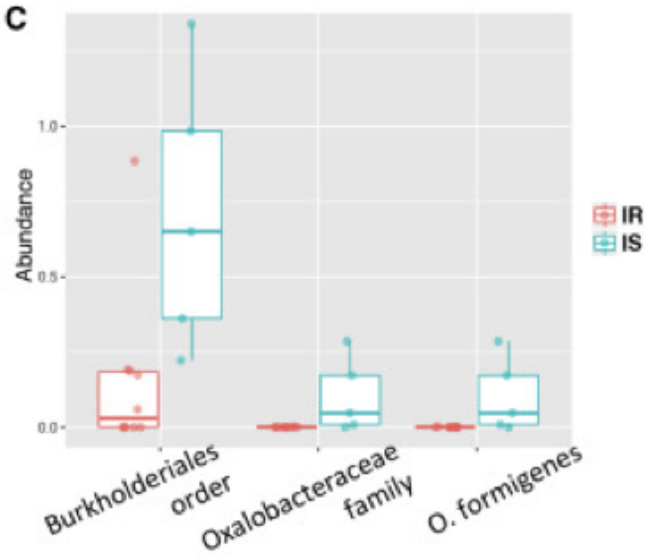
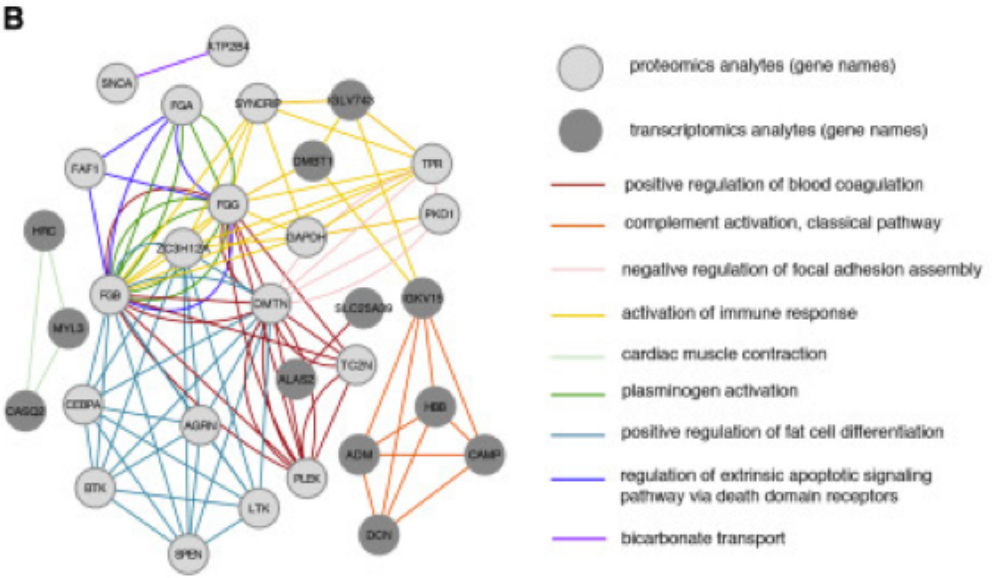

A
Maintain peak
Weight gain
weight
Weight loss
7 DAYS
PEAK WEIGHT
30 DAYS
60 DAYS
T1
pre
T2
peak
T3
post
Log10(value)
2.25
2.00
1.75
1.50
SSPG
BMI
IR
IS
B
Protein (Olink)
192/15,360
Metabolites
2,473/197,840
Plasma
Genomic SNPs
100,057/2,401,368
Transcripts
23,615/1,889,200
Protein (MS)
661/31,725
PBMC
Stool
Microbial Abundance
728/34,944
Microbial Genes
2,683/128,784
Serum
Cytokines
62/4,960
C
IR
IS
Cytokine Expression
Protein Expression
(Olink based)
Protein Expression
(MS based)
Transcript Expression
Genomic Location
chr8
Chromosome
D
IS subject
IR subject

Figure 2: “Stuff is different at baseline” (between insulin resistant and insulin sensitive)

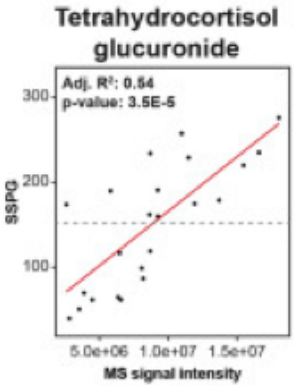






D

Pathway	Database	FDR
Arginine and proline metabolism	HMDB	0.000
Glycine, serine and threonine metabolism	HMDB	0.001
Valine, leucine and isoleucine biosynthesis	HMDB	0.010
Cyanoamino acid metabolism	HMDB	0.022
Glycerophospholipid metabolism	HMDB	0.030



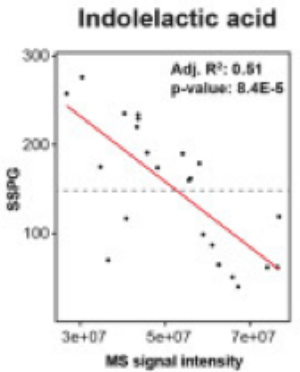
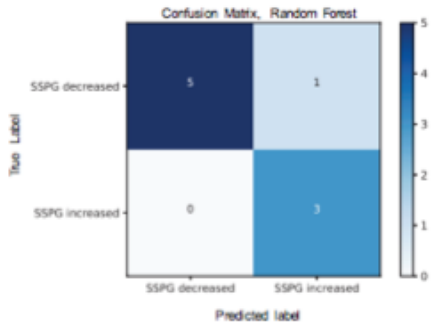


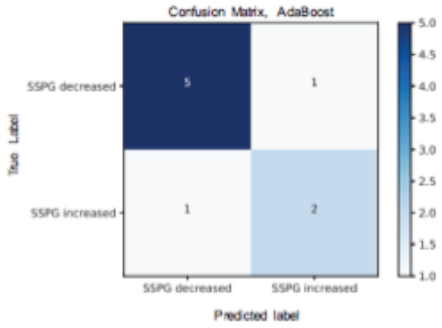
Figure S2: use metabolome to predict SSPG at baseline

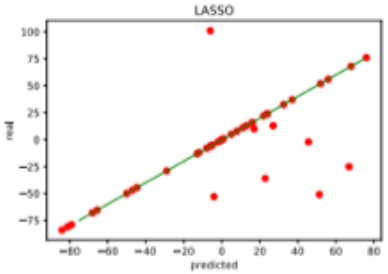
Predict delta SSPG from delta metabolites

D.

Model	Precision	Recall	F1-score
Random forest	88%	92%	88%
AdaBoost	78%	78%	78%







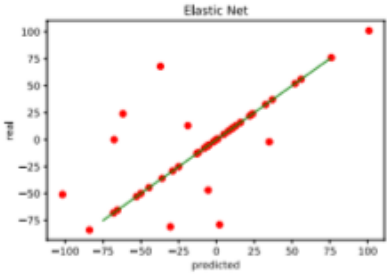
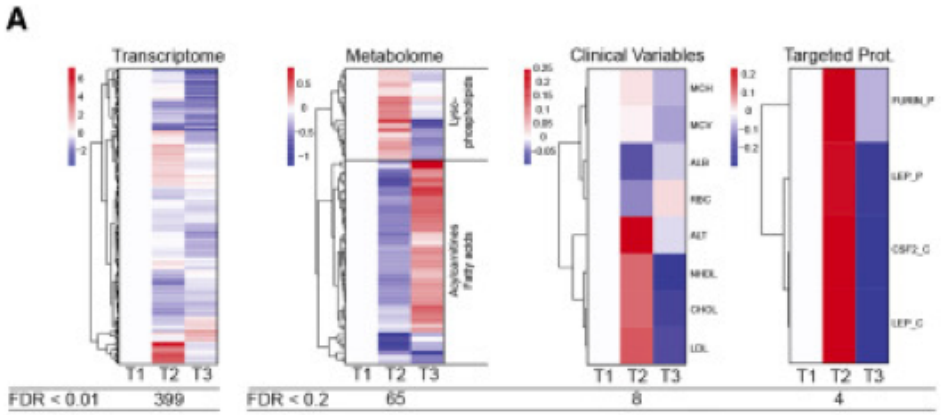


Figure 3: Patterns in weight gain and loss

"Overall, these results indicate that there are substantial biological pathways that change during weight gain that affect immune response, heart function, biochemistry, and microbiome."



B

Pathway	Database	baseline vs weight gain (direction & p-value)	gain vs loss (direction & p-value)
Actin filament-based process	GO	↑ 3.1E-15	↓ 1.4E-18
Dilated cardiomyopathy	KEGG	↑ 3.4E-07	↓ 1.2E-07
Response to lipid	GO	↑ 2.4E-08	↓ 7.8E-03
Response to lipopolysaccharide	GO	↑↓ 1.5E-09	↓↑ 6.1E-02
Inflammatory response	GO	↑↓ 8.1E-08	↓↑ 1.1E-03
Response to external biotic stimulus	GO	↑↓ 2.0E-10	↓↑ 3.9E-04
Response to cytokine	GO	↑↓ 1.1E-06	↓↑ 8.2E-05
Platelet activation	GO	↑↓ 2.9E-07	
Positive regulation of ATPase activity	GO		↑↓ 2.3E-02

Figure 6: Power and variance analysis.

“These findings highlight the fact that each individual is biochemically unique, and this stresses the need for personalized analysis in medicine.”