

Large-Scale Multi-Omics Genome-Wide Association Studies (Mo-GWAS): Guidelines for Sample Preparation and Normalization

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Materials

Name	Company	Catalog Number	Comments
Reagents and standards			
1,2-diheptadecanoyl-sn-glycero-3-phosphocholine (17:0 PC)	Avanti Polar Lipids	850360P	Internal standard for lipids
Chloroform	Supelco	67-66-3	FAME solvent
Isovitexin	Sigma Aldrich	38953-85-4	Internal standard for metabolites
Lignoceric Acid Methyl ester	Sigma Aldrich	2442-49-1	FAME
Methanol (MeOH)	Biosolve Chemicals	13684102	ULC-MS grade
Methoxyamin -hydrochlorid	Sigma Aldrich	593-56-6	Metabolite derivatization
Methyl laurate	Sigma Aldrich	111-82-0	FAME
Methyl myristate	Sigma Aldrich	124-10-7	FAME
Methyl palmitate	Sigma Aldrich	112-39-0	FAME
Methyl stearate	Sigma Aldrich	112-61-8	FAME
Methyl tert-butyl ether (MTBE)	Biosolve Chemicals	13890602	HPLC grade
Methyl-caprat	Sigma Aldrich	110-42-9	FAME
Methylcaprylat	Sigma Aldrich	111-11-5	FAME
Methyldocosanoat	Sigma Aldrich	929-77-1	FAME
Methyleicosanoat	Sigma Aldrich	1120-28-1	FAME
Methyl-hexacosanoat	Sigma Aldrich	5802-82-4	FAME
Methyl-octacosanoat	Sigma Aldrich	55682-92-3	FAME
Methyl-pelargonate	Sigma Aldrich	1731-84-6	FAME
N-Methyl-N-(trimethylsilyl)trifluoroacetamid (MSTFA)	Macherey-Nagel	24589-78-4	Metabolite derivatization
Pyridine	Supelco	110-86-1	Metabolite derivatization
Ribitol	Supelco	22566-17-2	Internal standard for derivatized metabolites
Triacantanoic Acid Methyl Ester	TCI Chemicals	629-83-4	FAME

Water	Biosolve Chemicals	23214102	ULC-MS grade
Equipment			
1.5 mL Safe-lock microcentrifuge tubes	Eppendorf	3120086	
2 mL Safe-lock microcentrifuge tubes	Eppendorf	3120094	
Balance	Sartorius Corporation	14 557 572	
DB-35ms, 30 m, 0,25 mm, 0,25 µm	Aglient	123-3832	Analysis of derivatized metabolites
GC-MS system	Leco Pegasus HT TOF-MS (LECO Corporation)		Analysis of derivatized metabolites
Grinding Balls, Stainless Steel	OPS DIAGNOSTICS	GBSS 196-2500-10	
MS system	Exactive, Orbitrap-type, MS (Exactive, Thermo Fisher Scientific)		Analysis of lipids
MS system	Q Exactive Focus (Q Exactive™ Focus Hybrid Quadrupol-Orbitrap™ Massenspektrometer, Thermo Fisher Scientific)		Analysis of metabolites
Refrigerated microcentrifuge	Eppendorf, model 5427R	22620701	
Reversed Phase (RP) Bridged Ethyl Hybrid (BEH) C8 column (100 mm × 2.1 mm containing 1.7 µm diameter particles)	Waters	186002878	Analysis of lipids
RP High Strength Silica (HSS) T3 column (100 mm × 2.1 mm containing 1.8 µm diameter particles)	Waters	186003539	Analysis of metabolites
Shaker	Eppendorf Thermomixer 5436	2050-100-05	
Sonicator	USC 300 TH	142-0084	
Tissue grinding mixer mill	Retsch, Mixer Mill MM 300	20.746.0001	
UPLC system	Waters Acquity UPLC system (Waters)		
Vacuum concentrator	Scan Speed Maxi Vac Alpha Evaporators	7.008.500.002	
Vortex mixer	Vortex-Genie 2, Model G560	SI-0236	
Software			
MetAlign			Chromatogram processing
MzMine			Chromatogram processing
R package "data.table"			
R package "fujiplo"			pleiotropic map
R package "genetics"			
R package "lme4"			BLUPs calculation
R package "LDheatmap"			LD plots
R package "MASS"			transformation
R package "rMVP"			GWAS
R version 4.0.4			
RefinerMS			Chromatogram processing
RefinerMS Genedata	Expressionist		Chromatogram processing
Tassel 5			Genotype filtering
Xcalibur	Thermo Fisher Scientific	OPTON-30965	Chromatogram processing