SUMMARY

In one aspect, the present invention provides an isolated protein having alkaline phosphatase activity, wherein said protein comprises an amino acid sequence of 365 consecutive amino acids having at least 98% sequence identity with SEQ ID NO: 5 as indicated in Figure 1, an amino acid sequence of 65 consecutive amino acids, having at least 98% sequence identity with SEQ ID NO: 6 as indicated in Figure 1, and an amino acid sequence of at least 54 consecutive amino acids having at least 98% sequence identity with SEQ ID NO: 7 as indicated in Figure 1, wherein the full length protein comprises an amino acid sequence having at least 98% sequence identity with the full length amino acid sequence of SEQ ID NO: 1 as indicated in Figure 1, with the proviso that the amino acid at position 279 is leucine (L), the amino acid at position 328 is valine (V) and the amino acid at position 478 is leucine (L).

In another aspect, the present invention provides a polynucleotide comprising a nucleic acid sequence encoding a protein as described herein.

In yet another aspect, the present invention provides a vector comprising a polynucleotide as described herein.

In yet another aspect, the present invention provides a protein as described herein, a polynucleotide as described herein, or a vector as described herein, for use as a medicament.

Also disclosed is a protein, polynucleotide or vector as described herein, for the prevention or treatment of a disease accompanied by a local or systemic zinc deficiency.

In yet another aspect, the present invention provides use of a protein as described herein, a polynucleotide as described herein, or a vector as described herein for preventing or treating an inflammatory disease, a kidney disease or hypophosphatasia.

In yet another aspect, the present invention provides a host cell comprising a protein as described herein, polynucleotide as described herein or a vector as described herein.

In yet another aspect, the present invention provides a method for producing a protein as described herein, comprising culturing the host cell as described herein and allowing the host cell to produce said protein.

In yet another aspect, the present invention provides a composition comprising a protein as described herein and/or obtainable by a method as described herein.

In yet another aspect, the present invention provides a composition as described herein for use as a medicament.

In yet another aspect, the present invention provides use of a composition as described herein in the preparation of a medicament for prevention or treatment of an inflammatory disease, a kidney disease or hypophosphatasia.

DETAILED DESCRIPTION

In a first embodiment, the invention provides an isolated protein having phosphatase activity, wherein said protein comprises an amino acid sequence of at least 200 consecutive amino acids having at least 90% sequence identity with SEQ ID NO: 5, an amino acid sequence of at least 50 consecutive amino acids having at least 90% sequence identity with SEQ ID NO: 6, and an amino acid sequence of at least 40 consecutive amino acids having at least 90% sequence identity with SEQ ID NO: 7, wherein the full length protein comprises an amino acid sequence having at least 90% sequence identity with the full length amino acid sequence of SEQ ID NO: 1, with the proviso that the amino acid at position 279 is leucine (L), the amino acid at position 328 is valine (V) and the amino acid at position 478 is leucine (L).

In a preferred embodiment, the full length protein comprises an amino acid sequence having at least 90%, at least 95%, or at least 98% sequence identity with the full length amino acid sequence of SEQ ID NO: 1, with the proviso that the amino acid corresponding to position 279 is leucine (L), the amino acid corresponding to position 328 is valine (V) and the amino acid corresponding to position 478 is leucine (L).

With the term "corresponding to" here, is meant the particular position, relative to the N-terminal amino acid of the mature protein, which is

Claims

1. An isolated protein having alkaline phosphatase activity, wherein said protein comprises an amino acid sequence of 365 consecutive amino acids having at least 98% sequence identity with SEQ ID NO: 5 as indicated in Figure 1, an amino acid sequence of 65 consecutive amino acids, having at least 98% sequence identity with SEQ ID NO: 6 as indicated in Figure 1, and an amino acid sequence of at least 54 consecutive amino acids having at least 98% sequence identity with SEQ ID NO: 7 as indicated in Figure 1, wherein the full length protein comprises an amino acid sequence having at least 98% sequence identity with the full length amino acid sequence of SEQ ID NO: 1 as indicated in Figure 1, with the proviso that the amino acid at position 279 is leucine (L), the amino acid at position 328 is valine (V) and the amino acid at position 478 is leucine (L).

2. A polynucleotide comprising a nucleic acid sequence encoding a protein according to claim 1.

3. A vector comprising a polynucleotide according to claim 2.

4. A protein according to claim 1, a polynucleotide according to claim 2, or a vector according to claim 3, for use as a medicament.

5. Use of a protein according to claim 1, a polynucleotide according to claim 2, or a vector according to claim 3, in the preparation of a medicament for preventing or treating an inflammatory disease, a kidney disease or hypophosphatasia.

6. Use of protein, polynucleotide or vector according to claim 5, wherein said inflammatory disease is selected from the group of autoimmune diseases, rheumatoid arthritis, asthma, chronic obstructive pulmonary disease,

atherosclerosis, inflammatory disease of the gastro-intestinal tract, infection, sepsis, neurodermatitis, inflammatory liver disease, inflammatory lung disease and inflammatory kidney disease.

7. Use of a protein, polynucleotide or vector according to claim 5, wherein said kidney disease is selected from the group of kidney injury, acute kidney injury, chronic kidney disease, renal failure, acute renal failure, ischemic renal disease and ischemia / reperfusion kidney damage.

8. Use of a protein, polynucleotide or vector according to claim 5, wherein said hypophosphatasia is selected from the group of perinatal hypophosphatasia, infantile hypophosphatasia, childhood hypophosphatasia, and adult hypophosphatasia.

9. A host cell comprising a protein according to claim 1, polynucleotide according to claim 2 or a vector according to claim 3.

10. A host cell according to claim 9, wherein said host cell is a CHO cell.

11. A method for producing a protein of claim 1, comprising culturing the host cell of claim 9 or 10 and allowing the host cell to produce said protein.

12. A composition comprising a protein according to claim 1 and/or obtainable by a method according to claim 11.

13. A composition according to claim 12 for use as a medicament.

14. Use of a composition according to claim 12 in the preparation of a medicament for prevention or treatment of an inflammatory disease, a kidney disease or hypophosphatasia.

15. Use of a protein, polynucleotide or vector according to claim 5 or 8 or a composition according to claim 14, wherein said prevention or treatment of hypophosphatasia results in prolonged survival, increased body weight, improved skeletal phenotype, attenuation of craniofacial defects, improvement of dento-alveolar phenotype, and/or reduction of plasma PPi levels.