such as chronic tophaceous gout, or condition associated with gout has been diagnosed with such imaging, such as with DECT.

Identifying Uric Acid Degradation

[0309] A method to identify uric acid degrading polypeptides can comprise the steps of functionally expressing a candidate uric acid degrading polypeptide by operably linking it to a promoter in a cell functionally expressing one or more of the uric acid transporters of SEQ ID NO: 9-18, or polypeptide having uric acid transporter activity; identifying cells with increased urate consumption by quantifying urate uptake and biodegradation of cells from step 1. using a urate consumption assay and comparing their urate consumption to cells functionally expressing only the one or more of the uric acid transporters of SEQ ID NO: 9-18 or polypeptide having uric acid transporter activity. The cells that show increased urate consumption functionally express a uric acid degrading polypeptide, thereby confirming the candidate uric acid degrading polypeptide can functionally break down uric acid and encodes a uricase (EC 1.7.3.3).

[0310] A method to identify uric acid transporters can comprise the steps of functionally expressing a candidate uric acid transporting polypeptide by operably linking it to a promoter in a cell functionally expressing one or more of the uricases of SEQ ID NO: 1-8, or polypeptide having uricase activity; identifying cells with increased urate consumption by quantifying urate uptake and biodegradation of cells from step 1. using a urate consumption assay and comparing their urate consumption to cells functionally expressing only the one or more of the uricases of SEQ ID NO:1-8 or polypeptide having uricase activity. The cells that show increased urate consumption functionally express a uric acid transporter polypeptide, thereby confirming the candidate uric acid transporting

CLAIMS

1. An engineered microbial cell comprising:

   nucleic acid encoding a first exogenous polypeptide and a second exogenous polypeptide;

   wherein the first exogeneous polypeptide is a uric acid degrading polypeptide; and

   wherein the second exogenous polypeptide is a uric acid transporter which transports uric acid into the microbial cell.

2. The engineered microbial cell of claim 1,

   wherein the uric acid transporter comprises at least 95% identity with the full length of any one of SEQ ID NOs: 9-18.

3. The engineered microbial cell of claim 1,

   wherein the microbial cell is a fungal cell.

4. The engineered microbial cell of claim 1,

   wherein the uric acid degrading polypeptide is a uricase.

5. The engineered microbial cell of claim 4,

   wherein the uricase is a fungal uricase.

6. The engineered microbial cell of claim 4,

wherein the uricase comprises at least 95% identity to the full length of one of SEQ ID NOs: 1-8.

7. The engineered microbial cell of claim 4,

wherein the uricase is a bacterial uricase.

8. The engineered microbial cell of claim 4,

wherein the uricase is a mutant uricase, a chimeric uricase, and/or an overexpression variant of the uricase.

9. A method of lowering uric acid in the gastrointestinal tract of a recipient, the method comprising:

orally administering the engineered microbial cell of claim 1 to the recipient.

10. The method according to claim 9, wherein the recipient suffers from a condition selected from the group consisting of: gout, rheumatoid arthritis, cerebral stroke, heart disease, arrhythmia, chronic renal disease, and chronic refractory gout.

11. The method according to claim 9,

wherein the amount of microbial cells administered is approximately 10^9 cells.

12. The method according to claim 9,

wherein the recipient suffers from chronic refractory gout.

13. The method according to claim 9, wherein orally administering populates the gastrointestinal tract of the recipient with the engineered microbial cell.

14. The method according to claim 9, wherein the recipient is administered 10^6 to 10^12 of the engineered microbial cell.

15. The method according to claim 9, further comprising determining that the recipient has a serum uric acid level of ≥6.8 mg/dl prior to administration.