WHAT IS CLAIMED IS:

1. Use of an active agent in the manufacture of a composition for modulating a metabolic marker or a nonalcoholic fatty liver disease marker in a subject in need thereof, wherein the active agent is selected from the group consisting of an ~~acylated sugar,~~ acylated hydroxybenzoic acid, acylated catechin polyphenol, acylated carotenoid, acylated ellagic acid, acylated ellagic acid analogue, acylated ketone body or pre-ketone body, acylated stilbenoid, acylated *S*-adenosyl-L-methionine, acylated amino acid, acylated bile acid, acylated mesalamine, acylated metformin, acylated shikimic acid, and acylated vitamin.

2. The use of claim 1, wherein the composition is for modulating a metabolic marker.

3. The use of claim 1, wherein the composition is for modulating a nonalcoholic fatty liver disease marker.

4. The use of claim 1 or 2, wherein the metabolic marker is for an obesity disorder.

5. The use of any one of claims 1 to 3, wherein the metabolic marker is for type II diabetes, prediabetes, insulin resistance, metabolic syndrome, hypercholesterolemia, or hyperlipidemia.

6. Use of an active agent in the manufacture of a composition for treating a metabolic disorder or nonalcoholic fatty liver disease in a subject in need thereof, wherein the active agent is selected from the group consisting of an ~~acylated sugar,~~ acylated hydroxybenzoic acid, acylated catechin polyphenol, acylated carotenoid, acylated ellagic acid, acylated ellagic acid analogue, acylated ketone body or pre-ketone body, acylated stilbenoid, acylated *S*-adenosyl-L-methionine, acylated amino acid, acylated bile acid, acylated mesalamine, acylated metformin, acylated shikimic acid, and acylated vitamin.

7. The use of claim 6, wherein the composition is for treating a metabolic disorder.

8. The use of claim 6 or 7, wherein the metabolic disorder is an obesity disorder.

9. The use of any one of claims 1 to 7, wherein the composition reduces total fat percentage, cellular adiposity, body mass index, rate of weight gain, abdominal fat quantity, ratio of white to brown fat, level of lipogenesis, or level of fat storage.

10. The use of claim 5 or 6, wherein the metabolic disorder is type II diabetes, prediabetes, insulin resistance, metabolic syndrome, hypercholesterolemia, or hyperlipidemia.

11. The use of any one of claims 1 to 10, wherein the active agent increases the level of insulin, GLP-1, or PYY; wherein the active agent reduces the level of blood sugar or hemoglobin A1c; or wherein the active agent increases the glucose tolerance.

12. The use of claim 5 or 6, wherein the composition is for treating a nonalcoholic fatty liver disease.

13. The use of any one of claims 1 to 12, wherein the composition is formulated for oral administration.

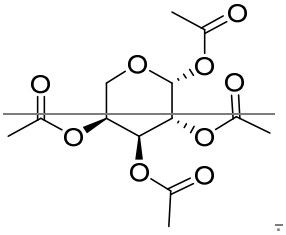
14. The use of claim 13, wherein the active agent is cleavable in the gastrointestinal tract of the subject.

~~15. The use of any one of claims 1 to 14, wherein the active agent is an acylated sugar.~~

~~16. The use of claim 15, wherein the acylated sugar comprises a monosaccharide core.~~

~~17. The use of claim 16, wherein the monosaccharide core is arabinose, xylose, rhamnose, fucose, glucosamine, or tagatose.~~

~~18. The use of claim 17, wherein the acylated sugar is a compound of the following structure:~~



~~19~~15. The use of any one of claims 1 to ~~17~~14, wherein the acylated active agent comprises at least one fatty acid acyl.

~~20~~16. The use of claim ~~19~~15, wherein the fatty acid acyl is a short chain fatty acid acyl.

~~21~~17. The use of claim ~~20~~16, wherein the short chain fatty acid acyl is acetyl, propionyl, or butyryl.

~~22~~18. The use of claim ~~21~~17, wherein the short chain fatty acid acyl is acetyl.

~~23~~19. The use of claim ~~21~~17, wherein the short chain fatty acid acyl is butyryl.

~~24~~20. The use of any one of claims 1 to 14, wherein the active agent is an acylated hydroxybenzoic acid.

~~25~~21. The use of any one of claims 1 to 14, wherein the active agent is an acylated stilbenoid.

~~26~~22. The use of any one of claims 1 to 14, wherein the active agent is an acylated mesalamine.

~~27~~23. The use of any one of claims 1 to 14, wherein the active agent is acylated carotenoid.

2824. The use of any one of claims 1 to 14, wherein the active agent is acylated ketone body or pre-ketone body.

2925. The use of any one of claims 1 to 14, wherein the active agent is acylated *S*-adenosyl-L-methionine.

3026. The use of any one of claims 1 to 14, wherein the active agent is acylated amino acid.

3127. The use of any one of claims 1 to 14, wherein the active agent is acylated bile acid.

3228. The use of any one of claims 1 to 14, wherein the active agent is acylated shikimic acid.

3329. The use of any one of claims 1 to 14, wherein the active agent is acylated vitamin.

3430. The use of any one of claims 1 to 14, wherein the active agent is acylated metformin.

3531. The use of any one of claims 1 to 14, wherein the active agent is an acylated catechin polyphenol.

3632. The use of any one of claims 1 to 14, wherein the active agent is acylated ellagic acid, or acylated ellagic acid analogue.

~~37. Use of a first active agent and a second active agent in the manufacture of one or more compositions for modulating a metabolic marker or a nonalcoholic fatty liver disease marker in a subject in need thereof, wherein the first active agent is a catechin polyphenol, stilbenoid, a monosaccharide, a hydroxybenzoic acid, carotenoid, vitamin, *S*-adenosyl-L-methionine, bile acid, metformin, shikimic acid, or mesalamine, and the second active agent is a ketone body or pre-ketone body.~~

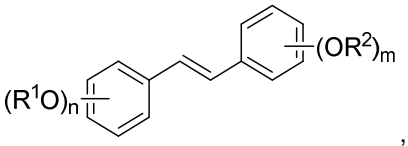
~~38. Use of a first active agent and a second active agent in the manufacture of one or more compositions for treating a metabolic disorder or a nonalcoholic fatty liver disease in a subject in need thereof, wherein the first active agent is a catechin polyphenol, stilbenoid, a monosaccharide, a hydroxybenzoic acid, carotenoid, vitamin, *S*-adenosyl-L-methionine, bile acid, metformin, mesalamine, or shikimic acid, and the second active agent is a ketone body or pre-ketone body.~~

3933. An acylated active agent having a core bonded to at least one group containing a ketone body or pre-ketone body, wherein the core is a stilbenoid, carotenoid, vitamin, catechin polyphenol, *S*-adenosyl-L-methionine, bile acid, or metformin, and the group containing a ketone body or pre-ketone body is bonded to the core through an ester bond, amide bond, glycosidic bond, carbonate linker, or carbamate linker.

4034. A unit dosage form comprising at least 0.5 g of an active agent selected from the group consisting of an acylated catechin polyphenol, acylated stilbenoid, acylated carotenoid, acylated mesalamine, acylated hydroxybenzoic acid, acylated shikimic acid, acylated vitamin, acylated *S*-

adenosyl-L-methionine, acylated bile acid, acylated amino acid, acylated ketone body or pre-ketone body, acylated metformin, ~~acylated sugar,~~ and combinations of a first agent and a second agent, wherein the first agent is a stilbenoid, catechin polyphenol, carotenoid, bile acid, amino acid, hydroxybenzoic acid, shikimic acid, monosaccharide, or mesalamine, metformin, vitamin, *S*-adenosyl-L-methionine, and a second agent is a ketone body or pre-ketone body.

~~41~~35. An acylated stilbenoid of the following structure:



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wherein

n is 1, 2, 3, or 4;

m is 1, 2, 3, or 4;

each R^1 is independently H, alkyl, acyl, a group containing a fatty acid, a group containing a ketone body or pre-ketone body, or a group containing an amino acid metabolite; and

each R^2 is independently H, alkyl, acyl, a group containing a fatty acid, a group containing a ketone body or pre-ketone body, or a group containing an amino acid metabolite;

wherein each group containing a fatty acid is independently a monosaccharide having one, two, three, or four hydroxyls substituted with fatty acid acyls;

provided that at least one R^1 or at least one R^2 is a group containing a fatty acid, a group containing a ketone body or pre-ketone body, or a group containing an amino acid metabolite.