1) They are produced in a complex environment (complex cultivation media and uncontrolled shake flask cultivations) and are thus very heterogeneous,

2) they cannot be produced under defined conditions contradicting regulatory guidelines (Quality by Design),

3) the lipid composition of the Archaea cannot be controlled,

4) they cannot be produced cost-efficiently in high amounts.

Summary

In a first aspect of the present disclosure, there is provided a method for producing a composition comprising archaeal lipids from a *Sulfolobus* cell culture, comprising
(1) growing a *Sulfolobus* cell culture at a temperature of 75 to 85°C and at a growth rate of 0.025 to 0.035 per hour and extracting the archaeal lipids from the archaeal culture so as to obtain a composition for use for oral retard therapy, or
(2) growing a *Sulfolobus* cell culture at a temperature of 75 to 85°C and at a growth rate of 0.005 to 0.015 per hour and extracting the archaeal lipids from the archaeal culture so as to obtain a composition for use for oral acute therapy.

In a second aspect of the present disclosure, there is provided a composition comprising archaeal lipids obtainable by a method disclosed herein.

Description

It is therefore an object of the present invention to reduce the heterogeneity of archaeosomes and enable generation of tailor-made archaeal lipids by process parameters under controlled cultivation conditions for Archaea. More specifically, the object of the present invention is to provide an archaeosome composition which comprises many cyclopentane ring lipids but at the same time also phosphatidyl archaeol. It is a further object to provide compositions of archaeal lipids which are suitable for specific delivery route and/or administration, e.g. for oral

Claims

1. Method for producing a composition comprising archaeal lipids from a *Sulfolobus* cell culture, comprising
(1) growing a *Sulfolobus* cell culture at a temperature of 75 to 85°C and at a growth rate of 0.025 to 0.035 per hour and extracting the archaeal lipids from the archaeal culture so as to obtain a composition for use for oral retard therapy, or
(2) growing a *Sulfolobus* cell culture at a temperature of 75 to 85°C and at a growth rate of 0.005 to 0.015 per hour and extracting the archaeal lipids from the archaeal culture so as to obtain a composition for use for oral acute therapy.

2. Method according to claim 1, wherein the *Sulfolobus* cell culture is a culture of *Sulfolobus acidocaldarius* cells.

3. Method according to claim 1 or 2, wherein the cells are homogenised after culturing, preferably via homogenization, especially high-pressure homogenization, or sonication.

4. Method according to claim 3, wherein the homogenised cells are mixed with a buffer, preferably with ammonium acetate buffer, especially with an ammonium acetate buffer having 100 to 200 mM ammonium acetate.

5. Method according to any one of claims 1 to 4, wherein the archaeal lipids are obtained by extraction from the aqueous phase comprising the cells and/or the homogenised cells into an organic phase, preferably by extraction into a chloroform/methanol organic phase, and phase separation of the organic phase from the aqueous phase.

6. Method according to claim 5, wherein the archaeal lipids are obtained by evaporation of the organic phase, preferably by evaporation of the organic phase to dryness.

7. Method according to any one of claims 1 to 6, wherein the archaeal lipids obtained are combined with a pharmaceutically active drug, preferably in combination with a pharmaceutically acceptable carrier, so as to obtain a composition comprising archaeal lipids and the pharmaceutically active drug.

8. Method according to any one of claims 1 to 7, wherein the archaeal lipids are obtained by supercritical fluid extraction, especially extraction with supercritical CO_2.

9. Composition comprising archaeal lipids obtainable by a method according to any one of claims 1 to 8.

10. Composition according to claim 9, wherein an archaeosome comprises at least 5 % w/w, preferably at least 10 % w/w, PI-Arc and at least 50 % w/w 2Hex-Cal (% w/w as % w/w of total lipid).