CLAIMS

1. A method for monitoring mucosal healing in a patient with a digestive disease or in a pre-disease state, the method comprising:

establishing a baseline of the patient comprising:

measuring, via fluorescence, a first amount of an enterally administered dose of a composition comprising a fluorescent tracer that is not substantially absorbed by a healthy gut that can be found outside the gut over a period of time; and

determining a baseline total percentage of the administered dose recovered,

measuring gut permeability of the patient after treatment comprising:

measuring, via fluorescence, a second amount of an enterally administered dose of the composition comprising the fluorescent tracer that can be found outside the gut over a period of time; and

determining a second total percentage of the administered dose recovered; and

comparing the second total percentage of the administered dose recovered to the baseline total percentage of the administered dose recovered.

2. The method of claim 1, wherein the first and second amount of the administered dose is measured in the patient's urine.

3. The method of claim 1, wherein the first and second amount of the administered dose is measured transdermally, via a transdermal sensor, wherein the transdermal sensor:

irradiates the composition in the patient's blood and/or tissue with non-ionizing radiation, causing the composition to fluoresce; and

detects the fluorescence of the fluorescent tracer in the patient's blood and/or tissue.

4. The method of claim 3, wherein the non-ionizing radiation has a wavelength of at least 350 nm.

5. The method of claim 1 further comprising assessing the patient's mucosal healing based on the comparison of the second total percentage of the administered dose recovered to the baseline total percentage of the administered dose recovered and to a distribution of values the administered dose recovered in a normal population.

6. The method of claim 5, wherein when the second total percentage of the administered dose recovered is less than the baseline total percentage of the administered dose recovered and less than or equal to two standard deviations above the mean of the recovered administered dose in a normal population, the patient likely has mucosal healing.

7. The method of claim 5, wherein when the second total percentage of the administered dose recovered is less than the baseline total percentage of the administered dose recovered but remains above 2 standard deviations above the mean of the recovered administered dose in a normal population, the patient likely does not have mucosal healing.

8. The method of claim 7 further comprising selecting an intervention for the patient and assessing mucosal healing after the intervention.

9. The method of claim 1, wherein the mucosal healing is assessed after treatment for at least 1 week.

10. The method of claim 1, wherein the digestive disease is selected from the group consisting of Crohn's disease, ulcerative colitis, celiac disease, and graft-versus-host disease.

11. The method of claim 1, wherein the first dosage and the second dosage are about 1.5 mg/kg to about 50 mg/kg.

12. The method of claim 1, wherein the fluorescent tracer comprises a pyrazine.

13. The method of claim 12, wherein the pyrazine is 3,6-diamino-2,5-bis{N-[(1R)-1-carboxy-2-hydroxyethyl]carbamoyl}pyrazine or 3,6-diamino-N2,N5-bis(D-serine)-pyrazine-2,5-dicarboxamide.

14. A method for determining mucosal healing in a patient with a digestive disease, the method comprising:

measuring, via fluorescence, an amount of an enterally administered dose of a composition comprising a fluorescent tracer that is not substantially absorbed by a healthy gut that can be found outside the gut over a period of time; and

determining a total percentage of the administered dose recovered, wherein the total percentage of the administered dose recovered correlates to the patient's mucosal healing.

15. The method of claim 14, wherein the amount of the administered dose is measured in the patient's urine.

16. The method of claim 14, wherein the amount of the administered dose is measured transcutaneously, via a transcutaneous sensor, wherein the transcutaneous sensor:

irradiates the composition in the patient's blood and/or tissue with non-ionizing radiation, causing the composition to fluoresce; and detects the fluorescence of the fluorescent tracer in the patient's blood and/or tissue.

17. The method of claim 16, wherein the non-ionizing radiation has a wavelength of at least 350 nm.

18. The method of claim 14 further comprising assessing the patient's mucosal healing.

19. The method of claim 18, wherein the patient likely has mucosal healing if the total percentage of the administered dose recovered is less than or equal to 1.5%.

20. The method of claim 18, wherein the patient likely does not have mucosal healing if the total percentage of the administered dose recovered is greater than 2%.

21. The method of claim 18, wherein the patient's mucosal healing is assessed by comparing the total percentage of the administered dose recovered to a distribution of values of the administered dose recovered in a normal population.

22. The method of claim 21, wherein if the total percentage of the administered dose recovered is less than or equal to two standard deviations above the mean of the recovery of the administered dose in a normal population, the patient likely has mucosal healing.

23. The method of claim 21, wherein if the total percentage of the administered dose recovered is greater than two standard deviations above the mean of the recovery of the administered dose in a normal population, the patient likely does not have mucosal healing.

24. The method of claim 14, wherein the digestive disease is selected from the group consisting of Crohn's disease, ulcerative colitis, celiac disease, and graft-versus-host disease.

25. The method of claim 14, wherein the dosage is about 1.5 mg/kg to about 50 mg/kg.

26. The method of claim 14, wherein the fluorescent tracer comprises a pyrazine.

27. The method of claim 26, wherein the pyrazine is 3,6-diamino-2,5-bis{N-[(1R)-1-carboxy-2-hydroxyethyl]carbamoyl}pyrazine or 3,6-diamino-N2,N5-bis(D-serine)-pyrazine-2,5-dicarboxamide.