SUPPLEMENTARY FIGURES LEGENDS:

Figure S1: Trichrome X 10 staining of individual liver sections showing cirrhosis

A. CCL4-treated conventional liver at week 12

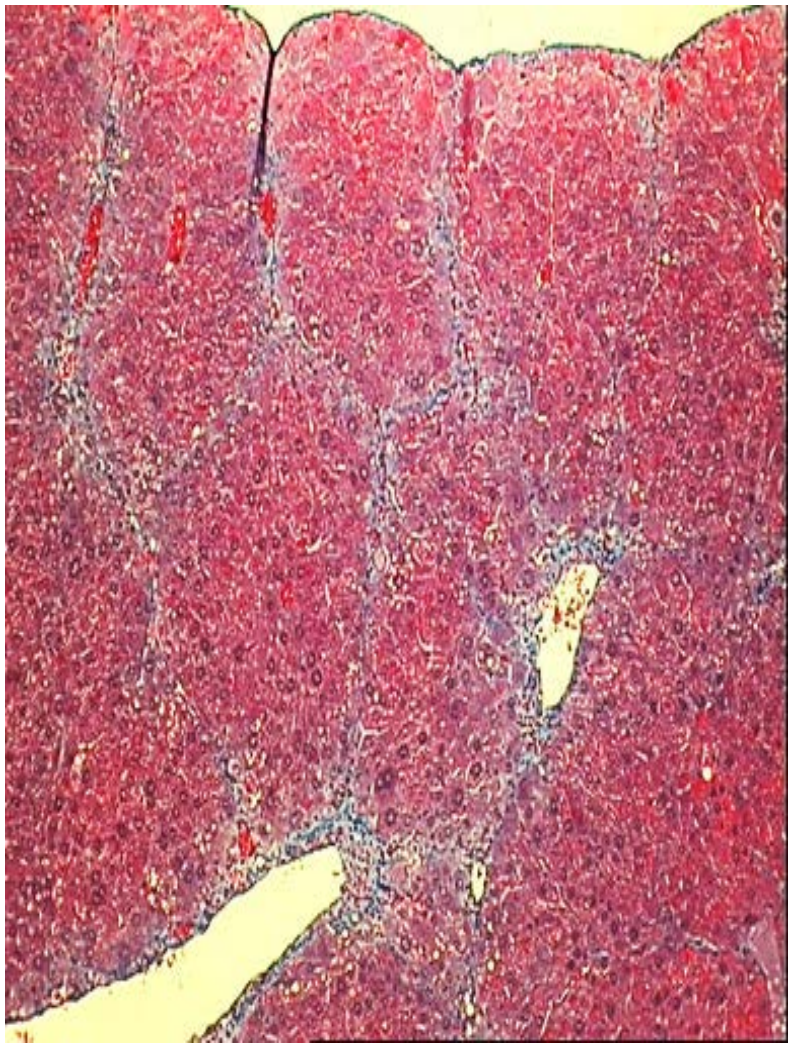
B. CCL4-treated germ-free liver at week 16

Figure S2: PiCRUST analysis of predicted bacterial functions.

A. Conventional mouse small intestine: Red=cirrhotic mice, Green=control mice. In the cirrhotic mice, predicted microbial functions related to bacterial invasion of epithelial cells, aromatic amino acid metabolism and degradation of branched-chain amino acids was higher compared to control mice.
B. Conventional mouse cecum: Red=cirrhotic mice, Green=control mice. This shows a significantly increased predicted bacterial functions related to endotoxin and endotoxin protein synthesis, aromatic amino acid metabolism and ammoniagenic asparate and glutamate degradation in cirrhotic mice.
C. Conventional mouse large intestine: Red=cirrhotic mice, Green=control mice. This shows a significantly increased predicted bacterial functions related to endotoxin and endotoxin protein synthesis, aromatic amino acid metabolism and branched chain amino acid degradation and nitrogen metabolism in cirrhotic mice.

Figure S1: Trichrome stain 4X of cirrhotic liver after CCL4

A: Conventional Mouse



B: Germ-Free mouse

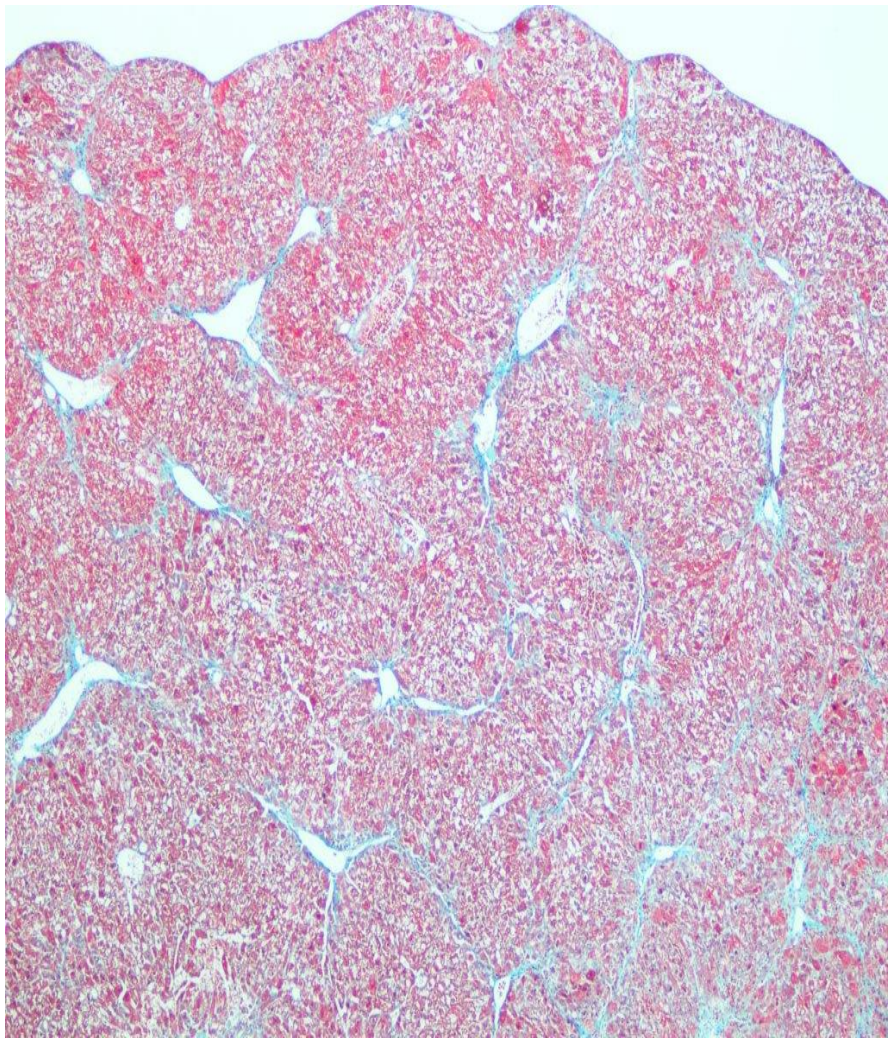
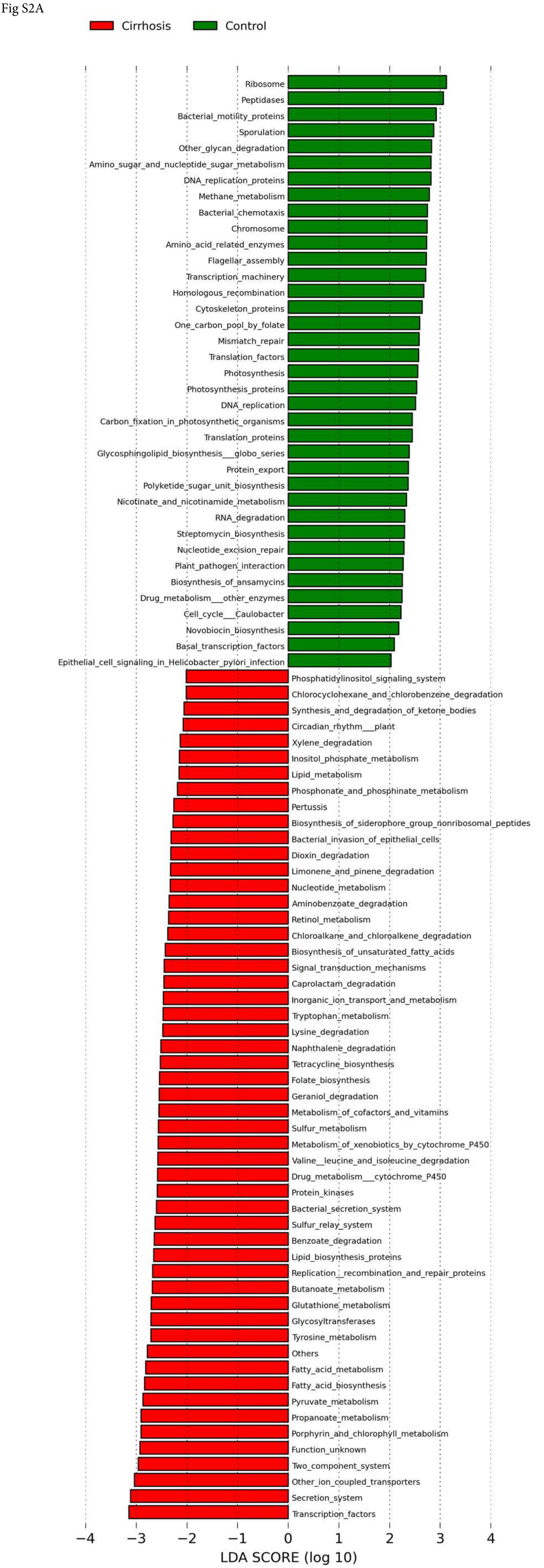


Fig S2A


Cirrhosis
Control
Ribosome
Peptidases
Bacterial_motility_proteins
Sporulation
Other_glycan_degradation
Amino_sugar_and_nucleotide_sugar_metabolism
DNA_replication_proteins
Methane_metabolism
Bacterial_chemotaxis
Chromosome
Amino_acid_related_enzymes
Flagellar_assembly
Transcription_machinery
Homologous_recombination
Cytoskeleton_proteins
One_carbon_pool_by_folate
Mismatch_repair
Translation_factors
Photosynthesis
Photosynthesis_proteins
DNA_replication
Carbon_fixation_in_photosynthetic_organisms
Translation_proteins
Glycosphingolipid_biosynthesis___globo_series
Protein_export
Polyketide_sugar_unit_biosynthesis
Nicotinate_and_nicotinamide_metabolism
RNA_degradation
Streptomycin_biosynthesis
Nucleotide_excision_repair
Plant_pathogen_interaction
Biosynthesis_of_ansamycins
Drug_metabolism___other_enzymes
Cell_cycle___Caulobacter
Novobiocin_biosynthesis
Basal_transcription_factors
Epithelial_cell_signaling_in_Helicobacter_pylori_infection
Phosphatidylinositol_signaling_system
Chlorocyclohexane_and_chlorobenzene_degradation
Synthesis_and_degradation_of_ketone_bodies
Circadian_rhythm___plant
Xylene_degradation
Inositol_phosphate_metabolism
Lipid_metabolism
Phosphonate_and_phosphinate_metabolism
Pertussis
Biosynthesis_of_siderophore_group_nonribosomal_peptides
Bacterial_invasion_of_epithelial_cells
Dioxin_degradation
Limonene_and_pinene_degradation
Nucleotide_metabolism
Aminobenzoate_degradation
Retinol_metabolism
Chloroalkane_and_chloroalkene_degradation
Biosynthesis_of_unsaturated_fatty_acids
Signal_transduction_mechanisms
Caprolactam_degradation
Inorganic_ion_transport_and_metabolism
Tryptophan_metabolism
Lysine_degradation
Naphthalene_degradation
Tetracycline_biosynthesis
Folate_biosynthesis
Geraniol_degradation
Metabolism_of_cofactors_and_vitamins
Sulfur_metabolism
Metabolism_of_xenobiotics_by_cytochrome_P450
Valine__leucine_and_isoleucine_degradation
Drug_metabolism___cytochrome_P450
Protein_kinases
Bacterial_secretion_system
Sulfur_relay_system
Benzoate_degradation
Lipid_biosynthesis_proteins
Replication__recombination_and_repair_proteins
Butanoate_metabolism
Glutathione_metabolism
Glycosyltransferases
Tyrosine_metabolism
Others
Fatty_acid_metabolism
Fatty_acid_biosynthesis
Pyruvate_metabolism
Propanoate_metabolism
Porphyrin_and_chlorophyll_metabolism
Function_unknown
Two_component_system
Other_ion_coupled_transporters
Secretion_system
Transcription_factors
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−3
−2
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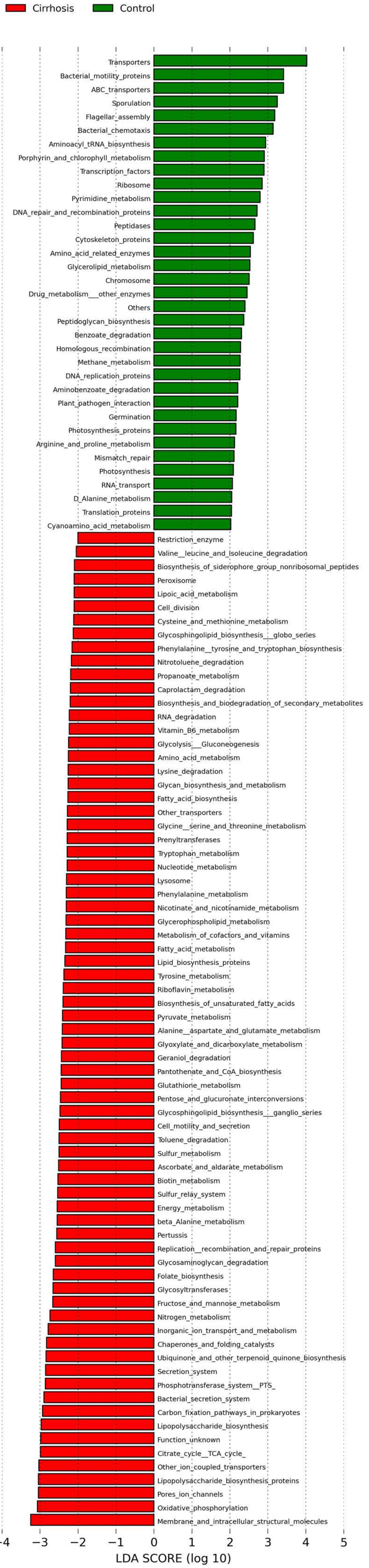
0
1
2
3
4
LDA SCORE (log 10)

Fig S2B


Cirrhosis
Control
Transporters
Bacterial_motility_proteins
ABC_transporters
Sporulation
Flagellar_assembly
Bacterial_chemotaxis
Aminoacyl_tRNA_biosynthesis
Porphyrin_and_chlorophyll_metabolism
Transcription_factors
Ribosome
Pyrimidine_metabolism
DNA_repair_and_recombination_proteins
Peptidases
Cytoskeleton_proteins
Amino_acid_related_enzymes
Glycerolipid_metabolism
Chromosome
Drug_metabolism___other_enzymes
Others
Peptidoglycan_biosynthesis
Benzoate_degradation
Homologous_recombination
Methane_metabolism
DNA_replication_proteins
Aminobenzoate_degradation
Plant_pathogen_interaction
Germination
Photosynthesis_proteins
Arginine_and_proline_metabolism
Mismatch_repair
Photosynthesis
RNA_transport
D_Alanine_metabolism
Translation_proteins
Cyanoamino_acid_metabolism
Restriction_enzyme
Valine__leucine_and_Isoleucine_degradation
Biosynthesis_of_siderophore_group_nonribosomal_peptides
Peroxisome
Lipoic_acid_metabolism
Cell_division
Cysteine_and_methionine_metabolism
Glycosphingolipid_biosynthesis__globo_series
Phenylalanine__tyrosine_and_tryptophan_biosynthesis
Nitrotoluene_degradation
Propanoate_metabolism
Caprolactam_degradation
Biosynthesis_and_biodegradation_of_secondary_metabolites
RNA_degradation
Vitamin_B6_metabolism
Glycolysis__Gluconeogenesis
Amino_acid_metabolism
Lysine_degradation
Glycan_biosynthesis_and_metabolism
Fatty_acid_biosynthesis
Other_transporters
Glycine__serine_and_threonine_metabolism
Prenyltransferases
Tryptophan_metabolism
Nucleotide_metabolism
Lysosome
Phenylalanine_metabolism
Nicotinate_and_nicotinamide_metabolism
Glycerophospholipid_metabolism
Metabolism_of_cofactors_and_vitamins
Fatty_acid_metabolism
Lipid_biosynthesis_proteins
Tyrosine_metabolism
Riboflavin_metabolism
Biosynthesis_of_unsaturated_fatty_acids
Pyruvate_metabolism
Alanine__aspartate_and_glutamate_metabolism
Glyoxylate_and_dicarboxylate_metabolism
Geraniol_degradation
Pantothenate_and_CoA_biosynthesis
Glutathione_metabolism
Pentose_and_glucuronate_interconversions
Glycosphingolipid_biosynthesis__ganglio_series
Cell_motility_and_secretion
Toluene_degradation
Sulfur_metabolism
Ascorbate_and_aldarate_metabolism
Biotin_metabolism
Sulfur_relay_system
Energy_metabolism
beta_Alanine_metabolism
Pertussis
Replication__recombination_and_repair_proteins
Glycosaminoglycan_degradation
Folate_biosynthesis
Glycosyltransferases
Fructose_and_mannose_metabolism
Nitrogen_metabolism
Inorganic_ion_transport_and_metabolism
Chaperones_and_folding_catalysts
Ubiquinone_and_other_terpenoid_quinone_biosynthesis
Secretion_system
Phosphotransferase_system__PTS_
Bacterial_secretion_system
Carbon_fixation_pathways_in_prokaryotes
Lipopolysaccharide_biosynthesis
Function_unknown
Citrate_cycle__TCA_cycle_
Other_ion_coupled_transporters
Lipopolysaccharide_biosynthesis_proteins
Pores_ion_channels
Oxidative_phosphorylation
Membrane_and_intracellular_structural_molecules
−4
−3
−2
−1
0
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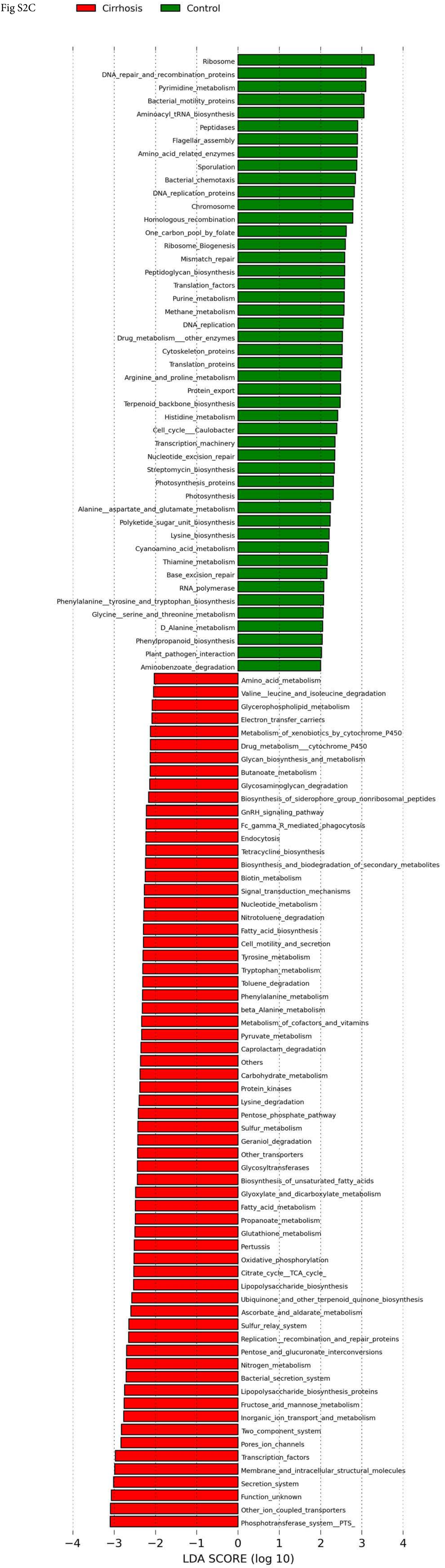
5
LDA SCORE (log 10)

Fig S2C


Cirrhosis
Control
Ribosome
DNA_repair_and_recombination_proteins
Pyrimidine_metabolism
Bacterial_motility_proteins
Aminoacyl_tRNA_biosynthesis
Peptidases
Flagellar_assembly
Amino_acid_related_enzymes
Sporulation
Bacterial_chemotaxis
DNA_replication_proteins
Chromosome
Homologous_recombination
One_carbon_pool_by_folate
Ribosome_Biogenesis
Mismatch_repair
Peptidoglycan_biosynthesis
Translation_factors
Purine_metabolism
Methane_metabolism
DNA_replication
Drug_metabolism___other_enzymes
Cytoskeleton_proteins
Translation_proteins
Arginine_and_proline_metabolism
Protein_export
Terpenoid_backbone_biosynthesis
Histidine_metabolism
Cell_cycle___Caulobacter
Transcription_machinery
Nucleotide_excision_repair
Streptomycin_biosynthesis
Photosynthesis_proteins
Photosynthesis
Alanine__aspartate_and_glutamate_metabolism
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Lysine_biosynthesis
Cyanoamino_acid_metabolism
Thiamine_metabolism
Base_excision_repair
RNA_polymerase
Phenylalanine__tyrosine_and_tryptophan_biosynthesis
Glycine__serine_and_threonine_metabolism
D_Alanine_metabolism
Phenylpropanoid_biosynthesis
Plant_pathogen_interaction
Aminobenzoate_degradation
Amino_acid_metabolism
Valine__leucine_and_isoleucine_degradation
Glycerophospholipid_metabolism
Electron_transfer_carriers
Metabolism_of_xenobiotics_by_cytochrome_P450
Drug_metabolism___cytochrome_P450
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Butanoate_metabolism
Glycosaminoglycan_degradation
Biosynthesis_of_siderophore_group_nonribosomal_peptides
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Caprolactam_degradation
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