Gly, Ala, Val, Ile, Leu, Met;

Asp, Glu, Ser;

Asn, Gln;

Ser, Thr;

Lys, Arg, His;

Phe, Tyr, Trp, His; and

Pro, Nα-alkalamino acids.

The practice of the invention will employ, unless otherwise indicated, conventional techniques of chemistry, molecular biology, microbiology, recombinant DNA, and immunology well known to those skilled in the art. Such techniques are described and explained throughout the literature in sources such as, J. Perbal, A Practical Guide to Molecular Cloning, John Wiley and Sons (1984), J. Sambrook et Molecular Cloning: A Laboratory Manual, Cold Spring Harbour Laboratory Press (1989), T. A. Brown (editor), Essential Molecular Biology: A Practical Approach, Volumes 1 and 2, IRL Press (1991), D. M. Glover and B. D. Hames (editors), DNA Cloning: A Practical Approach, Volumes 1-4, IRL Press (1995 and 1996), and F. M. Ausubel et al. (Editors), Current Protocols in Molecular Biology, Greene Pub. Associates and Wiley-Interscience (1988, including all updates until present). ~~The disclosure of these texts are incorporated herein by reference.~~

An "isolated polypeptide" as used herein refers to a polypeptide that has been separated from other proteins, lipids, and nucleic acids with which it naturally occurs or the polypeptide or peptide may be synthetically synthesised. Preferably, the polypeptide is also separated from substances, for example, antibodies or gel matrix, for example, polyacrylamide, which are used to purify it. Preferably, the polypeptide constitutes at least 10%, 20%, 50%, 70%, and 80% of dry weight of the purified preparation. Preferably, the preparation contains a sufficient amount of polypeptide to allow for protein sequencing (ie at least 1,10, or 100 mg).

present invention. Accordingly, in a seventh aspect of the present invention there is provided an interfering RNA molecule, the molecule comprising a double stranded region of at least 19 base pairs in each strand wherein one of the strands of the double stranded region is complementary to or capable of hybridizing under normal intracellular conditions with a region of an mRNA molecule encoding a polypeptide of the first aspect of the invention.

So called RNA interference or RNAi is known and further information regarding RNAi is provided in Hannon (2002) *Nature* 418: 244-251, and McManus & Sharp (2002) *Nature Reviews: Genetics* 3(10): 737-747, the disclosures of which are incorporated herein by reference.

The present invention also contemplates chemical modification(s) of siRNAs that enhance siRNA stability and support their use *in vivo* (see for example, Shen *et al.* (2006) *Gene Therapy* 13: 225-234). These modifications might include inverted abasic moieties at the 5' and 3' end of the sense strand oligonucleotide, and a single phosphorthioate linkage between the last two nucleotides at the 3' end of the antisense strand.

It is preferred that the double stranded region of the interfering RNA comprises at least 20, preferably at least 25, and most preferably at least 30 base pairs in each strand of the double stranded region. The present invention also provides a method of treating a subject for periodontal disease comprising administering to the subject at least one of the interfering RNA molecules of the invention.

Throughout this specification the word "comprise", or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated element, integer or step, or group of elements, integers or steps, but not the exclusion of any other element, integer or step, or group of elements, integers or steps.

~~All publications mentioned in this specification are herein incorporated by reference~~. Any discussion of documents, acts, materials, devices, articles or the like which has

been included in the present specification is solely for the purpose of providing a context for the present invention. It is not to be taken as an admission that any or all of these matters form part of the prior art base or were common general knowledge in the field relevant to the present invention as it existed in Australia or elsewhere before the priority date of each claim of this application.

~~It will be appreciated by persons skilled in the art that numerous variations and/or modifications may be made to the invention as shown in the specific embodiments without departing from the spirit or scope of the invention as broadly described.~~ The present embodiments are~~, therefore,~~ to be considered in all respects as illustrative and not restrictive. The invention specifically includes all combinations of features described in this specification.

In order that the nature of the present invention may be more clearly understood, preferred aspects of the invention will now be described in more detail with reference to the following tables and examples of compositions.

Growth and harvesting of P. gingivalis for biofilm v planktonic studies

Porphyromonas gingivalis W50 (ATCC 53978) was grown in continuous culture using a model C-30 BioFlo chemostat (New Brunswick Scientific) with a working volume of 400 mL. Both the culture vessel and medium reservoir were continuously gassed with 10% CO_2 and 90% N_2. The growth temperature was 37°C and the brain heart infusion growth medium (Oxoid) was maintained at pH 7.5. Throughout the entire growth, redox potential maintained at -300 mV. The dilution rate was 0.1 h^{-1}, giving a mean generation time (MGT) of 6.9 h. Sterile cysteine-HCl (0.5 g/L) and hemin (5 mg/L) were added. The culture reached steady state approximately 10 days after inoculation and was maintained for a further 30 days until a thick layer of biofilm had developed on the vertical surfaces of the vessel.

All bacterial cell manipulations were carried out on ice or at 4°C. During harvesting, the planktonic cells were decanted into a clean container and the biofilm washed twice gently with PGA buffer (10.0 mM NaH_2PO_4 , 10.0 mM KCl, 2.0 mM, citric acid,

CLAIMS

1. Use of an inhibiting agent in the preparation of a pharmaceutical composition for preventing, inhibiting or treating a *P. gingivalis* infection in a subject, wherein the inhibiting agent prevents, inhibits or reduces a *P. gingivalis* biofilm and is an inhibitor of ~~an enzyme~~ fumarate reductase activity.

2. Use of an inhibiting agent in the preparation of a pharmaceutical composition for preventing, inhibiting or treating periodontal disease in a subject, wherein the inhibiting agent prevents, inhibits or reduces a *P. gingivalis* biofilm and is an inhibitor of ~~an enzyme~~ fumarate reductase activity.

~~3. The use of claim 1 or claim 2, wherein the enzyme is a metabolic enzyme.~~

~~4. The use of any one of claims 1 to 3, wherein the enzyme is involved in organic acid metabolism.~~

~~5. The use of any one of claims 1 to 4, wherein the inhibiting agent is an inhibitor of fumarate reductase activity.~~

~~6~~3. The use of claim 1 or 2 ~~any one of claims 1 to 5~~, wherein the ~~enzyme~~ fumarate reductase activity is a bacterial fumarate reductase activity.

~~7~~4. The use of claim 6, wherein the fumarate reductase corresponds to accession number AAQ66643 or AAQ66642.

~~8~~5. The use of any one of claims 1 to ~~4~~7, wherein the inhibiting agent is selected from the group consisting of oxantel, morantel and thiabendazole.

~~9~~6. The use of claim ~~5~~8, wherein the inhibiting agent is oxantel.

~~107~~. The use of claim ~~58~~, wherein the inhibiting agent is morantel.

~~118~~. The use of claim ~~58~~, wherein the inhibiting agent is thiabendazole.

~~129~~. The use of any one of claims 1 to ~~811~~, further comprising the use of an antibiotic.

~~13. A composition for use in the prevention, inhibition or treatment of *P. gingivalis* infection, the composition comprising an inhibiting agent that prevents, inhibits or reduces a *P. gingivalis* biofilm and is an inhibitor of an enzyme.~~

~~14. A composition for use in the prevention, inhibition or treatment of periodontal disease, the composition comprising an inhibiting agent that prevents, inhibits or reduces a *P. gingivalis* biofilm and is an inhibitor of an enzyme.~~

~~15. The composition of any one of claims 13 to 14, wherein the inhibiting agent is an inhibitor of fumarate reductase activity.~~

~~16. The composition of any one of claims 13 to 15, wherein the enzyme is a fumarate reductase.~~

~~17. The composition of any one of claims 13 to 16, wherein the fumarate reductase corresponds to accession number AAQ66643 or AAQ66642.~~

~~18. The composition of any one of claims 13 to 17, wherein the inhibiting agent is selected from the group consisting of oxantel, morantel and thiabedazole.~~

~~19. The composition of any one of claims 13 to 18, further comprising an antibiotic.~~