Moreover, it has been described that the partial or complete loss of the NHE3 protein (*Sodium Hydrogen Exchanger 3*) in mice with mucoviscidosis reduced the incidence of intestinal obstructions, notably by increasing intestinal fluidity, and it was concluded that NHE3 is a potential target for regulating the fluidity of the intestinal tract in patients with mucoviscidosis and with altered expression of CFTR.

Therefore, there is still a need for new strategies for treating and/or preventing diarrhea.

Summary

In general, the present disclosure is based on the finding that, in a quite original manner, certain probiotic strains are capable of acting directly on diarrhea, by inducing absorption of water present in excess in the colon. Surprisingly and unexpectedly, the inventors showed that certain probiotic strains are capable of inhibiting the expression of transporters involved in the secretion of water in the colon and/or of stimulating the expression of transporters involved in the absorption of water in the colon, and can be used for treating and/or preventing diarrhea.

Thus, in a quite original manner, these probiotic strains do not act as inhibitors of the transporters, *i.e.* do not act by binding to the transporters, thus hampering their functioning, but act on their expression and therefore on the number of transporters present.

Moreover, as these probiotic strains act directly on the absorption of water present in excess in the colon, they have the advantage that they can be used for preventing and/or treating any type of diarrhea, in particular regardless of whether the diarrhea is of infectious or noninfectious origin and in the presence or absence of a dysbiosis.

In one aspect, the present ~~invention~~ disclosure relates to a method of selecting a probiotic strain for treating and/or preventing diarrhea, said method comprising the steps of:

- measuring the effect of at least one test strain on the expression of the CFTR (Cystic Fibrosis Transmembrane Conductance Regulator) protein, and
- selecting at least one strain that induces a decrease in the expression of the CFTR protein.

More specifically, the present disclosure relates to a method of selecting a probiotic strain for treating and/or preventing diarrhea, said method comprising the steps of:

- measuring the effect of at least one test strain on expression of the CFTR protein (*Cystic Fibrosis Transmembrane Conductance Regulator*) and/or on expression of the NHE3 protein (*Sodium Hydrogen Exchanger 3*), and
- selecting at least one strain that induces a decrease in expression of the CFTR protein and/or an increase in expression of the NHE3 protein.

In certain embodiments, the test strain is a yeast strain or a bacterial strain. In particular, a bacterial strain to be tested can be a strain of *Bacillus*, preferably a strain of *Bacillus subtilis*.

In certain embodiments, expression of the CFTR protein and/or of the NHE3 protein is measured by electrophoresis, Western blot, immunoassay, immunohistochemistry, immunocytochemistry, mass spectrometry, RT-PCR or Northern blot.

In another embodiment, the present disclosure relates to a probiotic strain selected using a method disclosed herein, for use in the treatment and/or prevention of diarrhea.

In one aspect, the ~~invention~~ disclosure relates to the use of a probiotic strain, or of cells obtained by culture of said probiotic strain or of a composition comprising said probiotic strain or said cells, for the manufacture of a medicament for the treatment and/or prevention of diarrhea, wherein said probiotic strain, or said cells or said composition induces a decrease in expression of the CFTR protein and an increase in the expression of the NHE3 protein, and wherein the probiotic strain is a strain of *Bacillus subtilis*.

In an embodiment, the disclosure relates to a probiotic strain that induces a decrease in expression of at least one transporter involved in the secretion of water in the colon and/or an increase in the expression of at least one transporter involved in the absorption of water in the colon, cells obtained by culture of said probiotic strain or composition comprising said probiotic strain or said cells, for use in the treatment and/or prevention of diarrhea.

In certain embodiments, the probiotic strain is a strain of *Bacillus subtilis*, preferably the strain of *Bacillus subtilis* CU1 deposited at the CNCM (Collection Nationale de Cultures de Microorganismes / National Collection of Cultures of Microorganisms, 25 rue du Docteur Roux, 75724 Paris Cedex 15) on October 25, 2001 under number I-2745.

in expression of the CFTR protein and an increase in the expression of the NHE3 protein, and wherein the probiotic strain is a strain of *Bacillus subtilis*.

~~8. The use as claimed in claim 7, characterized in that the probiotic strain is a strain of *Bacillus subtilis*.~~

~~9~~8. The use as claimed in claim ~~8~~7, characterized in that the probiotic strain is the strain of *Bacillus subtilis* CU1 deposited at the CNCM (National Collection of Cultures of Microorganisms) on October 25, 2001 under number I-2745.

~~10~~9. The use as claimed in ~~any one of claims 7 to 9~~claim 7 or claim 8, characterized in that the diarrhea is acute diarrhea or chronic diarrhea.

~~11~~10. The use as claimed in any one of claims 7 to ~~10~~9, characterized in that the diarrhea is diarrhea of infectious origin or diarrhea of noninfectious origin.