Supplementary Materials for

Sequential integration of multimodal data from serum improves the predictive performance of hepatic lipid accumulation in mice.

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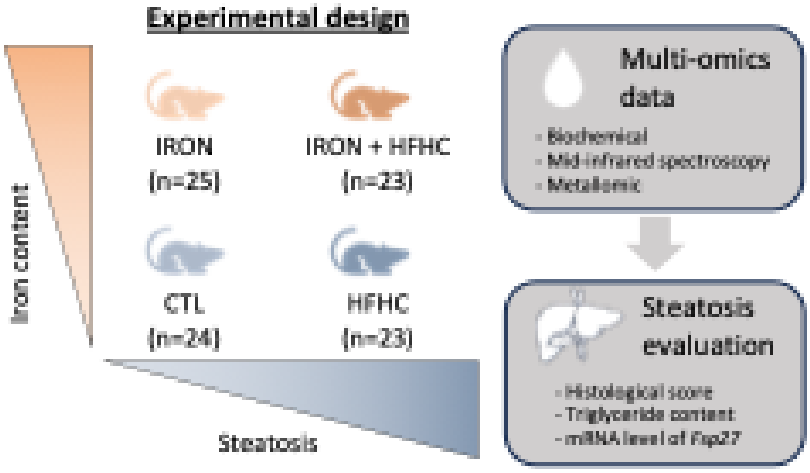

Figure S1: Experimental design. Mice were subjected either to a control diet or to a high-fat, high-carbohydrate (HFHC) diet, and, independently, received injections of either dextran or iron-dextran. The steatosis (i.e., hepatic lipid accumulation) has been evaluated through 3 biological scales. We constructed several datasets. The first dataset consists of biochemical measurements from serum. The second dataset is derived from mid-infrared (MIR) spectroscopy performed on serum, providing molecular fingerprints specific to each mouse. The third dataset comprises quantitative measurements of metals and trace elements in the serum.

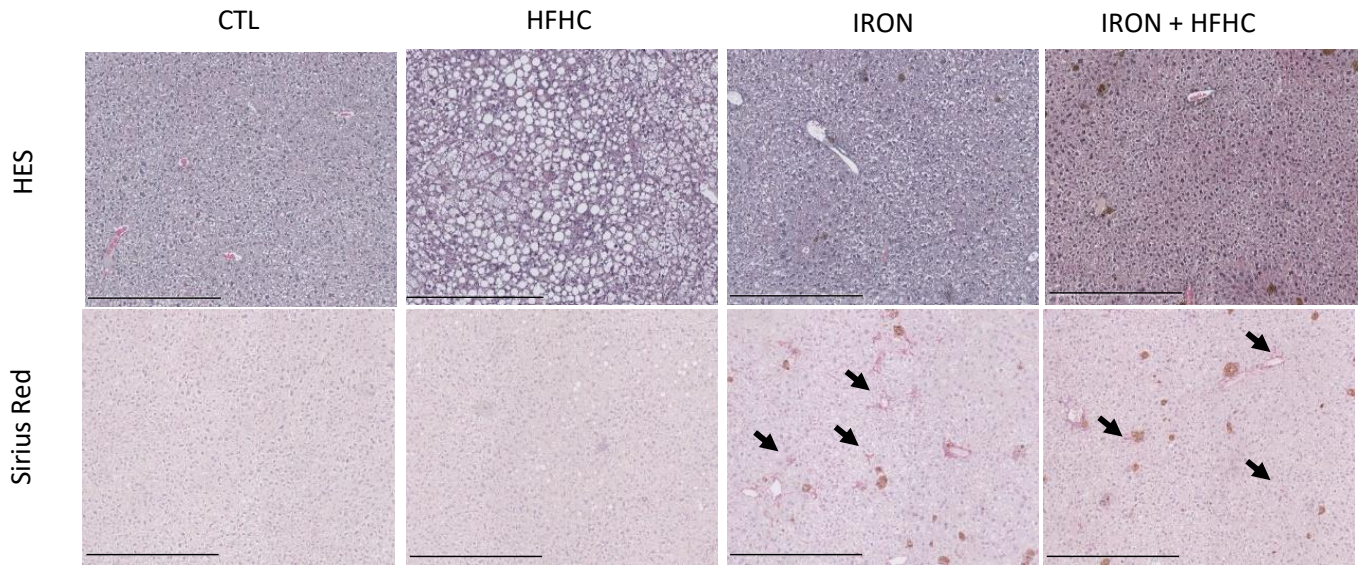

Figure S2. Liver staining. HES and Sirius Red staining of the liver of CTL, HFHC, IRON, and IRON/HFHC mice at 22 weeks. The scale bar corresponds to 500µm. Black arrows are related to the extracellular matrix.

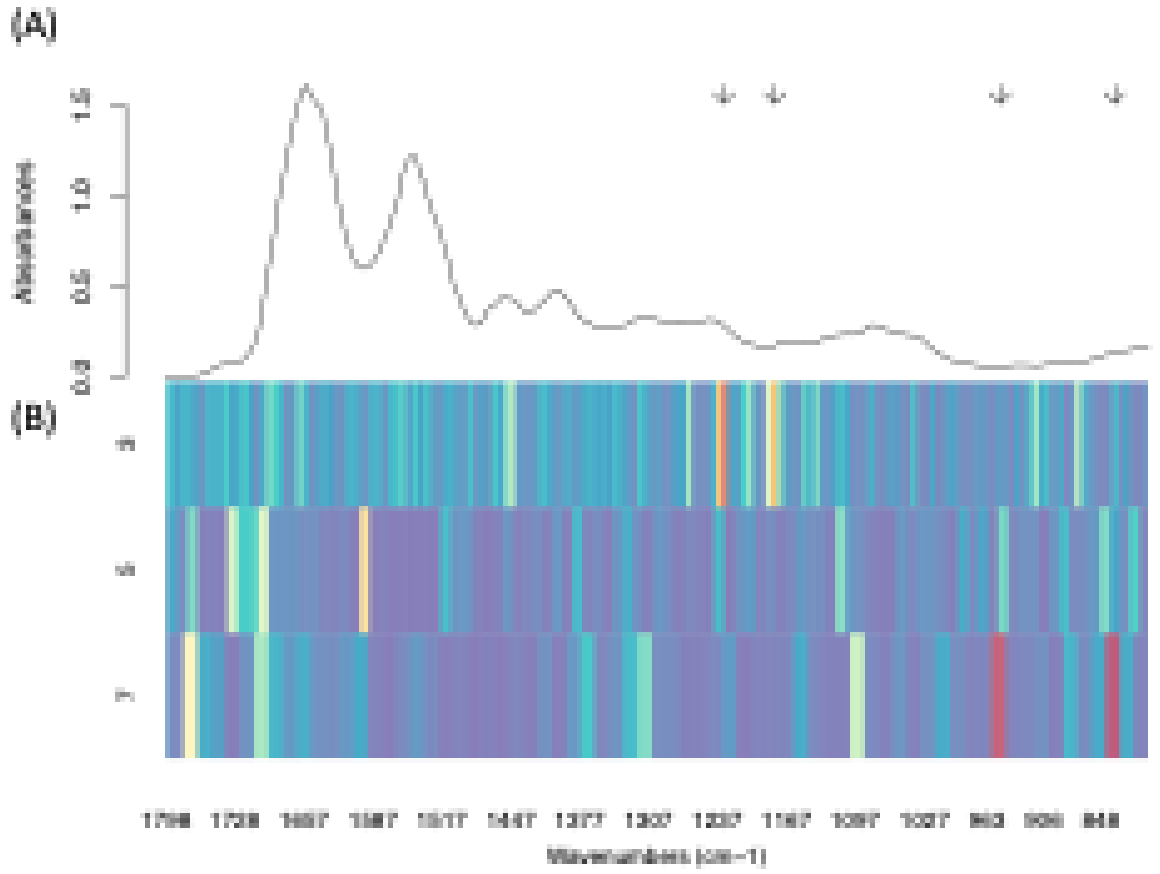

Figure S3. Representative spectra, with the important wavenumbers defining the lipid accumulation in the liver of mice. (A) Representative absorbance spectrum of the mid-infrared spectroscopy. The arrows correspond to the wavenumbers 1230, 1180, 950, 850 cm^{-1}. **(B)** The heatmap corresponds to the importance of the wavenumbers in the random forest of the sequential approach. The more the wavenumbers are colored (differ from the blue), the more the wavenumbers are important to predict the lipid accumulation in the liver. The y-axis of the plot corresponds to the B-spline width used in the normalisation process.

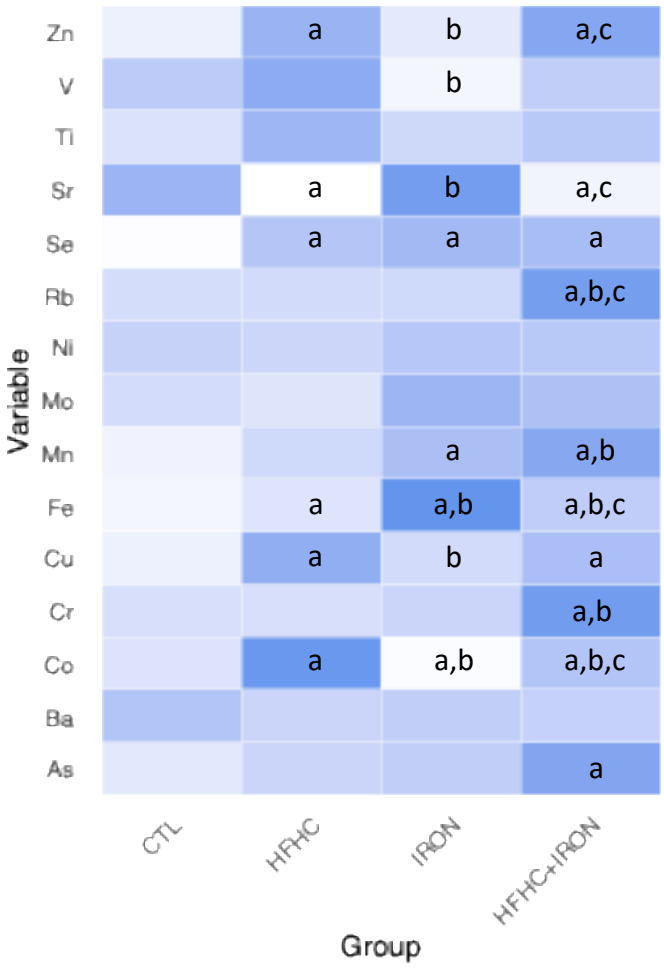

Figure S4. Heatmap of trace element levels across experimental groups. Increasing intensity of blue indicates higher values. Abbreviations: manganese (Mn), iron (Fe), copper (Cu), cobalt (Co), zinc (Zn), selenium (Se), rubidium (^{85}Rb), molybdenum (Mo), arsenic (As). Statistically significant differences are annotated as follows: *a* denotes a significant difference versus CTL, *b* versus HFHC, and *c* versus IRON. Statistical analysis was performed using multiple pairwise Wilcoxon tests with Bonferroni correction.

5’ - 3’	Fwd	Re
A2m	GAAACAGAGATCAGCATGACCAGTA	CATTTGGATTTGTGGTAGAGGAACT
Crp	TGGTGGGAGACATCGGAGAT	GCCCGCCAGTTCAAAACAT
Hprt1	CCGGAATCCCTATCTTTAGTCC	GGGTCAGTCCAGTGCCATAAG
Nrf2	CGAGATATACGCAGGAGAGGTAAGA	GCTCGACAATGTTCTCCAGCTT
Fsp27	ATGGACTACGCCATGAAGTCT	CGGTGCTAACACGACAGGG

Table S1. Primers used for liver tissue. *Crp,* C - reactive protein; *Hprt1*, hypoxanthine phosphoribosyltransferase 1; *Nrf2*, Nuclear factor (erythroid-derived 2)-like 2; *A2m*, α2-macroglobuline; *Fsp27* Fat-specific protein 27.